

MWI 8715.15

REVISION A

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MARSHALL WORK INSTRUCTION

QS01

MSFC SAFETY ASSESSMENT PROGRAM

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DOCUMENT HISTORY LOG

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1. PURPOSE

This Instruction provides guidelines for conducting the initial safety assessment that will systematically and objectively identify hazards, determine their risk level, and provide recommendations for their elimination or control.

2. APPLICABILITY

This Instruction applies to all facilities, equipment, and/or jobs/tasks/operations/processes controlled by Marshall Space Flight Center (MSFC).

3. APPLICABLE DOCUMENTS

- 3.1 MWI 8715.4, "Personal Protective Equipment (PPE)"
- 3.2 MWI 8715.6, "Hazardous Operations"
- 3.3 MWI 8715.8, "Operational Readiness Program"
- 3.4 29 CFR 1910.132, "General Requirements"

4. REFERENCES

- 4.1 29 CFR 1910, "Occupational Safety and Health Standards"
- 4.2 MPG 8715.1, "Marshall Safety, Health, and Environmental (SHE) Program"
- 4.3 MWI 8715.7, "Facility Safety Program"
- 4.4 NASA-STD-8719.7, "Facility System Safety Guidebook"
- 4.5 NPG 8715.3, "NASA Safety Manual"

5. DEFINITIONS

5.1 Baseline Assessment. The initial safety assessment performed of the work area including the facilities, equipment and/or jobs/tasks/operations/processes to identify all potential hazards.

5.2 Corrective Action. Action taken to eliminate or control identified hazards in order to reduce the risk to personnel, equipment, and facilities.

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5.3 Dry Run. A pretest operation of a given system, test, operation, or setup to determine operational readiness.

5.4 Facility Risk Indicator (FRI). An indicator used to help determine the level of system safety effort required to meet NASA safety requirements. (Reference NASA-STD-8719.7 for more information.)

5.4.1 FRI 1 (High Risk). A high probability that the hazards can cause loss of life. Hazards may result in loss of life, permanent disability, or serious occupational illnesses to one or more persons, three or more lost-time injuries, loss of facility operational capability for 1 month or greater, or damage to equipment or property in excess of \$500,000.

5.4.2 FRI 2 (Medium Risk). A medium probability that the hazards can cause loss of life. Hazards may result in permanent disability to one or more persons, hospitalization (associated with illness or injury) of three or more persons, up to two lost time injuries, loss of facility operational capability from 2 to 4 weeks, or damage to equipment or property from \$250,000 to \$500,000.

5.4.3 FRI 3 (Low Risk). A low probability that the hazards can cause loss of life. Hazards may result in hospitalization to 1 or 2 persons, occupational injury or illness resulting in a lost workday or restricted duty case, loss of facility operational capability from 1 day to 2 weeks, or damage to equipment or property from \$25,000 to \$250,000.

5.4.4 FRI 4 (Acceptable Risk). Loss of life as a result of the hazards is unlikely. Hazards may result in no lost workday injuries or no restricted duty cases, loss of facility operational capability of less than 1 day, or damage to equipment or property less than \$25,000.

5.5 Hazard. A potential condition that can result in, or contribute to, a mishap (injury, illness, death, or damage to systems, equipment, or facilities).

5.6 Hazard Analysis (HA). It is a method of identification and evaluation of existing and potential hazards and the recommended mitigation for the hazard sources found.

5.7 Hazardous Operation. Any operation involving material or equipment that has a high potential to result in loss of life, serious injury to personnel, or damage to systems, equipment, or

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facilities. Examples are operations that involve explosives, propellants, high pressure, oxidizers, corrosives, high elevations, cryogenics, hostile atmosphere, flammables, high electrical energy, radiation, noise, hyperbaric or hypobaric environment, toxic material, and critical hardware.

5.8 Inventory of Hazardous Operations (IHOPS). A listing of all identified hazardous operations on property controlled by MSFC.

5.9 Job Hazard Analysis (JHA). A method or process used to determine hazards associated with a specific job/task and their elimination or control.

5.10 Operating Procedure (OP). A detailed plan listing step-by-step instructions to ensure safe and efficient operations.

5.11 Operational Readiness Inspection (ORI). An ORI committee is established to review new or significantly altered equipment, facilities, or test activities/operations where there is a significant degree of risk of accident or misoperation which might cause personal injury or death, or where there is a high risk of serious damage to equipment, test articles, buildings, or adjoining areas. An ORI may also be established to review high visibility or value projects, facilities, or operations.

5.12 Personal Protective Equipment (PPE) Assessment. An assessment of the workplace to determine if hazards are present, or likely to be present, which necessitate the use of PPE.)Reference MWI 8715.4, "Personal Protective Equipment (PPE).")

5.13 Safety Assessment. A systematic process used to identify hazards and controls related to a given facility, equipment, job, task, operation, or process. It is also a generic term for a family of analyses performed at MSFC including, but not limited to JHA, HA, Operating Hazard Analysis (OHA), Failure Modes and Effects Analysis (FMEA), etc.

5.14 Safety Review Team (SRT). An SRT is established to review and inspect equipment, facilities, or test activities/operations of a less hazardous nature, to review and inspect facility additions or modifications that result in a change in existing hazard levels, or to ensure that all hazards are identified and either eliminated, controlled, or the risk has been accepted.

5.15 Test/Operational Readiness Review (TRR/ORR). A preoperational review of all risks associated with a specific hazardous test/operation to ensure test/operational objectives

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are met without property damage or personnel injury and to determine test/operational system and test article readiness. A TRR/ORR does not take the place of an ORI/SRT, but is used in conjunction with these reviews, if they are required.

6. INSTRUCTIONS

6.1 Supervisors shall ensure a baseline assessment of each facility, equipment, job, task, operation, and process under their control is performed to determine the FRI, reference section 5, Definitions. If an FRI cannot be determined from the definitions, contact the S&MA Office for assistance.

Note: In a typical office environment, a single review may encompass all facilities, equipment, jobs, tasks, operations, and processes performed by the office workers under a supervisor's purview.

6.1.1 The FRI classification is used to help the supervisor determine the level of system safety effort required to meet NASA safety requirements (Reference Table 1).

6.1.2 Supervisors shall ensure any new or modified facility, equipment, job, task, operation, or process are reviewed to determine the FRI.

6.2 Inventory of Hazardous Operations

6.2.1 Supervisors shall ensure that any facility, equipment, job, task, operation, or process determined to be an FRI 1, FRI 2, or FRI 3 is listed in the IHOPS data base located on "Inside Marshall."

NOTE: No entries into IHOPS is required until IHOPS is fully operational; estimated date is September 2001.

6.2.2 The supervisor shall ensure the appropriate data is entered in IHOPS.

6.2.2.1 The hazardous operation being performed.

6.2.2.2 The level of safety assessment performed (if required).

6.2.2.3 The controls implemented to control the hazard (JHA, OP, etc.).

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6.2.3 Supervisors shall ensure the IHOPS for his/her area of responsibility is reviewed annually to ensure the list is current.

Table 1

Minimum Level of Safety Analysis Required

Facility Risk Indicator Level	ORI	SRT	TRR/ORR	HA	JHA	OP	Dry Run	PPE Assessment
FRI 1	x		x	x		x	****x	x
FRI 2		x	x	x		x		x
FRI 3		*x	*x		**x	x		x
FRI 4					**x	**x		***x

* If determined necessary by the appropriate program/project office, the appropriate directorate or department management, or S&MA.

** A JHA or an OP is required. If an OP is used it must meet the requirements of section 6.3.3.

*** A PPE assessment is not required for normal non-hazardous office environments.

**** If determined necessary by the appropriate safety review team.

6.3 Level of Safety Analysis and/or Safety Review:

Note: Every facility and/or job/task/operation/process at MSFC shall have some level of documented safety assessment performed. (Reference section 5, Definitions)

6.3.1 FRI 1 - As a minimum, compliance with the requirements of MWI 8715.6, "Hazardous Operations," is required including an ORI, TRR/ORR, HA, OP, and a PPE assessment. A dry run may also be required if determined necessary by the appropriate safety review team, management, or S&MA. (Reference section 6.8)

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6.3.2 FRI 2 - As a minimum, compliance with the requirements of MWI 8715.6, "Hazardous Operations," is required including an SRT, TRR/ORR, HA, OP, and a PPE assessment.

6.3.3 FRI 3 - As a minimum, an OP. The OP shall comply with the requirements of section 6.10.

6.3.4 FRI 4 - As a minimum, a JHA meeting the requirements of section 6.9 or an OP meeting the requirements of section 6.10 of this MWI is required.

6.4 Supervisors shall ensure that a PPE assessment of the workplace is performed within their area of responsibility to determine if hazards are present or likely to be present that would necessitate the use of PPE in accordance with 29 CFR 1910.132 (d), "Hazard Assessment and Equipment."

6.5 Instructions for performing a PPE assessment are found in MWI 8715.4, "Personal Protective Equipment (PPE)."

6.6 Instructions for performing an ORI, SRT, and a TRR/ORR are found in MWI 8715.8, "Operational Readiness Inspections."

6.7 Instructions for performing an HA and OP for hazardous operations are found in MWI 8715.6, "Hazardous Operations."

6.8 Instructions for performing a dry run shall be determined by the appropriate level safety review team (ORI, SRT, and TRR/ORR), management, or S&MA. The need for a dry run may be based on the assessment of the hazard or other criteria determined by the Safety Review Team.

6.9 If the supervisor determines a JHA is needed, then the following action is required.

Note: The requirements of this section do not apply when the standard JHA for office workers is used.

6.9.1 A team is formed consisting of the supervisor and affected employees.

6.9.2 The team selects the job/task/operation to be observed.

6.9.3 The team selects the most experienced employee and observes them performing the job/task/operation.

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6.9.4 While observing the job, task, operation, or process, the team should define the steps and determine the hazards, if any, associated with each step, such as:

6.9.4.1 Impact

6.9.4.2 Contact with chemicals

6.9.4.3 Caught on or between

6.9.4.4 Fall or slip

6.9.4.5 Overexertion

6.9.4.6 Cumulative trauma

6.9.4.7 Energy sources

6.9.5 The team should determine preventive or corrective measures to control any identified hazard.

6.9.6 The team should review the steps with the observed employee for clarity.

6.9.7 The team should also include an ergonomic assessment of the employee's work area in the JHA. This assessment will identify any hazards that if not corrected could lead to musculoskeletal disorders. Contact the Occupational Medicine and Environmental Health Services (OMEHS) for assistance or more information.

6.9.8 The supervisor will complete the JHA, MSFC Form 4390, or an equivalent form. The supervisor will review and have the JHA approved by the responsible directorate manager/director.

6.9.9 After the JHA has been approved, it will be reviewed annually by the supervisor and the affected employees.

6.9.10 The JHA should also be reviewed as part of any mishap investigation to help identify any possible causes or problem areas.

6.10 Minimum requirements for an OP for operations with a FRI 3 or FRI 4 rating:

6.10.1 A cover sheet identifying the operation

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6.10.2 Activity description

6.10.3 Reference documents

6.10.4 Responsibilities

6.10.5 Safety section

6.10.5.1 List of potential hazards and control

6.10.5.2 Emergency telephone numbers

6.10.6 Operating or activity sequences

6.10.7 Hazardous area access control (if required)

6.10.8 List of required equipment

6.10.9 **"WARNING," "CAUTION,"** and **"NOTE"** precautionary notes prior to sequences/steps in which a malfunction or error produces a reaction that causes system degradation or property damage, personnel injury, or death.

6.10.10 Emergency procedures for securing facility and operation when an anomaly occurs (i.e., equipment failure, personal injury, and fire/explosion).

6.10.11 Schematics, drawings, setup diagrams, etc., as necessary for clarity.

6.10.12 Signature sheet. As a minimum, the signature sheet shall include the name and title of the person submitting the procedure and date signed, and the approval names and date signed of persons responsible for the test and appropriate department manager.

6.10.13 In some instances, a test preparation sheet (TPS) is used as an OP. If the TPS is used for an operation, at a minimum, it must contain the following:

6.10.13.1 Activity description

6.10.13.2 Safety instructions

6.10.13.3 Precautionary notes

6.10.13.4 Emergency situations

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6.10.13.5 Signature sheet

7. NOTES

A standard JHA has been developed for all office workers located in non-hazardous areas. The supervisor may use the standard JHA or modify it to include unique situations in their area. This JHA is located on "Inside Marshall."

8. SAFETY PRECAUTIONS AND WARNING NOTES

Safety precautions and warning notes are specific to the facility, equipment, job, task, operation, or process analyzed. For example, the OP will contain a similar step: "**CAUTION** - When performing a drilling operation eye protection shall be worn."

9. RECORDS

9.1 A JHA (MSFC Form 4390 or equivalent, Appendix), when required, shall be kept by the supervisor for jobs, tasks, operations, or processes in his/her area of responsibility. This record will be maintained for the duration of the job, task, operation, or process then destroyed or maintained for historical purposes.

9.2 Records of the HA, when required, shall be maintained in accordance with the requirements of MWI 8715.6, "Hazardous Operations."

9.3 Records of the ORI, SRT, ORR, and TRR, when required, shall be maintained in accordance with the requirements of MWI 8715.8, "Operational Readiness Program."

9.4 The OP, when required, for operations with a FRI 1 or FRI 2 rating shall be maintained in accordance with MWI 8715.6, "Hazardous Operations." The OP, when required, for operations with a FRI 3 or FRI 4 rating shall be maintained by the responsible organization's supervisor. This record will be maintained for the life of the operation then destroyed or maintained for historical purposes.

9.5 A record of any recommended supervisor or employee safety training will be maintained by the Employee and Organizational Development Department for the employees' length of employment then destroyed or maintained for historical purposes.

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10. PERSONNEL TRAINING AND CERTIFICATION

10.1 Recommended training for supervisors and employees:

10.1.1 NSTC 020, "Basic System Safety Practice," or an equivalent course for finding hazards and for assessing their safety risk.

10.1.2 NSTC 021, "Advanced System Safety Practice," or an equivalent course aimed at ensuring safety operating risks.

10.1.3 NSTC 005, "Manager's Safety," or an equivalent course that provides an introduction to workplace safety requirements.

10.1.4 NSTC 828, "Hazard and Operability (HAZOP) Analysis Methodology," or an equivalent course that provides an understanding of the HAZOP method of safety analysis.

10.1.5 NSTC 048, "System Safety for Managers," or an equivalent course which discusses typical analytical techniques.

10.1.6 NSTC 002, "System Safety Fundamentals," or an equivalent course that teaches the fundamentals of system safety management and hazard analysis of hardware and operations.

10.1.7 NSTC 008, "System Safety Workshop," or an equivalent course that teaches hazard recognition and analysis for hardware and operations.

11. FLOW DIAGRAM

None

12. CANCELLATION

MWI 8715.15 dated February 14, 2000

Original Signed by
Sidney P. Saucier for

A. G. Stephenson
Director

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APPENDIX

JOB HAZARD ANALYSIS

Job/Task: _____

Date: _____

Employee (optional): _____

Supervisor: _____

Org.: _____ **Location:** _____

No.	Job Steps	Potential Hazards/Causes	Recommended Controls