

MWI 1840.1
BASELINE-4

EFFECTIVE DATE: January 16, 2013

EXPIRATION DATE: June 5, 2022

MARSHALL WORK INSTRUCTION

AS01

INDUSTRIAL HYGIENE PROGRAMS

With Change 4 (9/6/17)

COMPLIANCE IS MANDATORY

DIRECTIVE IS UNCONTROLLED WHEN PRINTED

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DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Change/ Revalidation/ Canceled)	Document Revision/ Change	Effective Date	Description
Baseline		1/16/2013	Consolidates MPD 1840.3, "MSFC Respiratory Protection Program, MPR 1800.2, "MSFC Ergonomics Program," MPD 1840.2, "MSFC Occupational Noise and Hearing Conservation Program," MPR 1840.1, "MSFC Confined Space Entries," and MPR 1800.1, "Bloodborne Pathogens and Biohazardous Materials," which will be cancelled upon approval of this directive.
Change	1	5/20/13	On 5/20/13, at the request of the OPRD, an administrative change was made to change references to MWI 8715.3 and MWI 8715.4 with references to 29 CFR 1910 Parts 146 and 134 respectively, as appropriate.
Change	2	6/29/2015	On 6/29/15, at the request of the OPRD, administrative changes were made to update the link at 5.5.1, clarify form submittal as stated in the link at 5.5.1.1, added "Filtering Face Pieces" to Appendix A Definitions, and update link in Appendix D. Records.
Change	3	6/23/2016	On 6/23/16, at the request of the OPRD, an administrative change was made to remove the reference to MSFC Form 3790. Form is used by MSFC for Redstone Arsenal personnel only. Does not apply to MSFC program at MWI level.
Revalidation	Baseline	6/5/2017	Revised for the 5-year expiration review, which included the Applicable Documents, and Forms, signature, and Appendix D.
Change	4	9/6/2017	On 9/6/17, at the request of the OPRD, administrative changes were made to update 5.1.4, to clarify respiratory protection equipment and deleted a note regarding available equipment in 5.2.16, which is no longer relevant.

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1. PURPOSE

The purpose of this MWI is to provide instructions for managing Industrial Hygiene programs at MSFC in accordance with MPR 8500.1.

2. APPLICABILITY

2.1 This MWI applies to the personnel, programs, projects, and activities at MSFC including contractors and resident agencies to the extent specified in their respective contracts or agreements. (“Contractors,” for purposes of this paragraph, include contractors, grantees, Cooperative Agreement recipients, Space Act Agreement partners, or other agreement parties.)

2.2 This MWI does not apply to MAF. MAF follows procedures established in organizational issuance AS60-OI-033, MAF Industrial Hygiene Program.

2.3 This MWI applies the following: all mandatory actions (i.e., requirements) are denoted by statements containing the term “shall.” The terms “may” or “can” denote discretionary privilege or permission; “should” denotes a good practice and is recommended, but not required; “will” denotes expected outcome; and “are/is” denotes descriptive material.

2.4 This MWI applies the following: all document citations are assumed to be the latest version unless otherwise noted.

2.5 This MWI applies to Center-level directives developed or revised after the effective date of this MWI.

3. AUTHORITY

MPR 8500.1, MSFC Environmental Engineering and Occupational Health Program

4. APPLICABLE DOCUMENTS AND FORMS

4.1 Hazard Communication Standard, 29 CFR Part 1910.1200

4.2 Respiratory Protection, 29 CFR Part 1910.134

4.3 Permit-Required Confined Spaces, 29 CFR Part 1910.146

4.4 Telecommunications, 29 CFR Part 1910.268

4.5 MPR 3410.1, Training

4.6 MPR 8715.1, Marshall Safety, Health, and Environmental (SHE) Program

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- 4.7 MWI 3410.1, Personnel Certification Program
- 4.8 MWI 8550.1, Waste Management
- 4.9 MWI 8715.2, Control of Hazardous Energy (Lockout/Tagout) Program
- 4.10 MWI 8715.15, Ground Operations Safety Assessment Program
- 4.11 MSFC Form 2519, Confined Space Entry Permit
- 4.12 MSFC Form 4413, MSFC Ergonomic Checklist
- 4.13 MSFC Form 4525, Employee Ergonomic History
- 4.14 Biosafety in Microbiological and Biomedical Laboratories published by Centers for Disease Control and Prevention (CDC)/National Institutes of Health (NIH),
- 4.15 American National Standards Institute (ANSI) S3.6-1969 (R1973)
- 4.16 ANSI S.1.4-1971
- 4.17 AS60-OI-033, MAF Industrial Hygiene Program
- 4.18 Standard Form 93, Report of Medical History
- 4.19 MSFC Form 2801, Employee Physical Examination
- 4.20 MSFC Form 2805, MSFC Work History Questionnaire
- 4.21 MSFC Form 4066, Interim Medical History

5. INSTRUCTIONS

The MSFC Industrial Hygiene program is maintained through the Environmental Engineering and Occupational Health Office (EEOH). This allows the Center to maintain a safer work environment and meet Occupational Safety and Health Administration (OSHA), NASA and other regulatory requirements.

5.1 Respiratory Protection

5.1.1 Identification and assessment of areas that may require respiratory protection shall be done by a manager/supervisor/team lead in accordance with 29 CFR Part 1910.134 and MWI 8715.15.

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5.1.1.1 Processes that may require respiratory protection include, but are not limited to: welding, grinding, manipulation of highly-toxic materials, spray painting, using chromate/leaded primers, or isocyanates. Contact EEOH to conduct an additional assessment and to obtain recommended respiratory protection (if needed) for each process identified as potentially requiring respiratory protection.

NOTE: Elimination, substitution and engineering control systems are preferred measures for exposure managements. Respiratory protection is only used if the other options are not feasible or, in the opinion of EEOH, additional protection is required.

5.1.2 Manager/supervisor/team lead utilizes the procedures in MWI 3410.1 and MPR 3410.1 so that those employees requiring respiratory protection receive timely medical surveillance, training, and certification.

5.1.2.1 Any respiratory protection devices not approved by the National Institutes of Occupational Safety and Health (NIOSH) are prohibited for use.

5.1.2.2 Manager/supervisor/team lead or their designee document in standard operating procedures, job hazard analyses, or other appropriate job task instructions when respiratory protection is required and what type of respiratory protection is required/recommended.

5.1.3 A point-of-contact (POC) for respiratory protection shall be designated for organizations using respiratory equipment by a manager/supervisor/team lead if different from the Safety, Health, and Environmental (SHE) Organization POC.

NOTE: If an Organization does not use respirators, no POC is required. The SHE Organization POC is used for both civil service and contractor organizations unless an alternate is designated in writing to Respiratory Services. An example is: in the absence of the contractor designating a specific POC, a contractor working for AS10 would be assigned the Office of Center Operations SHE Organization POC.

5.1.4 Manager/supervisor/team lead instructs their employees to obtain respiratory protection equipment (including voluntary usage of dust masks or other respirators) only from EEOH's Respiratory Protections Services at (256) 544-4483 or (256) 544-4484 and to return devices when no longer needed.

5.1.5 Manager/supervisor/team lead instructs employees to:

5.1.5.1 Only use respiratory protection devices on which they have been trained and certified.

5.1.5.2 Inspect the respirator before each use.

5.1.5.3 Use tight-fitting face pieces only if facial hair does not interfere with face piece-to-face seal.

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5.1.5.4 Clean the devices after use.

5.1.5.5 Store respirators in a plastic bag or similar enclosure away from sunlight or materials that could contaminate the inside of the respirator or degrade the construction.

5.1.5.6 Do not use a respirator cartridge past its change schedule or past its end-of-service-life indicator, if equipped.

NOTE: Only use respiratory protection in the situations for which they are intended (i.e., do not use a respirator for spray painting for plating operations). Some personnel are assigned respirators which are used infrequently. For situations such as this, the supervisor or employee may wish to keep shaving supplies in the workplace to facilitate shaving should a respirator be needed and the employee have facial hair.

5.2 Confined Space

5.2.1 Manager/supervisor/team lead utilizes MWI 3410.1 and MPR 3410.1 so that those employees performing confined space entry receive timely medical surveillance, training, and certification.

5.2.1.1 At no time shall an employee be assigned to perform confined space activities unless they are certified.

5.2.2 Managers/supervisors/teams leads arrange for additional training when:

5.2.2.1 Confined space duties change.

5.2.2.2 There is a change in a permit-required confined space that presents a hazard about which the employee has not been previously trained.

5.2.2.3 There is reason to believe there are deviations from the permit-required confined space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.

5.2.3 Evaluations of work areas at MSFC shall be conducted by the manager/supervisor/team lead and EEOH to determine if work areas contain confined spaces and to classify any spaces found as permit-required or non-permit spaces. Results of the evaluation are entered by EEOH into the MSFC Confined Space Database.

5.2.4 Specifications found at 29 CFR Part 1910.146 shall be followed by managers/supervisors/team leads to post a "Danger" sign containing at a minimum "DANGER - CONFINED SPACE ENTER BY PERMIT ONLY" at all entrances to permit-required confined spaces.

5.2.5 Specifications found at 29 CFR Part 1910.146 shall be followed by

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managers/supervisors/team leads to post a “Caution” sign containing at a minimum “Caution-Non-Permit Confined space” at all entrances to non-permit confined spaces.

NOTE: The classification of a confined space (permit-required, non-permit) may only be changed by EEOH.

5.2.6 Procedures contained in 29 CFR Part 1910.268, Telecommunications, shall be followed by managers, supervisors, team leads and employees when telecommunication-related work operations are performed in a confined space.

5.2.7 Written entry procedures for permit-required spaces shall be developed by the manager/supervisor/team lead or their designee and EEOH that at a minimum contain:

5.2.7.1 The organization performing the entry.

5.2.7.2 The location, description, and classification of the space to be entered.

5.2.7.3 The purpose and maximum duration of entry into the space.

5.2.7.4 Entry hazards and symptoms of overexposure.

5.2.7.5 Pre-entry notifications and other required permits.

5.2.7.6 A list of required equipment to be obtained, checked, and assembled prior to entry.

5.2.7.7 Required isolation measures and ventilation.

5.2.7.8 Atmospheric tests required and their frequency.

5.2.7.9 Acceptable entry conditions.

5.2.7.10 Minimum number of entry attendants required.

5.2.7.11 Method of communication with entrants.

5.2.7.12 Maximum number of entrants.

5.2.7.13 Work procedures.

5.2.7.14 Procedures describing the fastest means of notifying emergency rescue services.

5.2.7.15 The method of contacting emergency rescue services (e.g., radio, 911, etc.).

5.2.7.16 Contingency plans for loss of communication with entrants, loss of ventilation, loss of breathing air, or loss of consciousness of entry personnel.

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5.2.7.17 The requirement that emergency services be contacted prior to attempting rescue.

5.2.7.18 The requirement that, if possible, entry is established in such a way that self-rescue can be affected for entrants (e.g., standing up out of space, etc.).

NOTE: For tasks that are similar in nature or repetitive, a single-entry procedure may be written that covers all tasks as long as the tasks covered are defined on the procedure. Additionally, self-rescue is the preferred form of rescue when feasible.

5.2.8 Submit all entry procedures to EEOH for approval prior to implementation.

5.2.8.1 For non-permit spaces, entry procedures are not required provided that no hot-work is performed, no atmospheric hazards exist and chemicals are not used in the space. Only oils and greases may be used inside a non-permit space. If conditions change to cause atmospheric hazards to exist, the space becomes permit-required and procedures must be established in accordance with 5.2.7.

5.2.9 Manager/supervisor/team lead informs each person filling a role on a confined space entry team of their duties for their role.

5.2.10 Permits are written only for the time required to complete the assigned task or job identified on the permit and can be at most one shift in duration.

NOTE: For deviations in permit duration, contact EEOH at (256) 544-2390.

5.2.11 For instances where confined space entry is done by multiple entities including civil servants, NASA-MSFC requirements take primacy over any contractor programs. In the event of discrepancies between the programs, contact EEOH for consultation and resolution.

5.2.12 The duty of an “entry supervisor” is to:

5.2.12.1 Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

5.2.12.2 Make the appropriate pre-entry notifications, including coordinating all entries with their designated safety representatives.

5.2.12.3 Notify the Redstone Arsenal Fire Department immediately before the entry begins in all permit-required confined spaces and immediately after the entry is completed.

5.2.12.4 Obtain a hot-work permit from Safety and Mission Assurance (SMA) prior to entry, if necessary.

5.2.12.5 Evaluate conditions inside and outside the confined space including temperature extremes, humidity, noise, and vibration prior to entry to determine what measures are necessary

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for a safe entry and to ensure that those measures are implemented.

5.2.12.6 Obtain an entry permit and verify (by checking that the appropriate entries have been made on the permit) that all tests specified by the permit have been conducted, and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.

5.2.12.7 Ensure that all attendants and authorized entrants have received the appropriate training prior to initiation of entry operations.

5.2.12.8 Ensure that all other required permits (including hot-work, if necessary) have been obtained prior to entry.

5.2.12.9 Terminate the entry and cancel the permit when operations are completed, or when unacceptable conditions have arisen and return the completed/cancelled permit to EEOH.

5.2.12.10 Verify that rescue services are available and means for summoning them are operable.

5.2.12.11 Remove unauthorized individuals who enter or who attempt to enter the permit-required confined space during entry operations.

5.2.12.12 Determine (whenever responsibility for a permit-required confined space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space) that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

5.2.12.13 Document any entry into a permit-required confined space on an MSFC Form 2519, or equivalent approved by EEOH.

5.2.12.14 Document the implementation of all measures required in the written entry procedure by completing and signing an entry permit form to authorize entry of personnel.

5.2.12.15 Make the permit available at the time of entry to all authorized entrants by posting it at the entry portal or by any other equally effective means so that the entrants can confirm that pre-entry preparations have been completed.

5.2.13 A confined space permit shall, at a minimum, note:

5.2.13.1 The permit-required confined space to be entered.

5.2.13.2 The purpose of the entry.

5.2.13.3 The date and the authorized duration of the entry permit.

5.2.13.4 The authorized entrants, by name, within the permit-required confined space.

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5.2.13.5 The personnel, by name, currently serving as attendants.

5.2.13.6 The individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry.

5.2.13.7 The hazards of the permit-required confined space to be entered.

5.2.13.8 The measures used to isolate the permit-required confined space and to eliminate or control hazards before entry, including lockout or tagging of equipment (MWI 8715.2) and procedures for purging, inserting, ventilating, and flushing.

5.2.13.9 The acceptable entry conditions.

5.2.13.10 The results of initial and periodic tests performed, accompanied by the names or initials of the testers, and an indication of when the tests were performed.

5.2.13.11 The means for summoning emergency rescue services.

5.2.13.12 The communication procedures used by authorized entrants and attendants to maintain contact during entry.

5.2.13.13 A list of required equipment, such as PPE, testing equipment, communications equipment, alarm systems, and rescue equipment.

5.2.13.14 Any other information for which inclusion is necessary, given the circumstances of the particular confined space, to ensure employee safety.

5.2.13.15 Any additional permits, such as a hot-work permit, required to authorize such work in the permit-required confined space.

5.2.13.16 Any equipment or employee representative may observe any aspect or technique employed in completing a confined space entry permit.

5.2.13.17 Any problems encountered during an entry operation to facilitate appropriate revisions to the permit-required confined space program.

5.2.13.18 Entry supervisors shall terminate entry and cancel the permit if entry operations are complete or if a condition that is not allowed by the permit arises in or near the confined space.

5.2.13.19 The manager/supervisor/team lead or entry supervisor forwards to EEOH one copy of the completed and cancelled confined space entry permit within 3 days of entry.

5.2.14 Conditions making it unsafe to remove an entrance cover shall be mitigated before the cover is removed.

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5.2.15 Floor openings created by the entry shall be promptly guarded with a temporary barrier to prevent an accidental fall through the opening and to protect each employee working in the space from foreign objects entering the space.

5.2.16 Only calibrated, direct reading or other appropriate calibrated instrumentation for testing of the space prior to entry shall be used.

5.2.17 Initial testing shall be performed only from outside the space.

5.2.18 At a minimum, oxygen content, flammable gases and vapors, potential toxic air contaminants shall be tested. Acceptable concentration of oxygen is between 20.1 and 22%; for flammable vapors <1%; for carbon monoxide <5 parts per million (ppm); for hydrogen sulfide <1 ppm; for any other toxic materials consult with EEOH.

NOTE: If using meters incapable of testing all contaminants at once, always test oxygen, then flammable, then toxic materials, in that order.

5.2.19 If concentrations are found above these limits, use forced-air ventilation for 30 minutes and re-test. If levels are below the thresholds entry may take place as long as continuous forced-air ventilation is used for the duration of the entry.

5.2.19.1 Forced-air ventilation, when required, shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and continues until all employees have left the space.

5.2.19.2 Air for ventilation shall be taken from a clean source so hazards in the space are not increased.

NOTE: If unsure of a clean air source, contact EEOH at (256) 544-2390.

5.2.19.3 Confined spaces shall be immediately evacuated if contaminant concentrations exceed levels listed in 5.2.18.

5.2.19.4 If contaminant levels are exceeded during entry, the entry shall be immediately terminated.

a. Forced-air ventilation shall be used for 30 minutes prior to re-entry if contaminate levels are exceeded during entry.

5.2.19.5 Re-entry shall not occur until contaminant levels fall below those listed in 5.2.18.

NOTE: If subsequent re-tests still indicate an atmospheric hazard, notify EEOH to conduct further air quality testing before entry is made.

5.2.19.6 The atmosphere within permit-required confined spaces shall be periodically tested (at

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least every 30 minutes) to ensure that acceptable entry conditions are being maintained during entry operations.

5.2.19.7 If isolation of the space is not feasible because the space is large or is part of a continuous system, continuous testing shall be used for the duration of the entry.

5.2.20 Inspect all portable electrical equipment used in a confined space prior to entry for proper insulation. Insulated and/or grounding (double insulated) electrical hand tools are acceptable.

5.2.20.1 Connect all case-grounded handheld electrical equipment to a ground fault circuit interrupter (GFCI) circuit breaker (4 to 6 milliamperes where possible) 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.

5.2.21 De-energize and lock out/tag out any equipment in the space that presents a hazard to the confined space entrants. This does not include fixed lighting or ventilation equipment unless repair or modification is being performed to those systems. Provisions for lockout/tagout of machinery and equipment follow requirements set forth in MWI 8715.2.

5.2.22 Use pneumatically-driven power tools instead of electrical tools where possible. If pneumatic tools are used, ensure it is equipped with conductive air supply hoses and that the tools are not connected to inert, flammable or toxic gases.

5.2.23 Use breathable air (Grade D or better) for confined space ventilation; never use pure oxygen.

5.2.23.1 Never use nitrogen or other inert gas as a substitute for air in confined spaces.

5.2.24 Use cordless rechargeable portable power tools, with an intrinsically safe rating, in confined spaces, where possible. If they are used, they shall have an explosion-proof or intrinsically-safe rating for spaces that could contain or develop an explosive atmosphere.

5.2.25 Only use temporary lighting equipped with bulb guards or protected by recessing.

5.2.26 Use temporary lighting powered by battery or low-voltage circuits in locations that are wet or have standing fluids. Consult with Industrial Safety if unsure.

5.2.27 Use heavy-duty electric cords equipped with GFCI and electrical tools with all-metallic housing components grounded and double insulated. Consult with Industrial Safety if unsure.

5.2.28 Use explosion-proof or intrinsically safe lighting, ventilation equipment, and tools in potentially-flammable atmospheres.

5.2.29 No sources of ignition are permitted into or in contact with permit-required confined spaces until tests by confined space monitors have ensured that combustible/flammable gases or vapors are not present in the space. In certain permit-required confined spaces, personnel may

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perform tasks in atmospheres where less than 10 percent of the lower explosive limit (LEL) is present if previous approval has been granted by EEOH and SMA Directorate.

5.2.30 Where the possibility of explosive atmospheres exists, polyethylene and other materials that generate static electricity shall not be used in the space or for tenting over the space.

5.2.30.1 Tents erected over or around a space where the possibility of explosive atmosphere exists shall be a conductive material and properly grounded.

5.2.31 Pipelines containing flammable, toxic, irritating, or oxygen-displacing gases or vapors shall be isolated to prevent a hazardous atmosphere from developing inside a permit-required confined space while work operations are underway, if possible. Isolation may consist of at least one of the following:

5.2.31.1 Complete depressurization and disconnection of the possible contaminant supply lines, and a blank flange placed on the pipe leading into the confined space.

5.2.31.2 Two blocking valves with a vent valve open between them.

5.2.31.3 Other configurations of blank, block, and bleed valves, if approved by the SMA Directorate prior to use.

5.2.32 Rescue and life support equipment (e.g., respiratory protective equipment, etc.) shall be at the site, inspected and operational prior to start of the entry.

5.2.33 Duties of the “attendant” are to:

5.2.33.1 Stay in the immediate vicinity outside the permit-required space at all times during permit-required confined space entry operations to monitor activities inside and outside the space, and to give assistance in cases of emergency.

5.2.33.2 Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.

5.2.33.3 Know possible behavioral effects of hazard exposure in authorized entrants.

5.2.33.4 Continuously maintain an accurate count of authorized entrants in the permit-required confined space on the entry permit form.

5.2.33.5 Remain outside the permit-required confined space during entry operations until relieved by another attendant.

5.2.33.6 Test entrant communication system prior to entry and remain in visual or voice contact with authorized entrants as necessary to monitor entrant status. (If the personnel in the space will be required to leave visual contact and the range of verbal contact, use mechanical or

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electronic contact methods.)

5.2.33.7 Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and order the authorized entrants to evacuate the space immediately under any of the following conditions:

- a. A prohibited condition is detected.
- b. The behavioral effects of hazard exposure in an authorized entrant are detected.
- c. A situation outside the space could endanger the authorized entrants.
- d. The attendant cannot effectively and safely perform all the duties required.

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

5.2.33.9 Use only equipment approved for the location (e.g., explosion proof).

5.2.33.10 Summon emergency rescue services as soon as it is determined that authorized entrants may need assistance to escape from hazards within the permit-required confined space.

5.2.33.11 Warn unauthorized persons to stay away from permit-required confined space, advise the unauthorized persons to exit immediately if they have entered the permit-required confined space, or inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit-required confined space.

5.2.33.12 Perform non-entry rescues when necessary and feasible after notifying emergency rescue services.

5.2.33.13 Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

NOTE: An attendant may be used to assist in a task as long as they do not have to enter the space or leave the area. An example would be an attendant passing tools to the entrant using a bucket and rope.

5.2.33.14 Under no circumstances enter a confined space to attempt a rescue unless a backup attendant is present and the attendant has been trained as part of an emergency rescue team.

5.2.34 Duties of the “entrant” are to:

5.2.34.1 Know the hazards that may be faced during entry, including information on the mode, signs, or symptoms, and consequences of the exposure.

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5.2.34.2 Properly use equipment as required by this program.

5.2.34.3 Communicate with the attendant (as necessary) to enable the attendant to monitor entrant status, and to enable the attendant to alert entrants of the need to evacuate the space as required.

5.2.34.4 Alert the attendant whenever:

- a. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
- b. The entrant detects a prohibited condition.

5.2.34.5 Exit from the permit-required confined space as quickly as possible whenever:

- a. An order to evacuate is given by the attendant or the entry supervisor.
- b. The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.
- c. The entrant detects a prohibited condition.
- d. An evacuation alarm is activated.

5.2.35 All organizations, contractors and their employees engaging in confined space activities:

5.2.35.1 Verify that the confined space log posted to the intranet identifies spaces in their area and notify EEOH of discrepancies.

5.2.35.2 Know appropriate emergency response procedures and protocols prior to confined space entry.

5.2.35.3 If required, utilize testing and monitoring equipment made available by EEOH.

5.2.35.4 Utilize portable ventilating equipment for spaces without permanent mechanical ventilation, if required.

5.2.35.5 Utilize communications equipment as required for communication with authorized entrants and with emergency services, if necessary.

5.2.35.6 Provide or obtain PPE, as required, to protect authorized entrants from exposure to hazards present inside the space, including:

5.2.35.7 Utilize hard hats for protection against falling objects or overhead bump hazards, if required.

5.2.35.8 Utilize impervious personal protective clothing for corrosive or irritating products or skin-penetrating toxic chemicals.

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5.2.35.9 Utilize eye or face protective devices for eye or face-damaging exposures.

5.2.35.10 Utilize respiratory protective devices for hazardous atmospheres only after consulting with EEOH.

5.2.35.11 Utilize self-contained breathing apparatus (SCBA) only when the authorized entrants can enter the space openings with SCBA strapped on. When this cannot be accomplished or when the free space opening is less than or equal to 18 inches in diameter, use an airline supplied-air breathing apparatus.

5.2.35.12 Utilize breathing air that meets, at a minimum, specifications for Grade D air as defined by the Compressed Gas Association.

5.2.35.13 Utilize lighting equipment for safe operation inside the confined space and for egress.

5.2.35.14 Utilize barriers and shields, as required, to prevent inadvertent entries into confined spaces while work is in progress.

5.2.35.15 Utilize equipment (such as ladders) needed for safe entry and egress by authorized entrants.

5.2.35.16 Provide rescue and emergency equipment to facilitate non-entry rescue whenever an authorized entrant enters a permit-required confined space.

5.2.35.17 Use at a minimum during confined space entries for each entrant and attendant a chest or full-body harness, with a retrieval line attached at the center of the entrant's back near shoulder level or above the entrant's head. Wristlets may be used in lieu of the chest or full-body harness if the entry supervisor can demonstrate that the use of a chest or full-body harness is infeasible, or creates a greater hazard and that the use of wristlets is the safest and most effective alternative or if the entryway is less than 18 inches in diameter.

NOTE: Wristlets are designed to help remove people from confined spaces by extending their arms, but are not designed to actually lift the person out of the space. This should be accomplished by a full-body harness.

5.2.35.18 For retrieval lines, the other end of the retrieval line is attached to a mechanical device or fixed point outside the permit-required confined space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary.

5.2.35.19 For spaces more than 5 feet deep, supply a mechanical device to retrieve personnel from vertical type permit-required confined spaces.

NOTE: For vertical type permit spaces more than 5 feet deep, a mechanical device shall be available to retrieve personnel before the workers enter unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the

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entrant. At the discretion of the entry supervisor, the hoist/support may also be necessary at non-permit confined space openings when vertical type entries are being made.

5.2.35.20 Inspect safety harnesses before each use.

5.2.35.21 Provide any other equipment necessary for safe entry into, and rescue from, the permit-required space.

5.2.35.22 Inform the emergency rescue service of the hazards they may confront when called on to perform entry rescues.

5.2.35.23 Provide the emergency rescue service with access to all permit-required confined spaces from which rescue may be necessary so that they can develop appropriate rescue plans and practice rescue operations.

5.2.35.24 Ensure that if an injured entrant is exposed to a substance for which a Safety Data Sheet (SDS) or other similar written information is required to be kept at the worksite, that the SDS or written information is made available to the medical facility treating the exposed entrant.

5.2.35.25 Gain approval from SMA, EEOH, and Redstone Fire Department (RSFD) if a confined space emergency response team is used other than RSFD. To obtain approval, the team will require a written program demonstrating compliance with 29 CFR 1910.146 including provisions for annual rescue drills.

5.2.36 When an organization arranges to have an offsite contractor perform work involving confined space entry, the requiring organization or designated/delegated representative:

5.2.36.1 Informs the offsite contractor that the workplace contains confined spaces and entry is allowed only through compliance with 29 CFR Part 1910.146, Permit-Required Confined Spaces, and adherence to the MSFC Confined Space Entry Program.

5.2.36.2 Apprises the offsite contractor of the elements involved, including the hazards identified and the host employer's experience with the space.

5.2.36.3 Apprises the offsite contractor of any precautions or procedures MSFC has implemented for the protection of employees.

5.2.36.4 Verifies offsite contractor employees have received the appropriate training and that they possess or have appropriate equipment to enter and rescue from the space. Provide a copy of the training and equipment list to EEOH prior to beginning work.

5.2.36.5 Coordinate entry operations with the offsite contractor.

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5.3 Indoor Air Quality (IAQ)

5.3.1 Employees with health complaints they believe related to IAQ should contact their manager/supervisor/team lead and EEOH to obtain an industrial hygiene and/or medical evaluation.

5.3.2 Corrective actions specified by the EEOH/Facilities Management Office to correct IAQ issues shall be implemented by the manager/supervisor/team lead/employee.

5.3.3 Modifications that may interfere with the proper function of the heating ventilation and air conditioning (HVAC) system (air circulation, temperature control, and pollutant removal) shall be coordinated with Facilities Engineering and EEOH.

5.3.4 Products should be avoided that generate pollutants when making purchasing decisions. Low-emission office furniture and products are preferred.

5.3.4.1 Do not use chemical products in areas that could produce an IAQ issue. Examples include, but are not limited to, the use of solvents in an office area and the use of chemicals brought from home.

5.3.5 Prior to application of pest control sprays (does not include baits), coordinate with the building manager to communicate to the impacted building/area the time of application.

5.3.6 Do not disrupt HVAC systems during construction, remodeling and renovations activities such that building occupants are exposed to contaminants from the activities.

5.3.7 Communicate to employees in the area prior to beginning any activity that generates contaminants. Examples may include actions such as, but not limited to, welding, painting, and using floor adhesive.

5.3.8 Use of gasoline, diesel, or propane engines inside buildings is prohibited without prior authorization from EEOH and SMA.

5.3.9 Contact the Facilities Maintenance Office for any of the following activities:

5.3.9.1 Maintenance of building HVAC, cooling towers, and assigned local exhaust ventilation systems.

NOTE: Facilities Maintenance Office works with EEOH to ensure these systems operate to NASA, statutory or industry standard specifications and IAQ requirements are incorporated in new building design or renovation.

5.3.9.2 Investigation of water leaks.

NOTE: Contact Facilities Maintenance Office immediately when interior water leaks are noticed.

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5.3.10 Notification shall be made to the building manager and EEOH if:

5.3.10.1 Using welding or chemicals within 15 feet of an HVAC intake or in an HVAC penthouse area.

5.3.10.2 Roofing operations that cover greater than 100 ft² which involve chemicals (e.g., tar or foam, etc.) are conducted. These operations require a minimum of a 3-day notice unless conducted in response to emergency roof repair which then requires notice prior to beginning operations.

5.3.11 Do not block air vents, grilles or modify filtration systems without permission of EEOH and the Facilities Maintenance Office.

5.3.12 Comply with any restrictions on smoking.

5.3.13 Store food properly and promptly dispose of garbage.

5.4 Special Emphasis Metals

Special emphasis metals (lead, chromium (VI) and cadmium) are commonly used in and around MSFC in both maintenance and non-maintenance activities. The purpose of this section is to provide direction during the demolition, maintenance, production, and/or repair activities at MSFC where lead, cadmium, or chromates are used or could be generated.

5.4.1 Manager/Supervisors/Team Leads:

5.4.1.1 Identify to EEOH any surfaces, coatings, or materials for analysis that are suspected of containing a special emphasis metal before a demolition, renovation, or maintenance project occurs.

5.4.1.2 Halt operations and notify EEOH of any suspect surfaces, coatings, or materials discovered during maintenance, renovation, or demolition projects that may contain special emphasis metals.

5.4.1.3 Conduct all work in accordance with this MWI and applicable Federal, state, and local standards.

5.4.1.4 Notify EEOH at least 10 days prior to any work with special emphasis metals.

5.4.1.5 Verify that personnel who work with special emphasis metals on MSFC property have appropriate training and/or credentials to perform their assignment.

5.4.1.6 Notify the facility occupants through the building manager of all special emphasis metal activities and abatement operations taking place in their area.

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5.4.1.7 Dispose of all waste from special emphasis metals in accordance with MWI 8550.1.

5.4.1.8 Coordinate with Facilities Management Office to ensure appropriate outages are scheduled, if necessary.

5.4.1.9 Provide placement of worksite barriers and posting of warning signs for controlled areas during work with special emphasis metals.

5.4.1.10 Correct any deficiencies noted during EEOH inspections.

5.4.1.11 Minimize or prevent contamination of adjacent work surfaces with dust or debris from the use, maintenance, or removal of special emphasis metals through the use of control measures identified by EEOH.

5.4.1.12 Coordinate with EEOH operations and activities which have the potential for producing employee exposures to special emphasis metals to facilitate identification and assessment of potential exposure.

5.4.1.13 Have EEOH evaluate surfaces prior to performing tasks that may result in employee exposures to special emphasis metals from the disturbed materials. Tasks that may create exposures are activities such as, but not limited to, welding, scraping, sanding, or other mechanical, thermal, or chemical disturbance.

5.4.1.14 Comply with any communication requirements of 29 CFR Part 1910.1200, Hazard Communication Standard, and 29 CFR Part 1910 Subpart Z for lead, chromium (VI), or cadmium.

5.4.1.15 Unless otherwise directed, comply with the requirements of 29 CFR Part 1910.1200, Hazard Communication Standard, for training, signage, and labeling.

5.4.1.16 Assess the work area in accordance with MWI 8715.15 and include in the job hazard analysis (JHA) the following components for special emphasis metals:

- a. Description of specific means employed to achieve compliance and the rationale for selection.
- b. Technology used to achieve compliance.
- c. Any air monitoring data used.
- d. Work practices used to achieve compliance.
- e. Work practices used to collect clothing used with special emphasis metals is collected for laundering or that disposable clothing is used. At no time is contaminated clothing to go home with the employee.

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5.4.2 All users:

5.4.2.1 Do not use compressed air or dry sweeping to clear a surface of accumulations of dust or debris from special emphasis metals.

5.4.2.2 Only use wet-methods or vacuum cleaners with high-efficiency particulate filters to remove debris or dust generated from special emphasis metals.

5.4.2.3 Report to MSFC Medical Clinic for appropriate surveillance examinations, if required.

5.4.2.4 Utilize provided PPE and contamination prevention measures, if exposed above their respective occupational exposure limit or if skin or eye irritation is encountered regardless of exposure level.

5.4.2.5 Utilize approved laundering practices and services for contaminated clothing, if required by EEOH.

5.4.2.6 Label bags with contaminated clothing with the following, depending on special emphasis metal used:

a. For clothing contaminated with lead, label the bag with:

DANGER: CLOTHING AND EQUIPMENT CONTAMINATED WITH LEAD, MAY DAMAGE FERTILITY OR THE UNBORN CHILD. CAUSES DAMAGE TO THE CENTRAL NERVOUS SYSTEM. DO NOT EAT, DRINK OR SMOKE WHEN HANDLING. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF LEAD CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.

b. For clothing contaminated with hexavalent chromium, label bags with:

DANGER: CLOTHING AND EQUIPMENT CONTAMINATED WITH HEXAVALENT CHROMIUM. EXPOSURE CAN CAUSE CANCER. DO NOT EAT, DRINK OR SMOKE WHEN HANDLING. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.

c. For clothing contaminated with cadmium, label bags with:

DANGER: CLOTHING AND EQUIPMENT CONTAMINATED WITH CADMIUM. EXPOSURE CAN CAUSE CANCER. DO NOT EAT, DRINK OR SMOKE WHEN HANDLING. DO NOT REMOVE DUST BY BLOWING OR SHAKING. DISPOSE OF CONTAMINATED WASH WATER IN ACCORDANCE WITH APPLICABLE LOCAL, STATE, AND FEDERAL REGULATIONS.

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5.5 Ergonomics

5.5.1 Employees who suspect they may be experiencing ergonomic symptoms should go to the EEOH ergonomics program Explornet Page:

<https://explornet.msfc.nasa.gov/groups/ergonomics-evaluation>. Employees may use this site to perform a self-evaluation of their work station and, if desired, submit a formal request for an ergonomic evaluation.

5.5.1.1 If applicable, employees shall complete MSFC Forms 4413 and 4525 and attach it to the NASA Integrated Service Management (NISM) ergonomic request.

NOTE 1: You will be prompted to complete Forms 4413 and 4525 systematically if they apply to the specific type of request.

NOTE 2: Any on-site ergonomic assessment cannot begin before these completed forms are returned to EEOH.

5.5.2 Managers/supervisors/team leads:

5.5.2.1 Conduct monthly safety walks in accordance with MWI 8715.15 and note compliance with ergonomic procedures or equipment and if maintenance is required.

NOTE: If job assists designed to reduce ergonomic stressors are not being used, refer the employee to the EEOH Web site for further consultation. Certain types of assists may be the wrong type or ineffective and may require further EEOH consultation to relieve the stressor.

5.5.2.2 Contact the Logistics Services Office to obtain chairs, desks, keyboard trays, or monitor stands.

NOTE: Logistics Services Office provides standard fully adjustable chairs, standard desks, keyboard trays and monitor stands. It is the responsibility of the Organization in which an employee resides to obtain ergonomic furniture if different than the standard provided. Examples include kneeling chairs and adjustable height desks. Any type of equipment required outside of the standard Logistics Services Office stocked chairs, desks, keyboard trays or monitor stands will require on-site EEOH consultation.

5.5.2.3 Participate in the ergonomic assessment if applicable and facilitate implementing any corrective actions identified.

5.5.2.4 Perform job hazard analyses in accordance with MWI 8715.15 to identify any safety hazard associated with the job requirements (including ergonomics related work-related musculoskeletal disorders (WMSD) hazards).

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5.5.2.5 If requested, provide to EEOH descriptions of the employee's job and hazards (e.g., the JHA) and a description of available changes to jobs or temporary alternative duty to fit the employee's capabilities during any recovery periods.

5.5.2.6 Implement any work restrictions placed on an employee by EEOH or their personal physician.

5.5.2.7 Complete the SHE Training Assessment in accordance with MPR 3410.1 and monitor employees for completion of any identified ergonomic training (SHE 231 or SHE 232).

5.5.3 Ensure employees provided with ergonomic assists, procedures or devices to reduce stressors use them.

5.6 Biohazardous Materials

5.6.1 The lead researcher/supervisor/manager/team lead:

5.6.1.1 Notifies EEOH 2 weeks prior to ordering biohazardous material with the following information:

- a. The principal investigator's name, title, organization, affiliation, location, and telephone number.
- b. The location of the experiment and the names of personnel handling the biological material.
- c. A detailed description of the biological materials and experimental protocol, the origin of the biological material, indication if the biological material poses any potential hazards to personnel, indication of human susceptibility infection by the biological material, indication as to whether medical surveillance is required, indication if immunization is required, data on animals to be used, description of any regulated radiation to be used, the biosafety level (BSL) of the biological material, if known, the maximum concentration of each biological sample and the maximum number of samples, the American Type Culture Collection (ATCC) number(s) for the biological material(s), and the proprietary nature of the biological data.
- d. Certification from an accredited medical laboratory that any human-derived cell cultures are free of Hepatitis A, B, C, Human T- Lymphotropic Virus (HTLV) 1 and 2, and Human Immunodeficiency Virus (HIV) 1 and 2.

NOTE: Biological material meeting biosafety Level (BSL) 4 requirements is prohibited at MSFC.

5.6.1.2 Ensures laboratories storing/utilizing/disposing of biohazardous materials conform with the biosafety guidelines as outlined in the latest edition of "Biosafety in Microbiological and Biomedical Laboratories (BMBL)" published by CDC/NIH.

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5.6.1.3 Instructs laboratory personnel in the appropriate laboratory techniques, safety procedures, and hazards associated with handling biohazardous agents/materials.

NOTE: EEOH may be contacted at (256) 544-2390 if the lead researcher/manager/supervisor/team lead requires assistance or expertise in providing instruction.

5.6.1.4 Submits a biohazardous materials inventory to EEOH at least annually or whenever information changes containing the following information:

- a. The name of the laboratory storing the biohazardous materials.
- b. The NASA technical monitor of the laboratory.
- c. The contract supervisor/manager of the laboratory.
- d. The building and room number where the biohazardous materials are stored.
- e. A detailed description of the biohazardous materials and the BSL, if known.

NOTE: The purpose of the annual biohazardous materials inventory is to maintain a centralized database where all biohazardous materials data can be stored, queried, and traced by EEOH.

5.7 Hearing Conservation

5.7.1 Identification and assessment of areas that may require hearing protection shall be done by a manager/supervisor/team lead in accordance with MWI 8715.15.

5.7.1.1 Processes that may require hearing protection include, but are not limited to: grinding, shop operations, heavy machinery operations, propulsion systems, or compressed air/chiller systems.

5.7.1.2 Contact EEOH to conduct an additional assessment, and if necessary, recommend hearing protection for each process identified as potentially requiring hearing protection.

NOTE: Elimination, substitution and engineering control systems are preferred measures for exposure management. Hearing protection is only used if the other options are not feasible or, in the opinion of EEOH, additional protection is required.

5.7.2 Procedures in MWI 3410.1 and MPR 3410.1 shall be followed by the manager/supervisor/team lead so that those employees requiring hearing protection receive timely medical surveillance and training both initially and annually.

5.7.3 Manager/supervisor/team lead or their designee document in standard operating procedures, job hazard analyses, or other appropriate job task instructions when hearing

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protection is required and what type of hearing protection is required/recommended as well as how to obtain the devices.

NOTE: By OSHA standard, it is the employer's responsibility to provide appropriate hearing protection at no cost for employees working in designated high noise areas and operations.

5.7.4 Manager/supervisor/team lead conducts monthly safety walks in accordance with MWI 8715.15 to monitor proper use and compliance with hearing protectors.

5.7.5 Employees who believe they have experienced hearing loss or other hearing or ear problems shall report them to their manager/supervisor/team lead and to EEOH for noise assessment and examination.

5.7.6 Notification to EEOH of any changes in operations requiring noise determinations or evaluations shall be done by the manager/supervisor/team lead or their designee.

5.7.7 Caution signs shall be posted in designated noise hazard areas and appropriate labels, decals, or placards placed on tools and equipment as specified by EEOH.

5.7.8 Notification to each affected employee of the results of noise monitoring shall be provided by EEOH when the employee's noise exposure meets or exceeds the action level of 82 decibels-A-weighted (dBA) time weighted average (TWA).

5.7.9 All procurement of machinery and equipment shall utilize the Agency's Buy Quiet Roadmap for procurement activities and submit the results to EEOH. (<http://buyquietroadmap.com/buy-quiet-purchasing/buy-quiet-process-roadmap/>).

5.7.10 Individual employees shall follow all JHAs and training and medical surveillance requirements as specified in MWI 8715.15 or MPR 3410.1, as appropriate.

6. CANCELLATION

None

Original signed by

Todd A. May
Director

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APPENDIX A DEFINITIONS

Acceptable Entry Conditions. Conditions that exist in a permit-required confined space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within that space.

Action Level. An exposure to an 8-hour TWA of 82 decibels (dB) measured with a dosimeter or sound level meter on the A-scale, slow response. The TWA computation is made using a 3 dB exchange rate. Employee exposure at or above the action level triggers enrollment into the hearing conservation program.

Annual Audiogram. The audiogram taken each year and compared to the baseline audiogram to determine if a standard threshold shift (STS) has occurred.

Attendant. An individual stationed outside one or more permit-required confined spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit-required confined space program.

Authorized Entrant. An employee who is authorized by the employer to enter a permit-required confined space.

Audiogram. An audiogram is a record of the threshold of audibility as a function of frequency obtained for each ear during an audiometric examination. An audiogram can be a chart, graph, or table resulting from an audiometric test. An audiogram shows an individual's hearing threshold level (HTL) as a function of frequency.

Audiometer. An electronic instrument that conforms to the requirements and specifications of ANSI S3.6-1969 (R 1973) used for measuring hearing threshold levels.

Baseline Audiogram. The audiogram against which future audiograms are compared.

Biosafety Level (BSL) – 1. Well-characterized agents not known to consistently cause disease in healthy adult humans, and of minimal potential hazard to laboratory personnel and the environment. Example: Bacillus subtilis.

BSL – 2. Agents of moderate potential hazard to personnel and the environment (absence of aerosols). Example: Influenza or Legionella.

BSL – 3. Indigenous or exotic agents which may cause serious or potentially-lethal disease as a result of exposure by the inhalation route (applicable to clinical, diagnostic, teaching, research, or production facilities). Example: West Nile Virus or Mycobacterium tuberculosis.

BSL – 4. Dangerous and exotic agents which pose a high individual risk of aerosol-transmitted laboratory infections and life-threatening disease. Example: Ebola Virus.

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Blanking or Blinding. The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Buy Quiet and Quiet by Design Program. A program that endeavors to achieve long-term reduction of employee noise exposures through purchase and design of equipment with the intention of achieving realistic and achievable noise criteria, which are considered before procurement or design, using criteria based on operational conditions as well as the noise outputs of equipment. The “Buy Quiet and Quiet by Design” approach requires designers and engineers to consider noise emission when purchasing and designing equipment that is expected to generate noise emission levels of concern for hearing conservation (80 dBA and higher).

Calibration. A check of proper functioning and stability of an audiometer, sound level meter or octave band analyzer, noise dosimeter, or audiometric test room by various means. Where methods or requirements vary, the methodology or specification that results in the most accurate data collection applies.

Cardiopulmonary Resuscitation (CPR). An emergency procedure consisting of external cardiac massage and artificial respiration; the first treatment for a person who has collapsed and has no pulse and has stopped breathing; attempts to restore circulation of the blood and prevent death or brain damage due to lack of oxygen.

Confined Space. A space that: (a) Is large enough and so configured that an employee can bodily enter and perform assigned work; (b) has limited or restricted means for entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, trenches, and pits); and (c) is not designed for continuous employee occupancy.

Decibels (dB). A unit of measurement of sound pressure level.

Decibels-A-Weighted (dBA). A unit of measurement of sound level corrected to the A-weighted scale as defined in ANSI S1.4-1971. The A scale discriminates against very low frequencies as does the human ear; therefore, it is better for measuring general sound levels.

Dose. The amount of actual noise exposure relative to the amount of allowable noise exposure and for which 100 percent and above represents noise exposures that are hazardous.

Double Block and Bleed. The closure of a line, duct, or pipe by closing and locking and tagging two in-line valves and by opening and locking and tagging a drain or vent valve in the line between the two closed valves as defined in MPR 8715.1.

Engineering Control. Any design procedure that reduces the sound level either at the source of the noise or within the hearing zone of individuals.

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Engineering Controls. Physical changes to jobs that control exposure to WMSD hazards. Engineering controls act on the source of the hazard and control employee exposure to the hazard without relying on the employee to take self-protective action or intervention.

Emergency. Any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit-required confined space that could endanger entrants.

Engulf. The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entry. The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry Permit (permit). The written or printed document that is provided by the employer to allow and control entry into a permit-required confined space and that contains the information specified in paragraph (f) of 29 CFR Part 1910.146.

Entry Supervisor. As defined in 29 CFR Part 1910.146, “The person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit-required confined space where entry is planned for authorizing entry, overseeing entry operations, and for terminating entry as defined in this section.

An entry supervisor also may serve as an attendant or as an authorized entrant as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.”

Ergonomics. The science of fitting jobs to people. Ergonomics encompasses the body of knowledge about physical abilities and limitations as well as other human characteristics that are relevant to job design.

Ergonomics Program. A systematic process for anticipating, identifying, recognizing, evaluating, and controlling WMSD hazards.

Filtering Face Pieces (a.k.a “Dust Masks”). A type of tight fitting negative pressure particulate respirator with a filter as an integral part of the face piece or with the entire face piece composed of the filtering medium. When required by a supervisor or EEOH to be worn when performing a job, medical approval, training and fit testing are required. When this type of respirator is worn voluntarily by the employee, training covering Appendix D of the 29 CFR Part 1910.134 standard is the only requirement.

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Ground Fault Circuit Interrupter (GFCI). A device used with electrical equipment to reduce the risk of a dangerous shock.

Hazardous Atmosphere. As defined in 29 CFR Part 1910.146, “An atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (i.e., escape unaided from a permit-required confined space), injury, or acute illness from one or more of the following causes:

Flammable gas, vapor, or mist in excess of 10 percent of its LEL;

Airborne combustible dust at a concentration that meets or exceeds its LEL;

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less;

Atmospheric oxygen concentration below 19.5 percent (oxygen deficient) or above 23.5 percent (oxygen enriched);

Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in 29 CFR Part 1910 Subpart G, Occupational Health and Environmental Control, or in 29 CFR Part 1910 Subpart Z, Toxic and Hazardous Substances, and which could result in employee exposure in excess of its dose or permissible exposure limit;

NOTE: Atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision;

Any other atmospheric condition that is immediately dangerous to life or health (IDLH). *NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Materials Safety Data Sheets that comply with the Hazard Communication Standard, §1910.1200 of this part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.”*

Healthcare Professionals. Persons educated and trained in the delivery of healthcare services, which are operating within the scope of their license, registration, certification, or legally-authorized practice when they are performing the medical management requirements of this MPR.

Hearing Threshold Level (HTL). The amount, in decibels, by which the threshold of audibility for an ear differs from the standard audiometric reference level.

Hertz (Hz). The international symbol for cycles per second and is the unit of measurement for the frequency of tones.

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High Noise Area. Any work area where the environmental noise level is at or above 85 dBA, or where the environmental impulse noise level is at or above 140 dB peak C or linear, regardless of duration of exposure or number of impulses.

Hot-Work Permit. The employer's written authorization to perform operations (e.g., riveting, welding, grinding, cutting, burning, or heating) capable of providing a source of ignition.

Immediately Dangerous to Life or Health (IDLH). As defined in 29 CFR Part 1910.146, “Any condition that poses an immediate or delayed threat to life, causes irreversible adverse health effects, or interferes with an individual's ability to escape unaided from a permit-required confined space.

NOTE: Some materials—hydrogen fluoride gas and cadmium vapor, for example—may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim “feels normal” from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be “immediately” dangerous to life or health.”

Impulse Noise. Variations in noise levels that involve peaks of intensity that occur at intervals of greater than 1 second. If the noise peaks occur at intervals of 1 second or less, the noise is considered continuous. Noise equivalent to 140 dB or greater peak sound pressure level (dBp) is considered to be hazardous.

Isolation. The process by which a permit-required confined space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Lower Explosive Limit (LEL). The minimum concentration of a material that when mixed with air forms an explosive mixture.

Medical Management. The process for assuring that employees with WMSDs are provided with the appropriate medical care.

Musculoskeletal Disorders (MSDs). Injuries and disorders of the muscles, nerves, tendons, ligaments, joints, cartilage, and spinal disks (e.g., carpal tunnel syndrome, epicondylitis, synovitis, muscle strains, Raynaud’s phenomenon, sciatica, tendonitis, rotator cuff tendonitis, De Quervains' disease, carpet layers knee, trigger finger, or low back pain).

Non-Permit Confined Space. A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

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Oxygen Deficient. An atmosphere containing less than 19.5 percent oxygen by volume.

Oxygen Enriched. An atmosphere containing more than 23.5 percent oxygen by volume.

Permit-Required Confined Space. A confined space that has 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.

Permit-Required Confined Space Program. The employer's overall program for controlling, and, where appropriate, for protecting employees from hazards and for regulating employee entry into permit-required confined spaces.

Personal Protective Equipment (PPE). Interim control devices worn or used while working to protect employees from exposure to WMSD hazards. In this MPR, PPE includes items such as gloves and knee pads.

Prohibited Condition. Any condition in a permit-required confined space that is not allowed by the permit during the period when entry is authorized.

Rescue Service. The personnel designated to rescue employees from permit-required confined spaces.

Retest Audiogram. This is the audiogram that is taken no sooner than 6 months after the annual audiogram that identified a potential STS. If the STS is persistent after this audiogram, the patient is considered to have experienced a permanent STS and the baseline audiogram is revised.

Retrieval Equipment. The equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit-required confined spaces.

Safety Data Sheet (SDS). Basic information required to be supplied by the manufacturer, importer or distributor of a material controlled by OSHA's Hazard Communication standard.

Special Emphasis Metals. Cadmium, Hexavalent Chromium, and Lead.

Standard Threshold Shift (STS). An average hearing threshold shift of 10 dB or more at 2000, 3000, and 4000 Hz in either ear. A STS that is demonstrated on a retest audiogram is determined to be a permanent or persistent STS.

Testing. As defined in 29 CFR Part 1910.146, "The process by which the hazards that may confront entrants of a permit-required confined space are identified and evaluated. Testing

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includes specifying the tests that are to be performed in the permit-required confined space.

NOTE: Testing enables employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.”

Time Weighted Average (TWA). That sound level, which if constant over an 8-hour exposure, would result in the same noise dose as is measured.

Work-Related. Means that the physical work activities or workplace conditions in the job are reasonably likely to be causing or contributing to a reported WMSD.

Work-Related Musculoskeletal Disorders (WMSD) Hazards/Problem Jobs. Workplace conditions or physical work activities that cause or are reasonably likely to cause or contribute to a WMSD.

Work Restrictions. Any limitation placed on the manner in which an employee with a WMSD performs a job during the recovery period. Work restrictions include modifications and restrictions to the employee's current job, such as limiting or reducing the intensity or duration of exposure, and reassignment to temporary alternative duty jobs. Work restrictions also include complete removal from the workplace.

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APPENDIX B ACRONYMS

ATCC – American Type Culture Collection

BSL – Biosafety Level

CDC – Centers for Disease Control and Prevention

CPR – Cardiopulmonary Resuscitation

dB – Decibel

dBA – Decibels-A-Weighted

EEOH – Environmental and Occupational Health Office

GFCI – Ground Fault Circuit Interrupter

HBV – Hepatitis B Virus

HIV – Human Immunodeficiency Virus

HTL – Hearing Threshold Level

HTLV – Human T-Lymphotropic Virus

HVAC – Heating, Ventilation and Air Conditioning

Hz – Hertz

IAQ – Indoor Air Quality

IDLH – Immediately Dangerous to Life or Health

JHA – Job Hazard Analysis

LEL – Lower Explosive Limit

MSDs – Musculoskeletal Disorders

MSFC – Marshall Space Flight Center

MWI – Marshall Work Instruction

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NIH – National Institutes of Health

NISM – NASA Integrated Service Management

OPIM – Other Potentially Infectious Materials

OSHA – Occupational Safety and Health Administration

POC – Point of Contact

PPE – Personal Protective Equipment

ppm – Parts Per Million

RSFD – Redstone Fire Department

SMA – Safety and Mission Assurance

SCBA – Self-Contained Breathing Apparatus

SDS – Safety Data Sheet (formerly known as Material Safety Data Sheet)

SHE – Safety, Health, and Environmental

STS – Standard Threshold Shift

TWA – Time Weighted Average

WMSD – Work-related Musculoskeletal Disorders

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APPENDIX C (Reserved for Verification Matrix)

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APPENDIX D RECORDS

The following records will be maintained according to the “List of AS10 Occupational Health Records” located at the following link: (<https://explornet.msfc.nasa.gov/community/msfc/office-of-center-operations/as10>).

- D.1 Standard Form 93, Report of Medical History
- D.2 MSFC Form 2801, Employee Physical Examination
- D.3 MSFC Form 2805, MSFC Work History Questionnaire
- D.4 MSFC Form 4066, Interim Medical History
- D.5 Medical Surveillance Requirements output from SHE Training Assessment
- D.6 Cancelled and returned MSFC Form 2519, NASA-MSFC Confined Space Entry Permit
- D.7 Personnel training records for civil service employees
- D.8 Personnel training records for contractor employees
- D.9 Personnel certification records
- D.10 Chemical Inventory
- D.11 Annual ergonomic program evaluation
- D.12 EEOH Noise Sampling Data