

MWI 8715.15

REVISION I

EFFECTIVE DATE: July 21, 2017

EXPIRATION DATE: July 21, 2022

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# MARSHALL WORK INSTRUCTION

QD01

## GROUND OPERATIONS SAFETY ASSESSMENT PROGRAM

**COMPLIANCE IS MANDATORY**

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## DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Change/ Revalidation/ Canceled)	Document Revision/ Change	Effective Date	Description
Baseline		2/14/00	
Revision	A	5/31/01	Document title changed to MSFC Safety Assessment Program; and rewrote document in its entirety.
Revision	B	10/15/2004	Document title changed to Ground Operations Safety Assessment and Risk Mitigation Program; and rewrote document in its entirety. This new document includes the content of the following documents: MWI 8715.6A Hazardous Operations, and MWI 8715.8A Operational Readiness Program, as well as the MWI 8715.15A, MSFC Safety Assessment Program. These documents will be deleted as a result of this revision. Format changed per HQ requirement review.
Revision	C	5/13/2008	Total rewrite. Changed title from "Ground Operations Safety Assessment and Risk Mitigation Program." Revised to better describe the safety assessment process and better define roles and responsibilities. Revised 2. Applicability statement to address the applicability of this directive to the Michoud Assembly Facility. Changed affected Reference Documents and Applicable Documents. Deleted RI and RIB definitions. Added several new definitions. Removed Personal Protective Equipment (PPE) section. Referenced the PPE MWI. Deleted Appendix Z. Changed Appendices to Chapters. Minor grammatical changes throughout the document.
Revision	D	9/17/2009	Total Rewrite. Updated JHA form. Updated IHOPS entry process. Better defined the level of management that accepts remaining risk identified in the HA Change RAC from a 4 X 5 to a 5 X 5. Added Chapters 8 and 9.
Revision	E	11/22/2010	Changed directive title from "Operational Safety Assessment Program" to clarify that the processes described in this MWI are intended to be applicable to ground equipment and not intended for flight hardware or flight articles. Attempted to provide a more explanation on the general process described in the MWI. Renumbered and rearranged some paragraphs. Clarified minimum HA signatures and what the signature on an HA means. Clarified the acceptance of residual risk in an HA. Removed PSM signature from HA. Changed some definitions. Changed RAC back to a 4 X 5. Revised Chapter 8 to common and generic hazards list.
Revision	F	8/23/2012	Total rewrite. Revised per 2011 management review. Rearranged some sections so that the flow is easier to follow and the requirement is clearer. Moved Training to Appendix E. Added environmental to the RAC. Deleted Chapters 1, 3, 5, 8, and 9. Deleted all responsibilities and moved some to MPR 8715.1. Added Workplace Hazard Assessment process from MWI 8715.4. Reformatted per MWI 1410.1 revision.
Revision	G	8/8/2013	The update makes the MWI more generic so that it is applicable to both MSFC and MAF. Where applicable replaced "MSFC and MAF" with "Center" so the instruction is more generic and can be easily applicable to both locations. Where applicable replaced Center specific organization names (ISB) with the generic terms "Center Safety Office" so the instructions can be easily applicable to both locations. Used MSFC or MAF if the instruction is applicable to only one location. Added definitions in Appendix A for "Center Safety Office" and identified which org at each location (MSFC or MAF) performs the instruction. Clarified requirements for PPE in CH3.8.
Change	1	9/19/2013	On 9/19/13, an Administrative Change was made at the request of the OPRD to update the title of ANSI Z535.5.

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Change	2	1/8/2014	On 1/8/14, an Administrative Change was made at the request of the OPRD to update the definitions for high, moderate, low and minimum risk, remove references to the IHOPS database and startup notification.
Revision	H	10/3/2014	Clarify use of Safety Data Sheet when identifying PPE in a safety assessment. Minor word clarification in various sections. Changed S&MA to SMA.
Change	1	3/21/2016	On 3/21/16, at the request of the OPRD, an administrative change was made to update Inside Marshall to MSFC's Explornet Homepage and SHE Webpage to SHE Community, format NOTES, and change NPR 1441.1 to NRRS 1441.1.
Change	2	3/27/2017	On 3/27/17, at the request of the OPRD, administrative changes were made to update references to NASA's Explornet, Appendix D Records, 5.9.1 NOTE and definition, and NPR chapter titles.
Revision	I	7/21/2017	Clarified frequency for owners to review their safety assessments in 5.1.4 and Chapter 2.

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## **1. PURPOSE**

To describe the Center’s systematic approach to determine the most effective system safety activities necessary to assess a facility or operation to identify hazardous conditions and control methods to minimize the level of risk that are directly or indirectly related to operating the facility or performing the operation in accordance with NPR 8715.3.

## **2. APPLICABILITY**

2.1 This MWI applies to Center personnel, programs, projects, and activities, 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 applies to the Michoud Assembly Facility (MAF).

2.3 This MWI applies as follows: 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 only to operations that involve the use of ground equipment and facilities.

*NOTE: Safety assessments performed for “flight or flight development” can elect to follow the processes described in this MWI, NPR 8715.3 chapter for System Safety, or the process identified by the Program/Project Program.*

## **3. AUTHORITY**

NPR 8715.3, NASA General Safety Program Requirements

## **4. APPLICABLE DOCUMENTS AND FORMS**

4.1 Occupational Safety and Health Standards, 29 CFR pt. 1910

4.2 Safety and Health Regulations for Construction, 29 CFR pt. 1926

4.3 NPD 8700.1, NASA Policy for Safety and Mission Success

4.4 NPR 8621.1, NASA Procedural Requirements for Mishap and Close Call Reporting, Investigating, and Recordkeeping

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- 4.5 NPR 8715.1, NASA Occupational Safety and Health Program
- 4.6 NPR 8820.2, Facility Project Requirements (FPR)
- 4.7 NRRS 1441.1, NASA Records Retention Schedules
- 4.8 MPR 8715.1, Marshall Safety, Health and Environmental (SHE) Program
- 4.9 MPR 8823.1, Design Control of Facilities
- 4.10 MWI 3410.1, Personnel Certification Program
- 4.11 NASA STD 8719.7, Facility System Safety Guidebook
- 4.12 ANSI Z41.1, Men’s Safety-Toe Footwear
- 4.13 ANSI Z87.1, Occupational and Educational Eye and Face Protection
- 4.14 ANSI Z88.2, Respiratory Protection
- 4.15 ANSI Z89.1, Personnel Protection – Protective Headware for Industrial Workers
- 4.16 ANSI Z535.2, Environmental and Facility Safety Signs
- 4.17 ANSI Z535.3, Criteria for Safety Symbols
- 4.18 ANSI Z535.4, Product Safety Signs and Labels
- 4.19 ANSI Z535.5, Safety Tags and Barricade Tapes (for Temporary Hazards)
- 4.20 MSFC Form 4390, Job Hazard Analysis

## **5. INSTRUCTIONS**

### **5.1 General**

5.1.1 A safety assessment of the appropriate level [hazard analysis (HA), Job Hazard Analysis (JHA), Job Safety Analysis (JSA), workplace safety assessment or a similar method of assessment that identifies the hazardous conditions and control methods] shall be performed prior to the startup/restart of all jobs, operations and facilities identified to have a high, moderate and low level of risk in accordance with 29 CFR pt. 1910.132 (d) following the processes described in NPD 8700.1, NPR 8715.3 chapters for System Safety and Facility Safety Management, NASA STD 8719.7, MPR 8715.1, and this MWI.

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*NOTE 1: Safety assessments are performed by the facility/operation owner with assistance and concurrence provided by the Center’s Safety Office, as needed.*

*NOTE 2: The term “Hazardous Facilities/Operations” is a generic term used to reference facilities or operations where an in-depth safety assessment is performed such as a HA.*

*NOTE 3: Work activities performed in the office/administrative environment are normally considered to be of a minimal level of risk. A documented safety assessment for office/administrative work activities is not required unless its use is desired by the supervisor. (See section 5.6 and Chapter 2 of this MWI for more information.)*

*NOTE 4: All types of safety assessments focus on identifying hazardous conditions, assessing the risks that can be encountered and identifying the actions necessary to eliminate, reduce or control the hazardous condition to a safe working level.*

5.1.2 The level of safety assessment performed shall be determined by the overall level of risk identified for the facility/operation.

*NOTE 1: The level of safety assessments needed is determined based on an agreement between the facility/operation owner and the Center’s Safety Office.*

*NOTE 2: Notify the Center’s Safety Office when a safety assessment is needed for the startup/restart of a facility/operation. Notification should be provided by the facility/operation owner far enough in advance of the projected startup/restart of a facility/operation to allow the Center’s Safety Office to plan accordingly if they are expected to be involved in supporting the development of a HA for a projected startup/restart of a facility/operation.*

5.1.3 Hazardous conditions and corresponding methods to eliminate, reduce, or control the hazardous conditions shall be documented in safety assessments and operating procedures, and be communicated and made readily available (hardcopy or electronic) by the facility/operation owner to the employees expected to perform a job or operation.

5.1.4 Safety assessments shall be reviewed frequently by the facility/operation owner for accuracy and updated when changes/modifications are made to a job, operation, or facility that has the potential to cause an undesired event.

5.1.4.1 The facility/operation owner shall determine the frequency for reviewing safety assessments. At a minimum, an annual review is required. The review may be included as part of another review or meeting, e.g., Readiness Review, safety meeting, or Operations Tracking (OpsTrak). JHA’s may be done individually or as a group.

5.1.4.2 The frequency shall be based on such considerations as updates, changes, new hazards, employee training, and risk.

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5.1.4.3 A record of the review shall be maintained.

*NOTE: Frequent reviews of safety assessments (e.g., HA, JHA, JSA) with employees are encouraged to remind the employees of the hazards directly associated with the jobs/operations they perform and the methods for controlling these hazards.*

5.1.5 Safety assessments shall clearly identify when Personal Protective Equipment (PPE), emergency or monitoring equipment/systems, emergency showers/eyewashes, and other types of protective equipment/systems are necessary to control a hazardous condition.

## 5.2 HA

*NOTE 1: There are several types of HAs and techniques available to identify hazardous conditions. The type selected will depend on the level of information available and the phase in the life-cycle of the facility/operation that the HA is developed.*

*NOTE 2: Recommend initiating the HA during the design and construction phase for facilities/operations identified to have an overall level of risk of high or moderate. An HA can be included as supporting data as part of the Center's Facility Safety Management Process (FSMP) or Facility Project Management Plan for a facility when requested or specified by the Center's Facility Project Manager (FPM) following the processes described in NPR 8820 chapter for Project Development and Planning. The Center's Safety Office generates comments during facility construction design reviews and provides these comments to the FPM for inclusion in the design as part of the Center's FSMP as needed. (See NPR 8715.3 chapter for Facility Safety Management, NPR 8820.2 chapter for Project Development and Planning, NASA STD8719.7, Military STD (MIL STD) 882, and MPR 8823.1 for more information.)*

5.2.1 A HA shall:

5.2.1.1 Focus primarily on a specific facility/operation and all of the hazardous conditions that one could encounter or could be encountered during the performance of the facility/operation.

5.2.1.2 Be started early in the process for facilities/operations when possible.

5.2.1.3 Identify the facility/operation being analyzed.

5.2.1.4 Identify the scope of the analysis.

5.2.1.5 Be tailored specifically for the complexity, function, and structure of the facility/operation being analyzed.

5.2.1.6 Be performed using a systematic step-by-step approach.

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*NOTE: The Center's Safety Office and the facility/operation owner agree upon the scope of the analysis.*

5.2.1.7 Identify the hazardous conditions that are inherent or can be induced to the facility/operation.

*NOTE: See Appendix G of this MWI for a list of common hazardous conditions that may be associated with a facility/operation.*

5.2.1.8 Identify the control methods necessary to eliminate, reduce, or control the hazardous conditions to a safe level of risk.

5.2.1.9 Provide a one-to-one correspondence between a hazardous condition and its control methods in the HA so they are easily understood by employees.

5.2.1.10 Track hazardous conditions until the control methods have been implemented.

5.2.1.11 Identify the initial and final Risk Assessment Code (RAC) classification for the hazard.

5.2.1.12 Be reviewed by the Center's Safety Office for concurrence and/or comments.

5.2.1.13 Have the residual risk accepted by the appropriate level of management responsible for the facility/operation.

*NOTE: See Appendix E Table 2 of this MWI for the appropriate level of management to accept the residual risk.*

5.2.1.14 Include a review of other supporting documentation, such as Safety Data Sheets (SDS), operating procedures and manufacturer's instructions that are directly associated with the facility/operation being assessed.

*NOTE: If the PPE selected for use during the assessment is different than the PPE recommended in the supporting data contact the Center's Occupational Health Office for assistance to ensure the selected PPE is sufficient to control the hazardous condition and note this concurrence in the HA. (See NPR 8715.3 chapter for Operational Safety for more information.)*

5.2.2 The following shall be considered and noted in the HA as applicable:

5.2.2.1 Energy sources that are inherent or can be induced to the facility/operation.

5.2.2.2 Hazardous conditions that are inherent or can be induced to the facility/operation.

5.2.2.3 Hazardous conditions that can affect or be induced from adjacent facilities/operations.

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5.2.2.4 Potential severity if an undesired event were to occur. (See Appendix E Table 3 of this MWI for more information.)

*NOTE: The undesired event is normally identified as the worse-case scenario in the HA.*

5.2.2.5 Probability that an undesired event can occur. (See Appendix E Table 4 of this MWI for more information.)

5.2.2.6 Control methods necessary to eliminate, reduce or control the severity and frequency of an undesired event.

5.2.3 Each hazardous condition identified in an HA shall be controlled and tracked as “open” until the control methods are verified as implemented and effective by the facility/operation owner and the Center’s Safety Office.

5.2.3.1 Verification of the implementation and effectiveness of control methods shall be accomplished prior to the initial startup or restart of the facility/operation by the facility/operation owner.

*NOTE: Use reasoning and good judgment in identifying undesired events, causes and effects, so that they are confined to “credible” as opposed to “conceivable” events. Only identify those conditions that can reasonably be expected to occur while operating the facility or performing the operation. Divide the facility/operation into systems and subsystems if needed to better define the credible hazardous conditions in order to make the HA manageable. When needed, provide additional details and supporting information to better describe the undesired event as an appendix. The supporting information can be linked back to the hazardous condition by including the hazard-unique identifier assigned the hazardous condition in the appendix with the supporting information.*

5.2.4 Hazardous conditions and the control methods identified in a HA shall be clearly communicated by the facility/operation owner to employees operating the facility or performing the operation in accordance with 29 CFR pt. 1910.132(d)(ii).

*NOTE: The hazardous conditions and the control methods may be communicated by the use of operating procedures, training, signage, or other methods as deemed appropriate.*

5.2.4.1 When signage is used as the method of communication, it shall be specific in identifying the hazardous condition and/or control methods. (See 29 CFR pt. 1910.144 and 145, and American National Standards Institute (ANSI) Z535.2, Z535.3, Z535.4 and Z535.5 for more information.)

*NOTE: Signs intended to communicate hazardous conditions and/or control methods may be computer-generated or purchased from a vendor.*

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5.2.5 HAs shall be updated by the facility/operation owner when the changes/modifications are made to a facility/operation and the changes/modifications have the potential to result in any of the following:

5.2.5.1 Create new hazardous conditions that require new or additional controls.

5.2.5.2 Affect existing controls implemented to control hazardous conditions that were previously identified.

5.2.5.3 Allow the facility/operation to be operated outside previously-established safety parameters.

5.2.5.4 Create changes internally or externally to the facility/operation or to the environment that could affect the facility/operation.

5.2.6 If the HA is intended to serve as the workplace safety assessment in accordance with 29 CFR pt. 1910.132(d), it shall include the documentation information contained in section 5.7 of this MWI.

5.2.7 Updated HAs shall be reviewed and receive concurrence from the Center's Safety Office following the same process as the original HA.

### 5.3 Assigning a RAC Classification to Individual Hazards

*NOTE: Assigning the initial and final RAC classification to a hazardous condition can be a challenge. The assignment of a severity and probability RAC classification is based on reasoning, sound judgment, and engineering analysis, which can include safety factors, data from past mishaps, calculations, experience, configuration or complexity, quality control, organizational protocols, and the surrounding environment.*

5.3.1 The following shall be considered when selecting the initial and final RAC classification assigned to a hazardous condition:

5.3.1.1 Are existing or built-in controls in place?

5.3.1.2 How effective are the existing controls in preventing the occurrence of an undesired event?

5.3.1.3 Do the controls have limitations or uncertainties that can hinder them from preventing the occurrence of an undesired event?

5.3.1.4 Are additional controls needed to lower the probability of the occurrence of an undesired event or its potential severity?

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5.3.2 Each hazardous condition identified to have a probability to cause the occurrence of an undesired event shall be assigned an initial and final RAC classification. (See Appendix E of this MWI for more information.)

### 5.3.3 Assigning the Initial RAC

5.3.3.1 The initial severity RAC classification shall provide a relative measure of a credible “worst-case” severity of an undesired event if a hazardous condition is not controlled.

5.3.3.2 The initial probability of occurrence RAC classification shall provide a credible probability that the hazardous condition can cause the occurrence of an undesired event sometime during the life of the facility/operation.

*NOTE: The probability of occurrence can be determined by using either the qualitative or quantitative method and is based on information obtained on the system design in conjunction with built-in and existing controls. The method to determine the probability of occurrence is determined by the one performing the HA.*

### 5.3.4 Assigning the Final RAC

5.3.4.1 The final severity and probability of occurrence RAC classification shall be assigned based on the effectiveness of control methods that are selected and implemented.

*NOTE: Normally, the initial severity RAC classification does not change unless the hazardous condition has been eliminated through a design change.*

5.3.5 Every effort possible shall be taken by the facility/operation owner to reduce each initial RAC classification to the lowest RAC classification possible or feasible prior to startup of the facility/operation.

## 5.4 Hazard Reduction/Control Protocol

5.4.1 Each hazardous condition identified in a HA shall be eliminated, reduced, or controlled using the following order of precedence:

5.4.1.1 Engineering controls such as changing the design or installing protective safety devices (guards or warning lights).

5.4.1.2 Administrative controls such as written operating procedures, training, barriers, and signs where it is impractical to eliminate or reduce the hazardous conditions or the initiating event through the design selection process.

5.4.1.3 Use of personal protective equipment.

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*NOTE: A combination of control methods are sometimes necessary to eliminate, reduce, or control the hazardous condition to an acceptable safe working level.*

5.4.2 The control methods shall be identified in the HA or JHA and correspond directly (one-to-one) to the specific hazardous condition they are intended to control.

#### 5.5 Closure and Risk Acceptance in an HA

5.5.1 The signatures on the HA shall signify the following:

5.5.1.1 The HA is complete in identifying known hazardous conditions associated with the facility/operation and their corresponding control methods.

5.5.1.2 The control methods have been implemented and verified by the Center's Safety Office and the facility/operation owner.

5.5.1.3 The analysis is technically accurate, thorough, and comprehensive.

5.5.1.4 All recommendations and control methods have been implemented and validated as closed.

5.5.1.5 Concerns and recommendations provided by Subject Matter Experts (SME) have been resolved to their satisfaction.

5.5.2 Minimum signatures for the closures of the HA include the following:

5.5.2.1 Center's Safety Office representative.

5.5.2.2 Representative for the facility/operation.

5.5.3 Minimum signature for the risk acceptance is the following:

5.5.3.1 The signature of the facility/operation owner management shall indicate that they accept the residual risk and concur to close the HA.

*NOTE 1: The level of management needed to accept residual risk is shown in Appendix E Table 2 of this MWI. Management can elect to elevate the approval and acceptance of residual risk identified in a hazard assessment to the next higher level of management when they determine the level of risk is higher than their approval authority, if necessary. (See NPd 8700.1 and NPR 8715.3 chapters for Risk Assessment and Risk Acceptance for more information.)*

*NOTE 2: The organization performing the HA can elect to include additional signatures of concurrence on the HA signature sheet in addition to those listed in this section of the MWI.*

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5.5.4 The facility/operation owner managers shall ensure employees that operate the facility or perform the operation and are being placed at risk are informed or made aware of any risks that have been accepted by management. (See NPR 8715.3 chapters for Risk Assessment and Risk Acceptance for more information.)

*NOTE: “Warning and caution notes” in the operating procedure can be one method of informing employees of the hazardous conditions and control methods. (See Appendix F of this MWI for more information.)*

## 5.6 JHA

*NOTE 1: A JHA is only one of several methods that can be provided as evidence that a job or operation has been assessed to some level in order to identify the hazardous conditions and control methods. Other methods can include the use of operating procedure, work instructions, manufacturer’s instructions, and safety-related checklists so long as the document clearly identifies the hazardous conditions and control methods.*

*NOTE 2: Work activities performed in the office/administrative environment are normally considered to be of a minimal level of risk. A documented safety assessment for office/administrative work activities is not required unless its use is desired by the supervisor. (See Chapter 2 of this MWI for more information.)*

*NOTE 3: A JHA is written for a specific job/operation. Do not attempt to capture all jobs/operations performed by a specific employee in one JHA. An employee that does multiple jobs/operations will have multiple JHAs.*

### 5.6.1 A JHA shall:

5.6.1.1 Focus primarily on the employee’s interaction with a specific job or operation and the hazardous conditions that they can encounter in while performing the job or operation.

5.6.1.2 Be performed following the process identified in Chapter 2 of this MWI.

5.6.1.3 Be specific in identifying the hazardous condition and the control methods to eliminate, reduce, or control the hazardous condition.

5.6.1.4 Be documented using MSFC Form 4390, Job Hazard Analysis or a similar form that includes a description of the steps identified to contain potential hazards, the specific hazardous conditions that can be encountered while performing the step and the specific actions necessary to eliminate, reduce, or control the hazardous conditions.

*NOTE 1: JHAs are normally documented using a three (3) column format. Example JHAs for select jobs and operations can be viewed on MSFC’s “Inside Marshall,” select “Organizational Websites,” locate the Safety and Mission Assurance Directorate, select*

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*“Safety, Health and Environmental (SHE),” select “Safety Information,” select “Safety Assessments.”*

*NOTE 2: There are cases where the safety assessment is documented on a MSFC Form 4390 and the MSFC Form 4390 is revised. In these cases the safety assessment data does not need to be transferred to the revised MSFC Form 4390 unless changes have occurred in the safety assessment data such as changes in hazardous conditions or control methods, or the revision to the MSFC Form 4390 has added requirements that were not in the previous revision.*

*NOTE 3: MSFC’s “Inside Marshall” is located on NASA’s “Explornet page.”*

5.6.1.5 Be updated by the job/operation owner when changes to the job or operation introduce new hazardous conditions or affect the existing control methods.

5.6.1.6 Indicate the supervisor directly responsible for the job or operation (1) concurs that the job or operation is identified as a low risk; (2) concurs with the hazardous conditions and control methods listed in the JHA; and (3) concurs the use of a JHA for the job or operation .

5.6.1.7 Include a review of other supporting documentation, such as SDS, operating procedures and manufacturer’s instructions that are directly associated with the job or operation being assessed.

*NOTE: If the PPE selected for use during the assessment is different than the PPE recommended in the supporting data contact the Center’s Occupational Health Office for assistance to ensure the selected PPE is sufficient to control the hazardous condition and note this concurrence in the JHA. (See NPR 8715.3 chapter for Operational Safety for more information.)*

5.6.1.8 Be made readily available (electronic or hard copy) to employees performing the job or operation.

5.6.2 If the JHA is intended to serve as the workplace safety assessment in accordance with 29 CFR pt. 1910.132(d), it shall include the documentation information contained in section 5.7 of this MWI.

*NOTE 1: MSFC Form 4390 states it serves as the workplace safety assessment for the job/operation/workplace being assessed.*

*NOTE 2: Contractors are allowed to use their company JHA form in lieu of the MSFC Form 4390, so long as the contractor’s form is in a format that is specific in identifying the hazardous conditions and the control methods.*

5.6.3 The hazardous conditions and the control methods identified in a JHA shall be clearly communicated by the job/operation owner to employees performing the job/operation in accordance with 29 CFR pt. 1910.132(d)(ii).

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*NOTE: The hazardous conditions and control methods may be communicated by the use of operating procedures, training, signage, verbal instructions, or other methods as deemed appropriate.*

5.6.4 Operating procedure, work instructions, and manufacturer’s instructions for equipment and systems shall be permitted to serve in lieu of a JHA for job or operations if they clearly identify the hazardous conditions and control methods that would have been identified in a JHA.

*NOTE 1: Safety-related checklists that are specific to the job or operation are permitted for use as a method to assess construction-related jobs and operations for hazardous conditions. See MSFC’s “Inside Marshall,” select “Organizational Websites,” locate the Safety and Mission Assurance Directorate, select “Safety, Health and Environmental (SHE),” select “Safety Information,” select “Safety Assessments,” select “SHE Checklists.”*

*NOTE 2: A JSA and Safe Plan of Action (SPA) are similar types of safety assessments and can serve as a JHA, so long as they are specific in identifying the hazardous condition and control methods.*

5.6.5 JHAs shall be periodically evaluated during inspections and audits to ensure the JHAs clearly identify the hazardous conditions, specific control methods for the job or operation, and employees are adhering to the specified control methods while performing the job or operation.

## 5.7 Workplace Safety Assessment

*NOTE: This type of assessment is sometimes referred to as a PPE Assessment.*

5.7.1 A workplace safety assessment shall:

5.7.1.1 Focus primarily on the employee’s interaction in a specific work area including specific jobs or operations and the hazardous conditions that they can encounter that can be controlled by the use of PPE.

5.7.1.2 Be performed for work areas and activities where hazardous conditions are present or likely to be present and the potential exists for an employee to be injured through the absorption, inhalation, visual, auditory, physical contact, or be impaired in the function of any part of their body in accordance with 29 CFR pt. 1910.132(d).

5.7.1.3 Be performed following the process identified in Chapter 3 of this MWI.

5.7.1.4 Be made readily available (electronic or hard copy) to employees in the work area.

5.7.1.5 Be documented using Appendix H of this MWI or a similar type form that includes the following:

a. The specific workplace being evaluated.

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- b. The supervisor and/or employees(s) performing the evaluation.
- c. The specific hazard and the specific type PPE necessary to reduce exposure to the hazard.
- d. The date the evaluation was performed.
- e. Be identified that it serves as the Work Place Hazard Assessment in accordance with 29 CFR pt. 1910.132(d)(2).

5.7.1.6 Be updated by the facility/operation owner when changes in workplace conditions induce new hazardous conditions or affect the existing control methods.

5.7.1.7 Include a review of other supporting documentation, such as SDS, operating procedures and manufacturer’s instructions that are directly associated with the job or operation being assessed.

*NOTE: If the PPE selected for use during the assessment is different than the PPE recommended in the supporting data contact the Center’s Occupational Health Office for assistance to ensure the selected PPE is sufficient to control the hazardous condition and note this concurrence in the workplace safety assessment. (See NPR 8715.3 chapter for Operational Safety for more information.)*

5.7.2 The hazardous conditions and the control methods identified in a workplace safety assessment shall be clearly communicated by the facility/operation owner to the employees performing the job/operation in accordance with 29 CFR pt. 1910.132(d)(ii).

*NOTE: The hazardous conditions and the control methods may be communicated by the use of operating procedures, training, signage, or other methods deemed appropriate.*

5.7.3 When a sign is used to communicate a hazardous condition and/or control method the signs shall provide a clear message and be specific in identifying the hazardous condition and/or control method, such as the specific PPE and period of time when PPE is expected to be worn by employees. Example – Safety Glasses are required when operating this machine or performing this operation.

*NOTE 1: Some signs will provide both the hazardous condition and control method.*

*NOTE 2: In most cases, signs purchased from vendors have a message similar to “Safety Glasses Required” or “Hearing Protection Required.” This type of message does not provide a clear statement as to when PPE is required to be worn and have led to some confusion and misunderstanding by area employees and visitors. These messages indicate that the PPE is to be worn at all times while in the work area, but in reality the PPE is only required when operating the equipment or performing the operation.*

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*NOTE 3: Organizations can elect to modify existing PPE signs so that they clearly state when PPE is actually required to be worn. The modification can be accomplished by adding wording similar to “while operating the equipment” to the existing sign by using a label maker or other similar method. The modification allows the sign to be modified to read “Safety Glasses Required While Operating the Equipment,” so that it clearly states the type of PPE and when the PPE is actually required to be worn.*

*NOTE 4: Signs intended to communicate hazardous conditions and/or control methods may be computer-generated or purchased from a vendor.*

*NOTE 5: See 29 CFR pt. 1910.144 and 145, and ANSI Z535.2, Z535.3, Z535.4, and Z535.5 for sign format and color combinations.*

5.7.4 Workplace safety assessments shall be periodically evaluated during inspections and audits to ensure the workplace safety assessments clearly identify the hazardous conditions, specific control methods for the work area, and employees are adhering to the specified control methods while in the work area.

## 5.8 Operating Procedure

5.8.1 Operating procedures shall:

5.8.1.1 Be developed by the operation owner for facilities/operations identified to have the potential for high or moderate level of risk to cause the occurrence of an undesired event. (See NPR 8715.3 chapter for Operational Safety for more information.)

5.8.1.2 Be routed to the Center’s Safety Office for review and concurrence prior to the startup/restart of the facility/operation.

*NOTE 1: Operating procedures that require a Center’s Safety Office concurrence are normally those identified as high or moderate level of risk operations, but in some cases, the Center’s Safety Office can request a review for low level of risk operations.*

*NOTE 2: Some operating procedures and plans will also require concurrence from other Center organizations that are responsible for specific Center programs such as the Center’s radiation program.*

5.8.1.3 Be conspicuously identified on the cover sheet or title page with wording similar to the following: “THIS DOCUMENT CONTAINS HAZARDOUS OPERATIONS PROCEDURES,” “THIS DOCUMENT CONTAINS SAFETY CRITICAL OPERATIONS,” or similar wording indicating that the operation contains steps or processes considered as hazardous.

5.8.1.4 Contain “caution or warning” statements preceding each step containing hazardous conditions to communicate the hazardous conditions to employees in accordance with 29 CFR

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pt. 1910.132(d)(ii). (See Appendix F of this MWI for example “caution and warning” statements.)

5.8.1.5 Contain the sequence of steps or emergency actions to place the operation in a safe mode and/or secure the facility in the event of an emergency or anomaly occurs and for securing the facility (i.e., equipment failure, personal injuries, and fire/explosion) if applicable.

5.8.1.6 Contain a Signature sheet signature that, at a minimum, includes the following:

a. Name and title of the person submitting the operating procedure for concurrence and date signed.

*NOTE: This name indicates the operating procedure is technically accurate, comprehensive, thorough, and addresses the hazardous conditions and control methods that were identified in an HA where use of the procedure was identified as the control method.*

b. Concurrence from the Center’s Safety Office when required.

*NOTE: This signature indicates the operating procedure provides sufficient detail to identify hazardous conditions and the control methods.*

5.8.1.7 Be made readily available to all employees that perform operations.

5.8.1.8 Identify the specific of PPE to use when required as a control method for a hazardous condition identified in an HA, JHA, JSA, SPA, or Workplace Safety Assessment.

5.8.1.9 Be updated when the changes/modification are made to the facility/operation that induce new hazardous conditions or affect the existing control methods.

5.8.2 If the operating procedure is intended to serve as the Work Place Hazard Assessment for the facility/operation, it shall in accordance with 29 CFR pt. 1910.132(d) and include the documentation information contained in section 5.7 of this MWI.

5.8.3 Operating procedures shall be periodically evaluated during inspections and audits to ensure employees are adhering to the “caution and warning notes” contained in the operating procedures while performing the job or operation.

## 5.9 Entry into the Center’s Inventory of Operations Database

5.9.1 Facilities/operations identified as high, moderate and low risk shall be entered into the Center’s inventory of operations database by the facility/operation owner.

*NOTE 1: At MSFC the OpsTrak database serves as the Center’s list of operations identified to have an increased level of risk (high, moderate and low) to cause/contribute to an*

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*accident, injury, illness, or damage to property or environment due to the nature of the work being performed.*

*NOTE 2: At MAF OpsTrak is not fully implemented. An equivalent method/system to document the assessment of facilities/operations may be used until the OpsTrak is operational. Contact the MAF SMA Manager/QD10 for additional information.*

*NOTE 3: At MAF the extent of using OpsTrak to document the assessment of facilities/operations will be coordinated between SF02 and QD12.*

*NOTE 4: Facilities/operations identified as a minimal level of risk can be entered into the Center's OpsTrak, if desired by the facility/operation owner. This is one method of providing rationale that the facility/operation was evaluated and determined to have minimal level of risk.*

5.9.2 Inventory of operation entries shall be reviewed at least annually by the facility/operation owner and Center's Safety Office to ensure the facility/operation is still active and the supporting documentation is up-to-date, and maintained.

*NOTE: At MSFC, OpsTrak allows the facility/operation owner to upload supporting documentation for the facility/operation.*

5.9.3 The Center's OpsTrak shall serve as a central location to maintain a current listing of facilities/operations that have been identified by the facility/operation owner, with concurrence from the Center's Safety Office, as high, moderate and low risk.

*NOTE: Instructions for entering facilities/operations into OpsTrak is located on MSFC's "Inside Marshall," select "Organizational Websites," locate the Safety and Mission Assurance Directorate, select "Safety, Health and Environmental (SHE)," select "Safety Information," select "Safety Assessments," select "OpsTrak."*

5.9.4 At MSFC, the overall level of risk selected for a facility/building may be maintained in Electronic Project Online Risk Tool (ePort). Access to ePort is requested through the NASA Application Management System (NAMS).

## **6. CANCELLATION**

MWI 8715.15H, Ground Operations Safety Assessment Program, dated October 3, 2014.

*Original signed by*

Todd A. May  
Director

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## **CHAPTER 1 HA CONTENT**

CH1.1 The HA, at a minimum, shall include the following:

CH1.1.1 Cover sheet that identifies the name of the facility/operation being analyzed, the organization that prepared the HA, and the date the HA was completed.

CH1.1.2 Signature page, at a minimum, identifies the names and organization of who prepared the HA, the Center's Safety Office representative that reviewed the HA, and the appropriate level of management that accepts the residual risk listed in the HA.

CH1.1.2.1 The signature page shall include a brief statement signifying which signature is accepting the residual risk identified in the HA.

*NOTE: This brief statement alerts the organization's management that they are accepting the residual risk identified in the HA.*

CH1.1.3 Description of the facility/operation being analyzed.

CH1.1.4 Any ground rules or assumptions used during the analysis.

CH1.1.5 RAC classifications of the residual risks after the controls have been implemented.

CH1.1.6 The identified hazardous conditions, the hazard cause, the hazard effect (undesired event) and corrective methods that were implemented to control the hazardous condition, and how the corrective action was verified in place.

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## **CHAPTER 2 PROCESS TO PERFORM A JHA**

*NOTE 1: JHAs focus primarily on the employee’s interaction with a specific job or operation and the hazardous conditions that they can encounter while performing the job or operation. JHAs are normally the only level of assessment performed for jobs or operations identified to have a low or minimal level of risk and are written specific to the employee’s interaction with job/operation being assessed.*

*NOTE 2: A JHA is only one of several methods that can be provided as evidence that a job or operation has been assessed to some level in order to identify the hazardous conditions and control methods. Other methods can include the use of operating procedure, work instructions, and manufacturer’s instructions, so long as the document clearly identifies the hazardous conditions and control methods.*

*NOTE 3: The JSA and SPA are similar types of safety assessments and can serve as a JHA so long as they are specific in identifying the hazardous condition and control methods.*

*NOTE 4: Safety-related checklists that are specific to the job or operation are permitted for use as a method to assess construction-related jobs and operations for hazardous conditions.*

*NOTE 5: Work activities performed in the office/administrative environment are normally considered to be of a minimal level of risk. A documented safety assessment for office/administrative work activities is not required unless its use is desired by the supervisor. If the supervisor elects to have a JHA for office/administrative activities they have the option of developing their own JHA or using the generic JHA for “General Admin/Office Work” posted on the MSFC’s SHE Web page with the example JHAs. If the supervisor elects to use the generic JHA for office/administrative activities, the generic JHA can be tailored to be more specific to their activities if desired.*

*NOTE 6: A JHA is written for a specific job/operation. Do not attempt to capture all jobs/operations performed by a specific employee in one JHA. An employee that does multiple jobs/operations will have multiple JHAs.*

**CH2.1** All jobs/operations shall be evaluated by the job/operation owner to determine the level of assessment needed to identify the hazards specific to the job and the actions necessary to reduce or control the hazards. (See MPR 8715.1 and NPR 8715.3 chapter for Risk Assessment and Risk Acceptance for more information.)

**CH2.2** A JHA alone is not recommended as the only type of assessment performed for facilities/operations identified to be a high or moderate level of risk facility/operation.

*NOTE 1: High and moderate risk facilities/operations require a more detailed level of assessment such as a HA. A JHA can be identified as a control measure in a HA for a specific job/operation associated with a high or moderate level of risk operation.*

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*NOTE 2: A JHA is recommended to be performed by employees that are knowledgeable and familiar with the job/operation being assessed. These employees can more readily identify the hazards directly associated with the job/operation being assessed and determine the most effective mitigation techniques to eliminate, reduce, or control them.*

*NOTE 3: The most effective and reliable method of assessing a job/operation is for a team of employees to observe an experienced employee perform the job/operation being assessed. This allows involvement by the employees that are expected to perform the job/operation in identifying the hazards and the mitigation techniques necessary to eliminate, reduce, or control them.*

CH2.3 The following process shall be considered by the job/operation owner when performing a JHA:

CH2.3.1 Select a specific job/operation to be assessed.

*NOTE: Normally the JHAs are performed first for the jobs/operations that are considered to have more potential that credible hazards can exist or have a high rate of injury or damage to equipment or parts.*

CH2.3.2 Break the job/operation down into a sequence of steps that contain a single action.

*NOTE: Breaking the job/operation down into steps can help identify the potential hazards that can exist with the step. Evaluate every step of the job/operation, but normally only the steps that contain potential hazards are listed in the JHA. If the JHA is also intended for use as an operating procedure, additional steps can also be included.*

CH2.3.3 Carefully examine each step to identify any potential hazards or unsafe conditions that can exist while performing the step.

*NOTE: Potential hazards and unsafe conditions include, but are not limited to, the following: caught between; contact with; struck by; striking against; exposure to shock, burns, heat, cold, noise, or toxic fumes; straining by lifting, lowering, bending; or falls or slips.*

CH2.3.3.1 While examining the each step, consider the following:

- a. What can go wrong in this step?
- b. What would be the consequences if something did go wrong?
- c. What could cause it to happen?
- d. What would be the contributing factors?

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- e. What are the chances it can happen?
- f. What are the control measures, if any, that are currently in place?

CH2.3.4 When a hazard or unsafe condition is identified, determine the corresponding mitigation technique to eliminate, reduce, or control the hazard.

*NOTE: List the hazards individually so it easily identifies which mitigation technique is used for the hazard. Mitigation techniques that can be taken to eliminate, reduce, or control potential hazards include, but are not limited to, the following: engineering controls, administrative or procedural controls, installation of safety devices such as barriers, warning lights, and alarms, or the use of personal protective equipment.*

CH2.3.5 Review other supporting documentation, such as SDS, operating procedures and manufacturer’s instructions that are directly associated with the job or operation being assessed.

*NOTE: If the PPE selected for use during the assessment is different than the PPE recommended in the supporting data contact the Center’s Occupational Health Office for assistance to ensure the selected PPE is sufficient to control the hazardous condition and note this concurrence in the JHA. (See NPR 8715.3 chapter for Operational Safety for more information.)*

CH2.4 JHAs shall be documented using MSFC Form 4390, “Job Hazard Analysis” or a similar three (3) column format that contains the necessary information.

*NOTE 1: MSFC Form 4390 is located on “NASA’s Explornet page,” select “Center,” select “Marshall,” select “Marshall Integrated Document Library (MIDL),” select “Forms Management - MSFC Forms.” (See section 5.6.1 of this MWI for more information.)*

*NOTE 2: A JSA and SPA are normally documented using an equivalent three column form.*

CH2.5 JHAs shall be written as follows:

CH2.5.1 Each step that contains a potential hazard is identified individually and written specific in its description.

CH2.5.2 Each hazard is identified individually and written specific in its description of the potential effects.

CH2.5.3 Each mitigation action is identified individually and written specific in the description of how hazard can be mitigated.

CH2.5.4 Steps do not contain multiple hazards or mitigation actions.

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*NOTE: In these situations, subsets (e.g., 1.a, 1.b, and 1.c) are used to easily distinguish the hazard and corresponding mitigation action.*

CH2.5.5 Contain a clear and easily identifiable one-to-one relationship between a specific hazardous condition and the control methods, so they are easily understood by employee.

CH2.5.6 Does not contain general terms such as “use appropriate or necessary PPE, or take appropriate training.”

CH2.6 JHAs shall be made readily available (electronic or hard copy) to the employees that perform the job/operation.

*NOTE 1: Posting or providing the JHA adjacent to the job/operation is an effective method for ensuring easy accessibility for employees.*

*NOTE 2: When the JHA is posted, it is recommended to also attach the signature sheet as a method to document that the employees performing the job/operation have read the JHA and are aware of the potential hazards and the actions to take to eliminate, reduce, or control their exposure to them.*

CH2.7 JHAs shall be reviewed frequently by the job/operation owner for accuracy, with the employees that perform the job/operation covered by the specific JHA and updated when the changes/modifications are made to a job or operation that has the potential to cause an undesired event.

CH2.7.1 The facility/operation owner shall determine the frequency for reviewing safety assessments. At a minimum, an annual review is required. The review may be included as part of another review or meeting, e.g., Readiness Review, safety meeting, or Opstrak. JHA’s may be done individually or as a group.

CH2.7.2 The frequency shall be based on such considerations as updates, changes, new hazards, employee training, and risk.

CH2.7.3 A record of the review shall be maintained.

*NOTE 1: Frequent reviews of JHAs with the employees are encouraged to remind the employees of the hazards directly associated with the jobs/operations they perform and the methods for controlling these hazards.*

*NOTE 2: JHAs may be reviewed individually with the employees as part of their performance evaluation or as a group review during an organization’s monthly safety meeting with all employees that perform the job/operation for which the JHA was written.*

CH2.8 The use of JHAs shall indicate the supervisor directly responsible for the job or operation  
1) concurs that the job or operation is identified as a low risk, 2) concurs with the hazardous

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conditions and control methods listed in the JHA, and 3) concurs with the use of a JHA for the job or operation.

*NOTE: This does not prevent the supervisor from requesting the Center’s Safety Office review the JHA to ensure the hazards and their mitigation actions are adequate.*

CH2.9 In cases where the JHA is to also serve as an operating procedure, it shall be written in an orderly sequence of procedural steps that are clear and concise, and clearly identify each step that includes the potential of becoming exposed to a hazard.

*NOTE 1: Additional information on how to perform a JHA is contained on NASA’s “Explornet page,” select “Center,” select “Marshall,” select “Inside Marshall,” select “Organizational Websites,” locate the Safety and Mission Assurance Directorate, select “Safety, Health and Environmental (SHE),” select “Safety Information,” select “Safety Assessments” select “Job Hazard Analysis Examples.” Processes to perform a JHA are provide at the bottom of the page.*

*NOTE 2: When MSFC Form 4390 is used to document a JHA it states that it may also serve as the workplace safety assessment for the job/operation/workplace being assessed.*

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### **CHAPTER 3 PROCESS TO PERFORM A WORKPLACE SAFETY ASSESSMENT**

*NOTE: Focus primarily on the employee's interaction in a specific work area and the hazardous conditions that they can encounter while being in the work area that can be controlled by the use of PPE.*

CH3.1 The following process shall be considered by the facility/operation owner when preparing to perform the workplace safety assessment:

CH3.1.1 Are there any obvious hazardous conditions that can cause an employee(s) to be injured while being in the workplace or while performing an activity?

CH3.1.2 What can be done to prevent the employee(s) from being injured?

CH3.1.3 What tools, equipment, including PPE, or safety devices are needed?

CH3.1.4 Are there any obvious ergonomic issues?

CH3.1.5 A workplace safety assessment shall be performed by the following process:

CH3.2 Define the workplace (e.g., room, laboratory, or high-bay building), or select a particular work activity (e.g., drill press or lathe, working with cryogenics, mixing hazardous chemicals, or working overhead) to be assessed. [See OSHA 3151-12R, OSHA 3071, and OSHA 3132 for more information.]

CH3.3 Perform a walk-through survey of the workplace or observe the activity. The survey of the workplace or activity is to develop a list of the potential hazards that the employee can become exposed to while in the workplace or while performing the activity. The typical hazard categories include following:

CH3.3.1 Impact (falling objects or flying debris).

CH3.3.2 Penetration/puncture (sharp objects that can poke, cut or stab).

CH3.3.3 Compression/roll-over or pinching.

CH3.3.4 Chemical (inhalations, ingestion, absorption, skin contact, eye contact or injection).

CH3.3.5 Extreme temperatures (burns, eye injuries, fire, or frost bite).

CH3.3.6 Harmful dust/mist/fumes/particulates (respiratory system hazards).

CH3.3.7 Light radiation (welding, brazing, cutting, furnaces, heat treating, or high intensity lights).

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CH3.3.8 Biologic (blood or other potentially-infected material).

CH3.3.9 Excessive noise.

CH3.3.10 Electrical shock or arc-flash.

CH3.3.11 Elevated work areas.

CH3.3.12 Oxygen-deficient/enriched atmospheres (asphyxiation/explosive).

CH3.3.13 All sources of energy.

CH3.4 Identify the areas of the body or body systems that can be exposed to the hazardous condition or put at risk of being injured to determine the type of PPE necessary to reduce the potential for the employee to be injured as a result of exposure to the hazardous condition.

*NOTE: Special consideration is to be given to the eyes, face, head, hands, feet, hearing, and respiratory system.*

CH3.4.1 Identify any training or certification that may be needed to wear or use the PPE. (See MWI 3410.1 for more information.)

CH3.5 Estimate the potential for the employee to become exposed to the hazardous condition and the consequences if the employee does come into contact with the hazardous condition.

CH3.6 Rank the hazardous conditions. The hazards that can be encountered frequently or can cause severe injury (e.g., loss of life, permanent disability, or serious occupational illnesses) shall receive the highest priority for being eliminated, reduced or controlled.

*NOTE: The hazardous conditions that fall into the high and moderate ranges in the RAC receive the highest priority for elimination, reduction, or correction.*

CH3.6.1 The initial RAC ranking of the hazards shall be based on the “as-is” state of the workplace or activity when the assessment is being performed.

*NOTE: The initial ranking takes into account any hazard control methods that currently exist in the workplace or with the activity.*

CH3.6.2 The residual (final) RAC ranking of the hazards shall be based on potential exposure to the hazardous condition after the additional hazard control methods have been implemented.

*NOTE: When prioritizing hazards, the RAC can be a useful tool in ranking the hazardous condition. The use of a RAC classification (initial or residual) is optional and is not required to be assigned to hazards in the workplace safety assessment.*

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CH3.7 Determine if exposure to the hazardous condition can be eliminated by the use of engineering or administrative controls, the installation of safety devices/guards or warning devices, or use of PPE.

CH3.8 Select the type of PPE that provides a level of protection greater than the minimum required to protect employees from the hazards.

CH3.8.1 Head protection shall be required when there is a potential for the employee to receive a head injury from exposure to falling or flying objects, by bumping their head against a fixed object, or (in some cases) against electrical shock.

CH3.8.1.1 Head Protection is selected in accordance with 29 CFR pt. 1910.135 or 29 CFR pt. 1926.100 (for construction) and be compliant with ANSI Z89.1.

CH3.8.2 Eye and face protection shall be required when there is a potential for the employee to receive an injury to the eyes or face from exposure to flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, potentially-injurious light radiation, or a combination of these.

CH3.8.2.1 Eye and Face Protection is selected in accordance with 29 CFR pt. 1910.133 or 29 CFR pt. 1926.102 (for construction) and be compliant with ANSI Z87.1.

CH3.8.3 Hearing protection shall be required when there is a potential for the employee to become exposed to high noise levels above 85 decibels averaged (dBA) over 8 working hours or becomes exposed to excessive noise.

CH3.8.3.1 Hearing Protection is selected in accordance with 29 CFR pt. 1910.95 or 29 CFR pt. 1926.101 (for construction).

CH3.8.4 Arm and hand protection shall be required when there is potential for the employee to receive an injury to the arms and hands from exposure to skin absorption of harmful substances, cuts or lacerations, abrasions, punctures, chemical or thermal burns, extreme temperature, or electrical shock.

CH3.8.4.1 Arm and Hand Protection is selected in accordance with 29 CFR pt. 1910.138.

CH3.8.5 Foot and leg protection shall be required when there is a potential for the employee to receive an injury to the legs or feet from exposure to falling or rolling objects, sharp objects piercing the sole, molten metal, hot surfaces, wet slippery surfaces, or where employee's feet are exposed to electrical hazards.

CH3.8.5.1 Foot and Leg Protection is selected in accordance with 29 CFR pt. 1910.136 or 29 CFR pt. 1926.96 (for construction) and be compliant with ANSI Z41.

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CH3.8.6 Torso protection shall be required when there is a potential for the employee to receive an injury to the torso from exposure to heat, splashes from hot metals and liquids, impacts, cuts, acids, or radiation.

CH3.8.6.1 Torso and General Skin Protection is selected in accordance with 29 CFR pt. 1910.132 or 29 CFR pt. 1926.95 (for construction) and is recommended by the Material SDS.

CH3.8.7 Respirators shall be required when engineering controls are not feasible and when there is a potential for employees to become exposed to receiving adverse health effects caused by breathing air contaminated with harmful dusts, fogs, fumes, mists, gases, smokes, sprays, or vapors.

CH3.8.7.1 Respiratory Protection is selected in accordance with 29 CFR pt. 1910.134 or 29 CFR pt. 1926.103 (for construction) and be compliant with ANSI Z88.2.

CH3.8.8 Fall protection shall be required when there is a potential for the employee to become exposed to working/walking on surfaces (horizontal or vertical) that have an unprotected side or edge where there is a potential fall hazard to a lower level or when working above uncommon hazards (e.g., moving machinery, chemicals, electrical).

CH3.8.8.1 Personal Fall Arrest System is selected in accordance with 29 CFR pt. 1910.23 and 29 CFR pt. 1926.501.

*NOTE: In general industry, the height is 4 feet or more above an adjacent floor or ground level. (See 29 CFR pt. 1910.23.) In construction areas the height is 6 feet or more above a lower level. (See 29 CFR pt. 1926.501 and 29 CFR pt. 1926.104.)*

CH3.9 Identify the specific type of PPE, such as “Kevlar gloves are required for hot temperatures, and butyl rubber or neoprene gloves required to work with chemicals” in the workplace safety assessment that is required to be worn or used by employees or visitors while they are in the work area, or while performing the operation.

*NOTE 1: The phrase “wear appropriate PPE” is not considered as an appropriate hazard control method and should not be stated in the workplace safety assessment.*

*NOTE 2: Provide specific details or control methods when using signage to communicate the hazardous condition to employees in the immediate work area, such as the specific PPE and period of time when PPE is expected to be worn by employees. Example – Safety Glasses are required when operating this machine or performing this operation.*

CH3.10 When signage is used to communicate PPE requirements the sign shall be specific in identifying the hazardous condition and/or control methods. (See 29 CFR pt. 1910.144 and 145, and ANSI Z535.2, Z535.3, Z535.4, and Z535.5 for more information.)

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*NOTE: Signs intended to communicate hazardous conditions and/or control methods can be computer generated or purchased from a vendor.*

CH3.11 When MSFC Form 4390 is used to document a JHA it states that it may also serve as the workplace safety assessment for the job/operation/workplace being assessed.

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## **APPENDIX A DEFINITIONS**

**Accepted Risk** A hazard whose residual risk has been accepted and documented by the operation or facility owner’s management. (See Appendix E Table 2 of this MWI.)

**Cause** The stimulus or triggering mechanism/act which precipitates an Undesired Event (mishap or incident), or can significantly contribute to the creation or existence of a hazardous condition.

**Caution Statement** A statement contained in an operating procedure that highlights an essential step within the procedure that if not strictly observed can have the potential to result in damage to the facility or equipment or loss of mission effectiveness.

**Center** NASA-owned property that has been designated as a NASA Center. In this MWI the Center is MSFC or MAF.

**Center’s Safety Office** The Center Office/Department/Branch that provides insight, oversight and Coordination of safety-related issues with internal and external organizations to ensure compliance is maintained with all applicable safety-related Executive Orders, Federal, State, local, NASA and Center regulations in accordance with in NPR 8715.1 and NPR 8715.3. At MSFC these functions are performed by the Safety and Mission Assurance (SMA) Directorate/Industrial Safety Branch (ISB)/QD12. At MAF these functions are performed by the MAF SMA Manager/QD12 and the Synergy Achieving Consolidated Operations and Maintenance (SACOM) Safety and Health Services who ensure all safety-related day-to-day functions identified in this MWI for SMA and ISB are performed.

**Control Methods** Means of reducing the probability of the undesired event from occurring and/or reducing the potential severity if the undesired event did occur by physical, design, structural, and engineering features (engineering controls); safety guards and warning devices (safety management programs); operating procedures, training and the use of personal protective equipment (administrative controls); and other controls necessary to provide adequate protection from exposure to the hazards. These mechanisms can also be implemented to eliminate, reduce, or minimize the potential effect of material loss or impact to program schedules.

**Corrective Action** An action taken to eliminate or control identified hazards in order to reduce the level of risk to personnel, equipment, and facilities.

**Documented Approval** A signature or written authorization from level of management identified to accept the residual risk. The authorization can be in the form of a HA, JHA, readiness review, or rationale that explains the decision for acceptance of the residual risk. (See Appendix E Table 2 of this MWI.)

**Effect** The potential consequence of an Undesired Event (incident) expressed in terms of loss of life, personnel injury/illness, and damage to property or the environment. This is normally stated as the “worst credible outcome.”

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Electronic Project Online Risk Tool (ePort) A Center risk management tool used to document and track institutional risks.

Facility Buildings, structures, and other real property including utility systems and collateral equipment. A facility can involve a single operation or multiple operations being performed within the same building or structure. This term does not include operating materials, supplies, special tooling, special test equipment, or non-capitalized equipment.

Facility/Operation Owner The Center organization identified to have primary responsibility for the facility/operation.

Hazard A state or a set of conditions internal or external to a facility or operation and has the potential to cause an undesired event.

Hazard Analysis (HA) A term used to describe a method or technique used to identify hazards, the hazard cause, the hazard effect (undesired event), and their associated risks for a given facility or operation and for providing the corrective actions to mitigate these hazards and their risks. This level safety assessment is normally performed for facilities/operations identified to have an overall level of risk of high or moderate.

Hazardous Facility/Operation An operation or facility containing hazards or risks of such a level that if not properly controlled have the potential to cause the occurrence of an undesired event. It is also a generic term used to reference facilities or operations where an in-depth safety assessment is performed.

High Risk An overall level of risk determined to present a significant level of probability to cause an undesired event and is considered as “Highly Undesirable.” A facility or operation with this level of risk can only be performed after receiving documented approval from the Engineering Management Council (EMC). This level of risk also includes undesired events that have the potential for the severity of damage to equipment or property to be classified as a Type A Mishap in accordance with NPR 8621.1. This level of risk is identified by the color “red” in Appendix E Table 1 of this MWI and is sometimes referred to as RAC 1.

Induced Hazards Exist due to the design or operation of the system; results of the design and can generally be removed or controlled without disabling the operational capability of the system; sometimes induced due to interaction between components, between systems, or between the system and the environment.

Inherent Hazards Exist in the system due to its basic nature or function; can be controlled but not eliminated without changing the basic technology associated with the system; usually a tradeoff between known hazards of different technologies.

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Industrial Safety Branch (ISB) The MSFC organization with the responsibility for ensuring facilities/operations identified as hazardous are analyzed for hazards and risks, and that a thorough readiness review is performed prior to their startup/restart.

Job Hazard Analysis (JHA) An assessment that focuses on identifying hazards associated with the interaction between the worker and job or operation being performed, and the necessary controls to eliminate the hazards before they can occur. This level safety assessment is normally performed for jobs and operations identified to have an overall level of risk of low or minimal. A JHA is sometimes referred to as a JSA or SPA. The JSA and SPA are similar forms and can serve the same purpose of a JHA if they are specific in identifying the hazardous conditions and the control methods.

Low Risk An overall level of risk determined to present no greater than normal level of probability to cause an undesired event and is considered as “acceptable.” A facility or operation with this level of risk can be performed after receiving documented approval from the supervisor directly responsible for operating the facility or performing the operation. This level of risk also includes undesired events that have the potential for the severity of damage to equipment or property to be classified as a Type C Mishap in accordance with NPR 8621.1. This level of risk is identified by the color “green” in Appendix E Table 1 of this MWI and is sometimes referred to as RAC 3.

Minimal Risk An overall level of risk determined to present a less than normal level of probability to cause an undesired event and is considered as “acceptable.” A facility or operation with this level of risk requires no documented approval, but an informal review performed by the supervisor directly responsible for operating the facility or performing the operation is highly recommended. This level of risk also includes undesired events that have the potential for the severity of damage to equipment or property to be classified as a Type D Mishap in accordance with NPR 8621.1. This level of risk is identified by the color “white” in Appendix E Table 1 of this MWI and is sometimes referred to as RAC 4.

Mitigate The actions taken to eliminate, reduce, or control a hazard in order to reduce the level of risk that the hazard can cause an undesired event.

Moderate Risk An overall level of risk determined to present a greater than normal level of probability to cause an undesired event and is considered as “undesirable.” A facility or operation with this level of risk can only be performed after receiving documented approval from the facility/operation owner’s Department/Laboratory/Office Manager or designee(s). This level of risk also includes undesired events that have the potential for severity of damage to equipment or property to be classified as a Type B Mishap in accordance with NPR 8621.1. This level of risk is identified by the color “yellow” in Appendix E Table 1 of this MWI and is sometimes referred to as RAC 2.

Operating Procedure A detailed plan providing clear, concise, and accurate series of actions listed in a step-by-step instruction that includes the hazardous conditions that can be encountered and corresponding control methods to ensure safe and efficient operations.

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**Operation** A series of acts involved in a particular form of work, job, task, or process. It can involve personnel, equipment, the entire facility or only a section of a facility.

**Operations Tracking (OpsTrak)** A MSFC SMA database that contains a listing facilities/operations identified to have an increased level of risk (high, moderate and low) to cause/contribute to an accident, injury, illness, or damage to property or environment due to the nature of the work being performed, provides the ability to maintain documentation associated with the facility/operation, and assists in the development of safety assessments for the facility/operation.

**Overall Level of Risk** This is a general term assigned to a facility/operation that is intended to describe its potential level of risk that an undesired event can occur while operating the facility or performing the operation. The level of risk is normally selected based on: (1) the complexity, structure, purpose and function of the facility/operation; (2) the visibility and/or value of the facility/operation; and (3) the potential for the facility/operation to cause an undesired event. The level of risk can also be selected by using the highest residual risk listed in an HA or a general consensus between the facility/operation owner and ISB of the appropriate level of risk for the facility/operation. The overall level of risk is the level of risk entered into OpsTrak for a facility or operation by the owner or for a building into the ePort database by ISB.

**Owner** The organization identified to have primary responsibility for the facility, operation, job or task.

**Probability** The likelihood that an undesired event can occur. There are 5 classifications of probability – frequent, probable, occasional, remote, and improbable. (See Appendix E Table 4 of this MWI.)

**Residual Risk** The level of risk that remains from a hazard after all of the corrective actions, mitigation, and controls (administrative and engineering) have been applied to eliminate, reduce, and control the hazard. This level of risk is sometimes referred to as the remaining risk.

**Risk** The combination of: (1) the probability (qualitative or quantitative) of experiencing the occurrence of an undesired event; (2) the consequences, impact, or severity that can result from the undesired event occurring; and (3) the uncertainties associated with the probability and consequences.

**Risk Assessment Code (RAC)** A numerical expression of a level of risk associated with a condition that is determined by an evaluation of both the severity of the condition (worse potential consequence) and the probability of its occurrence. (See Appendix E Table 1 of this MWI.)

**Safety Assessment** A disciplined, systematic approach to analyze and evaluate a facility/operation to determine its potential to affect the safety and health of personnel or its potential to cause damage to the environment, equipment, or adjacent facilities/operations. A safety assessment is a general term that covers the total spectrum of methods used to identify

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hazards and the actions necessary to eliminate, reduce, and control them. Safety assessments include all types of HAs, JHAs, operating procedures, and readiness reviews.

**Safety Critical** A term used to describe a condition, event, operation, process, equipment, or system that could cause or lead to severe injury, major damage, or mission failure if performed or built improperly, or allowed to remain uncorrected.

**Severity** The potential results of an undesired event if it occurred. There are 4 classifications of severity - catastrophic, critical, marginal, and negligible. (See Appendix E Table 3 of this MWI.)

**System Safety** An engineering discipline that is applied during system development to study the entire system during its total life cycle or process in order to identify, mitigate, and document system hazards under all possible conditions, and in so doing, eliminate or reduce the level of risk for a mishap and incident to occur.

**Undesired Event** An event or series of events which unleashes the potential inherent in a hazard and either directly or indirectly results in: (1) injury, occupational-related illness, or death to personnel or the public; (2) damage to or loss of facilities/equipment; or (3) detrimental impact to the environment and the surrounding community.

**Warning Statement** A statement contained in an operating procedure that highlights an essential step within the procedure that if not strictly observed can have the potential to result in injury or death to personnel, or long-term health hazards.

**Workplace Safety Assessment** An assessment of the workplace to identify hazardous conditions that would require PPE to be worn by employees.

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## **APPENDIX B ACRONYMS**

AC - Alternating Current

ANSI - American National Standards Institute

CFR - Code of Federal Regulations

dBA - Decibel Average

EMC - Engineering Management Council

ePort - Electronic Project Online Risk Tool

FMO - Facilities Management Office

FPM - Facility Project Manager

FSMP - Facility Safety Management Process

HA - Hazard Analysis

HEPA - High-Efficiency Particle Air

IDHL - Immediately Dangerous to Health and Life

IR - Infrared

ISB - Industrial Safety Branch

JHA - Job Hazard Analysis

JSA - Job Safety Analysis

MAF - Michoud Assembly Facility

MIDL - Marshall Integrated Document Library

MIL - Military

MPR - Marshall Procedural Requirements

MWI - Marshall Work Instruction

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NAMS - NASA Application Management System

NMIS - NASA Mishap Information System

NPD - NASA Policy Directive

NPR - NASA Procedural Requirements

NRRS - NASA Records Retention Schedule

OpsTrak - Operations Tracking

OSHA - Occupational Safety and Health Administration

PPE - Personal Protective Equipment

pt - Part

RAC - Risk Assessment Code

RCRA - Resource Conservation and Recovery Act

RF - Radio Frequency

SACOM - Synergy Achieving Consolidated Operations and Maintenance

SCBA - Self-Contained Breathing Apparatus

SDS - Safety Data Sheets

SHE - Safety, Health, and Environmental

SMA - Safety and Mission Assurance

SME - Subject Matter Expert

SPA - Safety Plan of Action

STD - Standard

TWA - Time Weighted Average

UV - Ultraviolet

X-Ray - Energetic High-Frequency Electromagnetic Radiation

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**APPENDIX C  
VERIFICATION MATRIX**

<b>Section</b>	<b>Brief Description</b>	<b>Verification</b>			<b>Comments</b>
		<b>Inspection</b>	<b>Document</b>	<b>Test</b>	
5.2	HA		x		
5.3	Assigning a RAC Classification to Individual Hazard		x		
5.4	Hazard Reduction/Control Protocol		x		
5.5	Closure and Risk Acceptance in a HA		x		
5.6	JHA		x		
5.7	Workplace Safety Assessment		x		
5.8	Operating Procedure		x		
5.9	Entry into the Center's Inventory of Operations database		x		

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**APPENDIX D  
RECORDS**

<b>RECORD</b>	<b>REPOSITORY</b>	<b>RETENTION</b>
HA records for program/project-related or operations/facilities identified with a level of risk of high or moderate.	Maintained by the facility/operation owner in accordance with NRRS 8, Program/Project Records.	The exact retention used will be dependent on whether the specific program/project meets the criteria in NRRS 8/101 or not.
HA records for non-program/project-related operations/facilities.	Maintained by the facility/operation owner.	NRRS 1/72/B/2; destroy when superseded or obsolete.
JHA records (MSFC Form 4390, "Job Hazard Analysis," JSA, SPA, or a similar form) and Workplace Safety Assessment, including review of these records.	Maintained by the facility/operation owner.	NRRS 1/72/B/2; destroy when superseded or obsolete.
Operating Procedures for program/project-related or facilities/operations identified with a level of risk of high or moderate.	Maintained by the facility/operation owner.	1. <u>Program/Project-related</u> : NRRS 8, Program/ Project Records. The exact retention used will be dependent on whether the specific program/project meets the criteria in 8/101 or not.  2. <u>Non-program/project-related</u> : NRRS 1/72/B/2; destroy when superseded or obsolete.
Configuration control of drawings, manuals, schematics and other data needed to support, operate, and maintain the facility/operation.  <i>NOTE: This does not include the building drawings maintained by Facilities Management Office (FMO).</i>	Maintained by the facility/operation owner in accordance with NRRS 8, Program/Project Records.	The exact retention used will be dependent on whether the specific program/project meets the criteria in NRRS 8/101 or not.
OpsTrak (Reference copies of HA, JHA, operating procedures.)	Maintained by MSFC ISB.	NRRS 8/110 as temporary for the length of time the operation is performed, then

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		destroyed/deleted when no longer needed for reference.
Request for Relief from Safety-Related Requirements.	Maintained by the facility/operation owner in accordance with NRRS 8, Program/Project Records.	The exact retention used will be dependent on whether the specific program/project meets the criteria in NRRS 8/101 or not.

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**APPENDIX E  
RAC**

<b>Table 1 RAC</b>				
<b>Probability</b>	<b>Severity</b>			
	<b>1 Catastrophic</b>	<b>2 Critical</b>	<b>3 Marginal</b>	<b>4 Negligible</b>
<b>A – Frequent</b>	<b>1A</b>	<b>2A</b>	<b>3A</b>	<b>4A</b>
<b>B – Probable</b>	<b>1B</b>	<b>2B</b>	<b>3B</b>	<b>4B</b>
<b>C – Occasional</b>	<b>1C</b>	<b>2C</b>	<b>3C</b>	<b>4C</b>
<b>D – Remote</b>	<b>1D</b>	<b>2D</b>	<b>3D</b>	<b>4D</b>
<b>E – Improbable</b>	<b>1E</b>	<b>2E</b>	<b>3E</b>	<b>4E</b>

<b>TABLE 2 Level of Risk and Level of Management Approval</b>	
<b>Level of Risk</b>	<b>Level of Management Approval/Approving Authority</b>
<b>High Risk (RAC 1)</b>	Highly Undesirable. Documented approval from the MSFC EMC or an equivalent level independent management committee.
<b>Moderate Risk (RAC 2)</b>	Undesirable. Documented approval from the facility/operation owner’s Department/Laboratory/Office Manager or designee(s) or an equivalent level management committee.
<b>Low Risk (RAC 3)</b>	Acceptable. Documented approval from the supervisor directly responsible for operating the facility or performing the operation.
<b>Minimal Risk (RAC 4)</b>	Acceptable. Documented approval not required, but an informal review by the supervisor directly responsible for operating the facility or performing the operation is highly recommended. Use of a generic JHA posted on the SHE Web page is recommended, if a generic JHA has been developed.

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<b>TABLE 3 Severity Definitions – A condition that can cause:</b>			
<b>Description</b>	<b>Personnel Safety and Health</b>	<b>Facility/Equipment</b>	<b>Environmental</b>
1 – Catastrophic	Loss of life or a permanent-disabling injury.	Loss of facility, systems or associated hardware.	Irreversible severe environmental damage that violates law and regulation.
2 – Critical	Severe injury or occupational-related illness.	Major damage to facilities, systems, or equipment.	Reversible environmental damage causing a violation of law or regulation.
3 – Marginal	Minor injury or occupational-related illness.	Minor damage to facilities, systems, or equipment.	Mitigatable environmental damage without violation of law or regulation where restoration activities can be accomplished.
4 – Negligible	First aid injury or occupational-related illness.	Minimal damage to facility, systems, or equipment.	Minimal environmental damage not violating law or regulation.

<b>TABLE 4 Probability Definitions</b>		
<b>Description</b>	<b>Qualitative Definition</b>	<b>Quantitative Definition</b>
A – Frequent	High likelihood to occur immediately or expected to be continuously experienced.	Probability is > 0.1
B – Probable	Likely to occur or expected to occur frequently within time.	0.1 ≥ probability 0.01
C – Occasional	Expected to occur several times or occasionally within time.	0.01 ≥ probability > 0.001
D – Remote	Unlikely to occur, but can be reasonably expected to occur at some point within time.	0.001 ≥ probability > 0.000001
E – Improbable	Very unlikely to occur and an occurrence is not expected to be experienced within time.	0.000001 ≥ probability

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## **APPENDIX F WARNING AND CAUTION NOTES IN OPERATING PROCEDURES**

F.1 WARNING and CAUTION statements are normally provided prior to sequences of steps in which failure to control a hazardous condition or an error in performing the sequence of steps can result in loss of life, personnel injury/illness, or damage to equipment or the environment.

F.1.1 Warning and Caution Statements normally consist of the following parts:

F.1.1.1 A signal word (WARNING or CAUTION) indicating the specific nature of the hazard.

F.1.1.2 A title for the Warning or Caution identification.

F.1.1.3 A precautionary statement that clearly identifies the hazard.

F.1.1.4 A precautionary statement that clearly identifies the actions necessary to avoid the hazard.

F.1.1.5 A precautionary statement that clearly identifies the potential effects if the previous precautionary steps or procedural steps are disregarded.

F.1.2 The Warning or Caution statement may include directions to reference a safety assessment (e.g., HA, JHA, workplace safety assessment or a similar method of assessment that identifies the hazardous conditions and control methods) for additional information.

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**APPENDIX G  
EXAMPLE PRELIMINARY HAZARD CHECKLIST**

<b>PRELIMINARY HAZARD CHECKLIST</b>		1. Date
2. Facility/Operation Name		3. Drawing/Document(s) Number
4. Facility/Operation Location (Building/Number)		5. System Engineer/Project Manager
6. Prepared By:	7. Mail Code	8. Phone
<p><b>9. LEVEL OF RISK</b>  Select a potential Risk Level classification for the facility/operation being analyzed based on its potential to directly or indirectly to cause: (1) injury, occupational-related illness or death to personnel or the public; (2) damage to or loss of facilities/equipment; or (3) detrimental impact to the environment and the surrounding community. (Refer to MWI 8715.15.)</p> <p><input type="checkbox"/> <b>High Risk</b> - An overall level of risk determined to be at the high level is considered as “unacceptable” and can only be performed after receiving documented approval from the EMC. This level of risk also includes the potential for damage to equipment or property resulting in a loss of \$2,000,000 or more. This level of risk is identified by the color “red” in Table CH1.1 and is sometimes referred to as RAC 1. See 5.26 and Table CH1.2.</p> <p><input type="checkbox"/> <b>Moderate Risk</b> - An overall level of risk determined to be at the moderate level is considered as “undesirable” and can only be performed after receiving documented approval from the facility/operation owner’s Department/Laboratory/Office Manager or designee(s). This level of risk also includes the potential for damage to equipment or property resulting in a loss of at least \$500,000, but less than \$2,000,000. This level of risk is identified by the color “yellow” in Table CH1.1 and is sometimes referred to as RAC 2. See 5.26 and Table CH1.2.</p> <p><input type="checkbox"/> <b>Low Risk</b> - An overall level of risk determined to be at the low level is considered as “acceptable” and can be performed after receiving documented approval from the supervisor directly responsible for operating the facility or performing the operation. This level of risk also includes the potential for damage to equipment or property resulting in a loss of at least \$50,000, but less than \$500,000. This level of risk is identified by the color “green” in Table CH1.1 and is sometimes referred to as RAC 3. See 5.26 and Table CH1.2.</p> <p><input type="checkbox"/> <b>Minimal Risk</b> - An overall level of risk determined to be at the minimal level is considered as “acceptable” and requires no documented approval, but an informal review performed by the supervisor directly responsible for operating the facility or performing the operation is highly recommended. This level of risk also includes the potential for damage to equipment or property resulting in a loss of at least \$1,000, but less than \$50,000. This level of risk is identified by the color “white” in Table CH1.1 and is sometimes referred to as RAC 4.</p>		

**10. Hazard recognition methods.**  
Hazard recognition methods used to help identify hazards associated with the proposed facility/operation. Check all methods performed.

<input type="checkbox"/> Site Survey (walk down)	<input type="checkbox"/> Review Codes, Specifications, etc.
<input type="checkbox"/> Interview site personnel	<input type="checkbox"/> Review Technical Specifications
<input type="checkbox"/> Interview System Engineer	<input type="checkbox"/> Review Mishaps in NASA Mishap Information System (NMIS)
<input type="checkbox"/> Interview Project Manager	<input type="checkbox"/> Review Lessons Learned
	<input type="checkbox"/> Other _____

**11. HAZARD LIST**  
For each major hazard category, identify all generic hazards that can apply by checking the YES block(s). Add additional hazard categories or hazards as necessary that can apply to this facility/operation, but are not listed. If a major hazard category has no potential hazards, check the NO block.

YES	NO				
		<b>Building Materials</b>			
		Compatibility			
		Combustibility			
		Structural Integrity			
YES	NO		YES	NO	
		<b>Access/Egress</b>			<b>Communications</b>
		Emergency - evacuation, fire-fighting, rescue			Public address
		Panic hardware			Alarms/central station
		Restricted - security, clean rooms			Emergency - fire department, police, medical services
		Handicapped/disabled			
		Life safety code requirements	YES	NO	
					<b>Confined Space</b>
					Vacuum chambers
					Raised floors
					Utility tunnel
YES	NO		YES	NO	
		<b>Acoustical Radiation</b>			<b>Documentation</b>
		Equipment Noise			Chemical hygiene plan
		Compressors			Configuration control plan

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	Ultrasonic Cleaners				Emergency action plan
YES	NO				Maintenance procedures
		<b>Corrosive</b>			Material Safety Data Sheets
	Acids				System safety plan
	Caustics				Test procedures
	Natural Chemicals (Soil, Air, Water)				Training
	Decontamination Solutions				
YES	NO		YES	NO	
		<b>Electrical</b>			<b>Electromagnetic and Particulate Radiation</b>
	Switchgear				Radioactive Sources
	Underground Wiring				Waste and Scrap
	Cable Runs				Contamination
	Service Outlets and Fittings				Irradiated Experimental and Reactor
	Pumps				Equipment
	Motors				Electric Furnace
	Wiring				Black light (e.g., Magniflux)
	Emergency power				Laser
	Electrostatic discharge				Medical Energetic High-Frequency Electromagnetic Radiation (X-ray)
	Shock				Radiography Equipment & Sources
	Shutoffs/breakers				Electric Arc - Other (High Current Circuits)
	Intra- and inter-room cable management/computer networks				Electron Beam
	Grounding/bonding				Radar
	Cathodic protection				Alternating Current (AC) Motors
	Lasers - high energy power supply, capacitors, interlocks				
	Lock-out/tag-out				
	Wires/Cables under raised floor				
	Insulation				

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YES	NO		Yes	NO	
		<b>Environmental</b>			<b>Exhaust</b>
		Resource Conservation and Recovery Act (RCRA) considerations			General
		Hazardous waste			Local
		Hazardous spill/release			Fume hoods
		Exposure to environment			Emergency
		Exposure from environment			Scrubber/filtration
					Recirculation/migration/reentrainment
YES	NO		YES	NO	
		<b>Explosive Pyrophoric</b>			<b>Fire Protection</b>
		Caps			Fire/smoke detection
		Primer Cord			Pull stations
		Dynamite			Alarms/annunciation
		Power Metallurgy			Automatic fire suppression
		Dusts			Extinguisher selection/location
		Hydrogen (Inc. Battery Banks and Water Electrolysis)			Standpipe hose connections
		Gases-Other			Fire Department connections
		Nitrates			Hydrants
		Electric Squibs			Smoke management
		Peroxides-Superoxides			Fire resistive construction
		Propellant			Fire barrier design/construction
					Compartmentalization/isolation from different occupancies
					Fire Department access
YES	NO		YES	NO	
		<b>Flammable Materials</b>			<b>Flammable Materials con't.</b>
		Gasoline/Diesel (Storage & in Vehicles)			Spray Paint

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		Lubrication Oil/Grease			Buildings and Contents
		Coolant Oil			Packing Materials/Rags
		Paint Solvent/Solvent Vats			Gases - Other
					Hydrogen (Including Battery Banks)
YES	NO		YES	NO	
		<b>General</b>			<b>Hazardous Materials</b>
		Stairs/railings			Flammables/combustibles
		Traffic			Explosives/pyrophorics
		Sidewalks			Toxic substances/poisons
		Loading/unloading			Corrosives
		Trailer pads			Oxidizers
		Height - rooftop observation dome, roof mounted antennae			Water reactive/unstable substances
					Irritants
					Asphyxiants
					Radioactive materials
					Carcinogens/pathogens
YES	NO		YES	NO	
		<b>Lighting</b>			<b>Kinetic-Linear</b>
		Ambient			Automobiles (cars, trucks, buses, forklifts, etc.)
		Emergency			Carts
		Exit			Dollies
		Security			Trains (Monorails)
					Surfaces
YES	NO				Obstructions
		<b>Material Handling</b>			Shears
		Storage - location/control areas,			Presses
		Use/Transfer/Delivery			Crane Loads in Motion
		Inventory control/quantity			Pressure Vessel Blowdown

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	Disposal			Power-Assisted Driving Tools	
	Spill control				
	Containment				
	Exhaust/ventilation				
YES	NO		YES	NO	
		<b>Kinetic-Rotational</b>			<b>Monitoring</b>
	Centrifuges			System/utility - pressure, temperature, flow, voltage, grounds	
	Motors/Pumps			Environmental - air quality, temperature, humidity	
	Gears			Security	
	Cooling Tower Fans			Fire/smoke detection	
	Cafeteria Equipment			Hazardous gas/vapor detection	
	Laundry Equipment			Leak detection	
	Floor Polishers			Alarms/annunciation	
	Shop Equipment (Grinders, Saws, Brushes, etc.)				
YES	NO		YES	NO	
		<b>Mass, Gravity, Height</b>			<b>Nuclear</b>
	Human Efforts			Vaults/Shops	
	Stairs			Temporary Storage Areas	
	Lifts			Receiving/Shipping Areas	
	Cranes			Burial Ground	
	Buckets and Ladders			Casks	
	Trucks			Inspection Areas	
	Slings			Storage Racks	
	Hoists			Canals/In-Tank Storage Areas	
	Elevators			Dollies/Trucks	
	Jacks			Assembly Areas	
	Scaffolds and Ladders			Hot Cells	
	Crane Cabs			Reactors	
	Pits			Lifts/Cranes	

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	Excavated Doors			Test Rigs
	Elevated Doors			
	Cranes			
	Vessels			
YES	NO		YES	NO
		<b>Natural Phenomena</b>		<b>Laboratory Design</b>
		High wind		Benches/work surfaces
		Snow		Storage
		Extreme temperatures		Drainage
		Floods		Exhaust/ventilation
		Lightning		Clean room environment
		Earthquake		Utilities
				Space utilization/placement
				Cross connection/backflow prevention
YES	NO		YES	NO
		<b>Kinetic/Mechanical</b>		<b>Operations</b>
		Sparks/friction		Electronic/mechanical testing and analysis
		Overhead cranes		Cooking/kitchen equipment
		Machine guards		Spectroscopy/optics
		Power tools		Chromatography
		Elevators		Magnetic analysis
		Overhead doors		Cryogenics
		Staging		Fabrication/machine shop
				Lasers
				Supercomputer operations
				High Pressure
				Elevated work
				High Voltage
				Toxic/Hazardous Chemicals

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YES	NO		YES	NO	
		<b>Personnel Safety</b>			<b>Pressure</b>
		PPE - gloves, gowns, eye and ear protection, respirators			Hydraulics
		Eyewashes/showers			Compressed gases - bottles, tanks
		Pre-action alarms (carbon dioxide/nitrogen)/extinguishing systems			Air/pneumatic systems
		Thermal contact - burns (hot and cold)			Relief valves
		Exposure control			Steam
		First aid			Pumps
YES	NO		YES	NO	
		<b>Pressure-Volume/K-Constant- Distance</b>			<b>Radiation</b>
		Test Loops and Facilities			Ionizing - alpha particles, beta particles, neutrons, x-rays, gamma rays
		Gas Bottles			Electromagnetic - lasers, radar, ultraviolet (UV) and infrared (IR) light, microwaves, radio frequency (RF) waves, high frequency signals from computer equipment
		Pressure Vessels			Acoustical - laboratory and ventilation equipment noise
		Coiled Springs			Thermal
		Stressed Members			
		Gas Receivers			
YES	NO		YES	NO	
		<b>Thermal</b>			<b>Toxic Pathogenic</b>
		Convection			Acetone
		Heavy Metal Weld Preheat			Fluorides
		Exposed Steam Pipes			Carbon Monoxide
		Electric Heaters			Lead

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	Fire Boxes			Ammonia and Compounds
	Lead Melting Pot			Asbestos
	Electrical Wiring and Equipment			Trichlorethylene
	Furnaces			Dusts and Particulate
	Boilers			Pesticides-Herbicides-Insecticides
	Steam Lines			Bacteria
	Solar			Beryllium and Compounds
	Heated Surge Tanks			Chlorine and Compounds
	Autoclaves			Decontamination Solutions
				Sandblasting Operations
				Metal Plating
				Asphyxiation-Drowning
YES	NO		YES	NO
		<b>Utilities</b>		<b>Ventilation</b>
		Location		Heating
		Controls/shutoffs		Air conditioning
		Electrical power supply		Clean room environment
		Water supply		Filters/dust control
		Sanitary/sewer		Humidity control
		Natural gas		General exhaust
		Special systems - bulk gas		Emergency
				Recirculation/migration/re-entrainment
				Plenum Spaces
YES	NO	<b>Personnel Training/Certification</b>		
		Specific training required		
		Certification required		

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**APPENDIX H  
EXAMPLE WORKPLACE SAFETY ASSESSMENT**

**Job/Operation/Workplace:** \_\_\_\_\_

**Organization Code:** \_\_\_\_\_ **Building:** \_\_\_\_\_ **Room:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Affected Employee(s):** \_\_\_\_\_

**Select the body part exposed or put at risk, work area or activity, potential hazards and the PPE required to eliminate or reduce exposure to the hazard.**

<b>Body Parts Exposed or Put At Risk: Eye and Face</b>		
[See 29 CFR Part 1910.133 or 29 CFR 1926.102, ANSI Z87.1 and OSHA 3151-12R]		
Initial RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Residual RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Can the hazards be eliminated or adequately controlled without the use of PPE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
If Yes, how? <input type="checkbox"/> Engineering Controls (design change) <input type="checkbox"/> Install Safety Devices/Guards <input type="checkbox"/> Install Warning Devices <input type="checkbox"/> Administrative Controls (written procedures) <input type="checkbox"/> Other:		
<b>Work Area/Activity</b>	<b>Potential Hazard(s)</b>	<b>PPE Required</b>
<input type="checkbox"/> Maintenance <input type="checkbox"/> Construction <input type="checkbox"/> Shop <input type="checkbox"/> Laboratory <input type="checkbox"/> Abrasive Blasting <input type="checkbox"/> Chopping <input type="checkbox"/> Cutting/Sawing <input type="checkbox"/> Drilling/Hammering <input type="checkbox"/> Welding/Brazing <input type="checkbox"/> Sanding/Grinding <input type="checkbox"/> Lasers <input type="checkbox"/> Handling Chemicals <input type="checkbox"/> Painting/Mixing <input type="checkbox"/> Cleaning <input type="checkbox"/> High Intensity Light <input type="checkbox"/> Dip Tank Ops <input type="checkbox"/> Pouring Molten Metal <input type="checkbox"/> Other:	<input type="checkbox"/> Impact-flying/falling objects, chips, sand or dirt <input type="checkbox"/> Airborne/Nuisance dust <input type="checkbox"/> UV light-welding, cutting, torch brazing or soldering <input type="checkbox"/> Chemical-splashing liquid <input type="checkbox"/> Chemical-irritating mists <input type="checkbox"/> Hot sparks-grinding <input type="checkbox"/> Splashing molten metal <input type="checkbox"/> Glare/High Intensity lights <input type="checkbox"/> Laser/Optical (light) Radiation <input type="checkbox"/> Harmful Dusts <input type="checkbox"/> Biological <input type="checkbox"/> Electrical Arc Flash <input type="checkbox"/> Other:	<input type="checkbox"/> Safety glasses w/side shields <input type="checkbox"/> Glasses/goggles w/face shield <input type="checkbox"/> Impact goggles <input type="checkbox"/> Welding goggles <input type="checkbox"/> Welding helmet/shield w/safety glasses & side shields <input type="checkbox"/> Chemical goggles/ face shield <input type="checkbox"/> Chemical splash goggles <input type="checkbox"/> Safety goggles <input type="checkbox"/> Shaded safety glasses <input type="checkbox"/> Laser spectacles or goggles <input type="checkbox"/> Filter lenses - shade: <input type="checkbox"/> Arc-Rated Face Shield <input type="checkbox"/> Other:

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<b>Body Parts Exposed or Put At Risk: Hand and Arm</b> [See 29 CFR Part 1910.138 and OSHA 3151-12R]		
Initial RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Residual RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Can the hazards be eliminated or adequately controlled without the use of PPE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
If Yes, how? <input type="checkbox"/> Engineering Controls (design change) <input type="checkbox"/> Install Safety Devices/Guards <input type="checkbox"/> Install Warning Devices <input type="checkbox"/> Administrative Controls (written procedures) <input type="checkbox"/> Other:		
<b>Work Area/Activity</b>	<b>Potential Hazard(s)</b>	<b>PPE Required</b>
<input type="checkbox"/> Maintenance <input type="checkbox"/> Construction <input type="checkbox"/> Shop <input type="checkbox"/> Laboratory <input type="checkbox"/> Welding <input type="checkbox"/> Material Handling <input type="checkbox"/> Sawing <input type="checkbox"/> Sanding <input type="checkbox"/> Hammering <input type="checkbox"/> Electrical Work <input type="checkbox"/> Other:	<input type="checkbox"/> Scrapes/Cuts/Punctures sharp or rough objects <input type="checkbox"/> Exposure to Chemical(s): <input type="checkbox"/> Extreme cold <input type="checkbox"/> Extreme heat <input type="checkbox"/> Blood <input type="checkbox"/> Electrical shock <input type="checkbox"/> Electrical Arc Flash <input type="checkbox"/> Vibration-power tools <input type="checkbox"/> Biological Materials: <input type="checkbox"/> Radiological <input type="checkbox"/> Other:	<input type="checkbox"/> Leather/cut resistant gloves <input type="checkbox"/> General purpose work gloves <input type="checkbox"/> Chemical/liquid resistant gloves - Type: <input type="checkbox"/> Temperature (hot/cold) resistance gloves <input type="checkbox"/> Heat/flame resistant gloves <input type="checkbox"/> Latex or nitrile gloves <input type="checkbox"/> Insulated rubber gloves; - Type: <input type="checkbox"/> Cotton, leather or anti-vibration gloves <input type="checkbox"/> Slip resistance gloves <input type="checkbox"/> Protective sleeves <input type="checkbox"/> Non-conductive gloves/sleeves <input type="checkbox"/> Other:

<b>Body Parts Exposed or Put At Risk: Hearing</b> [See 29 CFR Part 1910.95 or 29 CFR Part 1926.101 and OSHA 3151-12R]		
Initial RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Residual RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Can the hazards be eliminated or adequately controlled without the use of PPE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
If Yes, how? <input type="checkbox"/> Engineering Controls (design change) <input type="checkbox"/> Install Safety Devices/Guards <input type="checkbox"/> Install Warning Devices <input type="checkbox"/> Administrative Controls (written procedures) <input type="checkbox"/> Other:		
<b>Work Area/Activity</b>	<b>Potential Hazard(s)</b>	<b>PPE Required</b>
<input type="checkbox"/> Maintenance <input type="checkbox"/> Construction <input type="checkbox"/> Shop <input type="checkbox"/> Laboratory <input type="checkbox"/> Motors/Generators <input type="checkbox"/> Pneumatic equip <input type="checkbox"/> Sanding/Sawing <input type="checkbox"/> Other:	Exposure to excessive noise levels [ $> 85$ dBA 8-hour Time Weighted Average (TWA)] <input type="checkbox"/> Exposure to excessive noise levels for short duration of time <input type="checkbox"/> Chemical (affecting auditory nerve)	<input type="checkbox"/> Ear muffs <input type="checkbox"/> Ear plugs <input type="checkbox"/> Ear caps <input type="checkbox"/> Leather welding hood <input type="checkbox"/> Other:

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<b>Body Parts Exposed or Put At Risk: Head</b>		
[See 29 CFR Part 1910.135 or 29 CFR 1926.100, ANSI Z89.1 and OSHA 3151-12R]		
Initial RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Residual RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Can the hazards be eliminated or adequately controlled without the use of PPE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
If Yes, how? <input type="checkbox"/> Engineering Controls (design change) <input type="checkbox"/> Install Safety Devices/Guards <input type="checkbox"/> Install Warning Devices <input type="checkbox"/> Administrative Controls (written procedures) <input type="checkbox"/> Other:		
<b>Work Area/Activity</b>	<b>Potential Hazard(s)</b>	<b>PPE Required</b>
<input type="checkbox"/> Maintenance <input type="checkbox"/> Construction <input type="checkbox"/> Shop <input type="checkbox"/> Laboratory <input type="checkbox"/> Electrical <input type="checkbox"/> Overhead Work <input type="checkbox"/> Confined Space <input type="checkbox"/> Tight Working Space <input type="checkbox"/> Other:	<input type="checkbox"/> Falling object <input type="checkbox"/> Bumping against fixed object <input type="checkbox"/> Electrical shock/Arc Flash <input type="checkbox"/> Other:	<input type="checkbox"/> Hard hat/cap <input type="checkbox"/> Class A (low voltage) <input type="checkbox"/> Class B (high voltage) <input type="checkbox"/> Class C <input type="checkbox"/> Soft Cap or Hair Net <input type="checkbox"/> Fire Retardant hard hat liner <input type="checkbox"/> Other:

<b>Body Parts Exposed or Put At Risk: Foot and Leg</b>		
[See 29 CFR Part 1910.136 or 29 CFR Part 1926.96, ANSI Z41 and OSHA 3151-12R]		
Initial RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Residual RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Can the hazards be eliminated or adequately controlled without the use of PPE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
If Yes, how? <input type="checkbox"/> Engineering Controls (design change) <input type="checkbox"/> Install Safety Devices/Guards <input type="checkbox"/> Install Warning Devices <input type="checkbox"/> Administrative Controls (written procedures) <input type="checkbox"/> Other:		
<b>Work Area/Activity</b>	<b>Potential Hazard(s)</b>	<b>PPE Required</b>
<input type="checkbox"/> Maintenance <input type="checkbox"/> Construction <input type="checkbox"/> Shop <input type="checkbox"/> Laboratory <input type="checkbox"/> Demolition <input type="checkbox"/> Welding <input type="checkbox"/> Electrical <input type="checkbox"/> Material Handling <input type="checkbox"/> Other:	<input type="checkbox"/> Falling/rolling objects <input type="checkbox"/> Slippery or wet surface <input type="checkbox"/> Puncture sharp objects <input type="checkbox"/> Penetration-chemical <input type="checkbox"/> Exposure to extreme cold/heat <input type="checkbox"/> Electrical shock/Arc Flash <input type="checkbox"/> Other:	<input type="checkbox"/> Steel toe safety shoes <input type="checkbox"/> Leather boots or safety shoes w/metatarsal guards <input type="checkbox"/> Slip resistant soles <input type="checkbox"/> Puncture resistant soles <input type="checkbox"/> Chemical resistant boots/covers <input type="checkbox"/> Rubber boots/closed top shoes <input type="checkbox"/> Insulated (hot/cold) boots or shoes <input type="checkbox"/> Electrical protection <input type="checkbox"/> Anti-slip soles <input type="checkbox"/> Leggings or chaps <input type="checkbox"/> Shin guards <input type="checkbox"/> Other:

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<b>Body Parts Exposed or Put At Risk: Body</b>		
[See 29 CFR Part 1910.132 or 29 CFR Part 1926.95 and OSHA 3151-12R]		
Initial RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Residual RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Can the hazards be eliminated or adequately controlled without the use of PPE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
If Yes, how? <input type="checkbox"/> Engineering Controls (design change) <input type="checkbox"/> Install Safety Devices/Guards		
<input type="checkbox"/> Install Warning Devices <input type="checkbox"/> Administrative Controls (written procedures)		
<input type="checkbox"/> Other:		
<b>Work Area/Activity</b>	<b>Potential Hazard(s)</b>	<b>PPE Required</b>
<input type="checkbox"/> Maintenance <input type="checkbox"/> Construction <input type="checkbox"/> Shop <input type="checkbox"/> Laboratory <input type="checkbox"/> Dip Tank Ops <input type="checkbox"/> Painting <input type="checkbox"/> Welding <input type="checkbox"/> Sanding <input type="checkbox"/> Sawing <input type="checkbox"/> Handling Chemicals <input type="checkbox"/> Other:	<input type="checkbox"/> Impact-flying objects <input type="checkbox"/> Moving vehicles <input type="checkbox"/> Puncture-sharp objects <input type="checkbox"/> Electrical Shock/Arc Flash <input type="checkbox"/> Hot metal or sparks <input type="checkbox"/> Chemical(s):  <input type="checkbox"/> Exposure to extreme cold/heat <input type="checkbox"/> Falls/unprotected elevated walking/working surface <input type="checkbox"/> Radiological <input type="checkbox"/> Biological <input type="checkbox"/> Other:	<input type="checkbox"/> Long sleeves/apron/coat <input type="checkbox"/> Traffic vest <input type="checkbox"/> Cut-resistant sleeves, wristlets <input type="checkbox"/> Static control coats/coveralls <input type="checkbox"/> Flame-resistant jacket/pants <input type="checkbox"/> Electrical Arc-Flash Clothing – Category: <input type="checkbox"/> Lab coat or apron/sleeves <input type="checkbox"/> Insulated jacket, hood <input type="checkbox"/> Welding leathers <input type="checkbox"/> Abrasion/cut resistance <input type="checkbox"/> Personal Fall Arrest System and lanyard <input type="checkbox"/> Other:

<b>Body Parts Exposed or Put At Risk: Respiratory Tract</b>		
[See 29 CFR Part 1910.133 or 29 CFR 1926.103, ANSI Z88.2 and OSHA 3151-12R]		
Initial RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Residual RAC ranking: <input type="checkbox"/> Not used (See MWI 8715.15, Appendix E, RAC Table 1)		
Can the hazards be eliminated or adequately controlled without the use of PPE? <input type="checkbox"/> YES <input type="checkbox"/> NO		
If Yes, how? <input type="checkbox"/> Engineering Controls (design change) <input type="checkbox"/> Install Safety Devices/Guards		
<input type="checkbox"/> Install Warning Devices <input type="checkbox"/> Administrative Controls (written procedures)		
<input type="checkbox"/> Other:		
<b>Work Area/Activity</b>	<b>Potential Hazard(s)</b>	<b>PPE Required</b>
<input type="checkbox"/> Maintenance <input type="checkbox"/> Construction <input type="checkbox"/> Shop <input type="checkbox"/> Laboratory <input type="checkbox"/> Dip Tank <input type="checkbox"/> Painting <input type="checkbox"/> Welding <input type="checkbox"/> Sanding/Sawing <input type="checkbox"/> Abrasive Blasting <input type="checkbox"/> Handling Chemicals <input type="checkbox"/> Mixing <input type="checkbox"/> Fiberglass <input type="checkbox"/> Other:	<input type="checkbox"/> Nuisance dust/mist <input type="checkbox"/> Harmful fumes/particulates <input type="checkbox"/> Welding fumes <input type="checkbox"/> Asbestos <input type="checkbox"/> Pesticides <input type="checkbox"/> Paint spray <input type="checkbox"/> Organic vapors <input type="checkbox"/> Acid gases <input type="checkbox"/> Oxygen deficient/toxic or Immediately Dangerous to Health and Life (IDLH) atmosphere <input type="checkbox"/> Other:	<input type="checkbox"/> Disposable dust/mist mask <input type="checkbox"/> Respirator w/High-Efficiency Particle Air (HEPA) filter <input type="checkbox"/> Respirator w/pesticide cartridges <input type="checkbox"/> Respirator w/paint spray cartridges <input type="checkbox"/> Respirator w/organic cartridges <input type="checkbox"/> Respirator w/acid gas cartridges <input type="checkbox"/> Self-Contained Breathing Apparatus (SCBA) or Type C airline respirator

<b>Marshall Work Instruction QD01</b>		
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		<input type="checkbox"/> Other
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**NOTES/COMMENTS:**

Per 29 CFR 1910.132(d)(2) this document shall serve as the CERTIFICATION that a Workplace Safety Assessment was performed for the following:

Job/Operation/Workplace: \_\_\_\_\_

Building: \_\_\_\_\_ Room: \_\_\_\_\_

Center's Safety Office or Center's Occupational Health Office concurrence when required:

Yes  NO \_\_\_\_\_

Workplace Safety Assessment Performed By: \_\_\_\_\_ Date: \_\_\_\_\_

<b>Marshall Work Instruction QD01</b>		
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## **APPENDIX I REFERENCES**

- I.1 MIL STD 882, Department of Defense Standard Practice for System Safety (5.2)
- I.2 OSHA 3071, Job Hazard Analysis (CH3.2)
- I.3 OSHA 3132, Process Safety Management (CH3.2)
- I.4 OSHA 3151-12R, Personal Protective Equipment (CH3.2 and Appendix H)