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Chapter 3.2 Hazard Elimination and Control

3.2.1 Applicability of this chapter

You are required to follow this chapter if you work at JSC or a JSC field site.

3.2.2 Hazard elimination and control requirements

3.2.2.1 JSC shall eliminate or control site hazards identified during hazard analyses, inspections, close-call reports, or mishaps by using the systems and the control hierarchy outlined in subparagraph d below. The following requirements apply:

- a. All affected employees and visitors shall understand and follow hazard controls.
- b. Hazard controls shall adequately eliminate or control the hazards in the work area.
- c. Training, positive reinforcement, and correction programs shall include hazard controls.
- d. JSC organizations shall follow the hierarchy of hazard controls in paragraph 3.2.7to eliminate or control hazards, with engineering controls being the most desirable:
- e. JSC shall have hazard control programs, which are a part of hazard elimination and control and include all required programs to control specific hazards in the work area such as Lockout/Tagout, Respiratory Protection, Hearing Conservation, etc. Paragraph 3.2.8 provides requirements for and a list of JSC's hazard control programs.

3.2.3 Determining the risk of a hazard

3.2.3.1 After identifying a hazard, you shall identify the risk of the hazard using the risk assessment process and Risk Assessment Code (RAC) in paragraph 2.3.8, Chapter 2.3. This allows JSC to determine how serious it is and prioritize hazard correction. Risk considers both the severity of a mishap that could result from a hazard and the chance the mishap could occur. Document both the risk assessment before controls are in place and the risk assessment after controls are in place. The table below states what action to take for each RAC. Investigation and abatement shall follow paragraph 3.2.6 and Chapter 3.5.

If the RAC is	Then the risk is
1	Unacceptable – All operations shall cease immediately until the hazard is corrected or until temporary controls are in place and permanent controls are in work.
	A safety or health professional shall stay at the scene at least until temporary controls are in place.
2	Undesirable – All operations shall cease immediately until the hazard is corrected or until temporary controls are in place and permanent controls are in work. Program Manager (Directorate level), Organizational Director, or equivalent management is authorized to accept the risk with adequate justification.*
3	Acceptable with controls – Division Chief or equivalent management is authorized to accept the risk with adequate justification.*

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4–7	Acceptable with controls – Branch Chief or equivalent management is authorized to accept the risk with adequate justification.*

*JSC organizations aren't authorized to accept the risk of violating JSC, NASA, local, state, or federal requirements. If you think you can't follow a requirement, contact the Safety and Test Operations Division or Occupational Health for help in meeting the requirement. Requesting relief as described in Chapter 1.3, "Written Safety and Health Program" is a last resort for not following requirements.

3.2.4 Determining the risk from exposures to physical, chemical, biological, and radiological health and environmental hazards

Determining the risk from exposure is a complicated process. It includes an evaluation of the hazard, the dose and exposure, acute and chronic health effects caused by the exposure, and other factors. While the table in paragraph 3.2.4 indicates some severity estimates for degree of illness, it is best to determine these risks through a cooperative effort involving the manager, employee, and occupational health professionals. Call Occupational Health, x36726, for help in evaluating these risks. For environmental issues, determine the severity and frequency according to JPR 8553.1, "JSC Environmental Management System Manual."

3.2.5 Investigating and correcting a hazard

3.2.5.1 When investigating a hazard where no event happened but a condition exists that may cause an injury, property damage, or an environmental release or spill, you shall find the hazard cause(s) and decide what actions to take to eliminate or control them. The Environmental Office will take the lead for hazard investigations that are strictly environmental and will help with others that involve environmental issues. Contact the Environmental Office for hazards that are strictly environmental. To correct a hazard, follow the <u>hazard abatement process</u> found in <u>https://smasp.jsc.nasa.gov/ns/ns1/Hazards/Home.aspx</u>. JSC Team Members shall follow these steps to investigate a hazard:

- a. First, make sure other JSC team members are protected from the hazard or environmental concern. This may include blocking trip hazards or spills with orange cones.
- b. For RAC 1 and 2 hazards:
 - (1) Do a full root cause analysis using an established root cause method. The cause may be simple, but try to look beyond the obvious. Perhaps the hazard was caused by some deficiency in the management system. Perhaps it was caused by human error, which resulted from deficiency in the management system.
 - (2) Evaluate the root cause(s) and determine which ones to fix to prevent injuries or future hazards.
 - (3) Take action to change, control, or prevent those root cause(s) from leading to future injuries or hazards.
 - (4) Document the results of the analysis and action plan or actions taken. Follow the hazard control hierarchy in paragraph 3.2.7 when determining the actions to take. Submit the results to the Safety and Test Operations Division. They will track the actions to closure and verify that actions are complete in the System for Tracking Audits/Assessments, and Reviews (STAR). See Chapter 3.5 for more details.

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- c. For RAC 3–7 hazards:
 - (1) Evaluate and take actions to eliminate or control the hazard as necessary. Follow the hazard control hierarchy in paragraph 3.2.7 when determining the actions to take. If no action is necessary, provide rationale.
 - (2) Look beneath the surface for underlying causes of the hazard, especially if you have seen other similar hazards.
 - (3) Document the actions taken in the appropriate tracking system. If it will take more than 30 days from the time the hazards identified to fix the hazard, enter it into the STAR. See Chapter 3.5 for more details. The Safety and Test Operations Division will automatically enter hazards reported through the Close Call system or the Safety Action Hotline into STAR as necessary.

3.2.6 Controls

- a. **Engineering Controls.** Engineering controls are design changes that directly eliminate (ideally) a hazard or limit the severity or likelihood of a potential mishap They are the most reliable and effective type of controls. Try to use engineering controls first to correct hazards in the work area before resorting to administrative controls. The engineering controls are listed below in order of preference:
 - (1) Change the design to eliminate or physically remove the hazard
 - (2) Reduce the hazard through substitution. For example, use a less hazardous material or lower voltage if possible.
 - (3) Install safety devices or guards. For example, use safety interlocks, machine guards, or relief valves if possible.
- b. Administrative Controls. Administrative controls change the way people work to significantly limit daily exposure to hazards by controlling or manipulating the work schedule or the manner in which the work is done, such as job rotation. They are less effective than engineering controls since they rely more on human performance. Use them only if engineering controls aren't feasible. Administrative controls include safe work practices, altered work schedules, training, administrative barriers, signs, and caution and warning devices. When using administrative controls:
 - (1) Everyone in the work area shall understand and follow them.
 - (2) They shall affect the hazards they are to control.
 - (3) Management shall enforce them fairly.
 - (4) Employees and management shall update them as needed.

NOTE: Parts 5–10 contain safe work practices for the entire Center. Individual work areas may need more specific work practices, depending on the hazards. You may also include special procedures in work instructions.

NOTE: See Chapter 6.11 for specific requirements on chemical alarms.

c. **Personal Protective Equipment (PPE).** PPE protects workers from the hazard and is not a substitute for engineering or administrative controls. First try to eliminate or control a hazard

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before resorting to PPE. When PPE is required or used as a control in a hazard analysis or job hazard analysis, follow Chapter 5.6, "Personal Protective Equipment." That chapter provides general requirements on PPE and requirements for specific types of PPE. Other chapters of this JPR or OSHA standards (29 CFR 1910) indicate what PPE is required for specific jobs.

3.2.7 Hazard control programs

JSC shall have written control programs that are implemented and updated by management, as needed, and used consistently by employees. The table below provides a listing of hazard control programs. Refer to the chapters listed for more details.

Hazard control program	Chapter	Use when	Other Requirements
Asbestos	5.7	Working in asbestos area or with	None
	Part 12	asbestos-containing materials	
Biosafety and Bloodborne Pathogens	7.4	Working with blood or other potentially infectious materials	None
Confined Spaces and controlled areas	6.10	Entering confined spaces and controlled areas	None
Cryogenics	6.5	Working with cryogenic fluids	None
Ergonomics	5.5	Arranging workstations and designing work activities	None
Fire Safety	5.1	Identifying fire risks and implementing controls	None
Hazard Communication and Hazardous Materials	9.1 & 9.2	Working with hazardous materials	None
Hearing Conservation	7.1	Working in a noisy environment	None
Lasers	7.5	For Class 1, 2, 3 and 4 lasers and laser systems	None
Lead	9.4	Working around lead-based materials	None
Lockout/Tagout (Stored Energy)	8.2	Servicing or maintaining equipment with stored energy such as electrical, mechanical, or pressure	None
Pesticide Control	9.3	Applying pesticides	None
Pressure Systems	6.11	Designing, building, or maintaining pressure systems	JPR 1710.13 (curent version)
Radiation Protection	7.3	Working with and around radiation sources	None
Respiratory Protection	7.2	Working in areas where respirators are required	None
Fall Protection	8.8	Working where fall protection is required.	None

Verify correct version before use at <u>Center Directives Management System</u>. JSC Form JF2420B (Revised April 3, 2012) (MS Word August 28, 2006)

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3.2.8 Responsibilities for hazard prevention and control

- a. As a JSC manager, you are responsible for:
 - (1) Making sure hazards in your work areas are controlled, preferably with engineering controls and using other controls only as necessary.
 - (2) Developing and enforcing necessary safety and health rules and procedures for your work areas and employees.
 - (3) Making sure your employees use the appropriate PPE for their jobs. This includes training on proper donning and doffing of PPE.
 - (4) Making sure your employees follow the appropriate hazard control programs for their jobs.
- b. The Safety and Test Operations Division and Occupational Health are responsible for:
 - (1) Reviewing hazard controls as necessary.
 - (2) Maintaining Center-level safety and health rules.
 - (3) Maintaining Centerwide hazard control programs.

3.2.9 Safety and health records and documentation for hazard prevention and control

- a. Center level Records required by OSHA to document hazard control programs.
- b. Organizational-level documentation:
 - (1) Hazard analyses and job hazard analyses, per Chapter 2.3, documenting hazards and hazard controls to support this chapter.
 - (2) Directives, procedures or work instructions that document safe work practices for organizations and individual work areas.
 - (3) PPE hazard assessments and other PPE documentation required by Chapter 5.6.
 - (4) Documentation required for hazard control programs described in the chapters listed in paragraph 3.2.8 above or any other OSHA-required documentation.

NOTE: See Appendix F, Attachment 1.1A for details on records and documentation required by this chapter.