

MID 5340.1

EFFECTIVE DATE: August 19, 2009
EXPIRATION DATE: August 19, 2010

MARSHALL INTERIM DIRECTIVE

ED01

FOREIGN OBJECT DAMAGE/FOREIGN OBJECT DEBRIS PREVENTION OPERATIONS

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1. PURPOSE

The purpose of this Marshall Interim Directive (MID) is to satisfy an urgent and immediate need to document requirements for Foreign Object Damage/Foreign Object Debris (FOD) Prevention operations of facilities.

2. APPLICABILITY

- a. This MID 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.)
- b. This MID applies to Project Offices and the Engineering Directorate that design, test, or manufacture FOD sensitive hardware. FOD sensitive hardware is an item of equipment or a part that may be susceptible to entrapment of foreign objects, damage from foreign object impact, or damage from leaks and spills. Development test hardware, ground support equipment, special test equipment, fixtures, tooling, and jigs may also be identified as FOD sensitive hardware where FOD may degrade the asset’s required safety or performance characteristics or may create a migration path for FOD entry to other FOD sensitive hardware.
- c. This MID applies to Directorates/Offices that perform work in facilities that have been identified by a Project Office or by the Engineering Directorate as FOD Sensitive Areas who are responsible for security, environmental, maintenance, construction, repair, or custodial activities in active FOD Sensitive Areas or on a roof or utility area directly overhead of facility areas that have been identified as FOD Sensitive Areas, where such overhead operations are identified as potential FOD hazards to FOD sensitive items below.
- d. This MID applies to Directorates/Offices that lift, handle, or transport hardware that has been identified as FOD sensitive.

3. AUTHORITY

- a. MPD 1280.1, “Marshall Quality Management System Manual”
- b. NASA-STD-6016, “Standard Materials and Processes Requirements for Spacecraft”

4. APPLICABLE DOCUMENTS

- a. MPR 3410.1, “Training”
- b. MPR 4000.1, “Control of Customer-Supplied Product”
- c. NAS 412, “Foreign Object Damage/Foreign Debris (FOD) Prevention”

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5. RESPONSIBILITIES

5.1 The Engineering Directorate (ED01), Manager, Materials & Processes (M&P) Laboratory (EM01), shall ensure that:

5.1.1 An MSFC FOD Focal Point is designated within the Environmental Effects Branch (EM50) to coordinate FOD prevention measures at MSFC.

5.1.2 A Project FOD Focal Point is assigned (by the Project) for each Project that designs, manufactures, or tests hardware requiring FOD control.

5.1.3 A FOD Sensitive Area designation is assigned (by the Project) for each facility where FOD sensitive hardware is present.

5.1.4 Written operational procedures have been established and reviewed for each FOD Control Area and FOD Critical Zone, as required by the responsible organization's governing Organizational Issuances.

5.1.5 FOD awareness and prevention training course materials are developed and made available, via the System for Administration Training and Education Resources for NASA (SATERN), to personnel assigned to work in or support FOD Sensitive Areas.

5.1.6 An MSFC FOD Measurement, Trending and Feedback System is established and maintained in accordance with the guidelines of NAS 412, "Foreign Object Damage/Foreign Debris (FOD) Prevention," and made available to Projects.

5.2 The Manager of each Project Office that designs, tests, or manufactures FOD sensitive hardware shall ensure that:

5.2.1 A Project FOD Focal Point is designated to establish and coordinate FOD prevention measures for the Project.

5.2.1.1 Project FOD Focal Points shall:

a. Develop a written FOD control program document for the Project in accordance with the requirements contained in NASA-STD-6016, "Standard Materials and Processes Requirements for Spacecraft," and tailored from NAS-412, "Foreign Object Damage/Foreign Debris (FOD) Prevention," which identifies FOD sensitive hardware and FOD Sensitive Areas, and establishes measures to prevent damage to hardware from FOD.

b. Designate the level of FOD control required for each Project facility (where FOD sensitive hardware is present) based on Project identification of hardware criticality and using the following classifications of FOD Sensitive Areas:

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(1) FOD Awareness Area: An area where FOD sensitive hardware is in place or in transit but there is a low potential for FOD entrapment, FOD migration, or impact damage from foreign objects. This designation may also be used to establish a buffer zone to minimize the risk of FOD migration to an adjacent FOD Control Area or FOD Critical Zone.

(2) FOD Control Area: An area where FOD sensitive hardware is in place and there is a high potential for FOD entrapment or migration to the hardware or for FOD-caused impact damage.

(3) FOD Critical Zone: A region within a FOD Control Area that is at the highest risk for potential FOD incidents. Exposure to foreign objects within these areas would potentially cause a system or product failure due to deterioration, malfunction, or damage.

c. Develop written FOD Control Area agreements (for all Project FOD Control Areas and FOD Critical Zones), in coordination with the corresponding Site Manager, that specify required protocols for personnel, tool controls, and operations; and obtain concurrence of the Site Manager and other affected Directorates/Offices.

d. Perform a FOD risk review, in coordination with the Site Manager and the Facilities Management Office, for facilities containing areas to be designated as FOD Sensitive Areas, and recommend corrective action.

e. Provide the Project FOD control program document and facility FOD Control Area Agreements to the MSFC FOD Focal Point for review and approval.

f. Verify that FOD control signs and a FOD Control Area agreement are posted at the entrance(s) to designated FOD Control Areas and FOD Critical Zones when FOD sensitive hardware is present and that established FOD protocols are being followed.

g. Coordinate with Logistics Services (AS40) to assure that adequate precautions are included in lifting, handling, and transportation plans to protect FOD sensitive items from damage during logistic operations.

h. Establish FOD training requirements for the Project, tailored from the FOD training program structure and materials provided by EM01, to address specific Project hardware FOD sensitivities.

i. Ensure that FOD incidents and the results of FOD walk downs and FOD audits are entered into the MSFC FOD Measurement, Trending and Feedback system, or an approved equivalent, and report FOD metrics to Project management on a regular basis.

j. Investigate FOD incidents and recommend corrective action.

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5.2.2 The Environmental Engineering and Occupational Health Office (AS10) and the Facilities Management Office (AS20) are notified when facilities are to be designated as FOD Sensitive Areas so that facility repairs or modifications can be planned and coordinated with the Project to minimize risks to FOD sensitive hardware.

5.2.3 The performance of the Project FOD prevention program is measured and tracked using the MSFC FOD Measurement, Trending, and Feedback System or an approved equivalent.

5.3 The Manager of the Department/Laboratory/Office responsible for the project operations in facilities where FOD sensitive hardware is present shall ensure that:

5.3.1 A Site Manager is designated as point of contact for each FOD Sensitive Area.

5.3.1.1 Site Managers shall:

- a. Coordinate with the Project FOD Focal Point to develop the required protocols for personnel, tool controls, and operations for their FOD Sensitive Area when the Project FOD sensitive hardware is present.
- b. Establish personnel access controls for the FOD Sensitive Area to prevent inadvertent access, including security locks, stanchions, integrity seals on sealed access doors, and other methods as appropriate, and including overhead utility areas as required.
- c. Post FOD signs and the applicable FOD Control Area agreement at the entrance(s) to designated FOD Sensitive Areas to alert personnel that FOD sensitive hardware is present and FOD control protocols are required.
- d. Designate a FOD Monitor and alternate FOD Monitor, as a minimum, for a facility designated as a FOD Control Area or FOD Critical Zone, to perform daily FOD control monitoring tasks and to enter data into the MSFC FOD Measurement, Trending, and Feedback System or approved equivalent.
- e. Initiate Facility Work Requests, as required, to bring facilities in compliance with FOD control requirements.
- f. Assure that personnel entering the FOD Sensitive Area have the required level of FOD training or are escorted as required per the FOD Control Area agreement.
- g. Arrange for escort (by a trained individual from the organization responsible for operations in the facility) of visitors and MSFC Center Operations personnel and contractors requiring access to the FOD Control Area for non-emergency purposes.
- h. Control the lifting and handling of FOD sensitive hardware during operations to prevent FOD entrapment or damage to hardware from FOD impact.

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i. Coordinate with the Marshall Lead Representative (MLR), for any Customer Supplied Product with FOD requirements, to assure that the CSP FOD requirements are addressed at MSFC facilities, per MPR 4000.1, “Control of Customer-Supplied Product.”

j. Monitor personnel using the facilities to ensure compliance with operating procedures.

k. Actively promote and support FOD awareness and continual improvement within the facility.

l. Ensure that FOD incidents are reported to the Project FOD Focal Point and the results of FOD walk downs and audits are entered into the MSFC FOD Measurement, Trending, and Feedback System or an approved equivalent.

5.3.2 FOD prevention protocols are enforced in all applicable work activities.

5.3.3 FOD prevention controls are incorporated in work area activation planning and work authorizing documents for Project operations.

5.3.4 Written operational procedures are established (per governing Organizational Issuances) that include appropriate FOD control requirements for each FOD Control Area and FOD Critical Zone.

5.4 The Manager of a manufacturing or test facility may designate an area as a FOD Sensitive Area, even when no Project hardware is present, when the manufacturing tooling or test equipment itself is FOD sensitive or may entrap FOD that could later migrate to Project FOD sensitive hardware. When such a FOD Sensitive Area designation is established, the manager shall:

5.4.1 Ensure that the requirements of section 6.3 are implemented, as applicable, for the designated FOD Sensitive Area.

5.4.2 Coordinate with the Project FOD Focal Point to tailor the required FOD control protocols for personnel, tool controls, and operations for the FOD Sensitive Area when Project hardware is present, to assure that both the Project hardware and the FOD sensitive manufacturing tooling or test equipment are adequately protected.

5.5 The Supervisor of personnel assigned to work in FOD Sensitive Areas shall incorporate the required FOD training into their learning plans.

5.6 Safety, Quality, & Management Systems Department (QD10) shall:

5.6.1 Consider the potential for damage to components/hardware caused by foreign object entrapment or impact damage when performing Safety Hazard Analyses.

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5.6.2 Provide feedback to the MSFC FOD Focal Point and the Project on recommended modifications and improvements to the FOD control program.

5.6.3 Perform Quality Assurance audits, incorporate (or ensure incorporation of) applicable FOD prevention protocols (as required by the Project) in the review of work/inspection planning and during surveillance of operations, within identified FOD Sensitive Areas.

5.6.4 Support the Project FOD Focal Point in the investigation of FOD incident reports.

5.6.5 Coordinate with the Project FOD Focal Point and applicable Site Managers in the disposition of Discrepancy Reports and Material Review Board actions (reference MPR 8730.3, "Control of Nonconforming Product") relating to FOD.

5.6.6 Periodically participate in FOD walk downs; frequency to be established by Project FOD control requirements.

5.6.7 Participate in FOD Sensitive Area activation planning and recommend techniques, methods, and continual improvements to the Project FOD Focal Point and Site Manager.

5.7 Environmental Engineering and Occupational Health Office (AS10) shall:

5.7.1 Coordinate environmental engineering and occupational health functions to be performed within or above FOD Sensitive Areas with the Site Manager to assure that these operations do not create a risk to FOD sensitive hardware.

5.7.2 Ensure that personnel assigned to perform environmental engineering or occupational health functions within FOD Sensitive Areas receive FOD awareness training and are escorted within FOD Control Areas by trained FOD escorts designated by the Site Manager.

5.8 Facilities Management Office (AS20) shall:

5.8.1 Support FOD risk reviews of facilities containing areas which are to be designated as FOD Sensitive Areas by a Project.

5.8.2 Coordinate Facilities operations to be performed within or above FOD Sensitive Areas with the Site Manager to assure that these operations do not create a risk to FOD sensitive hardware. Additional inspections or preventive maintenance may be required for cranes or other overhead facility equipment to identify and remove potential FOD sources. Additional controls on custodial cleaning operations and techniques may also be required.

5.8.3 Ensure that personnel assigned to perform custodial services, maintenance, or repairs within FOD Sensitive Areas receive FOD awareness training. Custodial personnel assigned to routinely perform services within FOD Control Areas may also require FOD prevention training.

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5.8.4 Require that personnel entering FOD Sensitive Areas to perform custodial services, maintenance, or repairs comply with the applicable FOD protocols for that area and are escorted in FOD Control Areas by trained FOD escorts designated by the Site Manager. FOD escort requirements are waived when an emergency such as a facility pipe break occurs that presents an imminent hazard to the FOD sensitive hardware.

5.9 Logistics Services Office (AS40) shall:

5.9.1 Coordinate with the Project FOD Focal Point to ensure that adequate precautions are included in lifting, handling, and transportation plans to protect FOD sensitive items from damage during logistic operations.

5.9.2 Ensure that personnel performing transportation, handling, and lifting operations of FOD sensitive hardware are trained for FOD control operations. Contact Environmental Effects Branch (EM50) for training requirements.

5.9.3 Ensure that personnel assigned to perform maintenance or repair of research, development, test and evaluation equipment within FOD Sensitive Areas receive FOD awareness training and are escorted within FOD Control Areas by trained FOD escorts designated by the Site Manager.

5.10 Protective Services Office (AS50) shall:

5.10.1 Ensure that personnel required to enter FOD Sensitive Areas to perform security functions receive FOD awareness training.

5.10.2 Require that Protective Services personnel entering FOD Sensitive Areas for non-emergency purposes comply with the applicable FOD protocols for that area and are escorted within FOD Control Areas by trained FOD escorts designated by the Site Manager. FOD escort and access control requirements are waived when emergency response is required per MPR 1040.3, "MSFC Emergency Plan" or when an emergency such as a facility pipe break occurs that presents an imminent hazard to the FOD sensitive hardware.

5.11 MAF Operations Office (AS60) shall:

5.11.1 Perform Facilities Management, Environmental Health, Logistics, Protective Services, and other functions delegated by MSFC as described above for FOD prevention at MAF.

5.11.2 Establish and maintain a MAF FOD Measurement, Trending, and Feedback System in accordance with the guidelines of NAS-412, "Foreign Object Damage/Foreign Debris (FOD) Prevention."

5.11.3 Designate a MAF FOD Focal Point to coordinate FOD prevention measures and FOD training at MAF.

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5.12 Training and Incentives Office (HS40) shall:

5.12.1 Track FOD training courses in the System for Administration Training and Education Resources for NASA (SATERN).

5.12.2 Maintain records of personnel trained for FOD control via the SATERN system in accordance with MPR 3410.1, "Training."

5.12.3 Coordinate with EM50 to schedule instructor-led FOD training courses.

6. CANCELLATION

None.

Original signed by

Robert M. Lightfoot
Acting Director

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ATTACHMENT A

REFERENCE DOCUMENTS

A.1 MPR 1040.3, “MSFC Emergency Plan”

A.2 MPR 8730.3, “Control of Nonconforming Product”