

Chapter 9.1

Hazardous materials safety and health

This could be you . . .

A diesel spill occurred in a parking lot when a personal diesel container in the back of a pickup truck tipped over and leaked.

Two workers cleaning an oxidizer storage tank were killed when the tank exploded due to a reaction between the cleaning agent and residual oxidizer.

Workers released a cloud of oxidizer that drifted outside the downwind safety zone because they unknowingly released too much oxidizer.

1. Applicability of this chapter

You are required to follow this chapter if you purchase or handle hazardous materials or control areas where hazardous materials are used or stored at JSC or JSC field sites.

2. What this chapter covers

This chapter covers the purchase, use, handling, transporting, and restrictions of hazardous materials.

3. What are hazardous materials?

A hazardous material is anything that can be a danger by contact, inhalation, consumption, or impacting the environment. These materials may include:

- a. Chemicals as listed in various regulations (see <http://sd.jsc.nasa.gov/omoh/scripts/OccupationalHealth/HazardousMaterials.aspx>)
- b. Radioactive materials
- c. Explosives or any pyrotechnics
- d. Pesticides

4. What to do when you need to use a hazardous material that is a risk to health, safety, or the environment

If you use or store, or plan to use or store, hazardous materials you shall:

- a. Complete a new or update an existing hazard analysis (see paragraph 6 below) for new materials or new uses of existing materials. Notify the Occupational Health Department before you use any hazardous materials for the first time or before using a hazardous material in a new or different way.

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- b. Request MSDSs from the manufacturer or supplier whenever you order a hazardous material. If they did not provide the MSDS for your hazardous material, contact them immediately for a copy. You may not use the material until you have an MSDS annotated with a “JSC MSDS Number” and have addressed the identified hazards. (See paragraphs 8 and 9 below.)
 - 1. Keep MSDSs up to date by having procedures for filing revised or newly acquired MSDSs from the JSC MSDS repository or supplier.
 - 2. Provide new or revised MSDSs to the Occupational Health Department.
 - 3. Keep a hard copy of your MSDSs readily available for employees in the work area.
- c. Review proposed purchases against the list of restricted and prohibited materials before starting a purchase request or supply requisition.
- d. Get a copy of the MSDS in advance to substantiate compliance with this requirement.
- e. Get a waiver before using any prohibited material or materials with a restricted use as described in paragraph 15 below.
- f. Contact the JSC RSO before purchasing radioactive materials (see Chapter 7.4 of this handbook).
- g. Review hazardous waste disposal requirements of residual, used, or contaminated material as well as empty containers to determine the cost impacts, environmental impacts, or regulatory restrictions. Regulations may require substitution of certain materials. For example, stratospheric ozone-depleting chemicals should be phased out under the Clean Air Act of 1990. See Chapter 5.8, “Hazardous operations: safe practices and certification,” of this handbook for more information on permits. See Chapter 4.1, “Program description,” for more information on safety and health training.
- h. Try to find a less hazardous material that will do the job within your quality standards.
- i. Purchase the smallest quantity necessary to do the job.
- j. Develop and maintain a list of hazardous materials in the JSC Hazardous Material Inventory Database. See Chapter 9.2, “Hazard communication,” of this handbook.
- k. Make sure that you and your employees are properly trained in the use and hazards of these materials before using them. See Chapter 9.2, “Hazard communication,” of this handbook.
- l. Use proper work practices and handling procedures.
- m. Use proper waste-handling practices such as labeling, segregating, and avoiding the mixing of different hazardous waste streams.
- n. Make sure that all hazardous materials are used properly and that necessary precautions are taken so that no harm is done to humans or the environment.
- o. Make sure that your subcontractors who use hazardous materials on site follow the requirements of this chapter if you are a prime contractor.

- p. Make sure your visiting scientists who use hazardous materials follow the requirements of this chapter.

5. Recycling

Recycling hazardous materials is another method of reducing cost and minimizing wastes while conserving natural resources. Before recycling hazardous materials, contact the Environmental Office to determine environmental requirements.

Planning to handle hazardous materials

6. Planning to handle hazardous materials

If you are planning to handle hazardous materials, you shall complete a hazard analysis for each process that you control, or that is in your area, that uses toxic, reactive, flammable, radioactive, or corrosive chemicals. The hazard analysis will help to establish precautionary measures and help to determine the need for an emergency action plan (EAP). Obtain and use the most current MSDS(s) when performing the hazard analyses. The hazard analysis shall:

- a. Contain a listing of chemicals used in the process.
- b. Be updated whenever quantities increase or processes change.
- c. Address the failure mode of the spontaneous release such as a container failure without operations in progress.

Note: See Chapter 2.4, “Hazard Analysis,” and JSC 17773, “Preparing Hazard Analysis for JSC Ground Operations,” for instructions on completing the hazard analysis. Follow Chapter 3.3, “Process Safety Management,” and 29 CFR 1910.119 for process safety management of highly hazardous chemicals.

7. What to do with a completed hazard analysis

If your analysis shows hazards with an RAC of 1, 2, or 3 as described in Chapter 3.5, “Hazard Correction Tracking,” of this handbook, you shall:

- a. Prioritize control measures using this order: engineering controls, work practices, PPE, and administrative measures.
- b. Send a list of the hazards to the Occupational Health Department (SD3229) for review.
- c. Develop or modify your EAP to cover the actions that need to be taken to ensure employee safety during fires, hazardous material releases, or other emergencies that might occur in your area. Your EAP shall follow the requirements in Chapter 3.8, “Emergency Preparedness,” of this handbook.

Obtaining and maintaining Material Safety Data Sheets

8. Responsibility for MSDSs at JSC

The following applies to MSDSs:

- a. Line organizations who acquire hazardous materials shall obtain a current MSDS using the process in paragraph 9 below.
- b. The Occupational Health Department keeps the central repository of MSDSs for JSC and assists in obtaining, collecting, maintaining, and distributing MSDSs. An on-line database of these MSDSs is available on the Health Home page. You may contact the Occupational Health Department MSDS Coordinator at (281) 483-7512 for any questions that you may have about MSDSs.

9. Ordering an MSDS

To order an MSDS:

- a. First check the NASA/JSC MSDS Search for any MSDSs that are not in your files. If the MSDS is in the database and scanned into the system, you can print the MSDS directly off the screen.
- b. If the MSDS is in the database but is not scanned into the system, submit a completed JSC Form 277, "Material Safety Data Sheet Request Form" (Appendix 9A), to the Occupational Health Department MSDS Coordinator (SD3229). The MSDS Coordinator will contact you when the item has been scanned into the system.
- c. If the MSDS is not in the database, request a copy of the MSDS from the manufacturer or supplier of the product.
- d. If the MSDS in your work area is more than 3 years old, it may be outdated. Contact the manufacturer or supplier to determine whether a more current MSDS is available.
- e. Submit all new and updated MSDSs, along with a completed JSC Form 277, to the Occupational Health Department MSDS Coordinator (SD3229). This individual will assign a JSC MSDS Number and will contact you when the item has been scanned into the system.

Purchases of hazardous materials

10. Purchase requests for hazardous materials

Both contractors and civil servants need to follow the requirements for purchasing hazardous materials in this chapter. You shall:

- a. State, on the purchase request, “MSDS REQUIRED. RECEIVING OFFICE: UPON RECEIPT OF MSDS, FORWARD ONE COPY EACH TO CENTRAL MSDS REPOSITORY AND TO USER.”
- b. Notify the Clinical Services Branch and the Environmental Office before you:
 1. Use any hazardous materials initially.
 2. Change the usage of any hazardous material.

11. The role of procurement in purchasing hazardous materials

The following requirements apply:

- a. The Procurement Support Group shall:
 1. Support procurement in identifying contract requirements for safety concerns under JPR 1281.6, “Procurement.”
 2. Coordinate all procurements involving hazardous materials with the Clinical Services Branch to identify requirements that the supplier must follow and document. The Clinical Services Branch requires an MSDS (OSHA Form 174 or equivalent) to accompany the shipment.
- b. Procurements of any potentially hazardous material shall follow subpart 23.3 of the Federal Acquisition Regulations (FAR) and NASA FAR Supplement 18–23.3, “Hazardous Material Identification and Material Safety Data.”
- c. All procurement offices shall make sure that specific safety or health requirements are in purchase orders and contracts. Specifically, safety or health requirements will indicate whether an MSDS is necessary.

12. Responsibilities of the receiving office

All receiving offices shall:

- a. Make sure that an MSDS accompanies all hazardous materials when specified on the purchase order.
- b. Confirm that each shipping container has a label that identifies the contents given on the MSDS, the manufacturer or distributor of the material, and the specific physical or health hazards cited in the MSDS.
- c. Send all MSDSs that accompany any shipments of materials to the Central MSDS Repository (SD3229). You shall keep copies of the original MSDS in the receiving office repository to be distributed later with the material.
- d. Make sure a copy of the MSDS accompanies all hazardous materials in storage and distribution either on site or off site. MSDSs shall be made available to receiving office employees on request.

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- e. Make sure receiving office employees are trained in the measures to take in the event of a spill or leak of hazardous materials.
- f. Immediately impound the material and contact the responsible forwarding office for correction if the MSDS is missing from the shipping documents. If an MSDS is already on file, the receiving office may add this MSDS to the shipping papers if the name and supplier of the material on the shipping container and the MSDS are identical. The exception to this is generic materials such as hydrochloric acid or caustic soda.
- g. Reject and return any shipment or transfer of hazardous materials if the supplier or forwarding office fails to provide an MSDS.

Requirements for safely handling hazardous materials

13. Safely handling and storing hazardous materials

If you have hazardous materials in your work areas, you shall also:

- a. Review the hazardous materials in your work area to:
 - 1. Reduce the quantity of the material.
 - 2. Reduce the chance of a fire, a spill, or an accidental release.
 - 3. Reduce hazardous waste.
- b. Take steps to eliminate or reduce the risks of hazardous materials. This includes substituting a less hazardous material, if possible, or writing work requests, as necessary, to install required engineering controls.
- c. Keep the proper fire extinguishers in the area. Contact the Safety and Test Operations Division for more information.
- d. Store hazardous materials in a manner consistent with manufacturer's recommendations and the Chemical Segregation and Storage Guide found on the Health Web page.
- e. Post appropriate warning signs within your work areas, and make sure that tanks and piping are labeled per ASME A13.1, "Scheme for the Identification of Piping Systems."
- f. Label all containers of hazardous materials within your work area as described in 29 CFR 1910.1200, "Hazard Communication Standard" (see Chapter 9.2 of this handbook).
- g. Use proper waste-handling practices, including waste segregation and disposal, for all processes that use hazardous materials per the Waste Segregation and Storage Guide found in JPR 8500.1, "Environmental Compliance Procedural Requirements."
- h. Make sure you have appropriate fire protection systems and fire extinguishers for the hazardous materials.

- i. Make an assessment for the need for escape respirators in areas where hazardous materials are stored.
- j. Make sure chemical alarms and warning lights are operational as described in Chapter 6.12, “Local Hazard Chemical Alarms,” of this handbook.
- k. Assess the condition of hazardous materials in storage at least quarterly and remove those you determine to be unsuitable.

Restricted and Prohibited materials

14. Restricted and prohibited materials at JSC

JSC has decided that some products are too hazardous to handle and are prohibited for purchase, storage, or use. Other products are toxic or highly regulated and may only be used in limited applications or restrictions may apply. See the following URL, for the list of restricted and prohibited chemicals:

<http://sd.jsc.nasa.gov/omoh/docs/Restricted%20and%20Prohibited%20Materials.doc>

The following requirements apply:

- a. JM/Project Management Office shall maintain JSC SPECSINTACT to conform to the policy on restricted materials that may be used in construction, modification, or repair of facilities, specifically asbestos-containing materials (ACMs), PCBs, chlorofluorocarbons (CFCs) and hydro-chlorofluorocarbons (HCFCs), and mercury.
- b. If you are responsible for maintaining facilities or equipment, you shall specify “non-asbestos” products, undetectable concentrations of PCBs, “non-CFC”-containing equipment, or non-mercury equipment.

JSC is continually evaluating the restricted and prohibited materials list. Before purchasing or using a material, check the most current list at

<http://sd.jsc.nasa.gov/omoh/scripts/OccupationalHealth/MSDS.aspx>

15. Waivers to use a restricted or prohibited material

You may request a temporary waiver if the use of a specific restricted or prohibited material is required to achieve JSC’s mission. You shall submit your waiver request in writing to the JE/Environmental Office. The Environmental Office will coordinate review of the waiver request, as appropriate, with the Clinical Services Branch or the Safety and Test Operations Division. The following requirements apply:

- a. Your temporary waiver request shall include the following information:
 1. Name and phone number of requestor.
 2. Organization name and mail code if NASA (or onsite contractor).
 3. Contract name and number if contractor.

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4. Name and Chemical Abstract Service (CAS) number of chemical.
 5. Location(s) of proposed use (building and room number).
 6. Description of proposed process using chemical.
 7. Estimated quantity of the chemical that you expect to store and use per year for each location.
 8. Justification for use of the restricted or prohibited chemical. If no alternative is available for the chemical, you shall provide documentation of your efforts to locate an alternative.
 9. If a specification, standard, or contract line item requires the use of this specific chemical; you shall provide a reference to that requirement (contract name and number and contract line item or procedure name and number) and a copy of the requirement.
 10. A copy of the hazard analysis and trade studies (if applicable) for the proposed activity or process that will use the chemical. Include any assessments of alternative materials.
- b. The Environmental Office and the Clinical Services Branch shall approve and sign your temporary waiver before you may use the restricted or prohibited chemical. If a new chemical is placed on the restricted and prohibited chemical list, you have 6 months in which to re-evaluate the process and find an alternative or request a temporary waiver.
 - c. Temporary waivers stay in effect for a designated time period of between 1 and 5 years, depending on the safety, health, and environmental characteristics of the chemical. You shall apply for a new waiver and have it approved before the expiration date of an existing waiver to continue using the chemical.

16. Other material restrictions

The following materials, in concentrations specified in the standards listed below, are subject to certain restrictions under 40 CFR 61, "National Emission Standards for Hazardous Air Pollutants" (NESHAP) or under OSHA substance-specific standards. These materials shall follow:

- a. NESHAP restrictions found in this table.

<i>For . . .</i>	<i>Follow this subpart of 40 CFR 61 . . .</i>
Asbestos	M
Beryllium	C
Mercury	E
Vinyl chloride	F
Radionuclides	I
Benzene	J, Y, BB, and FF

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- b. OSHA restrictions in 29 CFR 1910, “Occupational Safety and Health Standards, General Industry:”

<i>For . . .</i>	<i>Follow 29 CFR 1910 . . .</i>
Asbestos	1001
4-nitrobiphenyl	1003
Alpha-naphthylamine	1003
Methyl chloromethyl ether	1003
3,3-dichlorobenzidine and salts	1003
Bis-chloromethyl ether	1003
Beta-naphthylamine	1003
Benzedrine	1003
4-aminodiphenyl	1003
Ethyleneimine	1003
Beta-propiolactone	1003
2-acetylaminofluorene	1003
4-dimethylaminoazobenzene	1003
N-nitrosodimethylamine	1003
Vinyl chloride	1017
Inorganic arsenic	1018
Lead	1025
Cadmium	1027
Benzene	1028
1,2-dibromo-3-chloropropane	1044
Acrylonitrile	1045
Ethylene oxide	1047
Formaldehyde	1048
Methylenedianiline	1050
1,3 Butadiene	1051
Methylene Chloride	1052

- c. OSHA restrictions in 29 CFR 1926, “Occupational Safety and Health Standards, Construction Industry:”

<i>For . . .</i>	<i>Follow 29 CFR 1926 . . .</i>
Asbestos	1101
Cadmium	1127
Lead	62
Methylenedianiline	60

Transporting hazardous materials

17. Requesting transportation of hazardous materials

You shall use the following procedure for requesting transportation of hazardous materials:

- a. Contact Transportation Work Control at (281) 483-6563 as much in advance as possible. Transportation resources are limited, and different kinds of hazardous materials cannot be transported together. Schedule transportation of compressed gas cylinders in advance since they are transported on a cylinder truck.
- b. Identify the hazardous material, the amount, the weight, the type of container, and locations for transport. Have an MSDS for the material available at the time of pickup.
- c. The dispatcher will prepare a work order and the pickup will be scheduled, usually within 3 days. Depending on workload and the availability of equipment, work stoppage and rush shipments may be accommodated. Small amounts of certain hazardous materials may be moved by the Quick Dispatch Service within a few hours.
- d. Handle gas cylinders as described in JPR 1710.13, "Design, Inspection, and Certification of Pressure Vessels and Pressurized Systems."

18. Transporting hazardous materials

You shall follow these requirements:

- a. Follow paragraph 3.7.5 of NPR 8715.3, "NASA General Safety Program Requirements."
- b. Never transport hazardous materials on site in your car, truck, any other privately owned vehicle, or NASA administrative aircraft. This includes hazardous materials for personal use with the exception of household concentrations in quantities of less than 5 gallons. You may be denied access to site if you try to transport hazardous materials outside of the above exception.
- c. You may transport only materials that are unopened and packaged in the original DOT-approved shipping containers and only in government or official company vehicles. You shall not travel public roads.
- d. Route all other hazardous materials through the JSC Transportation Branch for appropriate handling per 49 CFR, Subchapter C, "Hazardous Materials Regulations."
- e. Route any hazardous materials leaving JSC, Ellington Field, or Sonny Carter Training Facility that will travel on public roads through the Transportation Branch for appropriate handling per 49 CFR, Subchapter C, "Hazardous Materials Regulations." This includes any materials transported between JSC ("in the fence"), Sonny Carter Training Facility, and Ellington Field.
- f. The Center Operations support services contractor is the only organization authorized to transport hazardous waste.

- g. The JSC Radiation Safety Officer or his/her designee is the only person authorized to transport radioactive materials.
- h. Craftspeople may transport hazardous materials that are specific to their craft and are essential to their work in a government or official company vehicle designed for that task; they shall not travel on public roads. Examples include welders who transport compressed gas cylinders, custodial workers who transport cleaning fluids, and pesticide applicators who transport pesticides to application sites
- i. Individuals may deliver chemicals for analytical purposes in a government or an official company vehicle only and shall not travel public roads.

19. Reporting an accident while transporting hazardous materials

In general, contracted commercial carriers are responsible by law for reporting all accidents involving transportation of hazardous materials. If you are transporting hazardous materials using JSC equipment and have an accident in the public domain, you shall report the accident by:

- a. Calling the DOT Accident Hotline (800-424-8802) if it involves any of the following:
 - 1. A fatality
 - 2. A person requiring hospitalization as a result of injuries received
 - 3. Estimated property damage exceeding \$50,000
 - 4. Possible existence of radioactive contamination
 - 5. A continuous danger existing at the site, such as a spill or leakage of hazardous material

- b. Notifying the JSC Safety and Test Operations Division at (281) 483-4900 and the JSC Transportation Branch at (281) 483-2301. They will help you meet other requirements.

At WSTF, you shall notify the NASA Safety Officer (Quality Assurance, Reliability, and Safety Office) and the Chief, Engineering Office. The WSTF Safety Officer will notify the JSC Director, Safety and Mission Assurance, for you.

- c. Follow Chapter 2.7, “Mishap and incident investigation,” of this handbook for further guidance on mishap reporting and investigation.

The Director, Safety and Mission Assurance, shall notify the NASA Headquarters Safety and Risk Management Division of the accident and will make sure that the DOT has been notified. This includes sending a written follow-up report to the Associate Director for Hazardous Materials Regulations, DOT, Washington, D.C. 20590, within 15 days as stated in 49 CFR 171.16, “Detailed Hazardous Materials Incident Reports.” It also includes sending copies to the NASA Safety Division, Office of the Chief Engineer, NASA Headquarters.

Emergency reporting and response

20. Reporting emergencies

You shall report all emergencies at JSC and Ellington Field by calling your emergency number; x33333 for JSC, the Sonny Carter Training Facility, and Ellington Field, 911 off site, and x5911 at WSTF.

21. Emergency response

Spills or leaks of hazardous materials often will require containment and countermeasures under EPA and OSHA regulations. Usually when a hazardous material spills or leaks into the environment or becomes an immediate threat to the safety of personnel or facilities, an emergency exists and requires immediate response under established contingency plans. Handle all leaks and spills as described in JPR 8550.1, “JSC Environmental Compliance Procedural Requirements,” mishap reporting requirements in this handbook (see Chapter 2.7), and JSC’s emergency response plan. The Occupational Health Department will acquire specific information on trade name products for purposes of emergency or first-aid treatment

Other requirements and responsibilities

22. For more information on handling hazardous materials

- a. 29 CFR 1910, “Occupational Safety and Health Standards, General Industry”
- b. 29 CFR 1926, “Occupational Safety and Health Standards, Construction Industry”
- c. Clean Air Act of 1990, 42 U.S.C. Section 7401, et seq.
- d. 49 CFR Parts 171–174, “Hazardous Materials Regulations” (DOT)
- e. *Department of Transportation Emergency Response Guidebook* (latest edition)
- f. 40 CFR 61, “National Emission Standards for Hazardous Air Pollutants” (EPA)
- g. 40 CFR Parts 240–281, “Solid and Hazardous Waste Regulations” (EPA)
- h. 40 CFR Parts 370–372, “Emergency Planning and Community Right-to-Know” (EPA)
- i. 40 CFR 355, “Emergency Planning and Notification”
- j. 40 CFR 302.4, “Designation of Hazardous Substances”
- k. NPR 8715.3, “NASA General Safety Program Requirements”
- l. NPD 1820.1, “NASA Environmental Health Program”
- m. NPD 8800.16, “NASA Environmental Management”
- n. JPR 8550.1, “Environmental Compliance Procedural Requirements”

- o. National Fire Protection Association Class IA flammable liquids

23. Additional responsibilities for hazardous materials

The following have responsibilities for hazardous materials:

- a. As a *supervisor* you are responsible for:
 - 1. Making sure that a quarterly hazardous material inventory is completed and providing inventory information to the Clinical Services Branch in the format specified. (See Chapter 9.2 of this handbook.) Making additions and deletions to your hazardous material inventory as they occur will make it easier to keep current.
 - 2. Providing PPE to control the hazards of the materials being handled. The Clinical Services Branch will help you select PPE.
 - 3. Following all requirements for restricted and prohibited materials.
 - 4. Developing and maintaining a hazard analysis for your processes that use hazardous materials as described in Chapter 2.4, "Hazard Analysis," of this handbook and in JSC 17773.
- a. Making sure that hazardous materials in your control have adequate evacuation and response procedures for a release or spill. You shall coordinate your procedures with your facility manager to ensure a unified emergency action plan for the facility.
- b. As a *facility manager*, you are responsible for making sure that emergency action procedures you develop for your facility consider inputs from any supervisors in your facility who control hazardous materials, which, if released, could result in evacuation of your facility.
- c. As the *person (civil service or contractor) who is responsible for managing operations* and who has stated decision-making authority and control over operations and activities involving hazardous materials, you are responsible for:
 - 1. Making the following certification at least once per calendar year: "I certify that I have personally examined and am familiar with this list or inventory and that based on my inquiry of those individuals immediately responsible for obtaining the information, it accurately reflects the materials used and stored within the defined work area under my authority. I also certify that each of these hazardous materials is necessary for the successful performance of activities within my area of responsibility; that no prohibited materials are on the list unless approval to use them has been granted in writing by the JSC Hazardous Materials Working Group; and that periodic evaluations are conducted and documented in order to ensure that less hazardous materials have been substituted whenever possible to do so."
 - 2. Signing the certification and attaching it to the hazardous materials list or inventory. You may need to make inquiries of more than one person to validate the accuracy and sign the certification. JSC's safety, health, and environmental staff will periodically

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audit certification and backup documentation to ensure that the lists are accurate and that evaluations for prohibited materials and substitutions have occurred.