# 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 section 3.2.6. 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 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 3.2.7 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.<br><br>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.<br>Program Manager, 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.* |

| | |
|---|---|
| 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 3.2.3.1 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 or Email Occupational Health, (x36726, jsc-dl-occ-health@mail.nasa.gov) for help in evaluating these risks. For environmental issues, determine the severity and frequency according to JPR 8553.1, "JSC Environmental Management System Manual" and follow the JPR 8550, "JSC Environmental Procedural Requirements."

### 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 Management Office will take the lead for hazard investigations that are strictly environmental and will help with others that involve environmental issues, per JPR 8550, "JSC Environmental Procedural Requirements." Contact the Environmental Management Office for hazards that are strictly environmental. To correct a hazard, follow the hazard corrective action plan process found at URL: https://smasp.jsc.nasa.gov/ns/ns1/SH%20%20Haz%20Process/Home.aspx. 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 barricading trip hazards or spills with orange cones.

b. For RAC 1 and 2 hazards:

(1) Do a full root cause analysis to evaluate and determine which ones to fix to prevent injuries or future hazards 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) Take action to change, control, or prevent those root cause(s) from leading to future injuries or hazards.

(3) Document the results of the analysis and action plan or actions taken. Follow the hazard control hierarchy in paragraph 3.2.6 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.

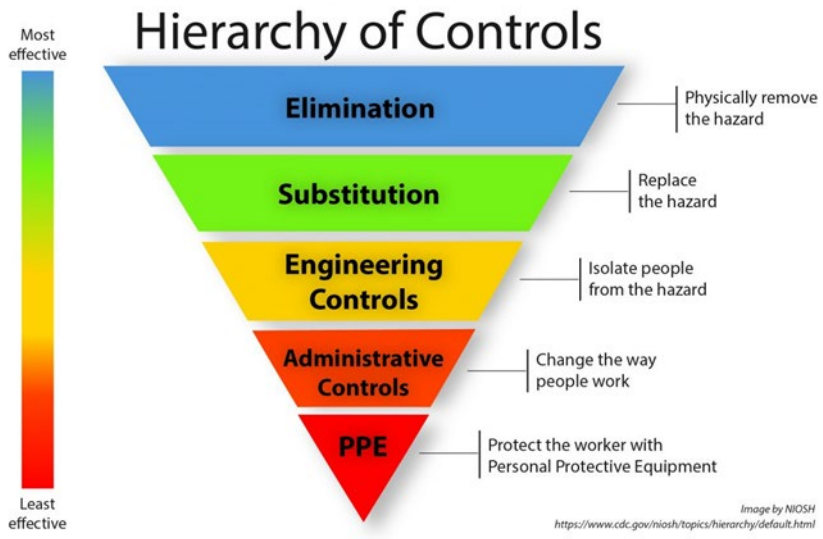
c. For RAC 3–7 hazards:

(1) Evaluate and take actions to eliminate or control the hazard as necessary. Follow the hazard control hierarchy in paragraph 3.2.6 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 are 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




3.2.6.1 The hierarchy of controls is a method of identifying and ranking safeguards to protect workers from hazards. They are arranged from the most to least effective and are elimination, substitution, engineering controls, administrative controls and personal protective equipment. Figure 3.2-1 illustrates the hierachry of controls.

**Figure 3.2-1. Hierarchy of hazard controls**

a. **Elimination.** Elimination makes sure the hazard no longer exist by changing the design to eliminate or physically remove the hazard. Examples include: Ending the use of a hazardous material, doing work at ground level other than at heights, stopping the use of noisy processes. These are the most reliable and effective type of controls.

b. **Substitution**. Substitution means changing out a material or process to reduce the hazard. Examples: Switching to a less hazardous material, switching to a process that uses less force, speed, temperature, or electrical current.

c. **Engineering**. Engineering controls reduce exposure by preventing hazards from coming into contact with workers. For example, noise enclosures, local exhaust ventilation, safety interlocks, machine guards, or relief valves.

d. **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: JPR 1700.1 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.

e. **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 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* | *JPR Chapter* | *Use when* | *Other Requirements* |
|---|---|---|---|
| Asbestos | 5.7<br>Part 11 | Working in asbestos area or with asbestos-containing materials | None |
| 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 |

### 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 **and actually elimination of the hazard or substitution is best.**

(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.