Langley Research Center

LPR 1740.2 P

Effective Date: April 11, 2023

Expiration Date: April 30, 2028

LANGLEY GENERAL SAFETY PROGRAM REQUIREMENTS

Responsible Office: Safety and Mission Assurance Office

National Aeronautics and Space Administration

Table of Contents

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Change History Log

Revision	Date	Description of Change
N	02/28/2019	Overhaul of document to include updated requirements and responsibilities from multiple documents.
N-1	11/29/2019	Updated CFR references in paragraph 13.7.1.1
N-2	3/23/2020	Updated references to Security Services Branch (SSB) to Langley Protective Services Office (PSO); Clarified wording in paragraph 13.2.1; Added "elevated work" definition in Appendix A
N-3	3/31/2021	Updated references from LPR 1710.17 to LPR 1800.1.
N-4	4/26/2021	Added a note under 1.5.3 regarding the Langley Research Center Move Tool.
O	N/A	Skipped to avoid confusion between zero and letter O in document lettering.
P	4/11/2023	This update includes small changes in the following chapters: 1, 3. 6, 7, 8, 9, 13, and 16, including updating requirements, clarifying wording, and updating references.

PREFACE

P.1 PURPOSE

a. This Langley Procedural Requirements (LPR) sets forth procedures, responsibilities, and criteria for safety requirements as part of Langley Research Center's (LaRC) Safety and Health Programs, in accordance with LAPD 1700.1 and LAPD 1700.2.

b. These procedural requirements are supported by the regulations and standards established by the American National Standards Institute (ANSI), the Occupational Safety and Health Administration (OSHA), and the National Aeronautics and Space Administration (NASA).

P.2 APPLICABILITY

a. This Langley Procedural Requirement (LPR) is applicable to all NASA LaRC organizations and all federal civil service personnel on Center.

b. This LPR is applicable to contractors, grant recipients, or parties to agreements only to the extent specified or referenced in the appropriate contracts, agreements, or grants.

c. Noncompliance with the requirements of this LPR may result in appropriate disciplinary action against civil service personnel or sanctions against contractors in accordance with the terms of their contracts.

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

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

P.3 AUTHORITY

a. Standards for Protection against Radiation, 10 CFR pt. 20.
b. Occupational Safety and Health Standards, 29 CFR pt. 1910.
c. Safety and Health Regulations for Construction, 29 CFR pt. 1926.
d. General Information, Regulations, and Definitions, 49 CFR pt. 171.
e. Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, Training Requirements, and Security Plans, 49 CFR pt. 172.
f. NPD 1800.2, NASA Occupational Health Program.
g. NPR 1800.1, NASA Occupational Health Program Procedures.
h. NPR 8715.1, NASA Safety and Health Programs.
i. NPR 8715.3, NASA General Safety Program Requirements.

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j. LAPD 1700.1, Safety Program.
k. LAPD 1700.2, Safety Assignments and Responsibilities.
l. LAPD 1700.5, NASA Langley Research Center (LaRC) Maximum Work Time Policy.

P.4 APPLICABLE DOCUMENTS AND FORMS

a. Occupational Safety and Health Standards, 29 CFR pt. 1910.
b. Machinery and Machine Guarding, 29 CFR pt. 1910, Subpart O.
c. Safety and Health Regulations for Construction, 29 CFR pt. 1926.
d. NPR 5104.1, Government Charge Cards.
e. NPR 8820.2, Facility Project Requirements (FPR).
f. LAPD 1700.7, Traffic Management.
g. LAPD 8800.15, Facilities Utilization Program.
h. LMS-CP-1750, Dig Permit Request Process
i. LMS-CP-3713, Reasonable Accommodations for Individuals with Disabilities.
j. LMS-CP-4709, Conducting a Facility Safety Head Monthly Inspection.
k. LMS-CP-7151, Obtaining Waivers for Langley Management System (LMS) Requirements.
l. LMS-CP-8715, Facility Risk Tier Determination.
m. LPR 1710.5, Ionizing Radiation.
n. LPR 1710.6, Electrical Safety.
o. LPR 1710.7, Safety Program for the Handling and Use of Explosives at Langley Research Center.
p. LPR 1710.8, Non-Ionizing Radiation.
q. LPR 1710.10, Langley Research Center Energy Control Program (Lockout/Tagout).
r. LPR 1710.11, LaRC Fire Protection Program.
s. LPR 1710.12, Potentially Hazardous Materials-Hazard Communication Standard.
t. LPR 1710.13, Chemical Hygiene Plan.
u. LPR 1710.40, Langley Research Center Pressure Systems Handbook.
v. LPR 1710.42, Safety Program for the Recertification and Maintenance of Ground-Based Pressure Vessels and Piping Systems (PVS).
w. LPR 1740.4, Facility System Safety Analysis.
x. LPR 1740.6, Personnel Safety Certification.
y. LPR 1800.1, Langley Research Center Occupational Health Program.
z. LPR 7123.2, Facility Configuration Management.
aa. LPR 7150.2, LaRC Software Engineering Requirements.
ab. LPR 8621.1, Langley Research Center Mishap Preparedness and Contingency Plan.
ac. NASA-STD-8719.9, Lifting Standard.
ad. NASA-STD-8719.12, Safety Standard for Explosives, Propellants, and Pyrotechnics.
ae. LaRC-FES-ARCH, Architectural Standard (https://sites-n.larc.nasa.gov/standards/cod/).
af. LaRC-FES-MECH, Facility Mechanical Systems (HVAC, Plumbing, and Fire

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Protection) (https://sites-n.larc.nasa.gov/standards/cod/).
ag. LF 44, Hazardous Material - Procurement, Inventory, and Storage Record.
ah. LF 60, Confined Space Entry Permit.
ai. LF 125, NASA LaRC Construction Safety Survey.
aj. LF 275, Job Hazard Analysis (JHA) Worksheet.
ak. LF 288, Crane/Hoist Inspection Checklist.
al. LF 358, Candidate Critical Lift Checklist.
am. LF 498, Safety Permit.
an. LF 512, High Reach Bucket Truck Checklist.
ao. LF 513, JLG Checklist.
ap. LF 514, Genie Boom Checklist.
aq. LF 533, Safety Permit - Pressurized Systems.
ar. LF 557, Lifting Hardware and Lifting Equipment.
as. LF 558, Crane and Hoist Inspection and Maintenance Service Report.
at. LF 598, Fall Prevention Plan.
au. LF 600, Forklift Daily Inspection Checklist.
av. LF 623, Truck/Trailer Inspection.
aw. ANSI ASC A14.1, American National Standard for Ladders – Wood Safety Requirements.
ax. ANSI ASC A14.2, American National Standard for Ladders – Portable Metal – Safety Requirements.
ay. ANSI ASC A14.3, American National Standard for Ladders – Fixed – Safety Requirements.
az. ANSI ASC A14.5, American National Standard for Ladders – Portable Reinforced Plastic – Safety Requirements.
ba. ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes.
bb. ANSI D6.1, Manual on Uniform Traffic Control Devices for Streets and Highways.
bc. ANSI/ASSP Z359 Fall Protection and Fall Restraint .
bd. ANSI/ASSP Z359.2, Minimum Requirements for a Comprehensive Managed Fall Protection Program.
be. ANSI/ISEA Z87.1, American National Standard for Occupational and Educational Personal Eye and Face Protection Devices.
bf. ANSI/ISEA Z89.1, American National Standard for Industrial Head Protection.
bg. ANSI/ISEA Z358.1, American National Standard for Emergency Eyewash and Shower Equipment.
bh. ANSI/ITSDF B56.1, Safety Standard for Low Lift and High Lift Trucks.
bi. ANSI/ITSDF B56.6, Safety Standard for Rough Terrain Forklift Trucks.
bj. ANSI/ITSDF B56.10, Safety Standard for Manually Propelled High Lift Industrial Trucks.
bk. ANSI/ITSDF B56.14, Safety Standard for Vehicle Mounted Forklifts.
bl. ANSI/SAIA A92.2, Vehicle-Mounted Elevating and Rotating Aerial Devices.
bm. ANSI/SAIA A92.3, Manually Propelled Elevating Aerial Platforms.
bn. ANSI/SAIA A92.5, Boom-Supported Elevating Work Platforms.
bo. ANSI/SAIA A92.6, Self-Propelled Elevating Work Platforms.
bp. ASME B30.1, Jacks, Industrial Rollers, Air Casters, and Hydraulic Gantries.
bq. ASME B30.2, Overhead and Gantry Cranes (Top Running Bridge, Single or

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Multiple Girder, Top Running Trolley Hoist).
br. ASME B30.5, Mobile and Locomotive Cranes.
bs. ASME B30.6, Derricks.
bt. ASME B30.7, Winches.
bu. ASME B30.9, Slings.
bv. ASME B30.10, Hooks.
bw. ASME B30.11, Monorails and Underhung Cranes.
bx. ASME B30.16, Overhead Underhung and Stationary Hoists.
by. ASME B30.17, Cranes and Monorails (with Underhung Trolley or Bridge).
bz. ASME B30.20, Below-the-Hook Lifting Devices.
ca. ASME B30.21, Lever Hoists.
cb. ASME B30.24, Container Cranes.
cc. ASME B30.26, Rigging Hardware.
cd. ASNT CP-189, ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel.
ce. ASTM F2413, Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear.
cf. CMAA 70, Specification for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes.
cg. CMAA 74, Specification for Top Running and Under Running Single Girder Electric Overhead Cranes Utilizing Under Running Trolley Hoist.
ch. EM-385-1-1, Safety and Health Requirements Manual.
ci. NAS410, NAS Certification and Qualification of Nondestructive Test Personnel.
cj. National Consensus Standards (NCS).
ck. NFPA 51B, Standard for Fire Prevention during Welding, Cutting, and Other Hot Work.
cl. NFPA 70, National Electrical Code (NEC).
cm. NFPA 101, Life Safety Code.
cn. NFPA 704, Standard System for the Identification of the Hazards of Materials for Emergency Response.
co. SNT-TC-1A, Recommended Practice, Personnel Qualification and Certification in Nondestructive Testing.

P.5 MEASUREMENT/VERIFICATION

a. Compliance with the requirements contained in this LPR will be verified through annual Facility Safety and Health audits conducted by the Safety and Facility Assurance Branch and the Fire and Emergency Management group, under the Safety and Mission Assurance Office (SMAO).

b. Compliance with the requirements contained in this LPR will be verified through the agency’s Institutional, Facility, Operational Safety Audit conducted by the NASA Safety Center.

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P.6 CANCELLATION

LPR 1740.2 N-4 dated August 16, 2019

David Young, Deputy Director April 11, 2023
Title Date

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CHAPTER 1: GENERAL SAFETY REQUIREMENTS

1.1 GENERAL

1.1.1 Langley Research Center (LaRC) is required to provide a safe and healthful work environment for all personnel.

1.1.2 All LaRC personnel shall be responsible for ensuring a safe and healthful workplace.

1.1.3 The procedural requirements contained in this Langley Procedural Requirement (LPR) shall be applicable to all personnel at LaRC, including civil servants, on-site contractors, research associates, students, visitors, and others.

1.1.4 The Safety and Facility Assurance Branch (SFAB) of the Safety and Mission Assurance Office (SMAO) shall assist personnel with correcting deficiencies and ensuring that LaRC remains a safe and healthful place to work. SFAB assistance may be obtained by calling (757) 864-7233, (4-SAFE).

1.1.5 Supervisors, regardless of level, shall ensure their personnel comply with the requirements of this chapter and shall seek help from SFAB, their Facility Coordinator (FC), or their Facility Safety Head (FSH) to ensure their personnel's workplace is safe, as mandated by OSHA and NASA requirements.

1.1.6 Request for relief to any of the requirements in this LPR shall be submitted to SFAB in writing and processed in accordance with LMS-CP-7151.

1.1.7 This chapter sets forth the minimum procedural requirements for creating and maintaining general safety at LaRC.

1.2 PERSONS WITH DISABILITIES

1.2.1 Designs of new facilities and modifications to existing facilities shall comply with the Americans with Disabilities Act.

1.2.2 Personnel with disabilities shall contact their supervisors and the Office of Equal Opportunity Programs for reasonable accommodations per LMS-CP-3713.

1.2.3 Supervisors may request the LaRC Occupational Health Clinic or Fire Department to provide training to personnel in their organizations to assist their personnel with disabilities.

1.3 REPORTING INJURIES, ILLNESSES, AND MISHAPS

1.3.1 If an emergency mishap or close call occurs, witnesses shall immediately call LaRC dispatch/emergency response. Witnesses may dial 911 from an internal NASA LaRC phone, or may dial (757) 864-2222 from any other phone. As soon as practicable, witnesses shall notify their supervisors of the mishap or close call per LPR 8621.1.

1.3.2 If a non-emergency mishap or close call occurs, witnesses shall notify SFAB at (757) 864-7233 per LPR 8621.1.

1.3.3 Personnel involved in or witnessing the mishap or close call should take steps to make safe the mishap, if able to be done without putting themselves in harm's way, site until the emergency responders arrive or upon request from the emergency responders,

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per LPR 8621.1.

1.4 SAFETY DISCUSSIONS AT MEETINGS

1.4.1 The objective of safety discussions at meetings is to maintain a high level of safety consciousness among personnel.

1.4.2 Supervisors shall ensure that safety topics are presented at least monthly to their personnel (e.g., at staff meetings, at all-hands).

1.4.3 The content, format, and frequency of safety discussions depend upon workplace variables including:

a. The categories of work performed by the work force,

b. The environmental conditions present in the workplace, and

c. The current safety record of the facility.

1.4.4 Topics to be covered shall include a review of all mishaps and close calls that occurred within the facility since the last safety meeting and relevant prevention techniques.

1.4.5 Attendance sheet and the topic(s) of the safety discussions shall be kept for at least a year by the supervisors, FC, or FSH and may be subject to audit review.

1.5 PHYSICAL LIFTING REQUIREMENTS

1.5.1 A maximum lifting requirement of 40 pounds has been established for LaRC personnel.

1.5.2 Personal physical requirements may lower this requirement, as personnel shall never lift more than their own capability.

1.5.3 Additional manpower or mechanical advantage shall be used whenever appropriate.

Note 1: The National Institute of Safety and Health (NIOSH) does not recommend the use of back belts for lifting.

Note 2: The NASA Langley Research Center Move Tool is available to personnel for furniture and office-related equipment moves within the Center (e.g., desks, bookcases, safes).

PART 1: HOUSEKEEPING AND OFFICE SAFETY

1.6 DOORS, AISLES, AND HALLWAYS

1.6.1 FSHs shall:

a. Ensure items are only located on one side of hallways. This ensures personnel can use one wall as a guide to exit the building if a hallway is filled with smoke.

b. Ensure there is at least 44 inches of clear hallway space the entire length of hallways.

c. Ensure combustible items (e.g., paper and cardboard) are stored in cabinets so they are not a readily available fuel source or a cluttered pile of obstructions to

trip over.

Note: Exceptions are items being placed as trash for pickup, unless an excessive amount, or small amounts of paper for use at copier machines or located in magazine racks, etc.

d. Ensure materials maintain a two-foot clearance to the ceiling and are not located on top of cabinets. This ensures fire sprinklers and smoke detectors are not obstructed.

e. Ensure no flammable liquids or chemicals are stored in hallways, even if they are in a cabinet and even if only temporarily.

f. Ensure no storage of any kind is within five feet of an exit or placed in such a way as to potentially hinder or impede emergency egress during visibility-restricted conditions.

1.6.2 Personnel shall:

a. Keep at least a two-foot clearance between the deflectors of sprinkler heads and materials or furniture below. This does not apply to cabinets or shelving placed against a wall unless the shelving is directly under a sprinkler head, with approval from the AHJ.

b. Leave two feet of space around heat or smoke detectors for proper activation and maintenance.

1.6.3 The following are the basic requirements for doors, aisles, and hallways. For more in-depth requirements, refer to LPR 1710.11.

1.6.4 Emergency procedures require that fire doors be closed at all times unless they have automatic releases and self-closing hardware.

1.6.4.1 Fire doors shall not be blocked with anything that would interfere with their operation.

1.6.5 If there are yellow stripes on the floor in front of a door and an “OPEN DOOR SLOWLY” sign, personnel shall open the door with care. These doors open into the flow of traffic and may hit someone when opened.

1.6.6 Nothing shall be stored in aisles and passageways.

1.6.7 Aisles and passageways shall be kept clear and in good repair.

1.6.8 Any aisle leading to a corridor, stair, or other exit route (e.g., area between cubicle/desk and exit route) shall be a minimum of 36 inches clear width.

1.6.9 A minimum width of 44 inches for exit routes (e.g., corridor, hallway, stairs) shall be maintained per NFPA 101.

1.6.10 Anything that blocks or sticks into an aisle or passageway shall be marked or removed.

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1.6.11 Sharp or pointed objects that block or stick into an aisle or a passageway shall be covered to prevent someone from being injured.

1.6.12 Floors and working surfaces shall be kept clean and dry.

1.6.13 If a spill occurs or is spotted, personnel are encouraged to stop and clean it up. This will help prevent one of the most common types of mishap at LaRC and the Agency: slips, trips, and falls.

1.6.14 Additional requirements for emergency exits/egress are covered in Section 1.18 of this LPR.

1.7 OFFICE WORK SPACES

1.7.1 Defective or improperly placed furniture can cause injury to personnel at LaRC.

1.7.2 Furniture at workstations should not cause discomfort. If personnel are experiencing discomfort, see LPR 1800.1 for ergonomic recommendations or contact SFAB at (757) 864-7233, (4-SAFE).

1.8 OFFICE SUPPLIES AND EQUIPMENT

1.8.1 Personnel shall not place telephone cords across aisles unless the cords are covered with rubber channels designed for this purpose.

1.8.2 Personnel shall only keep small quantities of flammable or combustible fluids, such as cleaning supplies or printer toners and inks.

1.8.3 Storing office supplies, equipment, or anything else in any building’s mechanical room shall be prohibited.

1.8.4 Open flames, such as candles, shall be prohibited in offices.

1.8.5 Hanging items from the ceiling shall be prohibited.

1.9 SHELVING SAFETY

1.9.1 Shelving requirements should be discussed with the FC, who shall advise on any restrictions, such as maximum height, space, and wall type (e.g., asbestos or plasterboard) that affect the type of shelving that can be used.

1.9.2 Large bookcases and racking units (greater than five feet tall) shall be secured to the wall to prevent them from toppling over.

1.9.3 Personnel shall follow manufacturer’s requirements for maximum load-bearing capacities for shelving.

1.9.4 Large, heavy, or bulky items shall not be stored above waist level. See Section 1.5 of this LPR for requirements on lifting or moving loads.

1.9.5 Material stored on wall-mounted shelving shall be secured against falling.

1.9.6 Shelving supports or stored items shall not come into contact with lighting fixtures, smoke detectors, or sprinkler heads.

1.9.7 Stackable bookshelves located against a wall, furniture, or secured panel shall not be stacked more than four shelves high.

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1.9.8 Freestanding stackable bookshelves shall not be stacked more than three shelves high.

1.9.9 Personnel shall report any shelving defects or concerns to their supervisor, FSH, or FC immediately.

1.10 FILE AND STORAGE CABINETS

1.10.1 The heaviest items stored in each cabinet should be located in the lowest drawers to prevent toppling or injury.

1.10.2 Items that could cause an injury if they fell shall not be stored unsecured above a height of four feet.

1.10.3 Cabinets shall not be used as partitions unless secured against tipping.

1.10.4 Cabinets and furniture that could cause injury or impede egress shall be secured against tipping. This includes securing them to the wall or floor if recommended by the manufacturer. Personnel shall check with the FSH before securing items.

1.10.5 A loaded cabinet should be limited to one open drawer at a time.

1.11 MECHANICAL ROOMS

1.11.1 A mechanical room is any room that houses any sort of mechanical or electrical equipment supporting the building. This includes any Heating, Ventilation, and Air Conditioning (HVAC), air handling, electrical, boiler, pump, sprinkler, elevator equipment, fire pump, etc.

1.11.2 Due to the complex equipment inside mechanical rooms, only authorized personnel shall have access to or shall enter these rooms.

1.11.3 FSHs shall inspect mechanical rooms in their facilities at least once a month to ensure appropriate storage and general housekeeping are adequate. Any deficiencies noted during the inspection shall be corrected immediately.

1.11.4 Maintenance personnel shall be responsible for maintaining a “clean” mechanical room at all times. When service work is performed, any guards that are removed or junction boxes that are opened shall be replaced and closed at the end of the service work for that day. At no time shall junction boxes or guards be left open or off unless under a Lockout/Tagout (LOTO).

1.11.5 All doors entering mechanical rooms shall be kept closed and locked at all times.

1.11.6 Smoking and food storage and consumption shall be prohibited in these rooms.

1.11.7 Storage of any kind, except that which pertains to the maintenance of equipment in that mechanical room, shall be prohibited.

1.11.8 Additional items shall only be stored in a mechanical room if the mechanical room has a fire-rated storage area and storage of the item has been approved by the Authority Having Jurisdiction (AHJ) and the FC.

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PART 2: ELECTRICAL AND ELECTRONICS

1.12 DISTRACTIONS AND INTERRUPTIONS FROM ELECTRONIC DEVICES

1.12.1 Non-Hazardous Activities

1.12.1.1 The use of cell phones, audio devices, and other such devices is acceptable in offices and when personnel are involved with non-hazardous activities. Earphones, if used, are recommended to be limited to a single ear to allow personnel to hear emergency warnings.

1.12.2 Hazardous Operations and Worksites

1.12.2.1 The use of cell phones, audio devices, and other such devices shall be prohibited while personnel are engaged in hazardous operations (e.g., wind tunnels, laboratories, and construction sites) unless specifically allowed by the supervisor and documented in the Standard Operating Procedures (SOPs), Job Hazard Analysis (JHA), or equivalent.

1.12.3 Other activities where using these devices shall be prohibited are detailed in the National Electric Code (NEC) (NFPA 70). These include Class I, Div. 1 or Div. 2 areas, such as gas pumps, flammable fuel transfer operations, flammable gas vents, etc.

1.13 ELECTRICAL APPLIANCES

1.13.1 Personnel shall only use Underwriters Laboratories (UL) or other testing laboratory-approved electrical devices.

1.13.2 Personnel shall not use electrical devices outside or in a wet environment unless protected by Ground Fault Circuit Interrupter (GFCI) devices.

1.13.3 High-current equipment (e.g., microwave ovens, space heaters, and coffee pots) shall be plugged directly into wall receptacles and shall not be used with extension cords.

1.13.4 The FC or FSH shall obtain clearance from the AHJ on the usage of toasters or toaster ovens in their facilities.

1.14 PORTABLE ELECTRIC HEATERS

1.14.1 Space heaters shall be approved by the LaRC Fire Chief and the LaRC Energy and Water Conservation Manager.

1.14.2 Personnel shall only use UL-rated oil-filled space heaters.

1.14.3 Space heaters shall be plugged directly into wall receptacles and shall not be used with extension cords.

1.15 POWER STRIPS AND EXTENSION CORDS

1.15.1 Power strip and extension cord requirements:

a. Personnel shall only use UL-listed, double-insulated cords and power strips that are rated for the current they will carry.

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b. Personnel shall never run extension cords or power strips through walls, ceilings, doorways, or windows.

c. Power strips and extension cords shall not be used to power high current equipment (e.g., microwave ovens, space heaters, and coffee pots).

d. Personnel shall never connect power strips or extension cords together (i.e., “daisy chain” them).

1.15.2 Detailed requirements regarding power strips and extension cords are addressed in LPR 1710.6.

PART 3: FIRE, EMERGENCIES, AND LIFE SAFETY CODE

1.16 FIRST AID KITS

1.16.1 LaRC policy is NOT to issue first aid kits to organizations.

1.16.2 Exceptions to this policy shall be based on meeting all of the following requirements:

a. Personnel are going on deployments where medical help is not readily accessible,

b. Personnel shall get the proper training (i.e., Blood-borne Pathogen and First Aid) from the LaRC Occupational Health Clinic personnel or a certified third party,

c. The first aid kits shall be purchased through the LaRC Occupational Health Clinic and approved by SMAO, and

d. The first aid kits shall be kept and maintained by the LaRC Occupational Health Clinic when not being used by personnel on deployments.

1.16.3 The LaRC Occupational Health Clinic Medical Center, Building 1216, shall have medical personnel available daily (Monday – Friday) from 7:00 a.m. to 3:30 p.m.

1.16.4 Medical help can be obtained from the LaRC Fire Station by walking in or by calling 911 from a Center telephone or (757) 864-2222 from any phone.

1.16.5 Personnel requiring treatment for an injury shall ensure they receive professional treatment by reporting to the LaRC Occupational Health Clinic, Building 1216, from 7:00 a.m. to 3:30 p.m. during the day shift and to the LaRC Fire Station, Building 1248, at all other times.

1.16.6 If treatment is sought off-site, personnel shall report to the LaRC Occupational Health Clinic, Building 1216, at their earliest convenience, to assure that their medical records are annotated.

1.16.7 Personnel treated by advanced life support providers at the LaRC Fire Station, Building 1248, or around the Center should report to the LaRC Occupational Health Clinic, Building 1216, at their earliest convenience, to assure that their medical records are annotated.

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1.17 FIRE EXTINGUISHERS

1.17.1 Responsibilities

1.17.1.1 FSHs shall:

a. Perform monthly fire extinguisher checks, to include the following assessments:

(1) Is the extinguisher present?

(2) Is there any damage?

(3) Does the gauge point to green?

(4) Is the extinguisher out of date?

b. Report any issues found during monthly fire extinguisher checks to the LaRC Fire Chief.

1.17.1.2 Personnel shall:

a. Not attempt to fight fires with portable fire extinguishers unless they are properly trained or their escape route is blocked by a fire.

Note: Fire extinguisher training is provided by request. Contact the Fire Department to request training.

b. Leave any area where a fire is starting and call 911 from a Center telephone or (757) 864-2222 from any phone as soon as possible from a safe area.

1.18 EMERGENCY EXITS/EGRESS

1.18.1 Emergency exits shall never be blocked.

1.18.2 Emergency exit lights and signs shall not be obscured.

1.18.3 Stairs are part of the emergency egress route and shall never be used for storage of any materials.

1.18.4 Hazardous materials shall not be stored near emergency exits.

1.19 EMERGENCY LIGHTS

1.19.1 Emergency lighting shall be installed in accordance with LPR 1710.11.

1.19.2 FSHs shall:

a. Report issues with emergency lighting by placing a trouble call.

b. Make requests for emergency lights to the LaRC Fire Chief, as needed.

c. Perform monthly tests of emergency lights that are not self-testing.

1.20 EMERGENCY COORDINATION

1.20.1 When an emergency occurs and a facility is evacuated, occupants shall move to a safe area away from the scene. This will ensure that emergency personnel have free access to provide emergency services.

1.20.2 Due to their direct knowledge of their facility, the FSH and FC should be the main persons to coordinate with the emergency response personnel concerning the cause of

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the alarm or other building hazards.

1.20.3 The evacuation procedure requires that all personnel remain outside the building in a designated safe area until reentry is authorized. Reentry to a facility shall only be authorized by the emergency response personnel.

1.21 BUILDING ALARMS

1.21.1 Personnel shall understand the meaning of alarms in all buildings and areas they work in or visit on a regular basis, and shall be aware of the appropriate response to each alarm. Refer to the building Emergency Action Plan (EAP) for additional information on building alarms and emergency evacuations.

1.22 EMERGENCY EYEWASH AND SHOWERS

1.22.1 All emergency eyewash and shower equipment shall be certified to meet the requirements of ANSI/ISEA Z358.1.

1.22.2 FSHs shall:

a. Ensure access to emergency eyewashes and showers is unobstructed at all times.

b. Ensure that work requiring emergency flushing is restricted to locations within 10-seconds travel of emergency flushing equipment.

c. Ensure that emergency shower and eyewash equipment are tested and maintained in accordance with the requirements of this section.

d. Ensure that personnel whose work requires emergency flushing be trained and proficient with the equipment.

e. Ensure fluid is refilled or replaced after use of self-contained units.

1.22.3 Emergency eyewash or shower equipment shall be required at the following locations:

a. Wet chemistry laboratories;

b. Lead acid battery charging stations;

c. Waste water treatment facilities;

d. Hazardous waste handling facilities;

e. Chlorination treatment facilities and operations (e.g., swimming pools);

f. Locations where corrosives with pH less than 3 or pH greater than 10 are stored, handled, or used; and

g. Where any material that, because of its quantity, concentration, physical, or chemical characteristics, or manner of use, poses a significant hazard to eyes or skin.

1.22.4 Equipment Selection

a. Plumbed Units

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(1) The preferred equipment shall be a combination deluge shower and foot-operated eyewash fountain. The shower fully drenches a contaminated person. The eyewash allows free use of hands to assist opening the eyes while rinsing them.

b. Self-Contained Units

(1) In areas where potable water is not available, self-contained eyewash or shower equipment shall be acceptable.

(2) Self-contained eyewashes shall be capable of delivering to the eyes not less than 1.5 liters per minute (0.4 GPM) for 15 minutes.

1.22.5 Equipment Access Requirements

a. The location of emergency equipment shall be as close to the hazard as possible, in accessible areas requiring no more than 10 seconds to reach, within a travel distance no greater than 50 feet from the hazard, and no travel through inward swinging doors or use of stairs.

b. Site or operation-specific circumstances may require closer installation (e.g., large amounts of corrosives in open containers, strong acid, or strong caustic).

c. The location shall not become hazardous when the eyewash or shower is used (e.g., near exposed electrical contacts).

1.22.6 Equipment Installation and Performance Requirements

a. All eyewash and shower equipment shall be inspected and tested upon initial installation to assure their performance complies with ANSI/ISEA Z358.1.

b. Eyewash nozzles shall be protected from airborne contaminants with cover caps. Their removal shall not require a separate motion by the operator when activating the unit.

1.22.7 Equipment Maintenance

1.22.7.1 FSHs shall ensure the following:

a. Plumbed eyewashes shall be activated at least weekly to flush the line.

b. Plumbed shower equipment shall be activated at least monthly to flush the line.

c. Self-contained eyewashes shall be visually inspected weekly and maintained in accordance with the manufacturer’s instructions and ANSI/ISEA Z358.1.

d. Emergency eyewashes and showers shall be inspected annually to assure compliance with ANSI/ISEA Z358.1 requirements.

1.23 WEATHER SAFETY

1.23.1 All organizations shall evaluate their potential for exposure to hazardous weather events and develop individual response plans.

1.23.2 LaRC emergency management officials are responsible for monitoring local weather conditions and providing notifications to Center personnel as necessary.

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Note: See Appendix C for additional information on severe weather.

1.23.3 LaRC emergency management officials notify Center personnel of severe weather conditions through the following systems:

a. LaRC Alert App – the app provides the latest notifications issued by Center emergency management officials regarding emergencies, security situations, safety-related updates, and weather conditions at the Center. The app also includes emergency contacts that can be used for reference or to quickly dial a resource.

(1) To download the free app, visit the Apple or Google app store and search for “LaRC Alerts.”

b. Reverse 911 - The “Reverse 911” system is part of the Center telephone system. The software allows Center emergency management officials to call back personnel in particular buildings, all the center telephones, or the building’s Public Address System, if available, to communicate any emergency situation in a short amount of time.

c. Emergency Notification System (ENS) - The ENS is the Agency-wide notification system. It can send notifications to government and personal email accounts; call office, home, government, and personal cellular phones; and send texts to government and personal cellular phones. The ENS call comes from a 615 area code. Personnel should answer the call and say “Hello” to activate the message, listen to the full message, and follow any directions given.

(1) The ENS system continues to contact personnel until they are accounted for.

(2) To ensure ENS notifications are received, personnel should enter their contact information following the instructions below:

(a) *Civil Servant* - Login to Employee Express. Click the “Continue to Main Menu” button. Scroll down to the miscellaneous section on the left side and click “Emergency Contact Information.” Complete both “Personal Information” and “Work Information” sections.

(b) *Contractor* - Login to IdMAX. Click the “Links” button. Click “Manage Personal Information.” Click the “Edit” button in the “Personal” section to update contact information.

d. Giant Voice – The Giant Voice is a series of speaker systems located around the Center to notify personnel who are not indoors of emergencies, security situations, safety-related updates, and weather conditions at the Center.

1.24 GRILLS AND SMOKERS

1.24.1 Authorization and instructions to use a grill on Center shall be obtained by contacting the LaRC Fire Chief prior to use. The grills located at the picnic pavilion (Building 1222C) do not need prior authorization from the LaRC Fire Chief, but shall still be reserved to use.

1.24.2 In no case shall grills be kept inside LaRC facilities. This includes LP-Gas “propane gas” tanks.

1.25 OCCUPANCY PERMITS

1.25.1 Requests for occupancy permits shall be made to the AHJ, per LPR 1710.11.

1.26 HOT WORK PERMIT

1.26.1 Personnel performing hot work or operating other flame- or spark-producing devices (e.g., welding, cutting, powder-actuated tools, tar pots) shall:

a. Obtain a written permit from the LaRC Fire Department before starting any hot work.

b. Post the permit at the jobsite prior to performing any hot work.

c. Provide at least two 20-pound "ABC rated" extinguishers or as specified by the hot work permit for hot work at each source with current inspection tag, approved safety pin, and tamper resistant seal.

d. Provide a designated Fire Watch (i.e., an individual with appropriate training and experience) for any hot work who remains on site for a minimum of 30 minutes after completion of the task or as specified on the hot work permit, and in accordance with NFPA 51B.

e. Review location of the nearest fire alarm boxes and the emergency services dispatch phone number with all personnel in the work area prior to starting hot work activities in the facility. The emergency services dispatch phone number is (757) 864-2222).

f. Perform and document periodic inspection of welding equipment and related grounding systems per ANSI Z49.1.

1.26.2 For more in-depth requirements, refer to LPR 1710.11.

1.26.3 Questions regarding fires, and post-emergency response and reporting should be directed to the LaRC Fire Chief at (757) 864-5600.

PART 4: BUILDING AND SYSTEM CONTROL

1.27 POSTING OF FACILITY SAFETY PERSONNEL

1.27.1 Each facility shall have the name of the FSH and FC, primary and alternates, posted at all main entrances to the facility, to include the individual’s name, day, and after-hours telephone numbers, facility building number (if FSH or FC are not located in the facility), and room number.

1.28 AFTER-HOURS

1.28.1 After-hours access to buildings and facilities shall be strictly controlled by security procedures promulgated by the Protective Services Office (PSO).

1.28.2 Personnel accessing buildings after normal duty hours shall be required to possess the proper security badges and access authorizations. If security areas exist within the facility or research apparatus, access and notification requirements shall be

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governed by secure area access procedures. To facilitate the after-hours emergency contact process, FSHs, FCs, and their respective alternates shall provide their cell phone numbers to the LaRC Safety Manager. The cell phone numbers shall be kept under strict control; only SFAB, the Center Operations Directorate's (COD) Integrated Operations Center (IOC), and the Security Dispatch shall have access to the list of names and cell phone numbers.The FSH or FC shall respond to on-call emergencies and other after-hours facility requirements.

1.29 SECURE AREAS

1.29.1 FCs shall contact the PSO and the AHJ to review and approve all requests to designate an area as a secure area to ensure compliance with security and life safety regulations.

1.29.2 FSHs shall post at the main entrance door(s) a roster of two or more persons who can be contacted for after-duty-hours entry to the secure area.

1.29.3 If the building FSH is not on the approved access list, the organization responsible for the secure area shall appoint an authorized person to be the secure area's FSH who shall exercise safety responsibilities within the secure area.

1.29.4 Emergency Access

1.29.4.1 In the event of a mishap, safety personnel shall have access to the secure area after showing their badges and identifying themselves.

1.29.4.2 Emergency response personnel shall obtain immediate entry to the secure area and forced entry if access doors cannot be immediately unlocked.

1.29.4.3 PSO representatives shall respond to the secure area and, after the response activities are completed, debrief all involved parties who gained access.

1.30 ROOF ACCESS

1.30.1 All personnel shall be restricted from accessing the roof unless permission is granted by the FC.

1.30.2 FCs shall ensure that their facilities' roof access is controlled.

1.30.3 FCs shall ensure that their facilities have an approved Fall Prevention Plan on file, per Chapter 13 of this LPR. For activities not covered under a facility's Fall Prevention Plan, a new Fall Prevention Plan shall be required.

Note: A Fall Protection Plan may be implemented to cover a set of routine operational activities over a pre-determined time period.

1.30.4 FCs shall approve any equipment installation, configuration changes, or any other rooftop work or activities, with assistance from SFAB, as needed.

Note: If the work or equipment installation or configuration changes are in the vicinity of chemical fume hood exhausts, the approval process shall include the NASA Industrial Hygienist or Safety and Facility Assurance Branch.

1.30.5 Personnel shall not walk on, damage, break, or disturb blisters in the roof membrane.

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1.30.6 Roofs utilized as an emergency egress shall follow the requirements listed in LPR 1710.11.

1.31 ADMINISTRATIVE LOCKS

1.31.1 Administrative locks shall be used any time equipment, systems, or areas need to be locked for any purpose other than Lockout/Tagout. For Lockout/Tagout requirements, see LPR 1710.10.

1.31.2 Administrative locks may be used for various reasons, including equipment security, programmatic purposes, or general safety. Administrative examples are:

a. A locked fence around a high-voltage switching station,

b. A lock on an overhead crane disconnect switch to prevent use,

c. A locked door to a laser or chemical laboratory, and

d. Abandoned or mothballed equipment.

Note: Mothballed equipment should be completely disconnected from energy sources before applying an administrative lock.

1.31.3 An administrative lock may be controlled by an individual, group, or organization.

1.31.4 The use of administrative locks shall be the responsibility of the facility or organization responsible for the equipment, system, or area.

1.31.5 Anytime an administrative lock is used, it shall consist of a lock and a tag.

1.31.6 An administrative lock can be any color other than red.

1.31.7 The tag shall communicate the reason for the lock and the person or organization controlling the lock. Examples are:

a. Equipment Controlled Area – See (list name and telephone extension) for access,

b. System Deactivated – Do not remove without the concurrence of (list name and telephone extension), and

c. Use Limited to Certified Operators – See (list name and telephone extension) for additional information.

1.31.8 Administrative Locking for General Safety Purposes

1.31.8.1 Anytime a lock is used for safety purposes, an identification tag or sign shall be affixed to communicate a warning, safety concern, or hazard, and responsible organization or individual. Examples are:

a. CAUTION – High Voltage Keep Out – Access controlled by (list name and telephone extension),

b. WARNING – Fall Hazard – Limited access controlled by (list organization, name, and telephone extension), and

c. DANGER – Nitrogen Asphyxiation – Limited access controlled by (list organization, name, and telephone extension).

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1.32 DUPLICATE KIRK KEY CONTROL

1.32.1 The following procedural requirements have been established to ensure safe operations:

a. Duplicate keys shall be kept under lock and key and shall be color-coded red for field identification.

b. Duplicate keys shall be issued by the responsible FSH or alternate.

c. FSHs shall develop a duplicate key issuance procedure.

d. All duplicate keys shall be logged in before initiation of research operations. If a duplicate key is issued because of a broken primary key, it shall no longer be considered a duplicate key.

1.33 DIGGING AND TRENCHING

1.33.1 Excavation, trenching, or other surface penetration activity (e.g., trenchless activity, placing stakes in the ground) performed on LaRC premises, including landscaping, by either in-house or contractor personnel, presents a potential safety hazard.

1.33.2 A dig permit process has been developed to control actual or potential disturbance of existing surfaces to a depth in excess of six inches in accordance with LMS-CP-1750.

1.33.3 Dig permit requests are submitted through the LaRC Facilities Dig Permit Request Tool (https://gis-dbweb.larc.nasa.gov/ords/apex/f?p=119:10:5201133508879::NO:40::).

1.33.4 The designated Contracting Officer Representative (COR) or the designated inspector shall ensure the digging permit process is followed per LMS-CP-1750.

1.33.5 Detectable Mylar tape or its equivalent shall be used in all installations and maintenance tasks for buried underground utilities at LaRC, to include laying detectable tape approximately six inches below the surface of the ground directly above buried utility lines.

1.34 WATER CONNECTIONS

1.34.1 Contamination of the potable water supply shall be prohibited.

1.34.2 LaRC procedural requirements have established safeguards against possible contamination of the fresh water supply caused by backflow or back siphonage. These safeguards are:

a. Backflow prevention devices, or the equivalent, shall be installed and tested periodically by certified personnel where the possibility of a cross connection exists.

b. Any suspected cross connection or contamination of fresh water shall immediately be reported to the FSH and SFAB’s Industrial Hygienist at (757) 864-7233 (4-SAFE).

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PART 5: MACHINERY AND MACHINE GUARDING

1.35 MACHINE SYSTEMS AND MACHINE GUARDING

1.35.1 New and existing machinery shall meet the requirements in 29 CFR 1910, Subpart O, which include:

a. Machines (manual or powered) shall be properly anchored to prevent walking or moving. Specifically, any machine shall be anchored that might move or walk because of unbalanced operation (tipping) or because it is located so that passing heavy equipment could impact or upset the machine.

Note: Tools and machines explicitly designed for portable use are excluded from this requirement.

b. Existing machinery found to be out of compliance with OSHA standards shall be brought into compliance.

c. All purchase requisitions and contractual commitments that include machinery shall contain in the specifications a requirement that machine guarding complies with 29 CFR 1910, Subpart O.

(1) All such specifications shall be reviewed and approved by SFAB.

PART 6: HAZARDOUS ITEMS

1.36 HAZARDOUS CHEMICALS SAFETY

1.36.1 Personnel shall have the right-to-know about chemical hazards in their work place (a.k.a. Hazard Communication).

1.36.2 All chemicals used at LaRC are required to have a Safety Data Sheet (SDS). These documents contain needed information about working safely with each specific chemical. LaRC's SDS can be found online in the Chemical Material Tracking System (CMTS) at http://emis.ndc.nasa.gov/cmts/index.htm.

1.36.3 All containers that contain Potentially Hazardous Materials (PHM) at LaRC shall be labeled as such, in accordance with 29 CFR 1910.1200 and LPR 1710.12.

1.36.4 A LF 44 shall be required prior to the purchase or transfer of hazardous materials.

1.36.5 Safety Permits, per LF 498, are used to standardize procedures and identify training and personnel involved with high-risk operations associated with certain PHM.

1.36.6 A laboratory-specific Chemical Hygiene Plan, per LPR 1710.13, shall be required for all laboratories that synthesize chemicals.

1.37 ASBESTOS

1.37.1 Personnel shall contact their FSH or FC with questions regarding the presence of asbestos in their facility.

1.37.2 FCs or FSHs shall contact SFAB personnel when in doubt about asbestos material in their facilities that may be disturbed by construction or demolition or any repairs.

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1.37.3 FCs or FSHs shall contact SFAB personnel if asbestos material becomes damaged or needs to be removed for remodeling purposes; a process to handle this situation has been established by SFAB.

1.37.4 For more details on handling asbestos at LaRC, see LPR 1800.1.

1.38 LEAD AND OTHER HEAVY METALS

1.38.1 Personnel shall contact their FSH or FC with questions regarding any operations involving the use of heavy metals in their facility.

1.38.2 FCs or FSHs shall contact SFAB when in doubt so an appropriate hazard assessment can be performed.

1.38.3 See LPR 1800.1 for more details on the processes for lead and other heavy metals at LaRC.

1.39 BATTERY ROOMS AND CHARGING STATIONS

1.39.1 Battery rooms and charging installations shall be located in areas designated for that purpose. Requirements are found in LPR 1710.6.

1.40 HIGH-INTENSITY DISCHARGE LAMPS

1.40.1 To ensure that safe handling and disposal requirements of High-Intensity Discharge (HID) lamps are met, LaRC procedural requirements are outlined below:

a. Lamp operation shall be discontinued if lamp's outer globe is broken or punctured, as potential exposure to excessive ultraviolet radiation levels is possible.

b. Extreme care shall be exercised when handling HID lamps, especially short arc types, as the lamps present an explosion hazard if not handled properly.

c. Special gloves and face shields shall be required for handling HID lamps, especially short arc lamps.

d. Manufacturer's instructions for the handling and use of HID lamps shall be strictly adhered to at LaRC.

e. Disposal information concerning HID lamps shall be obtain by contacting personnel from the Center Operations Directorate's Environmental Management Office.

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CHAPTER 2: HAZARDOUS OPERATIONS

2.1 GENERAL

2.1.1 This chapter sets forth the minimum procedural requirements for the Hazardous Operations (HazOps) program to protect personnel who engage in HazOps involving materials or equipment that, if misused or mishandled, have a high potential to result in loss of life, serious injury or illness to personnel, or damage to systems, equipment, or facilities.

2.2 REQUIREMENTS

2.2.1 All the HazOps at LaRC shall be under a Safety Permit, JHA, or SOPs.

2.2.1.1 All safety permit procedures shall comply with Chapter 11 of this LPR, LPR 1710.12, LPR 1710.8, LPR 1710.7, LPR 1800.1, or LPR 1710.5.

2.2.1.2 See Chapter 14 of this LPR regarding Job Hazard Analysis requirements.

2.2.1.3 See LPR 1740.4 regarding Standard Operating Procedures requirements.

2.2.2 Personnel who perform HazOps shall be trained and certified in accordance with LPR 1740.6.

2.3 RESPONSIBILITIES

2.3.1 SFAB shall:

a. Provide guidance on evaluating HazOps and assist personnel and organizations in identifying and classifying operations, as needed.

b. Review all Safety Permits and SOPs.

c. Ensure specific personnel certification requirements are established in cases where HazOps depend upon adherence to specific standards, guidelines, and training.

d. Recommend procedures to reduce the risk and minimize potential hazard exposure.

2.3.2 FSHs shall:

a. Identify HazOps in their areas and operations and follow the requirements established to control hazards.

b. Contact SFAB to assist with determining what operations are considered HazOps.

c. Ensure that all HazOps have been reviewed by the AHJ and SFAB.

d. Ensure deviations or changes to the Safety Permits, JHAs, or SOPs are documented and reviewed.

e. Ensure only certified operators perform HazOps in accordance with LPR 1740.6.

f. Ensure regulated areas are properly marked and access restricted.

g. Submit Safety Permits and SOPs that have identified fire protection or life safety

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risks to the AHJ.

2.3.3 Supervisors shall:

a. Ensure FSH are identifying HazOps Safety Permits, JHAs, and SOPs in their areas of responsibility.

b. Ensure personnel follow good work practices.

c. Ensure personnel meet training requirements and have knowledge of the hazards.

d. Ensure personnel only work alone under hazardous conditions if a safety assessment, such as a JHA, has been completed.

2.3.4 Personnel shall:

a. Become familiar with HazOps in their work area.

b. Comply with the requirements and conditions set forth in applicable SOPs and with other requirements for controlling hazards.

c. Notify supervisors of any uncontrolled hazards in their work areas.

d. Use Personal Protective Equipment (PPE) as specified in established work procedures (e.g., JHAs, Safety Permits, and SOPs).

e. Notify supervisors of any operational changes that would present new hazards.

f. Attend required training to become certified to perform HazOps activities requiring certification (e.g., high-voltage work, critical lifts, wind tunnel operation).

2.3.5 Occupational Medicine Services Medical Director shall:

a. Ensure that physical and medical examinations to support certification requirements are in compliance with Occupational Safety and Health Administration (OSHA) and other Federal, State, and Local agency applicable codes, regulations, and standards.

b. Maintain complete, accurate records of all physical and medical examinations for personnel in the certification program. Records shall be retained for the length of employment plus 30 years. Results of examinations shall be discussed with personnel as needed.

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CHAPTER 3: CONFINED SPACES

3.1 GENERAL

3.1.1 This chapter sets forth the minimum procedural requirements for work conducted in confined spaces.

3.2 RESPONSIBILITIES

3.2.1 SFAB shall:

a. Assist in the development of hazard evaluations and permit determinations as requested.

b. Evaluate and approve entry by permit or SOPs.

c. Review equipment to be used for entry.

d. Ensure that atmospheric measuring equipment is installed, maintained, calibrated, and used properly.

e. Assist supervisors in identifying and posting areas to be considered confined spaces.

f. Assist supervisors in training or approving training programs for personnel entering confined spaces.

g. Test the atmosphere, or as deemed appropriate, certify other personnel to perform this task.

h. Maintain the Center master confined space inventory list.

i. Maintain up-to-date hazard evaluations for all spaces on the inventory list and any related information to individual confined spaces.

j. Administer the confined space program and review completed permits.

3.2.2 FSHs shall:

a. Ensure that the confined space labels are accurate and legible.

b. Request assistance from the SFAB Industrial Hygiene staff if there is any doubt about whether a location meets the criteria of a confined space.

3.2.3 FCs shall:

a. Request assistance from the SFAB Industrial Hygiene staff if there is any doubt about whether a location meets the criteria of a confined space.

3.2.4 Entry Supervisors (i.e., person in charge of confined space entry) shall:

a. Have overall responsibility for entry and work in confined spaces and for ensuring that the requirements of this procedural requirement are implemented.

b. Notify the LaRC Fire Department during job planning, prior to the confined space entry, and once the entry has been completed by dialing (757) 864-5600.

Note: The LaRC Fire Department is trained and equipped to conduct confined space rescue.

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3.2.5 Attendants shall:

a. Be positioned outside permit-required confined spaces to give assistance in cases of emergency.

b. Have no assigned duties to perform other than to observe and communicate with the entrant(s).

(1) Audible voice, radio, telephone, constant visual, or other suitable forms of communication between the entrant(s) and standby attendant shall be continuously maintained.

(2) The system shall be tested immediately upon entry to confirm its effectiveness.

c. Have a communication link with additional persons who can render help in emergencies.

d. Contact the Fire Department by dialing 911 from any Center telephone or (757) 864-2222 from a cellular telephone if rescue becomes necessary.

3.2.6 Authorized Entrants shall:

a. Attend confined-space training.

Note: Training may be given at the site of the task or at an off-site location.

b. Notify their supervisor, and either the FSH or FC, prior to entry and work in a confined space.

3.2.7 The contracting company's safety representative shall be responsible for implementing the confined space program for its personnel and shall:

a. Complete a confined space entry permit (Langley Form (LF) 60) prior to entry into a Permit-Required Confined Space (PRCS).

b. Ensure that atmospheric measuring equipment is calibrated and used properly.

c. Test the atmosphere, or as deemed appropriate, certify other personnel to perform this task.

d. Conduct training.

3.3 PERMIT PROCEDURE SYSTEM

3.3.1 Prior to entry into a PRCS, personnel shall contact SFAB at (757) 864-7233, (4-SAFE), to initiate a permit, LF 60.

3.3.1.1 Contractors should contact their employer's safety representative as applicable.

3.3.2 Entry into a non-permit required confined space shall be performed in accordance with existing facility SOPs.

3.3.3 If there is not an existing SOP in place for the task at hand, personnel shall conduct a JHA (see Chapter 14) or equivalent hazard analysis to determine if hazards will be introduced into the space. If hazards will be introduced into the space, personnel shall contact SFAB at (757) 864-7233, (4-SAFE), for help determining whether a permit should be initiated.

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3.4 POSTING

3.4.1 Confined spaces shall be posted at all times with the appropriate label shown in Figure 3-1 and Figure 3-2.

3.4.2 During periods when work is scheduled within the confined space, a copy of the permit or procedure shall also be posted.

Figure 3-1, Confined Space Notice – Non-Permit Required Confined Spaces

Figure 3-2, Danger – Permit-Required Confined Space

Verify the correct version before use by checking the LMS website.

3.5 TRAINING

3.5.1 All personnel who participate in the entry of confined spaces shall be trained regarding the nature of the hazards involved as mandated in LPR 1740.6.

3.5.2 Training shall include operating and rescue procedures, precautions to be taken, and the proper use of required personal protective and emergency equipment.

3.5.3 Procedures shall be thoroughly explained so that each person is aware of the proper action to take under varying circumstances.

3.5.4 All persons involved in the entry of confined spaces shall be familiar with the system of communication used during confined space work.

3.6 ATMOSPHERIC TESTING

3.6.1 Prior to entry into a permit-required confined space, atmospheric tests shall be conducted to determine the presence of dangerous air contamination.

3.6.2 Subsequent atmospheric testing with hourly recording shall be required.

3.7 VENTILATION

3.7.1 In permit-required confined spaces, ventilation shall be recommended as the primary means of control in all cases of dangerous air contamination.

3.7.2 Continuous general dilution or local exhaust ventilation shall be maintained where dangerous air contamination is produced as part of a work procedure (e.g., cleaning with solvents, welding, or painting), or where dangerous air contamination may develop due to the nature of the permit-required confined space (e.g., desorption from walls or evaporation of residual chemicals).

3.7.3 Ventilating a permit-required confined space shall not eliminate the need for atmospheric testing.

3.7.4 Ventilation equipment used to prevent situations that are immediately dangerous to life and health shall have an audible warning device to signal ventilation system failure.

> *Note: It is good practice to ventilate all permit-required confined spaces before entry and during occupancy even though no dangerous air contamination is present.*

3.8 PREVENTION OF DANGEROUS AIR CONTAMINATION

3.8.1 Accidental introduction of dangerous air contamination into the confined space through interconnecting equipment, such as piping, ducts, vents, drains, and so forth, shall be prevented by positive means, such as lockout and tagging, disconnection of pipes, blind flanges, two block valves with an open vent between them, or other procedures.

3.9 ELECTRICAL EQUIPMENT

3.9.1 Due to the potential for electrical shock, electrical circuits in confined spaces shall be de-energized and locked/tagged out per LPR 1710.6 and LPR 1710.10.

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3.9.2 Any electrical equipment used inside confined spaces shall be properly insulated and grounded in accordance with LPR 1710.6 requirements.

3.9.3 PRCS subject to the presence of an explosive atmosphere above the Lower Explosion Limit (LEL) shall be classified as hazardous locations and shall meet the requirements in the NEC, Chapter 5.

3.9.4 The type of hand tools to be used in a permit-required confined space subject to the presence of an explosive atmosphere shall be determined after a hazard assessment is done for the particular jobsite, task, and mitigations implemented.

3.9.4.1 Where possible, pneumatically driven power tools equipped with conductive air supply hoses should be used.

3.9.5 Nitrogen or other inert gas pressure shall not be used as a substitute for air pressure unless specifically approved by the permit-required confined space monitor.

3.9.6 All hand-held electrical equipment shall have a ground fault interrupter circuit breaker (4 to 6 mA where possible) at the power source unless the power source is an ungrounded portable generator, an ungrounded battery source less than 28 volts, or an ungrounded isolation transformer of less than 28 volts.

3.10 PERSONAL PROTECTIVE EQUIPMENT

3.10.1 The safety representative completing the LF 60 shall determine the PPE needed based on the confined space and task being performed.

3.10.2 Respiratory protection requirements for civil servants shall be determined by SFAB Industrial Hygiene staff and by the contracting company safety representative for contractors as defined by the applicable contractor in accordance with LPR 1800.1.

3.10.3 Only when ventilation has been found to be impractical or ineffective shall personal respiratory protective equipment be required as a primary means of control.

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CHAPTER 4: LIFTING DEVICES AND EQUIPMENT SAFETY

4.1 GENERAL

4.1.1 This chapter sets forth the minimum requirements for design, procurement, maintenance, inspection, testing, certification, repair, alteration, operation, training, and personnel certification of LaRC lifting devices and equipment.

4.2 INTRODUCTION

4.2.1 This chapter provides LaRC-specific requirements and references the National Aeronautics and Space Administration (NASA) Lifting Standard, OSHA, and the applicable National Consensus Standards (NCS). In the event there is a conflict between this chapter and the referenced documents, the order of precedence shall be as follows:

a. OSHA,

b. NASA Lifting Standard, 8719.9, except where more stringent than OSHA, then

c. LaRC Lifting Devices and Equipment (LDE) management instructions, except where more stringent than either OSHA or the NASA Lifting Standard.

4.2.2 Compliance with this chapter is mandatory for all NASA-owned, NASA-leased, and NASA contractor-supplied LDE used in NASA operations. LDE equipped with features or components not covered by the requirements of this chapter shall be inspected, tested, and approved by the Lifting Device and Equipment Manager (LDEM) prior to use.

4.2.3 This chapter is applicable to NASA-owned, NASA-leased, and NASA contractor-supplied overhead and gantry cranes (including top running, monorail, underhung, and jib cranes), mobile cranes, derricks, hoists, winches used for lifting applications, hoist-supported personnel lifting devices, load positioning devices (e.g., Hydra Sets®), load measuring devices, hooks, jacks used for critical lifts, slings and rigging hardware, mobile aerial platforms, and high lift industrial trucks used in support of NASA operations.

4.2.4 This chapter does not apply to front-end loaders, elevators, or lifting devices used in non-lifting applications.

4.3 RESPONSIBILITIES

4.3.1 Personnel designated with the responsibility for lifting operations shall ensure:

a. Only trained or certified personnel operate LDE.

b. LDE is operated safely and used within its design and operational limits.

c. An approved lift plan is used for critical lifts.

d. LDE is properly tagged and certified.

e. Appropriate PPE is utilized.

f. Appropriate keep-out-zones are established and maintained during lifting operations.

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Note 1: For non-critical lifts, the designated person is usually the operator.

Note 2: Critical Lifts include engineered lifts.

4.3.2 Organizations utilizing LDE shall ensure:

a. LDE is inspected, maintained, and repaired by qualified personnel.

b. Inspectors, maintenance, and repair personnel have the appropriate tools and training to competently accomplish their work.

c. Inspectors, maintenance, and repair personnel have access to adequate information including operation and maintenance manuals, repair procedures, spare parts lists, wiring diagrams, and documented inspection, maintenance, and repair histories.

4.3.3 Personnel designated to manage critical lifts for hoisted loads shall ensure:

a. A lift plan is approved by the LDEM prior to the lift.

b. A documented pre-lift meeting is held with all personnel involved with the lift.

c. A spotter is assigned to the lifting equipment operator when required.

d. A signal person is assigned to the lifting equipment operator when required.

e. Personnel are qualified and certified, and understand how the **job** will be accomplished.

f. LDE is selected and verified in conformance with the applicable requirements.

g. The lifting device is properly set up and positioned.

h. The area is inspected for hazardous and unsafe conditions, and secured from unauthorized or non-essential personnel entry.

i. Appropriate PPE is utilized.

j. The lifting operation is performed in accordance with the approved lift plan.

k. Details of the lifting operation are documented, transmitted to the appropriate organization, and placed in a history file.

l. A representative from SFAB or their designee is present and responsible for the safety of operations.

Note: The LaRC LDEM shall be notified prior to the lift.

4.4 OVERHEAD AND GANTRY CRANES

4.4.1 Overhead and gantry cranes shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 5, ASME B30 series standards (ASME B30.2, B30.11, B30.17, or B30.24), and Crane Manufacturers Association of America (CMAA) Specification 70 or 74.

4.5 MOBILE CRANES AND DERRICKS

4.5.1 Mobile cranes and derricks shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 6, and ASME B30 series standards (ASME

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B30.5 and B30.6).

4.6 HOISTS AND WINCHES

4.6.1 Hoists and winches shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 7, and ASME B30 series standards (ASME B30.7, B30.16 or B30.21).

4.7 HOIST-SUPPORTED PERSONNEL LIFTING DEVICES

4.7.1 Hoist-supported personnel lifting devices shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 8, and applicable NCS.

4.8 MOBILE AERIAL PLATFORMS

4.8.1 Mobile aerial platforms shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 9, and ANSI/SAIA A92 series standards (ANSI/SAIA A92.2, A92.3, A92.5, and A92.6).

4.9 HIGH LIFT INDUSTRIAL TRUCKS

4.9.1 High lift industrial trucks, including forklift trucks, platform trucks, picker trucks, and reach trucks, shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 10, and ANSI/ITSDF B56 series standards (B56.1, B56.6, B56.10, and B56.14).

4.10 LOAD POSITIONING AND LOAD MEASURING DEVICES

4.10.1 Load position and load measuring devices shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 11, and ASME B30 series standards (ASME B30.20 or B30.26).

4.11 JACKS

4.11.1 Jacks used for critical lifts and engineered lifts shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 12, and ASME B30 series standards (ASME B30.1).

4.12 HOOKS

4.12.1 Hooks shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 13, and ASME B30 series standards (ASME B30.10).

4.13 SLINGS AND RIGGING HARDWARE

4.13.1 Slings and rigging hardware shall comply with the applicable OSHA regulations, the requirements in NASA-STD-8719.9 Chapter 14, and ASME B30 series standards (ASME B30.9, B30.20, and B30.26).

4.14 CLASSIFICATION OF LIFTS

4.14.1 For programmatic lifting operations, the respective program manager shall classify lifts involving program hardware as critical or noncritical, and document the decision process with LF 358.

4.14.2 Program lifting operations identified as noncritical may be reclassified as critical by the NASA LDEM or SFAB, if the lift involves hazards that are not program-specific,

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but reveal safety or facility concerns beyond normal lifting operations.

4.15 SAFETY HAZARD ANALYSIS

4.15.1 A recognized safety hazard analysis shall be performed on critical or custom-built LDE (excluding hooks, rigging hardware, and slings, subject to LDEM approval).

Note: One-of-a-kind, custom-built LDE is more likely to break down and should be considered less reliable than commercial off-the-shelf (COTS) equipment. Given this, original equipment manufacturer (OEM)-type LDE should be used when possible rather than custom, built-up equipment.

4.15.2 The safety hazard analysis shall, at a minimum, identify potential sources of danger and recommend resolutions for those conditions that could cause loss of life, personal injury, and loss of, or damage to, the LDE, facility, or load.

4.16 DESIGN AND PROCUREMENT

4.16.1 LDE purchased for NASA operations shall be high quality, from reputable manufacturers with relevant experience, and shall meet the requirements of the LaRC LDE Program. COTS equipment shall be used instead of one-of-a-kind, custom-built LDE, whenever possible.

Note: Coordinate with Office of Procurement on purchases above p-card limits.

4.16.2 LDE shall be designed and constructed in accordance with the applicable OSHA regulations, NASA-STD-8719.9, and NCS.

4.16.3 When critical or custom-built LDE (excluding hooks, rigging hardware, and slings, subject to LDEM approval) is designed or procured, the responsible organization shall notify the LDEM and shall provide the LDEM with the information necessary for review and approval of the design and procurement.

4.16.4 Use of shop fabricated or homemade rigging hardware (e.g., slings, shackles, rings, swivels, eye bolts, turnbuckles) or modified COTS shall be prohibited unless approved by the LDEM.

4.17 TESTING

4.17.1 Tests shall comply with the applicable OSHA regulations, NASA STD-8719.9, NCS, and shall be based upon manufacturer recommendations.

4.17.2 The use of lifting devices to load test items, such as rigging hardware, slings, platforms, and lifting fixtures, or, to relieve a portion of the weight of a constrained load shall be subject to the limitations defined in NASA STD-8719.9.

4.17.3 Rigging hardware shall be given an initial proof load test by the manufacturer. If a certificate of proof load test is not available from the manufacturer, the hardware shall be proof load tested in accordance with NASA-STD-8719.9.

4.17.4 Rigging hardware and slings shall be given a periodic load test in accordance with NASA STD-8719.9:

a. Noncritical slings shall be tested at least once every four years unless designated as non-load test slings.

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b. Slings shall be load tested within one year prior to use for a critical lift unless designated as a non-load test sling.

c. Rigging hardware shall be load tested within two years prior to use for a critical lift unless designated as non-load test rigging hardware.

4.17.5 Subject to NASA LDEM approval, slings and rigging hardware may be designated as non-load test slings and rigging hardware due to considerations such as usage, inspection and testing history, and potential for test-induced damage. Non-load test slings and rigging hardware are not subject to periodic load-testing requirements.

4.17.6 Certification Requirements

4.17.6.1 Equipment certification shall be based on a condition inspection and load test(s). The purpose of the condition inspection is to ensure that the overall structural, mechanical, electrical, and control components of the LDE have been maintained in a safe and serviceable condition and are functioning properly. The purpose of the load test(s) is to ensure that the equipment is capable of safely lifting and moving a rated load through normal design motion(s).

4.17.6.2 Load tests shall comply with OSHA regulations, NASA-STD-8719.9, the requirements in this chapter, and be based on manufacturer recommendations. Two types of load tests are required for LDE: proof load tests and periodic load tests.

4.17.6.3 Qualified personnel, under the direction of a competent person, shall perform all inspections and tests.

4.17.6.4 Critical LDE shall be certified (i.e., load tested and inspected) annually, except rigging hardware (e.g., shackles, rings, swivels, eye bolts, turnbuckles), which shall be load tested on a two-year cycle, but inspected annually. Slings shall be certified (i.e., load tested and inspected) within one year prior to use for a critical lift.

4.17.6.5 Noncritical LDE shall be load tested on a four-year cycle and inspected annually, except rigging hardware (e.g., shackles, rings, swivels, eye bolts, turnbuckles), which shall be load tested prior to first use only, but inspected annually.

4.17.6.5.1 Following the load test(s) and inspections, the lifting device shall be given a permanently affixed tag identifying the equipment and indicating the certification expiration date. Inadequacies found during the certification process shall be documented on the work plan or nonconformance system, and if determined to be a hazard, corrected prior to further use.

4.17.6.6 When the adjustment, repair, disassembly, or replacement of a load-bearing part, load-controlling part, or operational-safety device requires a load test for verification of satisfactory work performed, recertification shall be required.

4.17.6.7 Repaired or modified LDE components that do not affect the lifting, holding capability, or operational safety of the LDE shall undergo a functional check prior to being placed back into service to verify the repairs or modifications are acceptable.

4.17.7 Certifications shall be voided upon detection of a major deficiency, or after adjustment, repair, disassembly, replacement, or alteration of a load-bearing part, load-controlling part, or operational-safety device, which requires a load test(s) for verification

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of satisfactory work.

4.17.7.1 Condition inspections shall be performed before, during, and after a load test by qualified personnel. The inspections shall comply with OSHA regulations, NCS, and be based on OEM recommendations. Personnel performing the inspections shall record the results on the work plan. Deficiencies shall be documented on the work plan and shall identify the corrective action(s) taken.

4.17.7.2 A proof load test shall be required for all new LDE and major repairs to items in the load path of LDE prior to being placed in service.

4.17.7.3 A periodic load test shall be performed on LDE at least every four years, excluding rigging hardware (e.g., shackles, rings, swivels, eye bolts, turnbuckles) used for noncritical and engineered lifts.

4.17.7.4 Critical-lift certified LDE require an annual load test, except rigging hardware (e.g., shackles, rings, swivels, eye bolts, turnbuckles), which shall be load tested within two years prior to use for a critical lift unless designated as non-load test rigging hardware.

Note 1: When a proof load test is required, a periodic load test shall also be performed.

Note 2: Performance of a proof load test satisfies the periodic load test requirement for slings and rigging hardware.

4.17.8 Testing and inspection of hooks shall comply with OSHA regulations, NASA-STD-8719.9, and shall be based on manufacturer recommendations.

4.17.8.1 Nondestructive Evaluation (NDE) shall be performed on hooks of LDE following a load test.

4.17.9 Personnel performing Nondestructive Testing (NDT) other than visual testing shall be licensed in accordance with a nationally or internationally recognized NDT organization or standard such as ASNT-CP-189, SNT-TC-1A, NAS-410, or a similar document.

4.18 INSPECTION

4.18.1 Frequent Inspections (Pre-use)

4.18.1.1 Prior to each shift during which the equipment will be used, a competent person shall perform a visual and functional inspection, which meets the following requirements:

a. The inspection shall consist of observation for apparent deficiencies.

b. The results of the inspection shall be documented in the appropriate form (i.e., LF 288, LF 600, LF 512, LF 513, and LF 514).

c. Inspection forms shall be appropriately tailored to the type of lifting device being inspected.

d. The inspection shall comply with OSHA regulations and the recommendations of the lifting device manufacturer.

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e. Standard inspection forms (i.e., templates) shall be provided to the LDEM annually for review and approval of the content and the format.

4.18.2 Periodic Inspections

4.18.2.1 A qualified person shall perform a comprehensive inspection of the equipment annually or more frequently, as required by OSHA. The inspection shall meet the following requirements:

a. The inspection shall consist of a detailed assessment for deficiencies to include partial disassembly of components as appropriate.

b. The inspection shall comply with OSHA regulations and the recommendations of the lifting device manufacturer.

c. The results of the inspection shall be documented in the Computerized Maintenance Management System (CMMS) MAXIMO database.

4.18.3 Results of the pre-use inspection shall be documented on the applicable inspection form for NASA-owned or leased lifting devices according to the following requirements:

a. The pre-use inspection form shall be maintained for 30 days, except for mobile cranes and derricks.

b. Inspection forms for mobile cranes and derricks shall be maintained for three months.

c. The inspection forms shall be retained in the cab of mobile and derrick cranes, and attached to or appropriately near all other lifting devices.

d. Inspection forms with open discrepancies requiring corrective action shall be maintained until the corrective action is complete.

e. The documented results of the periodic inspection shall be maintained for 12 months.

Note: Requirement 4.18.3.e does not apply to jacks and manual chain fall hoists.

4.18.4 Discrepancies shall be brought to the attention of management prior to equipment use according to the following requirements:

a. Each discrepancy shall be reviewed and evaluated by management and the LDEM for impact on safety and operability of the equipment.

b. Discrepancies that present an immediate hazard shall result in the equipment being tagged-out until suitable corrective action is completed.

c. Minor discrepancies that do not present an immediate hazard shall be corrected within a suitable time as determined by the LDEM.

d. A work plan shall be initiated to correct the discrepancy.

4.18.5 Wire rope, hook, chain, and links shall be inspected for LDE in accordance with the requirements as defined by OSHA and in NASA STD-8719.9.

4.18.6 Synthetic rope, webbing, and round slings shall be inspected before each use.

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4.18.6.1 The inspection shall cover the entire length of the sling, including splices, end attachments, and fittings.

4.18.6.2 The sling shall be removed from service if inspection by a qualified person reveals any of the following:

a. Cuts, gouges, badly abraded spots, or other abnormal wear;

b. Seriously worn surface fibers or yarns;

c. Considerable filament or fiber breakage along the line where adjacent strands meet;

d. Powder or particles of broken filaments or fibers inside the rope between the strands;

Note: Twist or pry rope open for inspection.

e. Discoloration or harshness that may indicate rotting, chemical damage, or excessive exposure to sunlight;

Note: Inspect filaments or fibers for weakness or brittleness.

f. Kinks, crushing, or bird caging;

g. Variations in the size or roundness of the strands;

h. Melting or charring of any part of the sling;

i. Severe pitting or corrosion, or cracked, distorted, or broken fittings;

j. Knots in any part of the sling; or

k. Other visible damage that causes doubt as to the strength of the sling.

4.18.7 Visual inspection of other common rigging hardware (e.g., shackles, rings, swivels, eye bolts, turnbuckles) shall be performed by a competent user prior to each use.

4.18.7.1 Conditions, such as nicks, cracks, gouges, peening, weld splatter, distortion, spreading, or twisting, shall be cause for removal from service and disposal of the component.

4.19 OPERATIONS

4.19.1 LDE operations shall comply with OSHA, NASA-STD-8719.9, and the requirements in this chapter. Contractors, agencies, and organizations utilizing LDE shall be responsible for assuring that personnel are trained and informed of the hazards associated with LDE operations. Personnel shall be responsible for abiding by safety standards and procedures applicable to LDE operations.

4.19.2 A recognized safety hazard analysis shall be performed on all lifting devices used for critical lifts, per NASA-STD-8719.9.

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4.19.3 Safety Devices

4.19.3.1 Lifting device operators shall:

a. Be knowledgeable of the operation of safety systems on lifting devices.

b. Understand that safety devices, such as interlocks and limit switches, shall not be used for operational controls.

c. Be trained to approach operational limits (i.e., limit switches) only at slow speed.

4.19.4 Procedures

4.19.4.1 An approved lift plan with detailed procedures shall be required for all critical and engineered lifts.

4.19.4.1.1 Lift plans for critical and engineered lifts shall be approved by the LDEM.

4.19.4.2 Changes to approved lift plans during lifting operations shall be approved by the SFAB personnel or designee present at the lift. Lift plans shall address the following:

a. Identification of the LDE,

b. Identification of the weight and the center of gravity of the load,

c. Identification and mitigation of hazards,

d. Verification of operator and LDE certifications,

e. Verification of appropriate weather conditions,

f. Verification of pre-operational LDE inspection,

g. Verification of the keep-out-zone for safety of non-lift personnel, and

h. Detailed description of the lifting process.

4.19.5 Communications

4.19.5.1 Signal persons shall be trained on the types and application of signal methods (e.g., hand, radio) and LDE operations.

4.19.5.2 The operator of the LDE shall not engage in any movement of the lifting device without receiving an appropriate signal.

4.19.5.3 Critical, complex, or blind lifts shall require constant communication between the lifting device operator and signal person(s). In the event communication ceases, the operator shall stop until communication is reestablished.

4.19.6 Safety of Non-lift Personnel

4.19.6.1 Keep-out-zone(s) shall be established prior to the initiation of lifting operations. Keep-out-zones shall be conspicuously defined with an appropriate barrier (e.g., rope, tape, cones). Only personnel associated with the lifting operation shall be allowed inside the barrier.

4.19.7 Safety of Lift Personnel

4.19.7.1 Personnel executing LDE operations or working inside the barrier shall use

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appropriate PPE based on the hazards that are present or likely to be present. Minimum PPE requirements for lifting operations are protective footwear, hard hats, and safety glasses.

4.19.7.2 Personnel handling the load or rigging equipment shall also wear appropriate protective gloves.

4.19.8 Outdoor LDE Operations

4.19.8.1 The effects of wind on the load and lifting device shall be considered in all hoisted-load lifting operations.

4.19.8.2 For material lifts, hoisted-load lifting operations shall not commence if winds exceed the requirements of the lifting device manufacturer.

4.19.8.3 For personnel lifts, winds shall not exceed 10 mph steady-state or 15-mph gusts.

4.19.8.4 Lifting operations shall be suspended if winds exceed 30 mph, regardless of the lifting device manufacturer rating.

4.19.8.5 Lifting operations shall not to be initiated while under a lightning or severe weather warning.

4.19.8.6 In the event of severe weather conditions or if lightning occurs during a lifting operation, the designated person and SFAB Representative (if present) shall determine appropriate action (e.g., secure the load and terminate the lift).

4.19.8.7 Stability Factors

4.19.8.7.1 LDE operators shall consider the potential for tipping with or without use of outriggers, such as wind conditions, ground conditions, the action of freely suspended loads, condition and inflation of rubber tires, boom lengths, and operation speeds.

4.19.9 Emergency Procedures

4.19.9.1 The procedure for loss of power, overload, component failure, or loss of controllability of any lifting device shall consist of:

a. Secure main power source for power-operated equipment by contacting qualified personnel, if necessary.

b. Lockout and tagout the lifting device.

c. Secure the affected area.

d. Initiate an emergency trouble call.

e. Notify the LDEM and SFAB representative.

f. Emergency lowering of the load, if appropriate, shall follow the instructions in the lifting device operating manual for those lifting devices equipped with this feature.

4.19.10 Explosives Safety

4.19.10.1 LDE operations for handling explosives, propellants, and pyrotechnics shall comply with NASA-STD-8719.12.

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4.20 MAINTENANCE

4.20.1 COD, through their support maintenance contractor, shall be responsible for maintenance of LaRC lifting devices identified in the MAXIMO database.

4.20.2 Maintenance inspections shall be documented in LF 558.

4.20.3 The maintenance program shall be Reliability Centered Maintenance (RCM) while ensuring compliance with the minimum requirements of OSHA, NASA-STD-8719.9, and the OEM.

4.20.4 Responsibilities

4.20.4.1 COD shall:

a. Maintain and certify NASA-owned or leased LDE unless otherwise approved by the NASA LDEM.

b. Provide repair maintenance, scheduling, testing, and certification of lifting devices identified in the MAXIMO database.

c. Support and coordinate LDE operations throughout the Center.

4.20.4.2 The Maintenance Contractor shall:

a. Provide repair maintenance for NASA-owned lifting devices and shall provide oversight and coordination with outside contractors performing repair maintenance.

b. Perform preventive maintenance tasks and condition inspections on inventory of cranes, monorails, and hoists, as described in the MAXIMO database, and shall perform the tasks at the frequencies specified in the work plans.

c. Maintain OEM manuals for lifting devices.

4.20.5 CMMS work plans shall be used to initiate and record lifting-device maintenance activity. Deficiencies discovered during a preventive maintenance activity may be corrected during that activity or by a future corrective maintenance activity.

4.20.6 Deficiencies that impact the safe operation of the lifting device shall be corrected immediately, or the lifting device shall be taken out of service (i.e., administratively tagged out) until corrective action is complete.

4.20.7 Deficiencies shall be recorded in the CMMS database or the appropriate nonconformance system.

4.20.8 Repair or Replacement Components

4.20.8.1 Repaired or replaced components shall be in accordance with OEM requirements. Load-bearing structural members or major components of LDE that are cracked, bent, broken, or excessively worn shall be repaired or replaced.

4.20.8.2 All repair and replacement activities shall be documented in the work plan and entered into the CMMS.

Note 1: Major repairs to items in the load path of LDE require notification to the LDEM, and subsequent proof load test and new certification.

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Note 2: Repaired or modified LDE components that do not affect the lifting or holding capability of the LDE shall undergo a functional check prior to the LDE being placed back into service to verify the component repairs or modifications are acceptable.

Note 3: Replacement in kind is not considered a modification and does not require LDEM approval.

4.20.8.3 Scheduling Equipment Inventory

4.20.8.3.1 CMMS generated work plans shall be used to schedule maintenance activity.

4.20.8.4 Modifications or Additions

4.20.8.4.1 Modifications or additions that affect the capacity or safe operation of the LDE shall be prohibited, except where the requirements of OSHA, NASA-STD-8719.9, and NCS are met. Modifications to upgrade, rerate, or modernize LDE require LDEM approval.

Note: Restoring LDE to its original condition by technically recognized and accepted procedures is not a modification or addition, provided the capacity or safe operation of the LDE is unchanged.

4.20.9 Severe Service Environments (Maintenance)

4.20.9.1 The operating environment of lifting LDE has an impact on maintenance, testing, and inspection requirements. Factors such as corrosive atmospheres or elevated oxygen environments that are associated with clean room operations and test facilities can introduce factors that accelerate the deterioration of components and structural elements. These factors require that LDE receive preventive maintenance, testing, and inspection on a more frequent basis than LDE subjected to normal operating environments. LDE with a severe service shall have a tailored maintenance, testing, and inspection program that accounts for the unique operating environment.

4.21 LABELING AND TAGGING

4.21.1 Slings and rigging hardware shall be tagged to clearly identify the manufacturer, the rated capacity, and the test certification date.

4.21.2 Labels and tags for synthetic web and synthetic fiber round slings shall include:

a. Name or trademark of manufacturer,

b. Manufacturer’s code or stock number,

c. Unique identification number,

d. Rated capacity by hitch type (usually vertical, basket, or choker),

e. Type of material and construction, and

f. Load test date (proof or periodic rated load test) (should be same as date of manufacture).

4.22 RECORDS

4.22.1 LDE history files that support trend and data analysis shall be maintained, and

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shall include equipment type, manufacturer, age, maintenance, operational problems, discrepancy and corrective actions, mishaps, safety notices, variances, and load test results.

4.22.2 Load test results shall be documented in LF 557.

4.22.3 The LaRC Maintenance Contractor shall utilize CMMS for data collection, file storage of data for maintenance, and load tests of NASA-owned LDE.

4.23 PERSONNEL TRAINING AND LICENSING

4.23.1 Training shall be provided either by in-house training personnel or approved independent third-party training contractors unless noted otherwise or approved by the NASA LDEM.

4.23.2 LaRC training, licensing, certification, and medical requirements are delineated in LPR 1740.6.

4.24 LDEM ROLES, APPROVALS, AND SPECIAL PERMISSIONS

4.24.1 Additional requirements are delineated in NASA-STD-8719.9, Appendix C.

4.24.2 Responsibilities:

4.24.2.1 NASA (LDEM shall:

a. Be responsible for the overall management, maintenance, and operation of the LaRC LDE program and coordination with all contractors, tenants, and agencies.

b. Represent the Center on the Agency Lifting Device and Equipment Committee (LDEC).

c. Establish a Center LDEC and coordinate selection of committee members with contractors, tenants, and agencies.

d. Chair the LDEC. The LDEC shall meet semi-annually, or more frequently as needed, to review program performance and initiate program revisions and corrective actions. The LaRC committee charter and membership is documented under the LaRC Executive Safety Committee.

e. Review designs, specifications, and statements of work for modified or new LDE (excluding standard rigging hardware), and provide recommendations that promote compliance with NASA-STD-8719.9.

4.24.2.2 Alternate NASA Lifting Device and Equipment Manager shall:

a. Have the delegated authority to act on behalf of the LDEM.

b. Support the overall management, maintenance, and operation of the LaRC LDE program.

4.25 SUSPENDED LOAD OPERATIONS

4.25.1 Suspended Load Operations shall comply with the OSHA-approved NASA Alternate Standard for Suspended Load Operations (i.e., Appendix A of NASA-STD-8719.9).

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4.25.2 Suspended load operations at LaRC shall be a last resort and shall only be considered when no other options are possible.

4.25.2.1 Suspended load operations shall have approval from the LDEM and the LaRC Safety Manager.

4.25.3 Personnel shall not be located under a suspended load except as specifically authorized by the NASA Alternate Standard for Suspended Load Operations.

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CHAPTER 5: SHOP MACHINERY SAFE WORK PRACTICES

5.1 GENERAL

5.1.1 This chapter sets forth the minimum safe work practice requirements for LaRC's use of machining equipment and tools in shops and facilities.

5.2 INTRODUCTION

5.2.1 This policy is applicable to:

a. Machine Shops,

b. Carpentry Shops,

c. Facilities containing any shop equipment, or

d. Other working areas that use machinery for the purpose of fabrication (e.g., plastics, wood, glass, ceramics).

5.2.2 The locations listed in Section 5.2.1 shall be collectively referred to as "shops" for the remainder of this chapter.

5.2.3 Each facility that operates a shop shall be responsible for its safe and compliant operation and shall ensure the implementation of these safe work practices.

5.2.4 It shall be the responsibility of all supervisors to ensure safe working environments that comply with OSHA and other applicable regulatory standards and that their personnel comply with the operating practices listed in this chapter.

5.3 RESPONSIBILITIES

5.3.1 Each organization operating a shop shall:

a. Designate a qualified and/or competent person representing the organization, herein known as the Shop/Facility Safety Representative, to implement the safety measures outlined in this chapter.

b. Maintain an inventory of shop machinery, machining tools, and associated fabrication and supporting equipment.

c. Update annually information on operational shops including equipment inventories, designated Shop/Facility Safety Representatives, and JHA, etc.

d. Ensure that safety work practices are monitored and audited by the Shop/Facility Safety Representative and their management to ensure ongoing safety in their shops.

5.3.2 The Shop/Facility Safety Representative shall:

a. Manage the operation of equipment or machining tools in the shop and ensure that they are operated safely and per the approved Shop Safety Plan.

b. Stop any personnel from using the shop machining equipment or tools if that individual does not comply with the approved Shop or Facility Safety Plan.

c. Be knowledgeable about safety protocols and procedures to ensure the safe use of all tools and machinery in the shop.

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d. Maintain and document the key elements of the Shop Safety Plan.

5.3.2.1 The Shop or Facility Safety Representative role is a collateral duty.

5.3.2.2 The Shop/Facility Safety Representative does not have any supervisory control over the personnel utilizing the equipment in the shop other than ensuring the proper safe use of the equipment.

5.4 SHOP SAFE WORK PRACTICES

5.4.1 The Shop Safety Plan shall include:

a. Contact information for the FSH and Shop/Facility Safety Representative;

b. An inventory of machinery or machining tools in the shop;

c. A list of personnel authorized to use the shop;

d. Documented training program and records;

e. Job Hazard Analysis, if needed; and

f. A copy of the shop's policies and procedures, to include:

(1) General rules for housekeeping and safety;

(2) Operating attire (i.e., tie back long hair, roll back sleeves);

(3) Training requirements;

(4) Emergency procedures, including contact information;

(5) A pre-use inspection process;

(6) Personal protective equipment requirements, and

(7) Lockout/Tagout requirements.

5.4.2 The Shop Safety Plan and any documentation shall be kept in the shop, if possible, or readily available, if kept elsewhere.

5.4.3 The Shop Safety Plan shall be made available to the shop users and other personnel.

5.4.4 All machine tools and equipment that are deemed unsafe shall be removed from service and locked out until properly repaired or disposed.

5.5 CONTROLLED ACCESS TO SHOPS AND EQUIPMENT

5.5.1 Shops shall develop a method for controlling unauthorized personnel.

5.5.2 Shops shall implement a means to prevent the unauthorized use of dangerous machinery and tools through methods such as administratively locking out machinery.

5.5.3 Shops shall post a list of authorized users.

5.6 WORKING ALONE IN SHOPS

5.6.1 The practice of working alone in a shop can present significant risks and should be avoided.

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5.6.2 Working alone shall only be allowed with approval from the FSH and Shop/Facility Safety Representative.

5.6.2.1 Factors to consider in determining if personnel can work alone include the experience of the personnel accessing the shop to work alone, the type of work to be performed, equipment or machining tools to be utilized, and other shop specific circumstances.

5.7 TRAINING AND AUTHORIZATIONS FOR USE

5.7.1 Shop users shall complete training commensurate with their use of shop equipment and machining tools that ensures their safe and proficient use. Training sessions for shop users shall be conducted by a qualified operator(s) and shall be coordinated by the Shop/Facility Safety Representative.

5.7.2 The training shall include the following topics:

a. Review of the Shop Safety Plan and shop specific operating rules,

b. Dangers associated with specific tools and machinery in that shop,

c. Personal protective equipment requirements,

d. Safe use,

e. Hazards and limitations,

f. Guard placement and adjustments,

g. Cleaning and maintenance (e.g., Lockout/Tagout requirements), and

h. Equipment use demonstrations.

5.7.3 The Shop/Facility Safety Representative shall periodically observe operators and conduct refresher training as need, when a process or equipment changes, or following a mishap.

5.7.4 Training records of personnel shall be maintained by the Shop/Facility Safety Representative.

Verify the correct version before use by checking the LMS website.

CHAPTER 6: LADDER SAFETY REQUIREMENTS

6.1 GENERAL

6.1.1 This chapter sets forth the minimum procedural requirements for ladder usage and maintenance at LaRC.

6.2 PORTABLE LADDER GENERAL REQUIREMENTS

6.2.1 Procurement and Selection

6.2.1.1 Ladders shall conform to the specifications outlined in ANSI ASC A14.1, ANSI ASC A14.2, and ANSA ASC A14.5. Only ladders meeting these standards shall be purchased or used at LaRC.

6.2.1.2 Purchase requisitions for ladders shall specify the appropriate ANSI code and type.

6.2.1.3 ANSI Type III ladders shall be prohibited from use at LaRC.

6.2.2 Care and Maintenance

6.2.2.1 Ladders shall be maintained in good usable condition at all times.

6.2.2.2 Hardware fittings and accessories shall be checked frequently and kept in good working order.

6.2.2.3 Additionally, ladders shall be inspected prior to use and those found to be defective or unsafe shall be withdrawn immediately from service and destroyed.

6.2.2.4 Ladders shall be stored in places that afford protection and where they are not a hazard when not in use.

6.3 FIXED LADDERS

6.3.1 Fixed ladders shall be designed, constructed, and installed to conform to the requirements of ANSI ASC A14.3.

6.3.2 The following considerations apply to rungs and cleats:

a. The distance between rungs, cleats, and steps shall not exceed 12 inches, shall be uniform throughout the length of the ladder, and shall be free of sharp edges, burrs, or projections that may be hazards.

b. All metal rungs shall have a minimum diameter of 3/4 inch.

c. The minimum clear length of rungs and cleats shall be 16 inches.

d. The rungs of an individual rung ladder shall be designed so that the foot cannot slide off the end.

e. Rails to top landings shall extend a distance of at least 42 inches above the landing.

f. Rungs above the top landing shall be omitted when it is necessary to pass through the rails.

g. Landing platforms shall be provided where a person must step a distance greater

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than 14 inches from ladder to roof, tank, etc.

h. All new permanently fixed ladders 24 feet or more in height shall be equipment with a ladder safety device.

i. The distance from the centerline of rungs, cleats, or steps to the nearest permanent object behind the ladder shall be not less than seven inches.

j. It shall be required that a clear area be maintained at the base of any fixed ladder which is 18 inches from the centerline of the ladder along the wall and 36 inches from the rungs on the climbing side.

k. This area should be marked on the floor to assist in keeping the area clear of obstructions.

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CHAPTER 7: TRAILER SAFETY PROGRAM

7.1 GENERAL

7.1.1 This chapter sets forth the procedural requirements for the LaRC Trailer Safety Program.

7.2 INTRODUCTION

7.2.1 All trailers shall be under the control of COD.

7.2.2 The four classifications of trailers covered by this chapter are:

a. Compressed gas (tube),

b. Liquid storage (tank),

c. Office and laboratory, and

d. Other (e.g., van type, instrument, cargo containers).

7.2.3 Vehicles supporting the movement of these trailers shall comply with the state of Virginia's roadworthiness requirements.

7.2.4 Planned movement off Center of a NASA-owned trailer shall be coordinated with the LaRC Transportation Officer prior to the expected date of movement.

7.2.5 Permanent trailers shall be properly installed per COD requirements.

7.2.6 LPR 1710.11 contains additional requirements concerning trailers.

7.2.7 Drivers shall complete LF 623 before moving a trailer to ensure that it is safe.

7.3 GASEOUS TUBE TRAILERS

7.3.1 Trailers shall be fabricated in accordance with U.S. Department of Transportation (DOT) criteria and shall require recertification every five years.

7.3.1.1 Trailers shall not be filled with gas if they have exceeded the five-year recertification period.

7.3.1.2 Trailer owners shall forward recertification information and records to COD for retention in the Pressure Systems Library.

7.4 LIQUID STORAGE TRAILERS

7.4.1 Permanent and mobile liquid storage trailers shall be fabricated in accordance with U.S. DOT criteria and shall require recertification every five years.

7.4.2 The structural integrity of liquid storage trailers for cryogenics shall be inspected in accordance with LPR 1710.40.

7.4.3 These trailers and all other liquid storage trailers shall have the required vessel inspection criteria included in the LaRC CMMS.

7.5 OFFICE AND LABORATORY TRAILERS

7.5.1 Trailers used for office or laboratories at LaRC shall be controlled by COD as set forth in LAPD 8800.15.

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7.5.2 The COD Center Facility Utilization Manager shall be responsible for the configuration and movement of these trailers.

7.5.3 Each trailer unit shall have a designated FC responsible for its normal daily management.

7.5.4 These units shall be subject to the annual safety and health audits by SFAB and fire inspection and evacuation drills performed by the PSO, at the discretion of the AHJ.

7.6 OTHER TRAILERS

7.6.1 Utility trailers, cargo trailers, and other small trailers required to have a license plate shall be included in the LaRC roadworthiness program.

7.6.2 Personnel moving trailers shall have the proper driving skills to pull and park a trailer.

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CHAPTER 8: COMPRESSED GAS CYLINDERS SAFETY

8.1 GENERAL

8.1.1 This chapter sets forth the minimum procedural requirements to address hazards associated with compressed gases, including handling and storage.

8.2 INTRODUCTION

8.2.1 Any material that is under pressure can be dangerous if it is not handled properly.

8.2.2 If the material is a compressed gas, it may be flammable, explosive, reactive, toxic, or a combination of these characteristics.

8.2.3 Because of the hazards associated with compressed gases, it is important to know their hazardous properties and how to safely handle compressed gas cylinders.

8.3 IDENTIFICATION

8.3.1 Before handling any compressed gas cylinder, personnel shall be trained to:

a. Identify the cylinder by its identification and hazard labels, not its color.

Note: Different manufacturers use different color codes.

b. Check the label for hazards and read the SDS instructions on handling requirements and protective equipment.

c. Ensure each cylinder has a label showing its maximum approved pressure and a current hydrostatic pressure test date.

d. Not handle cylinders with missing information on their labels, have expired hydrostatic pressure testing, are damaged, or are above their maximum approved pressure.

e. Notify the emergency dispatch center to initiate assessment and mitigation for cylinders not determined to be safe to handle.

8.4 HANDLING CYLINDERS

8.4.1 Only trained personnel shall unload cylinders.

8.4.2 The trained personnel shall:

a. Inspect compressed gas cylinders for damage or leaks before accepting them and at regular intervals after accepting them.

b. Move damaged or leaking cylinders to a safe, isolated storage area.

c. Use special cylinder hand trucks when moving cylinders, with the cylinder lashed to the cradle and standing as upright as possible.

d. Avoid dropping, banging, or rolling cylinders.

e. Keep cylinders away from fire, heat, and sparks.

f. Open the valve slowly when using cylinders, with the discharge end of the cylinder pointed away from personnel.

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g. Ensure cylinder hoses and connections are clean and are in good condition before the cylinder is used.

h. Screw down the protective metal cap to the last thread when cylinder is not in use.

i. Label empty cylinders.

j. Keep empty cylinders separate from full cylinders.

k. Not use cylinders in confined spaces.

8.5 STORAGE

8.5.1 Compressed gas cylinders shall not be stored in temperatures above 125 °F

(51.7 °C), in direct sunlight, or subjected to artificially created low temperatures.

8.5.2 Cylinders shall be kept upright, secured with a chain or cable, in a safe, fire-resistant, well-ventilated area, and away from heat sources, combustible materials, and electrical wiring.

8.5.3 Cylinders shall be grouped with others of the same contents, while empty cylinders shall be stored separately.

8.5.4 Stock shall be rotated to use older cylinders first.

8.6 COMPRESSED GASES REQUIRING SPECIAL HANDLING

8.6.1 The following procedural requirements are for compressed gases requiring special handling:

a. Oxygen cylinders shall be kept away from combustible or flammable materials and fire hazards, including oil or grease on hands, clothes, and in the work area.

b. Oxygen shall not be used in place of compressed air.

c. Chlorine and fluorine shall not be mixed with acetylene and exposed to light, as they may explode.

d. Chlorine shall not be mixed with water, as it eats into iron and steel equipment.

e. Acetylene and hydrogen are both highly explosive gases that shall be handled with extreme caution.

f. Acetylene bottles shall always be kept upright to prevent the possibility of a gas leakage or explosion.

8.7 PRESSURIZED LABORATORY SYSTEMS SAFETY

8.7.1 The Laboratory Pressure Systems Operator or Researcher shall:

a. Understand pressure system safety concepts.

b. Understand the function of their specific pressure systems.

c. Be familiar with SOPs for their laboratory system.

d. Be familiar with Process and Instrumentation Diagrams (P&IDs), if applicable.

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e. Understand the risks and their controls associated with specific pressure system operations.

8.7.2 Laboratory personnel shall submit a LF 533 for use with small, long term (i.e., greater than six months) laboratory or research systems having a compressed gas cylinder attached to COTS laboratory equipment.

8.7.3 Systems using gas cylinders as their source of fluid shall include adequately sized pressure relieving devices on the downstream side of the pressure regulator.

8.7.4 The systems at the laboratory shall be set up per the following diagram, in accordance with LPR 1710.40.

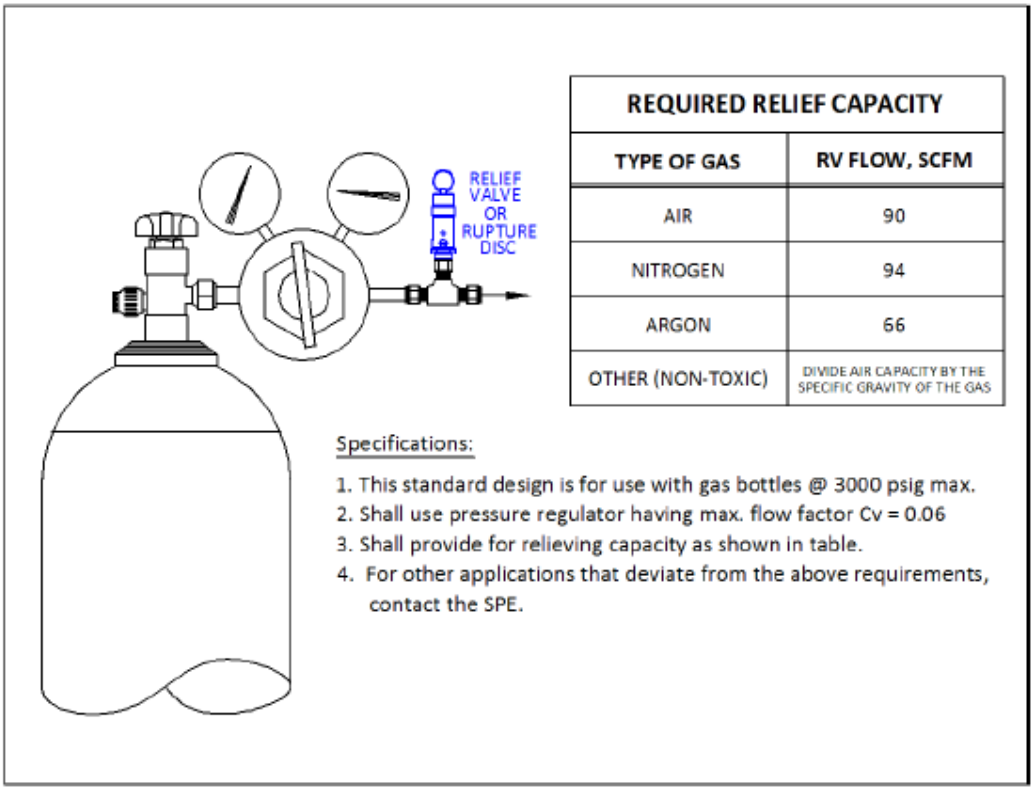

Figure 8-1, Required Relief Configuration

8.7.5 Pressure relief valves shall not be installed in the outlet gauge port. See Figure 8-1 for details.

8.7.6 Flex hoses installed in a laboratory pressure system shall have the proper test tagging and restraints.

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CHAPTER 9: FACILITY SAFETY AND HEALTH AUDITS AND INSPECTIONS

9.1 GENERAL

9.1.1 This chapter sets forth the minimum procedural requirements for conducting Safety and Health Audits and Monthly Inspections of the facilities at LaRC.

9.2 ANNUAL FACILITY SAFETY AND HEALTH AUDITS

9.2.1 The Annual Facility Safety and Health Audit Program is a comprehensive, announced, and scheduled general inspection conducted annually for LaRC facilities by SFAB.

9.2.2 Responsibilities

9.2.2.1 SFAB shall:

a. Coordinate and conduct the Annual Facility Safety and Health Audit Program. The annual audits include:

(1) Safety and industrial hygiene audits, and

(2) Health physics audits.

b. Manage the System for Tracking Audits/Assessments and Review (STAR).

c. Record audit results in STAR.

d. Conduct follow-up inspections on findings requested to be closed.

e. Conduct follow-up inspections after the due date for findings requested abated or corrected per terms of the Corrective Action Plans (CAPs) recorded in STAR.

f. Assess the risk of each audit finding and assign a Risk Level: “1—Immediate Danger”; “2—Serious (less than imminent)”; “3—Routine (less than serious).”

g. Stop all activity that is immediately hazardous to life and property (i.e., Risk Level 1) and coordinate with the supervisor, the FSH, and the FC to remove personnel from the area and begin abatement of the hazard.

h. Conduct occasional informal and unannounced inspections as needed, to determine the general safety and health of facilities.

i. Review and approve CAPs for all inspection findings not corrected in the assigned time period based on the finding’s risk level.

9.2.2.2 FSHs shall:

a. Accompany the audit team for all formal safety and health audits and inspections.

b. Take immediate proper actions to protect personnel and equipment when safety or health concerns are observed or reported.

c. Address all inspection findings assigned to them or their organizations.

d. Create a SFAB-approved CAP to inspection findings that cannot be closed within the time allowed by the assigned risk level.

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e. Maintain and update their facilities' CAPs in STAR.

f. Post audits until all findings are corrected and closed.

Note: The FC may assist the FSH in any of the above responsibilities.

9.2.2.3 Supervisors shall:

a. Ensure that any finding brought to their attention is properly addressed through either immediate corrective action or the development and implementation of a CAP.

9.2.2.4 Personnel shall:

a. Report any safety, health, or life safety code violations immediately to the FC, FSH, supervisor, or SFAB at (757) 864-7233.

9.3 MONTHLY FACILITY SAFETY INSPECTIONS

9.3.1 Responsibilities

9.3.1.1 SFAB shall:

a. Conduct randomized checks of monthly inspections to monitor the status of issues identified during walkthrough inspections.

b. Produce a monthly report for the SMAO Director.

c. Ensure compliance with LMS-CP-4709.

9.3.1.2 FSHs shall:

a. Conduct Facility Safety Head Monthly inspections per LMS-CP-4709.

9.3.1.3 FCs and supervisors shall:

a. Take immediate proper actions to protect personnel and equipment when safety or health concerns are observed or reported by the FSH.

9.3.1.3.1 FCs and supervisors are encouraged to participate in the Monthly Facility Safety Inspections of their areas or facilities with the FSH.

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CHAPTER 10: MOTOR VEHICLE AND TRAFFIC SAFETY

10.1 GENERAL

10.1.1 This chapter sets forth the minimum procedural requirements for motor vehicle and traffic safety policy at LaRC.

10.2 INTRODUCTION

10.2.1 The NASA Langley traffic regulations and traffic violations are described in LAPD 1700.7.

10.3 MOTOR VEHICLE OPERATION

10.3.1 Personnel operating any motor vehicles on NASA property or operating NASA vehicles either on or off NASA property shall:

a. Not use hand-held communication devices while vehicles are in motion, except for emergency, security, and fire vehicles during official operations.

Note 1: This includes cell phones, UHF radios, or other hand-held wireless communication devices. When there are two individuals traveling during official operations in an emergency, security, or fire vehicle, the passenger should be the person to use the hand-held communication device.

Note 2: Hands-free communication devices are allowed.

b. Have training commensurate to the complexity of the vehicle being operated.

(1) Such training shall be specified and completed before vehicles are issued to personnel.

(2) Training completion shall be verified and documented by the vehicle-issuing official.

10.3.2 Only approved fuel-delivery methods and storage devices shall be used to transport fuel on any vehicle operated on NASA property.

10.3.2.1 Any fuel storage containers to be transported in motor vehicles shall be done in accordance with the manufacturer recommendations and LPR 1710.11.

10.3.3 All doors on a motor vehicle, including all side doors and any rear doors, shall be securely closed whenever the vehicle is driven anywhere on Center.

10.3.3.1 If a vehicle’s doors need to be open while in motion, then a safety net shall be installed to prevent personnel or equipment from inadvertently falling off the vehicle.

10.4 MODIFICATIONS TO VEHICLES USED ON LARC OR FOR OFF-CENTER OFFICIAL BUSINESS

10.4.1 NASA-Owned Vehicles

10.4.1.1 COD’s Office of Logistics shall be responsible for all NASA-owned vehicles on LaRC.

10.4.1.2 Any questions as to the use or modification of NASA-owned vehicles shall be directed to the Center’s Transportation Officer.

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10.4.1.3 The Center’s Transportation Officer shall coordinate with the Center Safety Manager on any modifications to NASA-owned motor vehicles that may affect the safety of the operators or the occupants.

10.4.1.4 The COD’s Office of Logistics shall ensure that any modifications to NASA-owned motor vehicles are done in accordance with the manufacturers’ instructions and done by a certified technician.

10.4.2 Contractor-Owned Vehicles

10.4.2.1 Contractors operating motor vehicles on Center shall ensure that any modifications to their motor vehicles are done in accordance with the manufacturers’ instructions and done by a certified technician.

10.5 SEAT BELTS

10.5.1 Center policy requires the use of seat belts for all occupants of motor vehicles operated on NASA property, including delivery vans and trucks of all sizes, at all times the vehicle is in motion.

10.5.1.1 All Federal personnel shall use seat belts while on official business. This requirement also covers passengers riding in government vehicles.

10.5.1.2 Personnel shall ensure all children required to sit in child safety seats sit in appropriate child safety seats, as required by Virginia State law.

10.5.2 Passengers shall not be carried in the cargo area of pickup trucks, flatbeds, or special purpose equipment (e.g., fire trucks, escape trucks) unless designated occupant positions with seat belts are provided.

10.5.3 All modifications of NASA-owned vehicles to allow for additional seating shall be approved in advance by the Center’s Transportation Officer.

10.5.3.1 All modifications shall be able to meet Federal, State and Local inspection regulations as related to seat belts.

10.5.4 All modifications of contractor vehicles to allow for additional seating shall be able to meet Federal, State, and Local inspection regulations as related to seat belts.

10.6 MOTOR VEHICLE INSPECTIONS

10.6.1 Annual Inspections

10.6.1.1 The Center’s Office of Logistics management shall ensure that all NASA-owned motor vehicles used on and off NASA Centers are inspected annually to the standards of the State or other jurisdiction's vehicle safety inspection requirements.

10.6.1.2 All contractor-owned vehicles operated on Center shall be inspected annually by a State-authorized inspection station.

10.6.2 Routine Inspections

10.6.2.1 Drivers should examine a vehicle before operation to ensure that it is safe. This examination should include a check of the following items:

a. Tires and tire pressure;

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b. Directional signals, headlights, tail lights, and brake lights;

c. Fuel supply;

d. Spare tire and accessories;

e. Windshield wipers;

f. Fire extinguishers (if applicable); and

g. Placards (when transporting hazardous materials).

10.7 TRAFFIC CONTROL DEVICES AND MARKINGS

10.7.1 The COD shall be responsible for all markings on streets and street signage.

10.7.2 All markings and signage shall be in accordance with ANSI D6.1.

10.7.3 All NASA-owned vehicles shall include appropriate signage regarding: (1) the usage of seat belts, (2) the need to remain seated while vehicles are in motion, (3) the restriction on cell phone use and other hand-held communication devices, and (4) that smoking is restricted in all government vehicles.

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CHAPTER 11: SAFETY PERMIT CONFIGURATION REQUIREMENTS

11.1 GENERAL

11.1.1 This chapter sets forth the process for the development, implementation, and revision of Safety Permits, their supporting documentation, and any SOPs covered under a Safety Permit.

11.2 INTRODUCTION

11.2.1 The requirements in this chapter shall be followed when issuing any Safety Permit (e.g., Laser, Potentially Hazardous Materials, Explosives) and when developing any SOPs under those Safety Permits. Deviations from this chapter may be permitted to enhance clarity, but shall be approved by the LaRC Safety Manager or designee.

11.2.2 For the purpose of this chapter, Safety Permit SOPs are defined as detailed, written, formal instructions for operators to use during operation of a laboratory, a laser, explosives, equipment, or a facility under a Safety Permit.

11.2.3 SFAB shall keep the official copy of the approved permit and procedures, and make them publicly available to Center personnel.

11.2.4 The title pages of the safety permits' procedures and Standard Operating Procedures shall be marked conspicuously with "THIS DOCUMENT CONTAINS HAZARDOUS OPERATIONS PROCEDURES" to alert operators that strict adherence to the procedural steps and to the safety and health precautions is required to ensure the safety and health of personnel and equipment.

11.3 SAFETY PERMITS CONFIGURATION CONTROL

11.3.1 All Safety Permits' supporting documentation shall have the following information on each page: (1) permit number, (2) revision number, if applicable, and (3) expiration date.

11.4 TYPES OF STANDARD OPERATING PROCEDURES

11.4.1 Any SOP developed to operate or support a Safety Permit shall have the following sections, if applicable:

a. Pre-Operational

(1) The Pre-Operational section includes: (1) all activities required to bring systems or subsystems from a dormant or safe condition to a condition ready for operation, (2) personnel required to operate the systems or subsystems, and (3) pre-operational maintenance and safety checks (optional).

b. Operational

(1) The Operational section includes all activities required during active operations of the facility or system. This also includes all activities required to turn around or recycle the facility or system for additional runs.

c. Post-Operational

(1) The Post-Operational section includes all activities required to bring the facility

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from an operational condition to a dormant or safe condition.

d. Tasks and Sub-Tasks

(1) The complexity of the system dictates the detail and number of tasks and sub-tasks required.

e. Line Items or Steps

(1) Line Items or Steps define actions that shall be performed to accomplish a task or sub-task.

(2) The steps shall be presented in a chronological order and shall be sufficiently detailed to permit an operator to safely operate the facility or system.

11.5 STANDARD OPERATING PROCEDURES FORMATTING REQUIREMENTS

11.5.1 Each SOP under a Safety Permit shall have an identification designation. An example of an identification designation for a Safety Permit SOP is “Permit Num-###-ltr.” Each part of the identification designation is defined below:

a. “Permit Num” – Identifies the permit number that controls this procedure.

b. “###” – Identifies the SOP. Even if there is only one SOP for the safety permit, the SOP needs to be identified and revision controlled.

c. “ltr” – Identifies SOP revision.

11.5.2 The SOP Identification shall be entered in the upper right-hand corner of each page.

11.5.3 Page numbers shall be entered at the bottom center of each page of the SOP.

11.5.4 The statement “Configuration Controlled Item” shall be entered at the top center of each page.

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CHAPTER 12: FACILITY RESUME

12.1 GENERAL

12.1.1 This chapter sets forth the minimum procedural requirements for implementing and maintaining Facility Resumes at LaRC.

12.2 APPLICABILITY

12.2.1 All High or Medium Safety Risk facilities shall implement and maintain a Facility Resume (FR). Facility risk levels are provided in the Facility Safety Personnel List (FSPL) and are determined according to LMS-CP-8715, “Facility Risk Tier Determination.”

12.2.2 The implementation and updates of the FR is the responsibility of the FSH with the concurrence of the FC.

12.2.3 Facilities classified as Low Safety Risk are not required to implement and maintain a FR.

12.3 FACILITY RESUME REQUIREMENTS

12.3.1 Facility Resumes shall contain the following items:

a. A statement indicating that a list of all relief devices and valves located within the facility can be found in the CMMS, “Maximo.”

b. A statement indicating: (1) that the FC is responsible for coordinating and approving the facility’s LOTO energy control procedures and (2) the physical location of the Lockout/Tagout records.

c. A statement indicating that a current copy of the “Configuration Baseline List” is available in Facility Configuration Management System (FCMS).

d. A statement indicating the location of the facility’s working master documentation.

e. A statement indicating that the chemical inventory and SDS of the facility are available in the LaRC CMTS.

f. A statement noting the location of facility's calibration process and calibration records (e.g., web site address or specific room number and file cabinet).

g. A copy of the Emergency Cutoff Procedures or the location where the Emergency Cutoff Procedures can be found, if available.

h. A copy of the IOC Facility Response Procedures.

i. A copy of the facility’s winterization plan.

j. Copies of current LF 159s, LF 121s, and LF 122s, or the location of these forms.

k. A description of the process used to certify and recertify qualified operators.

l. A description of systems located within the facility. This shall include a brief summary identifying the type of system(s) and research conducted within the facility. High-risk facilities shall provide information within the resume pertaining to the Safety Analysis Report (SAR) and other documentation available in the

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FCMS.

Note: When stating a location, the building and room number shall be included.

12.3.2 If the FR is not maintained in FCMS, then a copy of the FR shall be maintained within the facility.

12.3.3 All FRs shall be updated when any major system changes are implemented within the facility.

12.3.4 The FSH, with the concurrence of the FC, shall verify annually that their facility's FR is up-to-date.

Note: A Facility Resume template is available from the SFAB Engineering Group.

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CHAPTER 13: FALL PROTECTION ON ELEVATED STRUCTURES

13.1 GENERAL

13.1.1 LaRC's fall protection policy is to take every reasonable precautionary measure to protect the health and safety of all personnel working at height and exposed to fall hazards. Implicit in the fall protection policy is the requirement that personnel shall be protected by the use of effective fall protection control measures when working at heights in any situation that presents a foreseeable exposure to a fall hazard.

13.1.2 Supervisors, FSHs, and FCs shall ensure that each work area or task that exposes personnel to an unprotected side or edge four feet or more above a lower level will be assessed to identify the extent of the fall hazards specific to the job and actions needed to protect personnel from those hazards.

13.1.2.1 The assessment shall be conducted by a competent person or a qualified person.

13.1.2.2 The assessment shall identify all hazards associated with the job to include but not limited to access to the job location, location of work to be performed, frequency of work, any additional hazards associated with the work itself, and any other risk factors to assist in ranking of fall hazards where applicable for the purpose of hazard elimination or mitigation.

13.1.3 This chapter sets forth the minimum procedural requirements for safety and fall protection on elevated structures.

13.2 FALL PREVENTION PLANS

13.2.1 When a personal fall protection system is needed for a specific job, a Fall Prevention Plan shall be prepared by a competent person using LF 598.

13.2.2 The FC or FSH may contact the LaRC Fall Protection Program Administrator with any questions regarding Fall Prevention Plans.

13.2.3 The Fall Prevention Plan, in accordance with ANSI/ASSP Z359.2, shall:

a. Include a written discussion of measures that shall be taken to reduce or eliminate the fall hazard for personnel.

b. Detail the task, fall protection equipment, identified fall hazards, the procedure, and a rescue plan.

c. Be reviewed and approved by the qualified person, competent person, or the Langley Fall Protection Program Administrator.

d. Be kept at the jobsite for the duration of the job.

e. Be implemented under the constant supervision of a competent person.

Note: SFAB has available the results of a roof fall protection survey to help FSHs and FCs in the development of fall prevention plans.

13.2.3.1 After reviewing the plan, all personnel involved shall sign off, showing that they understand the hazards involved, the equipment to be used, and the rescue plan.

Verify the correct version before use by checking the LMS website.

13.3 DESIGN OF FALL PROTECTION SYSTEMS

13.3.1 Designs of fall protection systems in LaRC facilities shall be in accordance with the Center Operations Directorate's Langley Engineering Standard, "Architectural Standard" (LaRC-FES-ARCH).

13.4 FALL PROTECTION EQUIPMENT

13.4.1 Fall protection equipment shall be purchased in accordance with the Office of Procurement regulations for the purchasing of PPE.

13.4.2 All new personal fall arrest equipment shall meet the current requirements of ANSI/ASSP Z359 fall protection standards.

13.4.3 Already acquired equipment that does not meet ANSI/ASSP Z359 shall be reviewed and approved by the LaRC Fall Protection Program Administrator.

13.4.4 All fall protection equipment shall be initially inspected by a competent person before being placed into service at the Center.

13.4.5 Fall protection equipment shall be inspected by a competent person at intervals of no more than one year or as prescribed by the manufacturer of the equipment.

13.4.6 The competent person shall document the inspection of the equipment in the SharePoint list "Government Issue Fall Protection" managed by SFAB. Where applicable, the competent person shall also check the tag on the equipment and date the tag with the date of inspection.

13.5 ROOF ACCESS

13.5.1 Personnel accessing the roof shall meet the requirements stated in Section 1.30 of this LPR.

13.6 RESCUE

13.6.1 All Center Fall Prevention Plans shall utilize the LaRC Fire Department as their method of providing rescue to personnel.

13.6.2 Any deviations from this rescue policy shall be approved by the LaRC Fire Chief.

13.7 SCAFFOLDING

13.7.1 Scaffolds shall be designed, built, erected, and maintained as described in 29 CFR 1910.27 and 29 CFR 1926, Subpart L.

13.7.2 Personnel using, assembling, inspecting, repairing, or maintaining scaffolds shall:

a. Be trained as described in LPR 1740.6.

13.7.3 Personnel assembling, inspecting, repairing, or maintaining scaffolds shall:

a. Maintain scaffolds and other devices in a safe working condition.

b. Correct any defects, unsafe conditions, or noncompliance before further use.

c. Not use any broken, bent, excessively rusted, altered, or otherwise structurally damaged frames or accessories.

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d. Not use scaffolding components from different manufacturers or systems together unless specifically authorized to do so by the scaffolding manufacturer.

e. Inspect scaffold equipment for defective parts and structural integrity before each assembly and at the beginning of each work shift in which the scaffolding will be used. The FSH or a representative from SFAB may help in these inspections. The inspection reports shall be recorded, dated, and maintained in the office of the responsible organization.

f. Inspect wire ropes, fiber ropes, slings, hangers, platforms, and other supporting parts for defects before each installation and daily during use.

g. Inspect periodically all welded frames and accessories.

h. Remove defective equipment from service immediately. A designated scaffolding-competent person, FSH, FC, SFAB safety representative, or supervisor shall put a “WARNING - DO NOT OPERATE” tag on the equipment until it is repaired or destroyed.

13.8 REQUIREMENTS FOR WORKING ON SCAFFOLDS

13.8.1 To use scaffolding, personnel shall follow the manufacturer’s recommended work practices, as well as 29 CFR 1910.27 or 29 CFR 1926, Subpart L, and NEVER:

a. Assemble or disassemble scaffolds unless trained.

b. Work on scaffolds unless trained.

c. Alter or move a scaffold horizontally while in use or occupied unless it is specifically intended for that purpose.

d. Exceed the intended working load for the scaffold.

e. Work on scaffolds during storms or high winds or if the scaffold is covered with ice or snow.

Note: Personnel shall remove ice, snow, and sand from the planking to prevent slips.

f. Accumulate tools, materials, and debris in quantities that could cause a tripping hazard.

g. Use “shore-” or “lean-to-” type scaffolds.

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CHAPTER 14: JOB HAZARD ANALYSIS

14.1 GENERAL

14.1.1 This chapter sets forth the minimum procedural requirements for personnel to perform a JHA at LaRC.

14.2 INTRODUCTION

14.2.1 The purpose of a JHA is to provide a safety assessment technique that ensures potential hazards, related to a specific task or job, are anticipated and abated prior to beginning work on that activity.

14.3 RESPONSIBILITIES

14.3.1 SFAB shall:

a. Assist in JHA development as needed.

b. Review JHA content for thoroughness and appropriateness of hazard controls.

c. Develop and provide JHA training, as requested.

14.3.2 FSHs and FCs shall:

a. Maintain completed LF 275s in the Facility Resume.

14.3.3 Supervisors shall:

a. Identify processes that require JHAs.

b. Prioritize development of JHAs.

c. Lead the development and ensure the implementation of JHAs using LF 275.

d. Seek the help of FSH, FC, or SFAB in completing the above tasks, as needed.

14.3.4 Personnel shall:

a. Participate in JHA development.

b. Follow the procedures developed in JHAs.

c. Provide feedback to continuously improve JHAs.

14.4 TASKS REQUIRING A JHA

14.4.1 Tasks documented in the FCMS and performed under a permit reviewed by SFAB or otherwise analyzed through a standardized hazard risk assessment process are exempt from JHA development.

14.4.2 A JHA shall be used when there are no documented work processes for operating a piece of equipment.

14.4.3 JHAs shall also be used during non-routine, unique, or complex projects that require coordination of hazard mitigation requirements to meet safety and compliance objectives.

14.4.4 Any work task with a documented history of injury or illness shall receive priority for JHA development.

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14.4.5 JHAs shall be updated whenever new hazards have been identified, or the task has undergone changes in environment, processes, or procedures.

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CHAPTER 15: SAFETY REQUIREMENTS FOR THE PURCHASE OF EQUIPMENT AND SERVICES

15.1 GENERAL

15.1.1 This chapter sets forth the minimum procedural requirements for purchasing equipment or services using Credit Cards/P-cards or task orders through existing contracts or sub-contracts.

15.2 INTRODUCTION

15.2.1 The following categories of items and services require review and approval by SFAB to be purchased:

a. PHMs,

b. Contracted Services,

c. PPE and other equipment,

d. Quality sensitive items, and

e. Construction items.

15.2.2 The purchasing of items listed in this chapter requires review and approval by SFAB to ensure:

a. All associated hazards are identified and controlled to an acceptable level,

b. Appropriate PPE is utilized to prevent injury or illness,

c. Personnel receive the training or certification for operations involved in the use of certain items,

d. Safety Permits have been obtained, if required, and

e. Compliance with all applicable Federal, Local, and Center policies (e.g., National Fire Protection Association, Langley Procedure Requirements, Langley Policy Directives, Langley Management System Center Procedures).

15.3 POTENTIALLY HAZARDOUS MATERIALS

15.3.1 A NASA LF 44 shall be approved prior to the purchase of potentially hazardous materials.

15.3.2 PHMs are any substances that may pose a risk of injury or illness to personnel or destruction of property.

15.3.2.1 Examples include, but are not limited to the following:

a. Compressed gas cylinders,

b. Cryogens,

c. Explosives and pyrotechnics,

d. Lead sources,

e. Hazardous chemicals,

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f. Corrosives,

g. Lubricants,

h. Paints,

i. Solvents,

j. Epoxies and adhesives,

k. Cleaning solutions,

l. Radiation sources,

m. X-Ray or electronic devices,

n. Lasers,

o. Radio frequency and microwave devices, and

p. Ultraviolet lights.

15.4 CONTRACTED SERVICES

15.4.1 Contracted services are purchases and procurement requests that will result in the issuance of a contract (new or follow-on) for on-site services.

15.4.2 Construction Work Services

15.4.2.1 Construction work service purchases through credit cards shall only be done in accordance with NPR 5104.1. See Chapter 16 of this LPR for construction work safety requirements.

15.4.2.2 The following activities shall not be considered construction work:

a. Office work;

b. Maintenance to office equipment, such as copiers, fax machines, and computers;

c. Aircraft and vehicle repairs;

d. Job estimates and bid proposals;

e. Off-site assembly or manufacturing of structures or systems for delivery to LaRC;

f. Maintenance personnel currently working on site under a support service contract requiring them to perform daily work on the Center; and

g. The delivery or pickup of machinery and equipment, during which the driver is not tasked to perform the duties of an equipment operator on the jobsite.

15.4.2.3 If personnel are unsure if scheduled work is construction work or not, they shall contact SFAB branch head for a decision on classification.

15.5 PPE AND OTHER EQUIPMENT

15.5.1 Examples include, but are not limited to the following:

a. Gloves (disposable and non-disposable);

b. Fall protection (e.g., harnesses, lanyards);

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c. Eye Protection (e.g., goggles, face shields, safety glasses);

d. Laser eyewear;

e. Hearing protection (e.g., earplugs, earmuffs);

f. Head protection (e.g., hard hats);

g. Protective clothing and footwear;

h. Eyewashes and emergency showers;

i. Respirators, including self-contained breathing apparatus equipment;

j. Dust collection systems;

k. Space heaters;

Note: Need to be approved by the Center Authority Having Jurisdiction (AHJ) and the Center Energy Manager.

l. High-voltage electrical protective equipment;

m. High-noise producing equipment (> 80 dBA);

n. Safety signs;

o. Machinery and shop equipment;

p. Oxygen, flammable, or toxic gas monitors and sensors;

q. Portable ladders, stairs, and platforms;

r. Pressure and vacuum systems;

s. Scaffolding;

t. Flammable storage cabinets; and

u. Flammable and liquid storage containers.

15.6 QUALITY SENSITIVE ITEMS

15.6.1 Examples include, but are not limited to the following:

a. Space flight projects and drop models;

b. Flight demonstration vehicles (e.g., radio controlled, Airworthiness, Safety Review Board reviewed vehicles);

c. Vehicles or space flight projects that could end up as flight hardware protoflight or engineering models;

Note: Qualified flight hardware for aircraft qualified to a Federal Aviation Administration (FAA) Technical Standard Order are excluded.

d. Design or development of space flight hardware, and flight project hardware, as described above; and

e. Software or software activities for space, aeronautical flight, and wind tunnel projects, including not limited to, the design, development, documenting, testing,

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maintenance, and Independence Verification and Validation.

Note 1: Application and commercial off-the-shelf software that will not be utilized in a space flight project or wind tunnel are excluded.

Note 2: Software classified as safety critical shall also comply with applicable LPR 7150.2 requirements.

15.7 CONSTRUCTION ITEMS

15.7.1 Examples include, but are not limited to the following:

a. Elevators,

b. Emergency lighting,

c. Equipment or services that will become a permanent part of a facility,

d. Facility modifications (e.g., installation or modification to walls, partitions, doors, etc.),

e. Modular housing (e.g., trailers, offices),

f. Fire detection and prevention equipment,

g. Fixed ladders, and

h. Ventilation and exhaust systems, including fume hoods.

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CHAPTER 16: CONSTRUCTION SAFETY REQUIREMENTS

16.1 GENERAL

16.1.1 This chapter sets forth the minimum procedural requirements for construction safety at LaRC.

16.2 INTRODUCTION

16.2.1 Personnel who manage, perform, and provide support for construction work located on all property under the jurisdiction of LaRC shall conduct operations in compliance with the requirements identified in this chapter, all applicable governing agency regulations, and agency guidelines pertaining to safety in construction.

16.2.2 The U.S. Government considers the prime contractor to be responsible for the safety and health of their personnel and subcontractors. Contractors shall be responsible for informing their subcontractors of the safety provisions under the terms of the contract and the penalties for noncompliance.

16.2.3 All construction personnel shall attend the LaRC Construction Safety Briefing, conducted daily at 7:30 a.m. at the Badge and Pass Office conference room, prior to beginning work at LaRC. The briefing is valid for one year from the date taken.

16.2.4 The Center Maintenance, Operations, and Engineering (CMOE) contractor is authorized to conduct the LaRC Construction Safety Briefing for their construction subcontractors. Their briefing is valid for one year from the date taken.

16.2.5 All requirements listed in this Chapter that pertain to contractor responsibilities with respect to construction activities shall be considered within the scope of their associated contract’s Statement of Work.

16.2.6 The requirements defined below can be tailored by SFAB and the COR based on project scope.

16.2.6.1 Construction work is the construction, installation, assembly, modification, servicing, and repair of new facilities, or the demolition of existing facilities to any LaRC on-site facility, structure, or equipment involving the following:

a. Chemical, paint, or solvent usage;

b. Pressure or vacuum systems or vessels, and compressed air;

c. Cryogenic, nitrogen, or oxygen systems, and other gas distribution systems;

d. Exhaust or ventilation systems, spray booths, fire and smoke dampers, and fume hoods;

e. Installing or removing permanent eyewash stations;

f. Installing or removing walls, ceilings, partitions, stairs, or doors;

g. Installing or removing tile or carpet;

h. Pipe and duct insulation or HVAC systems;

i. Elevators, cranes, or other lifting devices;

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j. Plumbing;

k. Electrical wiring or systems, transformers, and switchgear equipment, and power transmission lines or systems;

l. Sanding, cutting, or welding, including hot work;

m. Roofing work;

n. Confined spaces;

o. Installing or removing exit signs, emergency lighting, gas monitoring systems, smoke detection, fire suppression, fire hydrants, water mains, or other piping that supplies fire suppression systems;

p. Roadways, sidewalks, curbs, airfields, and gutters or sewers, irrigation or drainage systems;

q. Digging, shoring, and trenching;

r. Pyrotechnics and explosives;

s. Any aeronautic or space flight lab, assembly, or test facility and associated equipment (e.g., simulators, clean rooms, lasers, anechoic chambers);

t. Surveying; and

u. Clearing of land by cutting, removing, burning, or other disposition of trees or shrubbery.

16.3 RESPONSIBILITIES

16.3.1 Organizations responsible for construction work shall:

a. Designate a construction/project manager to oversee the work.

Note: For the CMOE contract, designation of the construction/project manager shall follow the existing contract requirements.

16.3.2 Construction/Project Managers shall:

a. Ensure that the FC and the FSH are informed of construction or demolition activities to be conducted in their facilities prior to any work performance.

b. Ensure that a survey to determine the presence, location, and quantity of asbestos- or lead-containing materials is conducted prior to any work performance, if applicable.

c. Ensure that all construction or demolition activities are conducted in accordance with NASA policies and all applicable regulations that pertain to construction safety.

d. Coordinate all construction work with COD Projects and Engineering Branch (PEB) and SFAB.

e. Include jobsite Safety and Health Plan requirements in construction contracts.

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f. Ensure that construction or demolition does not start until SFAB approves the jobsite's Safety and Health Plan.

g. Ensure all construction personnel attend the Construction Safety Briefing, conducted daily at 7:30 a.m. at the Badge and Pass Office conference room, prior to beginning work at LaRC.

h. Maintain communication with the LaRC Construction Safety Specialist to ensure:

(1) Monitoring of construction activities,

(2) Participation in bid walks, and

(3) Participation in pre-construction and weekly progress meetings.

i. Coordinate confined space activities as required in Chapter 3 of this LPR.

j. Ensure that existing utilities (e.g., electrical, gas, steam, HVAC) requiring shutoff are identified and that a written, jobsite specific Lockout/Tagout plan has been established.

16.3.3 LaRC Contracting Officer/COR shall:

a. Invoke the "Stop Work" provision of the contract should the contractor or subcontractors refuse or fail to ensure prompt corrective action of safety deficiencies.

b. Ensure that every construction project has a designated construction/ project manager.

c. Submit contractor Safety and Health Plans, authorized work plans, and all associated documentation to the LaRC Safety Manager for review.

d. Ensure that construction contractors implement and comply with the approved Safety and Health Plan.

e. Ensure that all construction activities are conducted in accordance with NASA policies and all applicable regulations that pertain to construction safety.

f. Ensure SFAB is included in any post-award conference meetings.

16.3.4 Prime Construction Contractors shall:

a. Be responsible for all construction activities associated with their contract or construction project.

b. Comply and require all subcontractors to comply with NASA construction safety requirements and all applicable regulations that pertain to construction safety and health.

c. Not begin work until SFAB has approved the Safety and Health Plan.

d. Ensure that no deviation from the approved Safety and Health Plan submittals occur without the approval of SFAB.

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e. Comply with the provisions of the approved construction Safety and Health Plan and associated documentation.

f. Designate a competent person with responsibility for safe work procedures and authority to correct unsafe conditions.

g. Conduct and document jobsite safety inspections.

h. Ensure that all personnel are fully aware of the hazards associated with the project.

i. Ensure any hazards created at the jobsite are immediately abated.

j. Notify construction/project manager, the LaRC Construction Safety Specialist, and the COR immediately upon discovery of any health and safety deficiency that the contractor cannot resolve.

k. Notify construction/project manager and the LaRC Construction Safety Specialist immediately upon awareness of an inspection by regulatory agency personnel, including OSHA.

l. Notify the LaRC Construction Specialist as soon as practical after an accident or mishap.

m. Investigate and document any accident or mishap at the jobsite and submit a copy to SFAB.

n. Develop a written site-securing process and a severe weather and emergency action plan to identify communication and evacuation procedures.

o. Display required safety information at the jobsite per Section 16.4 of this LPR.

16.3.5 SFAB shall:

a. Provide construction safety oversight for construction projects.

b. Review and evaluate all construction Statements of Work (SOWs), contractor Safety and Health Plans, and all associated documentation prior to the start of construction projects.

c. Accompany regulatory agency personnel, including OSHA inspectors, on construction site visits.

d. Assign a LaRC Construction Safety Specialist to oversee each construction project.

e. Conduct regular jobsite inspections for compliance with NASA policies and all applicable governing regulatory agency laws and guidelines for construction activities.

f. Notify responsible parties of safety hazards to initiate remediation on construction jobsites.

g. Attend construction projects' bid walks, pre-construction meetings, and post-award conference meetings to communicate safety expectations and provide guidance to the COR, construction/project managers, and

contractor personnel.

h. Support construction-related mishap investigations per LaRC requirements.

i. Issue a LF 125, “NASA LaRC Construction Safety Survey,” to contractors to document site visits, along with any deficiencies which were identified during the visit or which were not resolved since the previous visit.

j. Issue a LF 125 to contractors when a deficiency is identified that poses an imminent health or safety hazard and notify the LaRC Safety Manager and the construction/project manager.

k. Maintain a copy of all construction project documentation related to safety and health.

l. Ensure that designated construction/project managers understand the requirements listed in this chapter.

16.3.6 Competent Persons shall:

a. Be the Safety Point of Contact (POC) for the construction project.

b. Be responsible for safety and health at the jobsite.

c. Be on site at all times when work is being conducted, including when subcontractors are performing work on site.

d. Be in a position of authority to take corrective actions to abate safety issues on the jobsite.

e. Perform and document daily jobsite safety inspections.

f. Have completed daily inspection documentation available on site.

g. Have specialized safety training to effectively recognize and correct additional site-specific hazards, such as “Fall Protection Competent Person,” “Scaffolding Competent Person,” as applicable to the jobsite.

16.3.7 FSHs and FCs shall:

a. Ensure notification to all affected building occupants before any construction work begins in their facilities.

b. Ensure construction activities in their facilities meet requirements of this chapter.

16.4 SITE REQUIREMENTS

16.4.1 Prime contractors shall assess the need for and comply with the following permits:

a. Confined space entry permits (See Chapter 3 of this LPR),

b. Hot work permits (See Section 1.26 of this LPR),

c. Digging permits (see Section 1.33 of this LPR), and

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d. Other permits, as applicable to the jobsite.

16.4.2 Display of Safety Information

16.4.2.1 Posted items shall be durable in order to withstand the outdoor elements, such as rain and sun, or be replaced frequently so they remain legible.

16.4.2.2 Items posted shall include:

a. Required site permits;

b. Emergency information including numbers to call for emergency assistance, name and location of designated medical facility; and

c. Contact information of key NASA and contractor personnel working on the project.

16.4.2.3 Where size, duration, or logistics of the project do not facilitate a bulletin board, an alternative method acceptable to the contracting officer that includes all mandatory information for personnel and visitor review shall be deemed as meeting the requirement for a bulletin board.

16.5 CONSTRUCTION SITE REFERENCE MATERIALS

16.5.1 Prime contractors shall maintain project-related reference materials and make them available to all personnel working at the jobsite, including:

a. Applicable equipment manufacturer's manuals,

b. Safety and Health Plan for the prime contractor and subcontractors,

c. SDSs, and

d. Training certifications and other safety-related information to ensure compliance and to protect personnel.

Note: Electronic or paper versions are acceptable.

16.6 SAFETY AND HEALTH PLANS

16.6.1 Prime contractors performing construction work at LaRC shall submit a Safety and Health Plan for approval by SFAB.

16.6.2 Prime contractors shall ensure their subcontractors performing construction work at LaRC follow the prime contractor’s approved Safety and Health Plan.

16.6.3 The prime contractor’s Safety and Health Plan shall address all the requirements in the U.S. Army Corp of Engineers’ manual, EM-385-1-1. If a section does not apply to the particular job, the contractor shall write in the plan, “Section does not apply.”

Note: Any deviation from this requirement shall be approved by the LaRC Safety Manager prior to submission of the Safety and Health Plan for review.

16.6.4 The CMOE contractor is responsible for reviewing and approving their subcontractors’ Safety and Health Plans. SFAB reserves the right to review any of CMOE subcontractors’ Safety and Health Plans.

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16.7 ACCIDENT SCENE AND NOTIFICATION

16.7.1 For minor accidents or injuries, the prime contractor shall notify the LaRC Construction Safety Specialist and shall conduct their own investigation.

16.7.1.1 Personnel requiring treatment for an injury shall ensure they receive professional treatment by reporting to the LaRC Occupational Health Clinic, Building 1216, from 7:00 a.m. to 3:30 p.m. during normal business hours.

16.7.1.2 After-hours medical help can be obtained from the LaRC Fire Station, Building 1248.

16.7.1.3 For any emergency, or to contact the LaRC Fire Station, personnel may call (757) 864-2222 from a cell phone or 911 from a Center phone.

16.7.2 For major accidents or injuries, the prime contractor shall:

a. Call the Emergency Dispatcher at (757) 864-2222 for security, emergency medical, and fire response.

b. Notify immediately the LaRC Construction Safety Specialist.

c. Preserve the conditions and evidence on the accident site until the Government investigation team arrives on site and the Government investigation is conducted.

d. Not allow personnel to leave the scene or discuss details before formal interviews have been completed by the Government investigation team.

e. Notify the contracting officer/COR or the construction/project manager as soon as practical, but not later than one hour after the accident.

(1) Notifications shall include:

(a) Contractor name;

(b) Contract title;

(c) Type of contract;

(d) Name of activity, installation, or location where accident occurred;

(e) Date and time of accident;

(f) Name(s) of personnel injured;

(g) Extent of property damage, if any;

(h) Extent of injury, if known; and

(i) Brief description of accident including type of construction equipment used and PPE used.

f. Conduct an investigation of the accident and submit copy of the report and findings to the contracting officer/COR, construction/project manager, and the LaRC Construction Safety Specialist.

16.8 PPE

16.8.1 Minimum PPE requirements for construction sites are:

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a. Head protection per ANSI/ISEA Z89.1,

b. Eye protection per ANSI/ISEA Z87.1,

c. Foot protection per ASTM F2413,

d. High visibility outer garments when motive construction equipment is present on site,

e. Long pants,

f. Shirts with at least 4-inch sleeves,

g. Hearing protection,

h. Leather hand protection, and

i. Other task-specific PPE as determined by the competent person on site.

16.9 RADIOACTIVE MATERIAL USE

16.9.1 Prime contractors shall provide the LaRC Radiation Safety Officer with a copy of the firm's radiation safety manual at least five business days prior to bringing radioactive material on site.

16.9.2 The construction/project manager shall notify the LaRC Radiation Safety Officer by calling (757) 864-7233, (4-SAFE), at least two working days prior to intended dates of radiography when performing industrial radiography.

16.10 POWDER-ACTUATED TOOLS

16.10.1 Construction contractors working with powder-actuated tools shall:

a. Be trained in the particular tool to be used before entering the worksite and shall exercise extreme care at all times.

b. Possess a certificate of training issued by Hilti or other authorized entity and be able to produce the certificate upon request.

Note: Copies of the personnel certificate shall be kept by the construction contractor’s competent person and by the personnel.

c. Use powder-actuated tools in accordance with the manufacturer's specifications and safety precautions.

d. Wear appropriate PPE, such as safety glasses or goggles, safety shoes, and hearing protection.

e. Provide notice to all occupants in and adjacent to the area when using tools before the tool is fired.

f. Obtain the SDS for the cartridges and keep the SDS with the equipment on site.

g. Secure under lock and key any unused cartridges.

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16.11 OBSTRUCTIONS

16.11.1 Contractors and construction activities shall not:

a. Obstruct a corridor, aisle, stairway, door, or exit in such a manner as to encroach on routes of ingress or egress utilized by the public or building occupants without written permission from the LaRC Fire Chief.

b. Obstruct access to fire protection panels and equipment.

c. Obstruct or close streets, walks, and other facilities occupied and used without written permission from the contracting officer and the LaRC Fire Chief.

16.12 TEMPORARY TRAFFIC DISRUPTION

16.12.1 Construction that disrupts traffic shall:

a. Be conducted in accordance with Virginia Department of Transportation (VDOT) Uniform Traffic Control Devices.

b. Coordinate traffic disruption with the Center's PSO personnel.

c. Obtain approval from construction/project manager at least 72 hours in advance of starting any activity that will obstruct traffic.

16.13 FENCES AND BARRICADES

16.13.1 Prime contractors shall:

a. Ensure that the work area:

(1) Is fenced, barricaded, or otherwise blocked off from the public and building occupants to prevent unauthorized entry into the work area;

(2) Maintains access to fire hydrants and fire department connections; and

(3) Has fences and barricades removed upon completion of the project.

b. Coordinate with NASA Fire Department prior to erecting fences and barricades.

16.13.2 Caution tape or alternate methods may only be used to secure a construction site with the approval of the LaRC Construction Safety Specialist.

16.14 HAZARDOUS MATERIAL USE

16.14.1 Construction contractors working with hazardous materials on construction sites shall:

a. Maintain an inventory of all chemicals used.

b. Maintain SDSs for all chemicals used. The SDSs shall be made available on the jobsite at all times for any personnel who may be exposed to a chemical.

c. Train personnel in proper and safe use of any hazardous materials used at the jobsite.

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d. Provide suitable facilities for quick drenching or flushing of the eyes and body that can be reached within ten seconds of the immediate work area for when personnel are exposed to corrosive chemicals.

16.15 WEATHER SAFETY

16.15.1 LaRC emergency management officials notify contract personnel of severe weather conditions through the following systems:

a. LaRC Alert App – the app provides the latest notifications issued by Center emergency management officials regarding emergencies, security situations, safety-related updates, and weather conditions at the Center. The app also includes emergency contacts that can be used for reference or to quickly dial a resource.

(1) To download the app, visit the Apple or Google app store and search for "LaRC Alerts."

b. Giant Voice – The Giant Voice is a series of speaker systems located around the Center to notify personnel who are not indoors of emergencies, security situations, safety-related updates, and weather conditions at the Center.

16.15.2 In the event of a severe weather watch or warning, the prime contractor shall:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

Note: See Appendix C for additional information on severe weather.

16.16 CRANE CRITICAL LIFTS

16.16.1 Prime contractors shall make available licensed operator and rigger certifications.

16.16.2 See Chapter 4 of this LPR for critical lift requirements.

16.17 LANGLEY RESEARCH CENTER ENERGY CONTROL PROGRAM (LOCKOUT/TAGOUT)

16.17.1 See LPR 1710.10 for LaRC's Lockout/Tagout procedures.

16.18 ASBESTOS AND LEAD

16.18.1 See LPR 1800.1, Chapters 8 and 9, for safety requirements for asbestos and lead, respectively.

16.19 ELECTRICAL

16.19.1 See LPR 1710.6 for electrical safety requirements.

16.20 FALL PROTECTION

16.20.1 See Chapter 13 of this LPR for fall protection requirements.

Verify the correct version before use by checking the LMS website.

16.21 PRESSURE SYSTEMS

16.21.1 See LPR 1710.40 and LPR 1710.42 for pressure systems requirements.

16.22 SCAFFOLDING

16.22.1 See Sections 13.7 and 13.8 of this LPR for scaffolding requirements.

16.23 USE OF EXPLOSIVES

16.23.1 See LPR 1710.7 for requirements if explosives are to be used or brought to the project site.

Verify the correct version before use by checking the LMS website.

CHAPTER 17: HAZARD IDENTIFICATION AND MARKINGS

17.1 GENERAL

17.1.1 This chapter sets forth the minimum procedural requirements for hazard identifications and markings at LaRC.

17.2 RESPONSIBILITIES

17.2.1 SFAB shall:

a. Provide technical safety evaluations of the work areas at the request of the supervisor.

b. Provide specialized safety consulting on an as-requested basis.

17.2.2 FSHs shall:

a. Identify hazards that require barricading or posting as described in this chapter.

b. Ensure hazard warnings are posted in accordance with the requirements of this chapter.

c. Ensure illegible posted hazard warnings are replaced.

d. Ensure removal of posted hazard warnings that are no longer applicable to the location where they are posted.

e. Ensure the requirements of this chapter are addressed when planning and implementing new or modified facilities work.

17.2.3 FCs and Project Engineers shall:

a. Ensure the requirements of this chapter are addressed when planning and implementing new or modified facilities work.

b. Maintain or upgrade pipe paint colors and markings and other hazard warnings to meet the requirements of this chapter whenever maintenance work causes markings to be affected.

17.2.4 Supervisors shall:

a. Complete workplace assessments to determine what hazards are present, or are likely to be present, for all operations.

b. Ensure personnel are trained to identify hazards and to recognize and honor barricades and warning signs.

17.2.5 Personnel shall:

a. Read and observe the safety requirements delineated in this chapter.

b. Report any existing or potential safety hazards to supervisors.

c. Seek supervisor or FSH guidance on safety-related questions.

d. Obey safety signs, barricades, and warnings.

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17.3 WEATHER CONDITIONS AND ACTIONS

17.3.1 Supervisors and personnel shall assess the weather conditions prior to the start of any hazardous operations.

17.3.2 If the hazardous operations have already started when bad weather occurs, supervisors and personnel shall secure the operations as soon as possible.

17.3.3 If high winds occur, all crane operations shall stop unless the crane manufacturer allows for a higher wind restriction.

17.4 BARRICADES

17.4.1 Barricades shall be used to identify and deny access to hazardous areas.

17.5 HAZARD LABELING AND POSTING

17.5.1 Hazard labeling and posting requirements are found in the Center Operations Directorate's Langley Engineering Standard LaRC-FES-MECH, "Facility Mechanical Systems (HVAC, Plumbing, and Fire Protection)."

17.5.2 All personnel shall comply with posted warnings and instructions.

17.6 PHYSICAL HAZARDS

17.6.1 Color Coding - For each type of hazard identified, a specific color shall be required as specified in Table 17-1.

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Color	**Hazard Identification**
Red	Fire protection equipment and apparatus. Containers for flammable liquids having a flashpoint below 100° F. Emergency stop bars or buttons on hazardous machines.
Orange	Dangerous parts of machinery or energized equipment, which may cut, crush, shock, or otherwise injure, such as when enclosure doors are open or when gear belts or other guards around the moving equipment are open or removed, exposing unguarded hazards.
Yellow	Caution and for marking physical hazards, such as falling, stumbling, striking against, tripping, or getting caught in between objects. Solid yellow, yellow and black stripes, yellow and black checkers (or yellow with suitable contrasting background) shall be used interchangeably, and using a combination which will attract the most attention in the particular environment.
Green	"Safety" and the location of First Aid equipment, if any, (except firefighting equipment).
Blue	Warning against the starting, the use of, or the movement of equipment under repair or being worked on.
Magenta (Purple) and Yellow	Radiation hazards.
Black, White, or a Combination	Traffic and household markings. Solid black, solid white, single color striping, stripes of black and white or black and white checkers shall be used in accordance with local conditions.

Table 17-1, PHYSICAL HAZARD COLOR CODE

17.6.2 Identification Clarification

17.6.2.1 The use of color-coding shall be intended to identify the immediate area where the physical hazard exists.

17.6.2.2 If multiple hazards are identified, the most serious hazard shall determine the appropriate color-coding, as shown by the following examples:

a. Where no physical hazard exists, black and white shall be used for housekeeping walkways and work areas. However, when physical hazards intrude into these spaces, yellow or combination yellow and black shall be used for marking.

b. When a utility or research system also represents a physical hazard, the physical

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hazard color-coding represents the overriding requirement. The piping or device shall have a legend, and shall be painted yellow or yellow and black. Utility color bands at appropriate intervals may also be added to the basic physical hazard color.

Note 1: Excessive use of warning color defeats the identification of the specific hazard and tends to make the program ineffective.

Note 2: Personnel may consult SFAB with any questions regarding hazard labeling.

17.7 UNDERGROUND UTILITIES

17.7.1 A digging permit system has been developed to control actual or potential disturbance of existing surfaces to a depth in excess of six inches. See Section 1.33 of this LPR for more details.

17.8 POTENTIALLY HAZARDOUS MATERIALS

17.8.1 Communications concerning hazardous chemicals and their safe use are extremely important.

17.8.2 Hazard awareness shall be increased through the use of warning labels.

17.8.3 The use of color codes reduces the danger to the individual by enabling the person to immediately identify and evaluate the hazard posed by the various materials stored or being used.

17.8.3.1 The type of risk shall be identified by color as described in the NFPA 704, “Standard System for the Identification of the Hazards of Materials for Emergency Response” (i.e., blue – health; red – flammability; yellow – reactivity; and white – other hazards).

17.8.4 Personnel engaged in tasks requiring the use of potentially hazardous materials shall follow the criteria and requirements outlined in LPR 1710.12, which also includes chemical laboratory safety standards, and requirements for permits for the use of hazardous materials.

17.8.5 Additional information and assistance shall be provided by SFAB, particularly for instances involving contractor activities.

17.9 WALKING AND WORKING SURFACES

17.9.1 FCs shall be responsible for ensuring that appropriate floor loads signs are displayed and that the design loading is not exceeded.

17.9.2 The use and marking of allowable floor loads signs shall be in accordance with the following criteria:

a. Markings shall not be required on concrete slabs constructed directly on the ground.

b. Mezzanine and storage areas shall be marked to indicate the allowable live load in accordance with engineering design criteria as to the loads approved for the area by the COD.

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c. Areas with an allowable load of 300 pounds per square foot (psf) and above shall be marked with notice signs; below 300 psf shall be marked with caution signs. In both cases, the signs shall display the actual approved load in psf.

d. Sufficient signs shall be placed in the space to which they relate so that building occupants will be aware of the loading limitations.

e. All drawings and specifications involving new construction shall indicate allowable floor loadings and provide for the appropriate signs.

f. Any opening created in an existing floor caused by the removal of a walking or working surface shall be marked prior to removal to ensure proper reinstallation. This includes, but is not limited to, grating, deck plating, and utility trench covers.

g. Marking methodology shall be approved by the FC or FSH before the walking or working surface is removed.

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APPENDIX A. DEFINITIONS

Accidents.

a. **Minor –** Any injury requiring only first aid treatment and which does not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job; or minor equipment or property damage of less than $20,000.

b. **Major** – Any injury which involves medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job; or equipment or property damage greater than $20,000.

Attendant. OSHA defines an “attendant” as an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant’s duties.

Authorized Entrants. Personnel who are authorized by the employer to enter a permit-required confined space.

Competent. OSHA defines “Competent” as one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to personnel, and who has authorization to take prompt corrective measures to eliminate them.

Confined Space. A space that is large enough and so configured that an individual can bodily enter and perform assigned work, has limited or restricted means for entry or exit, and is not designed for continuous occupancy. These spaces may include, but are not limited to, tanks, vessels, silos, storage bins, hoppers, vaults, and pits. See also permit-required confined spaces.

Construction work. The construction, installation, assembly, modification, servicing, and repair of new facilities, or the demolition of existing facilities to any LaRC on-site facility, structure, or equipment involving the following:

a. Chemical, paint, or solvent usage;

b. Pressure or vacuum systems or vessels, and compressed air;

c. Cryogenic, nitrogen, or oxygen systems, and other gas distribution systems;

d. Exhaust or ventilation systems, spray booths, fire and smoke dampers, and fume hoods;

e. Installing or removing permanent eyewash stations;

f. Installing or removing walls, ceilings, partitions, stairs, or doors;

g. Installing or removing tile or carpet;

h. Pipe and duct insulation or HVAC systems;

i. Elevators, cranes, or other lifting devices;

j. Plumbing;

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k. Electrical wiring or systems, transformers, and switchgear equipment, and power transmission lines or systems;

l. Sanding, cutting, or welding, including hot work;

m. Roofing work;

n. Confined spaces;

o. Installing or removing exit signs, emergency lighting, gas monitoring systems, smoke detection, fire suppression, fire hydrants, water mains, or other piping that supplies fire suppression systems;

p. Roadways, sidewalks, curbs, airfields, and gutters or sewers, irrigation or drainage systems;

q. Digging, shoring, and trenching;

r. Pyrotechnics and explosives;

s. Any aeronautic or space flight lab, assembly, or test facility and associated equipment (e.g., simulators, clean rooms, lasers, anechoic chambers);

t. Surveying; and

u. Clearing of land by cutting, removing, burning, or other disposition of trees or shrubbery.

Contracted Services. Purchases and procurement requests that will result in the issuance of a contract (new or follow-on) for on-site services.

Critical Lifts. Operations where failure/loss of control presents an elevated risk of serious injury, loss of life, or loss of one-of-a-kind articles, high dollar items, or major facility components whose loss would have serious programmatic or institutional impact; or, mobile crane or derrick lifts in which the load exceeds 75 percent of rated capacity; or, hoisting of personnel with a mobile crane or derrick.

Elevated Work. There are four height categories (listed below) for elevated work that is unprotected. Each has its own personnel protection requirements per ANSI and OSHA 29 CFR 1926 standards, including substations, gantries, stacks, and certain hazardous roofs.

a. General safety ≥ four feet

b. · Construction safety ≥ six feet

c. · Scaffold ≥ ten feet

d. · High Work ≥ twenty-five feet outside protective enclosures, catwalks etc.

Note: Bucket work at any elevated level is considered high work.

Engineered Lifts. Similar to critical lifts in that there is an elevated risk to facilities, equipment, or personnel. Lifts utilizing multiple lifting devices, which could present significant risks, are generally classified as engineered lifts. Engineered lifts require a written lift plan approved by the LDEM prior to commencement of the operation.

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Additionally, the NASA SFAB Representative or their designee shall be notified of the operation prior to the lift.

Entry supervisor. OSHA defines an entry supervisor as the individual responsible for determining if there are acceptable entry conditions at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry.

Facility Risk Levels.

a. **High Risk Facility** – Hazards may result in loss of life, permanent disability, or serious occupational illnesses to one or more persons, three or more lost-time injuries, loss of facility operational capability for one month or greater, or damage to equipment or property in excess of $500,000.

b. **Moderate Risk Facility** – Hazards may result in permanent disability to one or more persons, hospitalization (associated with illness or injury) of three or more persons, up to two lost time injuries, loss of facility operational capability from 2 to 4 weeks, or damage to equipment or property from $250,000 to $500,000.

c. **Low Risk Facility** – Hazards may result in hospitalization to one or two persons, occupational injury or illness resulting in a lost workday or restricted duty case, loss of facility operational capability from 1 day to 2 weeks, or damage to equipment or property up to $250,000.

Hazard. A condition that, if left uncontrolled, could result in an unplanned event or series of events resulting in injury, illness, death, or property damage.

Hoisted Load Lifts. Defined as a lift where the LDE is lifting the load from above, such as a crane, hoist, chain fall, etc.

Hot Work. Work or activities that involve the use of flame, heat, smoke, or spark-producing tools.

Job. A work process with a definitive outcome that is made up of tasks.

Job Hazard Analysis (JHA). A technique that focuses on job tasks as a way to identify hazards and eliminate or reduce risk to an acceptable level.

Machine shop. A room or area where an individual uses machine tools and cutting tools to make, repair, or modify parts.

Mechanical Room. Any room that houses any sort of mechanical or electrical equipment supporting the building.

Noncritical Lifts. Involve routine lifting operations and are governed by standard industry rules and practices except as supplemented with unique NASA testing, operations, maintenance, inspection, training, and personnel certification requirements contained in this chapter and the NASA Lifting Standard (NASA-STD-8719.9).

Non-Permit Required Confined Space. A confined space that does not contain any of the following characteristics:

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a. Contains or has a potential to contain a hazardous atmosphere,

b. Contains a material that has the potential for engulfing an entrant,

c. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or

d. Contains any other recognized serious safety or health hazard.

Permit-Required Confined Spaces (PRCS). Confined spaces that have one or more of the following characteristics:

a. Contains or has a potential to contain a hazardous atmosphere,

b. Contains a material that has the potential for engulfing an entrant,

c. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section, or

d. Contains any other recognized serious safety or health hazard.

Potentially Hazardous Materials (PHMs). Any substances that may pose a risk of injury or illness to personnel or destruction of property.

Qualified. OSHA defines “Qualified” as one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, has successfully demonstrated his or her ability to solve or resolve problems relating to the subject matter, the work, or the project.

Scaffold. Any temporary, elevated platform (supported or suspended), and its supporting structure, including points of anchorage, used for supporting personnel or materials or both.

Standard Operating Procedure (SOP). Detailed, written, formal instructions for certified operators to use during operation of the facility.

a. **Safety Permit SOP**. Detailed, written, formal instructions for operators to use during operation of a laboratory, laser, explosives, equipment, or facility under a Safety Permit.

Task. A single or one of multiple actions that are required to complete a job.

Working Alone Personnel shall be considered to be working alone when they are performing work while out of audio or visual contact with coworkers.

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APPENDIX B. ACRONYMS

AHJ	Authority Having Jurisdiction
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
ASNT	American Society for Nondestructive Testing
CAP	Corrective Action Plans
CFR	Code of Federal Regulations
CM	Configuration Management
CMAA	Crane Manufacturers Association of America
CMMS	Computerized Maintenance Management System (a.k.a. MAXIMO)
CMOE	Center Maintenance Operations and Engineering
CMTS	Chemical Material Tracking System
COD	Center Operations Directorate
COR	Contracting Officer Representative
COTS	Commercial off-the-shelf
CP	Center Procedure
DOT	Department of Transportation
EAP	Emergency Action Plan
ENS	Emergency Notification System
FAA	Federal Aviation Administration
FC	Facility Coordinator
FCM	Facility Configuration Management
FCMS	Facility Configuration Management System
FR	Facility Resume
FSH	Facility Safety Head
FSPL	Facility Safety Personnel List
GFCI	Ground Fault Circuit Interrupter
HID	High-Intensity Discharge
HazOps	Hazardous Operations
HVAC	Heating, Ventilation, and Air Conditioning
IOC	Integrated Operations Center
ISEA	International Safety Equipment Association
ITSDF	Industrial Truck Standards Development Foundation
JHA	Job Hazard Analysis
LAPD	Langley Policy Directive
LaRC	Langley Research Center
LDE	Lifting Devices and Equipment
LDEC	Lifting Device and Equipment Committee
LDEM	Lifting Device and Equipment Manager
LEL	Lower Explosion Limit
LF	Langley Form
LMS	Langley Management System
LOTO	Lockout/Tagout
LPR	Langley Procedural Requirements
mph	miles per hour

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NASA	National Aeronautics and Space Administration
NCS	National Consensus Standards
NDE	Nondestructive Evaluation
NDT	Non-destructive testing
NEC	National Electric Code
NFPA	National Fire Protection Association
NIOSH	National Institute of Safety and Health
NPD	NASA Policy Directive
OEM	Original Equipment Manufacturer
OSHA	Occupational Safety and Health Administration
P&ID	Process and Instrumentation Diagram
PEB	Projects and Engineering Branch
PHM	Potentially Hazardous Materials
POC	Point of Contact
PPE	Personal Protective Equipment
PRCS	Permit-Required Confined Space
psf	pound per square foot
PSO	Protective Services Office
RCM	Reliability Centered Maintenance
SAIA	Scaffold and Access Industry Association
SAR	Safety Analysis Report
SDS	Safety Data Sheet
SFAB	Safety and Facility Assurance Branch
SMAO	Safety and Mission Assurance Office
SNT	Society for Nondestructive Testing
SOP	Standard Operating Procedures
SOW	Statement of Work
STAR	System for Tracking Audits/Assessments and Reviews
STD	Standard
UL	Underwriters Laboratories
VDOT	Virginia Department of Transportation

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APPENDIX C. WEATHER CONDITIONS

a. Tornado and Severe Thunderstorm Watches and Warnings:

(1) Watch – Weather conditions favor severe weather conditions (e.g., thunderstorms, tornados, floods).

(2) Warning – Severe weather conditions (e.g., tornado, thunderstorms, floods) have been spotted or are affecting the local area per the National Weather Service.

(3) LaRC emergency management officials issue a Tornado Warning when they see the potential of a tornado affecting the Center, which means they may not issue a warning at the same time the National Weather Center may issue a Tornado Warning for the Hampton Roads Area.

b. High Winds: Forecasted or observed sustained winds equal to or exceeding 25 knots.

c. Hurricane/Tropical Storm/Severe Storm: Hurricane and tropical storm bulletins received from the National Hurricane Center in Florida shall be relayed as received. Advisories for non-tropical severe storms shall be generated locally. Forecast briefings shall be provided as requested.

(1) High Tides/Flooding: Based on forecasted or observed data, tides have the potential to be more than 2 feet above normal.

(2) Excessive Rain (3 inches or more within 3 hours): Although this is a very rare occurrence other than with hurricane or tropical storms, advisories shall be issued if conditions exist.

(3) Snowfall Accumulation (2 inches or more): Winter storm watches and warnings received from the National Weather Service where snowfall accumulation is predicted shall be relayed as received with a local analysis added.

(4) Freezing Precipitation: Advisories shall be issued whenever freezing precipitation is expected.

(5) Extreme Heat (Heat Index equal to or greater than 100 °F): Forecasts and advisories for extreme temperature conditions shall be passed to organizations.

(6) Extreme Cold (Wind Chill equal to or less than 10 °F): Forecasts and advisories for extreme temperature conditions shall be passed to organizations.

Verify the correct version before use by checking the LMS website.

APPENDIX D. OTHER SAFETY REQUIREMENTS NOT COVERED UNDER THIS DOCUMENT

Other safety requirements are described in the following:

a. **Asbestos Safety**

Requirements for the application of Asbestos Safety are contained in LPR 1800.1.

b. **Aviation Safety**

The Research Services Directorate is responsible for the safe operations of the aircraft assigned to LaRC. Requirements for the application of aircraft operations at LaRC are contained in LPR 1710.16, “Aviation Operations & Safety Manual.”

c. **Electrical Safety Program**

Requirements for the application of Electrical Safety are contained in LPR 1710.6, “Electrical Safety.”

d. **Explosives Safety**

Requirements for the application of Explosives Safety systems are contained in LPR 1710.7, “Handling and Use of Explosives.”

e. **Facility Configuration Management**

The LaRC Facilities Configuration Management (FCM) Program covers the Center’s facility complexes, buildings, and horizontal infrastructure systems. Requirements for the application of FCM are contained in LPR 7123.2, “Facility Configuration Management.”

f. **Facility System Safety**

Requirements for facility system safety are contained in LPR 1740.4, “Facility System Safety Analysis.”

g. **Fire Protection System**

Requirements for the application of Fire protection systems are contained in LPR 1710.11, “LaRC Fire Protection Program.”

h. **Ionizing Radiation Safety**

Requirements for the application of Ionizing Radiation Safety systems are contained in LPR 1710.5, “Ionizing Radiation.”

i. **Laser Safety**

Requirements for the application of Laser Safety systems are contained in LPR 1710.8, “Non-Ionizing Radiation.”

j. **Lead Safety**

Requirements for the application of Lead Safety are contained in LPR 1800.1.

k. **Lockout/Tagout (LOTO)**

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Requirements for the application of Lockout/Tagout Program are contained in LPR 1710.10, “Langley Research Center Energy Control Program (Lockout/Tagout).”

l. **Mishap Preparedness and Contingency Planning**

Requirements for the application of Mishap Preparedness and Contingency Planning are contained in LPR 8621.1, “LaRC SMAO Mishap Preparedness and Contingency Plan.”

m. **Non-Ionizing Radiation Safety**

Requirements for the application of Non-Ionizing Safety systems are contained in LPR 1710.8, “Non-Ionizing Radiation.”

n. **Oxygen Systems**

Requirements for the application of Oxygen Systems are contained in LPR 1740.5, “Procedures for Cleaning of Systems and Equipment for Oxygen Service.”

o. **Personal Protective Equipment (PPE)**

Requirements for the application of PPE are contained in LPR 1800.1.

p. **Personnel Safety Certification**

Requirements for the application of Personnel Safety Certification are contained in LPR 1740.6, “Personnel Safety Certification.”

q. **Potentially Hazardous Materials-Hazard Communication Standard**

Requirements for the application of Potentially Hazardous Material and Hazard Communication are contained in LPR 1710.12, “Potentially Hazardous Materials-Hazard Communication Standard.”

r. **Pressure Systems**

Requirements for the application of Pressure Systems are contained in LPR 1710.40, “Langley Research Center Pressure Systems Handbook,” and LPR 1710.42, “Safety Program for the Recertification and Maintenance of Ground-Based Pressure Vessels and Piping Systems (PVS).”

s. **Temporary Non-Civil Servant Students and Researchers**

Requirements for the application of Temporary Non-Civil Servant Student/Researchers are contained in LMS-CP-1710, “Temporary Non-Civil Servant Student/Researchers Process.”

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