



**FOREST SERVICE HANDBOOK  
NATIONAL HEADQUARTERS (WO)  
WASHINGTON, DC**

**FSH 6709.11 – HEALTH AND SAFETY CODE HANDBOOK**

**Amendment No.:** 6709.11-2016-1

**Effective Date:** July 19, 2016

**Duration:** This amendment is effective until superseded or removed.

**Approved:** JANE C. COTRELL      **Date Approved:** 05/04/2016  
Associate Deputy Chief

**Posting Instructions:** Amendments are numbered consecutively by handbook number and calendar year. Remove only the required pages and replace it with this amendment. Retain this transmittal as the first page(s) of this document. The last amendment to this Handbook was 6709.11-2015-1 to 6709.11\_10.

<b>New Document</b>	Page 20-1 thru Page 20-76	76 Pages
<b>Superseded Document(s) by Issuance Number and Effective Date</b>	Page 20-1 thru Page 20-78 (Amendment 6709.11-99-1, 12/01/1999)	78 Pages

**Digest:**

21.14 - Added requirements for use of Satellite Emergency Notification Device (SEND).

22.62-22.62d - Removes codes, captions, and direction and recodes direction to FSH 4209.11.

# CHAPTER 20 – WORK PROJECTS AND ACTIVITIES

## Table of Contents

<b>21 - GENERAL PROJECT PLANNING .....</b>	<b>9</b>
21.01 - Authority.....	9
21.04 - Responsibility .....	9
21.06 - References .....	9
21.1 - Job Hazard Analysis.....	9
21.11 - Qualifications .....	10
21.12 - Training .....	10
21.13 - Personal Protective Equipment.....	11
21.13a - General Requirements .....	11
21.13b - Specific Requirements.....	12
21.14 - Procedures .....	15
21.2 - First Aid Training/Minimum.....	16
21.21 - First Aid and Cardiopulmonary Resuscitation (CPR).....	17
21.22 - First Aid Equipment .....	17
21.3 - Safety Practices .....	17
21.31 - Hunting Season.....	17
<b>22 - RESOURCE MANAGEMENT.....</b>	<b>18</b>
22.01 - Authority.....	18
22.06 - References .....	18
22.07 - Qualifications .....	19
22.08 - Procedures .....	19
22.1 - Environmental .....	20
22.11 - Pesticide Application.....	20
22.11a - Qualifications.....	20
22.11b - Personal Protective Equipment.....	20
22.11c - Procedures.....	21
22.11d - Safety Practices .....	22
22.12 - Aircraft Calibration for Pesticide Application .....	23
22.12a - Safety Practices.....	23
22.2 - Range.....	23
22.21 - Qualifications .....	23
22.22 - Fencing .....	24
22.22a - Personal Protective Equipment.....	24
22.22b - Safety Practices .....	24
22.3 - Recreation.....	26
22.31 - Qualifications .....	26
22.31a - Personal Protective Equipment.....	27
22.31b - Procedures .....	27
22.31c - Safety Practices.....	27

22.32 - Administration of Developed Sites .....	28
22.32a - Standards.....	28
22.32b - Qualifications .....	28
22.32c - Personal Protective Equipment.....	28
22.32d - Procedures .....	28
22.32e - Safety Practices.....	28
22.33 - Administration of Undeveloped Areas .....	29
22.33a - Qualifications.....	29
22.33b - Personal Protective Equipment.....	29
22.33c - Procedures.....	29
22.33d - Safety Practices .....	29
22.34 - Trail Maintenance/Construction.....	30
22.34a - Standards.....	30
22.34b - Qualifications .....	30
22.34c - Personal Protective Equipment.....	30
22.34d - Safety Practices .....	31
22.35 - Archeological Work Site .....	31
22.35a - Standards.....	31
22.35b - Qualifications .....	31
22.35c - Personal Protective Equipment.....	31
22.35d - Procedures .....	32
22.35e - Safety Practices.....	32
22.36 - Mountaineering.....	32
22.36a - Standards.....	32
22.36b - Qualifications .....	32
22.36c - Personal Protective Equipment.....	33
22.36d - Procedures .....	33
22.36e - Safety Practices.....	34
22.37 - Caving.....	35
22.37a - Standards.....	35
22.37b - Qualifications .....	35
22.37c - Personal Protective Equipment.....	35
22.37d - Procedures .....	36
22.37e - Safety Practices.....	36
22.4 - Forest Management .....	38
22.41 - Thinning and Girdling .....	38
22.41a - Qualifications.....	38
22.41b - Personal Protective Equipment.....	38
22.41c - Safety Practices.....	39
22.42 - Tree Pruning .....	39
22.42a - Qualifications.....	39
22.42b - Personal Protective Equipment.....	39
22.42c - Safety Practices.....	40

22.43 - Tree Planting .....	40
22.43a - Standards.....	40
22.43b - Qualifications .....	41
22.43c - Personal Protective Equipment.....	41
22.43d - Safety Practices .....	41
22.44 - Scaling .....	43
22.44a - Qualifications.....	43
22.44b - Personal Protective Equipment.....	43
22.44c - Procedures.....	44
22.44d - Safety Practices .....	44
22.45 - Mill Studies .....	47
22.45a - Standards.....	47
22.45b - Personal Protective Equipment.....	47
22.45c - Safety Practices.....	47
22.46 - Timber Sale Administration .....	48
22.46a - Standards.....	48
22.46b - Qualifications .....	48
22.46c - Personal Protective Equipment.....	48
22.46d - Procedures .....	48
22.46e - Safety Practices.....	48
22.47 - Timber Marking.....	50
22.47a - Standards.....	50
22.47b - Qualifications .....	50
22.47c - Personal Protective Equipment.....	50
22.47d - Procedures .....	51
22.47e - Safety Practices.....	51
22.48 - Saw Operations.....	52
22.48a - Standards.....	53
22.48b - Qualifications .....	53
22.48c - Personal Protective Equipment.....	53
22.48d - Equipment Requirements .....	55
22.48e - Procedures.....	57
22.48f - Safety Practices .....	58
22.49 - Tree Climbing.....	58
22.49a - Standards.....	58
22.49b - Qualifications .....	59
22.49c - Personal Protective Equipment.....	59
22.49d - Procedures .....	60
22.49e - Safety Practices.....	61
22.5 - Watershed and Air Management.....	61
22.51 - Water Surveys .....	61
22.51a - Qualifications.....	61
22.51b - Personal Protective Equipment.....	62

22.51c - Procedures.....	62
22.51d - Safety Practices .....	63
22.52 - Snow Surveys .....	63
22.52a - Qualifications.....	64
22.52b - Personal Protective Equipment.....	64
22.52c - Safety Practices.....	64
22.53 - Soil Surveys.....	65
22.53a - Standards.....	65
22.53b - Qualifications .....	65
22.53c - Personal Protective Equipment.....	65
22.53d - Safety Practices .....	65
22.6 - Wildlife, Fish, and Sensitive Plant Management .....	66
22.61 - Electrofishing .....	66
22.61a - Qualifications.....	66
22.61b - Personal Protective Equipment.....	66
22.61c - Safety Practices.....	67
22.63 - Cavity Nesting Bird Work Projects and Activities.....	68
22.63a - Qualifications.....	68
22.63b - Personal Protective Equipment.....	68
22.63c - Safety Practices.....	68
22.7 - Special Uses [Reserved].....	69
22.8 - Minerals and Geology .....	69
22.81 - Mine and Mineral Surveys .....	69
22.81a - Standards.....	69
22.81b - Qualifications .....	70
22.81c - Personal Protective Equipment.....	71
22.81d - Procedures .....	72
22.82 - Oil and Gas Operations .....	75
22.82a - Qualifications.....	75
22.82b - Personal Protective Equipment.....	75
22.82c - Procedures.....	75
<b>23 - STATE AND PRIVATE FORESTRY [RESERVED] .....</b>	<b>75</b>
<b>24 - RESEARCH [RESERVED].....</b>	<b>75</b>

25	PROTECTION AND DEVELOPMENT
25.01	Authority
25.06	References
25.07	Qualifications
25.08	Procedures
25.1	Fire
25.11	Qualifications
25.12	Personal Protective Equipment
25.13	Wildland Firefighting
25.13a	Safety Practices
25.13b	Fatigue Factors
25.13c	After Work Activities Involving Swimming
25.14	Prescribed Fire
25.14a	Qualifications
25.14b	Personal Protective Equipment
25.14c	Procedures
25.14d	Safety Practices
25.14e	Tractor Plow Use in Prescribed Fire
25.14f	All-Terrain Vehicle Use in Prescribed Fire
25.14g	Burning Out and Backfiring Operations
25.14h	Backfiring Equipment
25.15	Brushing and Brush Piling
25.15a	Standards
25.15b	Personal Protective Equipment
25.15c	Procedures
25.16	Vehicle Fires
25.16a	Procedures
25.17	Boat Fires
25.2	Smokejumping
25.21	Helicopter Rappelling
25.3	Law Enforcement
25.31	Standards
25.32	Qualifications
25.33	Personal Protective Equipment
25.34	Safety Practices
25.35	Firearms
25.36	Search and Rescue
25.36a	Authority and Responsibility
25.36b	Procedures
26	MANAGEMENT SERVICES
26.07	Qualifications
26.08	Procedures

26.1	Personnel [Reserved]
26.2	Office Safety and Health
26.3	Procurement [Reserved]
26.4	Recycling
26.41	Qualifications
26.42	Personal Protective Equipment
26.43	Safety Practices
26.5	Finance and Accounting [Reserved]
26.6	Telecommunications
26.61	Standards
26.62	Tower/Pole Climbing
26.62a	Qualifications
26.62b	Personal Protective Equipment
26.62c	Procedures
26.62d	Safety Practices
27	ENGINEERING
27.01	Authority
27.1	Engineering Operations
27.11	Qualifications
27.12	Procedures
27.13	Surveying
27.13a	Qualifications
27.13b	Personal Protective Equipment
27.13c	Safety Practices
27.14	Sign Installation/Maintenance
27.14a	Qualifications
27.14b	Personal Protective Equipment
27.14c	Procedures
27.14d	Safety Practices
27.15	Gravel Pit and Rock Quarry Operations
27.15a	Standards
27.15b	Qualifications
27.15c	Personal Protective Equipment
27.15d	Procedures
27.15e	Safety Practices
27.2	Buildings and Related Activities
27.21	Carpentry
27.21a	Standards
27.21b	Qualifications
27.21c	Personal Protective Equipment
27.21d	Procedures
27.21e	Safety Practices

27.22	Painting
27.22a	Standards
27.22b	Qualifications
27.22c	Personal Protective Equipment
27.22d	Procedures
27.22e	Safety Practices
27.23	Welding and Cutting
27.23a	Standards
27.23b	Qualifications
27.23c	Personal Protective Equipment
27.23d	Procedures
27.23e	Safety Practices
27.24	Demolition
27.24a	Standards
27.24b	Qualifications
27.24c	Personal Protective Equipment
27.24d	Procedures
27.24e	Safety Practices
27.25	Trams
27.25a	Qualifications
27.25b	Personal Protective Equipment
27.25c	Safety Practices
27.3	Public Health and Pollution Control
27.31	Wastewater Treatment
27.31a	Standards
27.31b	Qualifications
27.31c	Personal Protective Equipment
27.31d	Procedures
27.31e	Safety Practices
27.4	Water Storage and Transmission
27.41	Dam Inspections
27.41a	Standards
27.41b	Qualifications
27.41c	Personal Protective Equipment
27.41d	Procedures
27.41e	Safety Practices
27.5	Electrical [Reserved]
27.6	Transportation
27.61	Bridge Inspections
27.61a	Qualifications
27.61b	Personal Protective Equipment
27.61c	Procedures
27.62	Road Maintenance

27.62a	Qualifications
27.62b	Personal Protective Equipment
27.62c	Procedures
27.62d	Safety Practices
27.63	Clearing (Roadside and Land)
27.63a	Standards
27.63b	Personal Protective Equipment
27.63c	Safety Practices.
27.63d	Backpack Power Units
27.63e	Safety Practices

## **CHAPTER 20 – WORK PROJECTS AND ACTIVITIES**

### **21 - GENERAL PROJECT PLANNING**

This chapter provides general guidance to plan and accomplish a variety of work projects and activities.

#### **21.01 - Authority**

Regulations regarding work projects and activities are in Title 29, Code of Federal Regulations (29 CFR), Parts 1910, 1926, and 1960; 30 CFR Parts 1-199; 42 CFR Part 11; and 49 CFR Parts 1-199 and 301-399.

#### **21.04 - Responsibility**

Line Officers and Supervisors have the responsibility to:

1. Ensure the safety of both employees and the public.
2. Use the job hazard analysis (JHA) to document the level of experience and skill employees must possess to safely complete a specific work project or activity.
3. Analyze tools, equipment, and facility needs necessary for safe and healthful operations.
4. Require use of selected tools and personal protective equipment (PPE).
5. Select tools and personal protective equipment (PPE) to accommodate employee gender, size, and other special needs.

#### **21.06 - References**

1. National Fire Protection Association. NFPA 1977: Protective Clothing and Equipment for Wildland Fire Fighting. Quincy, MA.
2. U.S. Department of Transportation, Federal Highway Administration. Manual on Uniform Traffic Control Devices. U.S. Government Printing Office, Washington, DC.

#### **21.1 - Job Hazard Analysis**

The JHA is developed to ensure safety and health by assigning responsibility and accountability to employees, first-line Supervisors, and Line Officers. Everyone should prepare a JHA for all work projects and activities. Identify the worksite, name(s) of the employee(s) writing the JHA, and the name of the approving Line Officer, and the date the JHA was developed within the JHA. The Supervisor shall document in the JHA that employees have read and understand the contents, have received the required training, and are qualified to perform the job (sec. 71).

### **21.11 - Qualifications**

Specific qualifications are required for many work projects and activities. Examples are:

1. First Aid/Cardiopulmonary Resuscitation (CPR) Training.
2. Incident Command System Training.
3. Chain Saw Operation.
4. Hazardous Communication Training (Right-to-Know).
5. Motorized Heavy Equipment and Vehicle Endorsements/Licenses.
6. Firearm Certification.
7. Blaster Certification.
8. Mountain Bicycling.
9. Pesticide Use and Application Training/Certification.
10. Forest Protection Officer Certification (Law Enforcement).

### **21.12 - Training**

Train employees in the basic safety and health precautions they need to follow before beginning any work project or activity. For example, refer field-going employees to chapter 50, section 55.11a of this handbook for water supply information.

Ensure employees have a working knowledge of the tools, devices, personal protective equipment (PPE), hazards, and defenses against those hazards. Never assume employees have the necessary training and experience. Refer to 29 CFR 1926.21, 29 CFR 1960.59, and section 52 of this Handbook for further direction.

It is essential that global positioning system (GPS) training be provided to field-going employees prior to GPS utilization (refer to the Glossary).

All field-going employees doing strenuous work should perform stretching and other warm-up exercises appropriate to the work project or activity.

## **21.13 - Personal Protective Equipment**

### **21.13a - General Requirements**

For general requirements on PPE, refer to 29 CFR 1910.132. Follow these safety and health practices for selecting, training, using, and maintaining PPE.

1. Select PPE (such as the color of Forest Service-approved hardhats) based on the hazards identified in the JHA.
  - a. PPE shall fit properly.
  - b. Defective, damaged, or unsanitary PPE must not be used.
  - c. Supervisors shall be responsible to assure the adequacy (as well as proper maintenance and sanitation) of employee-owned equipment.
2. Train each employee to wear the PPE required by the JHA. Training must include:
  - a. PPE requirements such as when and where it should be worn.
  - b. Proper donning, adjustment, and removal of PPE.
  - c. Proper care, maintenance, useful life, limitations, and disposal of PPE.

3. Before performing any work project or activity requiring or recommending PPE, ensure that employees can demonstrate an understanding of their training. Employees are accountable for accidents and injuries that result from not using or misusing required PPE.

4. Provide additional training as necessary. Circumstances in which Supervisors should provide additional training include:

- a. Workplace changes that require new or updated training.
- b. Changes in the PPE to be used.
- c. Evidence that an employee's knowledge or use of PPE is not adequate.

### **21.13b - Specific Requirements**

Section 72, exhibit 01 identifies PPE required, approved, and furnished by the Agency without local JHA justification. Before starting a work project or activity, check the appropriate chapter of this Handbook for additional PPE requirements.

1. Occupational Eye and Face Protection. Ensure that employees wear appropriate eye and/or face protection (including side protection) when exposed to eye or face hazards such as flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation. These stipulations apply to employees and to visitors while they are in hazardous areas. Eye wear retention devices, such as elastic straps for goggles or for eyeglasses, are recommended. For specific requirements, refer to 29 CFR 1910.133. Eye protection must meet the standards of the American National Standards Institute (ANSI) Z87 (latest edition).

2. Occupational Noise Exposure. Provide protection against the effects of noise when the exposure for an 8-hour time-weighted average (TWA) measured on the A scale of a standard sound-level meter at slow response is 85 decibels or above. For specific requirements, refer to 29 CFR 1910.95.

When employees are subjected to sounds exceeding those listed in exhibit 01, institute administrative or engineering controls to reduce noise levels to acceptable levels. Where such controls are not practical (for example, in some field work situations) or fail to meet noise standards, provide and use PPE.

Implement hearing conservation programs in workplaces where employee noise exposure equals or exceeds an 8-hour time-weighted average (TWA) of 85 decibels.

In these programs, include employee hearing tests (audiograms) which must serve as baseline data for interpreting the results of future hearing tests. After obtaining the baseline audiogram, test affected employees annually.

21.13b - Exhibit 01 - Permissible Noise Exposure

<b>Duration per Day-Hours</b>	<b>Sound Level dBA Slow Response</b>
8	85
8	90
6	92
4	95
3	97
2	100
1-1/2	102
1	105
1/2	110
1/4 or less	115

Units shall keep a current list of employees exposed to noise levels. Include these employees in all aspects of the hearing conservation program.

Provide and explain audiogram results to tested employees and maintain results in their medical folders (29 CFR 1910.95).

Provide a variety of suitable hearing protection devices and ensure that employees wear the devices in designated high noise areas.

Inform employees of:

- a. The effects of noise on hearing.
- b. The advantages, disadvantages, and attenuation of various types of protectors as well as instructions on selection, fitting, use, and care.

3. Respiratory Protection. Do not assign employees tasks requiring respirator use unless they are physically able to perform the work and can use the equipment properly. For specific requirements, refer to 29 CFR 1910.134.

- a. Include standard operating procedures in the JHA for selecting and using respirators.
- b. Select respirators on the basis of hazards to which the employee is exposed; refer to 42 CFR Part 84 for requirements.
- c. Instruct employees in the proper use, fit, maintenance, and storage of respirators and their limitations.
- d. Ensure that employees attend required hazard communication training when they have a potential exposure risk to a hazardous chemical under normal conditions of use or in a foreseeable emergency.
- e. Ensure that respirators are National Institute of Safety and Health (NIOSH) certified.
- f. Regularly inspect, clean, disinfect, and store respirators in a convenient, clean, and sanitary location. Replace worn or deteriorated parts.
- g. Monitor work area conditions and the degree of employee exposure or stress levels.

4. Occupational Head Protection. Employees shall wear appropriate head protection when working where there is a potential for head injuries. Ensure that hardhat/helmet protection is Forest Service-approved and that the hardhats are made from material having a melting point of 350 °F (177 °C) or higher. For general and specific requirements, refer to 29 CFR 1910.132, 1910.135 and NFPA 1977 (sec. 21.06).

Inspect shells daily for dents, cracks, penetration, or any other damage that might compromise protection. Also inspect the suspension systems, headbands, sweatbands, and any accessories daily.

Follow manufacturer's recommended cleaning practices.

5. Occupational Hand Protection. Document the need for hand protection in the JHA. Ensure that the type of protection selected protects employees from the specific hazards identified. For specific requirements, refer to 29 CFR 1910.138.

6. Occupational Foot Protection. Employees shall wear protective footwear when working where there is a danger of foot injuries due to falling or rolling objects, objects piercing the soles of footwear, and electrical hazards.

Many different types of footwear are available. Section 72, exhibit 01 identifies foot protection required for specific projects or activities. In the site-specific JHA, identify foot protection necessary that is not covered in exhibit 01 (FSM 6716.03).

Supervisors shall provide direction to employees as to which type of foot protection is best suited for their particular project or activity (sec. 18.2). Ensure that safety-toed footwear meets the latest ANSI Z41 and ANSI Z41.1 standards. For specific requirements, refer to 29 CFR 1910.136.

## **21.14 - Procedures**

By review and signature approval of the JHA, a Line Officer or other competent person shall approve and document the assignment of employees to work alone. Supervisors and employees shall consider the entire project. If the nature of the work causes employees to be separated to the point of being unable to see or communicate with each other while in the field, then they must be considered 'alone' even though they are on the same project. Positive two-way communications are required and must be addressed in the Job Hazard Analysis/Risk Assessment when performing work in remote locations and when working alone. Line and crew shall jointly assess the risk and agree on a process that meets the intent for a check-in/check-out plan. They shall agree on the communication and tracking devices used and ensure training proficiency with the device(s). With changes in technology, differences in locations, and other challenges, it is not feasible to

designate one device but allow the line/crew to select a device that meets the intent of work safety. When an individual is alone in remote locations, the tracking feature should be used to determine employee location. This tracking feature will only be used to ensure safety of the employee/employees, and never used to track employees for accountability of work or time, in accordance with the National Federation of Federal Employees' (NFFE) Memorandum of Understanding signed by NFFE and Forest Service Management. Employee privacy will be maintained. If there is a significant potential hazard to an employee working alone, additional personnel shall be assigned as the benefit must always outweigh the risk.

Discuss the following items from the approved JHA, with employees, before they start the job:

1. Prepare instructions for each work project or activity not covered in other applicable documents.
2. Include methods to ensure public safety and health.
3. Correct recognized hazards before beginning work projects and activities.
4. Identify hazards that cannot be corrected. Inform all involved personnel as an initial abatement action of the hazards. Do not allow performance of work projects and activities having unacceptable risks.
5. Where hazardous chemicals/materials may be encountered, provide the applicable Material Safety Data Sheet (MSDS) and discuss the implications of the work with all employees.
6. Develop emergency evacuation procedures and pinpoint individual responsibilities for implementation.
7. Conduct and document tailgate sessions as needed. Tier the sessions to the JHA to provide more specific project/task safety concerns and requirements.

## **21.2 - First Aid Training/Minimum**

## **21.21 - First Aid and Cardiopulmonary Resuscitation (CPR)**

Each field crew and office group shall have at least one person currently certified by a nationally recognized organization to render first aid and perform CPR (29 CFR 1910.151, 1910.1030, and 1926.50). Supervisors shall ensure that employees receive training or retraining in first aid and CPR before certifications expire. Refer to section 52.3 for direction on the bloodborne pathogens program.

## **21.22 - First Aid Equipment**

Ensure that first aid/body fluid barrier kits (also referred to as a first aid kit) are available at each work site, whether in the field or office (refer to the Glossary).

1. Train one or more persons to render first aid, including CPR.
2. Ensure that a competent person checks first aid supplies and equipment at regular intervals and restocks as needed, paying particular attention to those items with expiration dates.
3. Select first aid supplies for the worksite based on the remoteness from medical facilities and anticipated types of injuries that can occur. For sites with chain saw operations, as a minimum, supply Type IV (belt) first aid kit(s).
4. Where employees may be exposed to injurious corrosive materials, provide facilities for quick flushing of the eyes at the work area. Maintain all eyewash stations in accordance with the ANSI Z358.1 and inspect them per the manufacturer's instructions. Conduct frequent inspection and maintenance of squeeze bottles since they lose water through evaporation, become contaminated, and are easily misplaced (sec. 61.25 para. 4).

## **21.3 - Safety Practices**

Discuss the JHA with involved employees and address safety concerns for the site-specific work project or activity.

### **21.31 - Hunting Season**

Hunting season presents its own unique situations such as back road travel, fire-arm safety, camping restrictions, and road closures.

1. Post signs near work sites to warn hunters of crew and employee locations. Post "No Shooting" signs for administrative sites and public use areas, such as campgrounds and trailheads, located in hunting areas.

2. Wear hunter's orange vests.
3. Reschedule jobs to allow crews to safely work away from hunters when possible.

## **22 - RESOURCE MANAGEMENT**

This section contains direction and safety guidelines for employees engaged in a variety of work projects and activities focused on managing National Forest System lands.

### **22.01 - Authority**

Regulations regarding safety, health practices, and requirements related to management of resources are in FSM 2300, Recreation, Wilderness, and Related Resource Management; FSM 2350, Trail, River, and Similar Recreation Opportunities; FSM 2400, Timber Management; FSM 2807, Certification for Mineral Examiners; FSM 2883.4, Geologic Hazard Evaluation; FSM 7410, Administration; FSM 7421, Water Supply; FSM 2150, Pesticide Use, Management, and Coordination; chapter 30 of FSH 2109.14, Pesticide-use Management and Coordination Handbook; and Title 36, Code of Federal Regulations (36 CFR), Part 219.

### **22.06 - References**

1. Gempler's, Inc. 1994. Reference Guide for EPA's Worker Protection Standard. Mt. Horeb, WI.
2. Haskins, Roger A., Eugene Carlat, and Frederic B. Mullin. 1989. Field Handbook for Mineral Examiners. H-3890-1. Washington, DC: Department of the Interior, Bureau of Land Management.
3. Herrero, Stephen. 1985. Bear Attacks: Their Causes and Avoidance. Nick Lyons Books.
4. Hoshide, Gary T., and W. J. Makel. U.S. Department of Agriculture, Forest Service. 1995. Cleaning Recreation Sites. San Dimas, CA: San Dimas Technology and Development Center, Forest Service.
5. Reiner, Jeff. Lake Tahoe Basin Management Unit. 1999. Diving Management and Safety Manual. U.S. Department of Agriculture, Forest Service. U.S. Government Printing Office, Washington, DC.

6. Taylor, William E. and Robert G. Hooper. 1991. A Modification of Copeyon's Drilling Technique for Making Artificial Red-Cockaded Woodpecker Cavities. General Technical Report SE-72. Asheville, NC: U.S. Department of Agriculture, Forest Service. Southern Research Station.
7. U.S. Department of Agriculture, Forest Service. 1996. National Tree Climbing Field Guide. Missoula, MT: Missoula Technology and Development Center, Forest Service.
8. U.S. Department of Agriculture, Forest Service. Wildfire Powersaw. Training course S-212.
9. U.S. Department of Agriculture, Forest Service. 1984. Standard Specifications for Construction of Trails. EM-7720-102. Washington, DC: Forest Service.

## **22.07 - Qualifications**

In addition to applicable training and certification listed in section 21.11, ensure employees involved in resource management activities are trained or familiar with the:

1. Identification of Hantavirus symptoms and preventive/precautionary measures (sec. 53.73a).
2. Use of body fluids protection items.
3. Identification and management of potentially hazardous animal behavior (sec. 22.06).
4. Use of chemical agents for self-defense.
5. Use of firearms for personal protection from aggressive animals.
6. Handling/disposal methods for hazardous materials.

## **22.08 - Procedures**

Employees and their supervisor shall prepare a job hazard analysis (JHA) (sec. 21.1) that includes:

1. An itinerary of planned travel route(s), date of travel, destination, and estimated time of departure/arrival.

2. Check-out/check-in system.
3. Names of employees.
4. Emergency phone numbers/communication system and contact points.
5. Other information pertinent to the project or activity. Some requirements for the JHA that are available in other documents, such as a district or project safety and health plan, may be included by reference.

If employees fail to report or return on schedule, the supervisor shall take actions required by the JHA.

## **22.1 - Environmental**

### **22.11 - Pesticide Application**

Pesticides include insecticides, fungicides, herbicides, rodenticides, attractants, repellents, and wood preservatives. Application projects may involve ground or aerial activity (sec. 61.32b and 61.7).

#### **22.11a - Qualifications**

Employees working with pesticides shall be trained and have experience in the specific work project or activity (sec. 22.07). Personnel involved in restricted-use pesticide applications shall be licensed or certified by the Forest Service, Environmental Protection Agency (EPA), State, and local jurisdiction.

#### **22.11b - Personal Protective Equipment**

Employees involved in pesticide work shall use the personal protective equipment (PPE) specified by the product label, material safety data sheet (MSDS), and JHA. Refer to direction in sections 21.13 and 21.22 for identifying PPE in the JHA. The minimum PPE requirements for pesticide application are:

1. First Aid Kits. Have them readily available to all workers (refer to the Glossary).
2. Hand Protection. Wear gloves impervious to pesticides. Ensure washing facilities are available for employees at application site.

3. Eye/Face Protection. Wear goggles, safety glasses with side shields, or face shields at all times when handling pesticide containers, and when mixing, loading, or applying pesticides. Ensure that permanent or portable eye wash facilities are available on site when mixing and loading pesticides.
4. Head/Hearing Protection. Wear Forest Service-approved hardhats. Use hearing protection when operating power equipment (85 dB or above).
5. Respirator. Wear the respirator identified by the pesticide/product label, MSDS, or JHA (sec. 21.13). Train employees in respirator use (sec. 21.13).
6. Rubberized Protective Equipment. Wear rubberized protective equipment when it is specified on the pesticide/product label, MSDS, or JHA. Wearing waterproof socks and skin barrier cream to provide additional protection from chemical herbicides is recommended.
7. Chemical-Resistant Garments. Use chemical-resistant, disposable coveralls (temperature permitting) and waterproof, lower leg protection (for spraying on hot days) to prevent chemical herbicide absorption through clothing.

### **22.11c - Procedures**

1. The project leader may appoint an employee to oversee the safety and health aspects of the pesticide application project or activity.
2. The Supervisor shall ensure that material safety data sheets (MSDSs) and the manufacturer's product labels are available for all pesticides on every project. Discuss the MSDSs and explain any specific risks to the mixer, loader, and applicator(s). Post MSDSs where they can be easily read.
3. Before application, assign individual employees specific responsibilities to be carried out should an employee be contaminated or injured by pesticides. Detail an emergency response plan in the JHA. The first step in such a plan is to contact a physician immediately with the following information:
  - a. Nature of the victim's exposure and how the pesticide was used.

- b. Product name, EPA registration number, and active ingredients.
- c. First aid and medical information from product label.

### **22.11d - Safety Practices**

Whenever pesticides are used, accident, injury, and illness prevention becomes every involved person's responsibility.

1. General Applications. Apply pesticides so that they do not endanger humans, livestock, crops, beneficial insects, fish, and wildlife. Standard general requirements for pesticide application are:

a. Do not apply pesticides when there is danger of wind drift that may contaminate water or non-targeted areas.

(1) If pesticides contact bare skin, wash those areas thoroughly. Follow manufacturer's direction for cleaning.

(2) Always wear a long-sleeved shirt with sleeves rolled down.

(3) Cover your neck by wearing a bandana and turning up collar.

(4) Keep pant legs rolled down over ankles and boot tops.

(5) Change to clean clothes after each workday. Machine wash work clothes separately from other clothing after each workday. Use heavy-duty detergent and hot water. Run the machine through at least one additional wash cycle without clothes, using detergent and hot water, to clean the machine.

b. Follow instructions on the pesticide/product label and in the MSDS and JHA.

c. Allow only trained and authorized persons in the mixing/loading area and near pesticides.

d. Inform workers of restricted entry intervals (REI). Do not allow entry into treated areas when REI applies. Post restricted entry notices at boundary of treatment area.

e. Dispose of pesticide container(s) in an authorized landfill, according to directions on the label (sec. 61.71c).

2. Aerial Applications.

a. Never permit Forest Service personnel to fly in any aircraft applying pesticides.

b. Keep unnecessary personnel out of the pesticide drop zones and provide for public safety.

c. Keep personnel at least 200 feet (61 m) from powerlines during aerial application.

d. Never stand under poles, towers, or wires during application drops.

### **22.12 - Aircraft Calibration for Pesticide Application**

Forest Service personnel shall inspect aircraft spray systems to ensure proper calibration and characterization of contract aircraft. Calibration may require work with both fixed-wing and rotary aircraft while engines are running and rotors are moving to measure the flow rate.

#### **22.12a - Safety Practices**

1. Hold a safety and health session (tailgate or classroom) for all personnel involved before inspecting the aircraft spray system.

2. Brief the pilot before beginning calibration and stay within the pilot's view when doing the work.

### **22.2 - Range**

#### **22.21 - Qualifications**

In addition to applicable training and certification listed in section 22.07, provide training in horsemanship to employees routinely involved in range activities using horses (sec. 16). Also provide employees with training to handle special equipment. Monitor their progress to ensure employees achieve a level of proficiency needed to safely perform assigned tasks.

## 22.22 - Fencing

### 22.22a - Personal Protective Equipment

Forest Service personnel address specific PPE for each work project or activity in the JHA. Use the following general PPE required for fencing operations:

1. Eye/Face Protection. Wear safety goggles, safety glasses (with wrap-around or side shields), or face shield when working with wire and when driving nails or staples.
2. Head/Hearing Protection. Wear Forest Service-approved hardhats and hearing protection when operating power equipment (85 dB and above).
3. First Aid Kit. Have kit readily available (refer to the Glossary).
4. Hand Protection. Wear heavy-duty, cut-resistant, gauntlet-type gloves.
5. Foot Protection. Wear high-top cut-resistant (or leather), lace up work boots with nonskid soles (FSM 6716.03 and sec. 16.3).
6. Clothing. Wear long pants and long-sleeved shirts.

### 22.22b - Safety Practices

Steps for safe fencing operations are:

1. Electrical Storms. Suspend all fencing operations during electrical (lightning) storms or when powerlines may be down.
2. Crossing Fence Lines. Place hand-carried objects on the other side of the fence before crossing.
3. Posts.
  - Post Driving. Use a post driver for driving metal posts.
    - a. Inspect the post driver before each work project or activity and periodically during use.

b. Put the driver over the post while the post is in a leaning position, then swing the post upright into position. Do not attempt to put the driver over a tall upright post.

c. When driving, use short strokes and do not operate the driver faster than you can maintain control.

4. Wood Fences. Do not store treated wood in enclosed spaces. Avoid contacting treated wood with bare skin.

5. Wire Fences. Always use caution when constructing fence. When possible, avoid installing fences under powerlines or near buried lines. Use properly maintained tools and equipment and use them only for the purpose designed.

a. Handling wire. Be aware of wire "memory"! Firmly wrap or hook the end of wire to a fixed object when unrolling the wire from a spool. Use spool rollers with side guards to prevent side lash. Keep the wire spool level and unroll wire straight off the roll, not off the side.

(1) When handling wire, always assign at least two persons to fencing projects.

(2) Wire can break under tension. To avoid whiplash and/or backlash, stay alert and safely positioned. Be aware of sloped terrain and maintain sound footing.

(3) When cutting wire, secure it on both sides of the pliers or cutting tool to prevent backlash. If necessary to ensure personal safety, have two people to cut the wire.

(4) When driving staples, do not place arms or legs over or under the wire to steady a fence post. Keep the wire close to your hand on the fence post.

(5) Wire can easily be severed. Do not drive staples hard enough to damage the galvanized coating on the wire.

b. Stretching wire.

(1) When working with wire, always consider the gauge of the wire. Inspect the wire for nicks, weak spots, and splices. Repair the wire before stretching it. Remove and splice stressed kinks before the wire is stretched.

(2) Roll up the wire slack slowly so kinks do not develop. Use a hammer or fence pliers to hold the wire in place while attaching weights, stapling, or releasing the wire from obstacles.

(3) When releasing wire from obstacles, stay on the side of the fence post that is opposite the wire. Be aware of wire recoil.

6. Electric Fences. Address the need for signing electric fence during the environmental analysis of a project area. Assess existing fence for the need to sign fencing commensurate with public use and the implied potential liability. Make sure the electric fence energizer has its own separate grounding rod. Never permit more than one energizer to be connected to the same electric fence.

- a. Disconnect the feed wires of an electric fence during installation or repairs.
- b. When testing fence, wear rubber gloves, rubber soled shoes, and the appropriate Forest Service-approved hardhat.
- c. Keep all metallic implements away from electric fences.
- d. Do not tether livestock with chains near electric fences.
- e. Avoid accumulations of groundwater or moisture near electric fences.

7. Clean Up. Pick up all cut ends of wire, dropped staples, nails, and other debris after completing any fencing job.

## **22.3 - Recreation**

### **22.31 - Qualifications**

In addition to applicable training and certification listed in section 22.07, employees involved in recreation-related activities shall receive training in or be familiar with:

1. Risk management.
2. Handling/disposal methods for hazardous materials associated with campgrounds and recreation facilities.

Employees involved in posting signs for recreational areas should be familiar with all signing requirements and regulations (sec. 22.06).

### **22.31a - Personal Protective Equipment**

After considering all factors, such as anticipated activities, project location, and weather, identify required PPE in the JHA (sec. 21.13 and 21.22).

### **22.31b - Procedures**

Safety inspect recreation sites annually prior to each season. Conduct monthly follow-up safety inspections during use. Take corrective actions and maintain documentation.

Prepare and discuss the JHA with employees for all recreation work projects or activities (sec. 22.08).

### **22.31c - Safety Practices**

The following are basic safety and health practices for recreation-related activities:

1. Train employees to recognize existing and potential hazards, and abate them where possible. When abatement is not possible, the following actions may be taken:
  - a. Use interpretive programs and/or maps and brochures to alert the public to the hazard.
  - b. Post warning signs or notices.
  - c. Install physical barriers.
  - d. Use signs to restrict specific types of use, and/or the season of use, or close the site to the public.
2. Post safety rules for specific sites or activities.
3. Ensure that proper maintenance is scheduled.
4. Develop or require concession operators to prepare and implement safety and health operation plans.

## **22.32 - Administration of Developed Sites**

### **22.32a - Standards**

The standards for occupational exposure to blood or other potentially infectious materials are in 29 CFR 1910.1030.

### **22.32b - Qualifications**

In addition to ensuring applicable training and certification listed in section 22.07, train and certify employees in the use of specific mechanized equipment.

### **22.32c - Personal Protective Equipment**

After considering all factors, such as specific activity, project location, and weather, identify required PPE in the JHA (sec. 21.13 and 21.22).

### **22.32d - Procedures**

Make material safety data sheets (MSDSs) available, and discuss them with employees. Properly label containers to identify contents.

### **22.32e - Safety Practices**

Follow basic safety and health practices for the administration of developed sites.

1. Monitor public water facilities in accordance with all Forest Service requirements, and Federal, State, and local regulations when applicable (sec. 22.06).
2. Have appropriate trash receptacles for the site and follow proper sanitation methods to eliminate conditions favorable to disease-spreading insects and rodents, to minimize obnoxious odors, and to prevent pollution of water supplies (sec. 55.11a and 55.11c).
3. Read product labels and follow instructions for safe use of cleaning products. Keep product labels on cleaning products to ensure that first aid information will be immediately available if needed (sec. 22.06).

4. Keep open flames out of areas where methane gas might tend to accumulate. Keep battery-operated systems well ventilated to prevent hydrogen gas build-up (sec. 22.06). Comply with requirements on confined spaces (sec. 38.2).
5. Treat all animals as potentially dangerous. Assess each situation and proceed with caution.
6. Identify all existing and potential hazards. Establish and maintain signs and/or other safety and health measures for hazards that cannot be eliminated.
7. Refer to section 52.3 for direction about bloodborne pathogens.
8. Refer to section 27.31 for direction about wastewater treatment.

## **22.33 - Administration of Undeveloped Areas**

### **22.33a - Qualifications**

Train and certify employees in the applicable subject areas as listed in section 22.07. Survival training is required where and when warranted.

### **22.33b - Personal Protective Equipment**

Identify required PPE in the JHA (sec. 21.13 and 21.22).

### **22.33c - Procedures**

Develop an emergency backup plan for situations where radio communication is not possible.

### **22.33d - Safety Practices**

Basic safety and health practices for working in undeveloped areas are:

1. Review general project planning procedures in section 21.14.
2. When assigned to work projects or activities, be prepared for unforeseen complications that could prevent scheduled transportation arrangements. Employees shall have survival equipment for an extra 48 hours.

3. Maintain visual, voice, or radio contact with each other at all times when and where the work environment warrants.
4. To prevent animal/human problems, maintain proper sanitation and follow required food storage and handling procedures (sec. 22.06).
5. Report unusual/unexpected evidence concerning animal or human activity to the proper authorities.
6. Treat all animals as potentially dangerous. Assess each situation and proceed with caution (sec. 53).

## **22.34 - Trail Maintenance/Construction**

### **22.34a - Standards**

The standards for trail operations, maintenance, and construction are in the regulations at 36 CFR Parts 212 and 261.

### **22.34b - Qualifications**

In addition to providing applicable training and certification listed in section 22.07, train employees in:

1. The use and care of appropriate hand and power tools and equipment required for each project.
2. Back-country travel/camping techniques following leave no trace principles (sec. 11.2 and 18).
3. Livestock handling, if required (sec. 16).
4. The use of motorized equipment, such as trail bikes and all-terrain vehicles (ATVs) (sec. 13.2).

### **22.34c - Personal Protective Equipment**

1. Forest Service-approved hardhat or helmet.
2. Gloves.
3. Nonskid boots. Material and height of boot must be determined by the specific tool or tools to be used.

4. Eye protection.
5. Hearing protection (85 dB and above). For chain saw operation, refer to section 22.48c.

### **22.34d - Safety Practices**

Basic safety and health practices for trail-maintenance work are:

1. Identify, communicate, and avoid hazards, both project related and environmental. When conditions significantly change, conduct an on-site safety session and adapt work tactics as necessary.
2. When changing from routine work to specialized project areas such as blasting, tree felling, or skidding, conduct a task-specific safety and health tailgate session. Emphasize safe and healthful practices, assignments, and high risks. The JHA should address in detail these specialized project areas.

### **22.35 - Archeological Work Site**

#### **22.35a - Standards**

The standards for archeological work sites are in 29 CFR 1926.650 and Part 296.

#### **22.35b - Qualifications**

In addition to providing the applicable training and certification listed in section 22.07, train employees in handtool use.

#### **22.35c - Personal Protective Equipment**

The following PPE is required for archaeological work:

1. First aid kit (refer to the Glossary).
2. Gloves and eye protection.
3. Personal communications device (minimum of one).
4. Additional PPE as identified in the JHA.

## **22.35d - Procedures**

The JHA must include the following:

1. Description of work area.
2. Requirements of Federal, State, and local regulations.
3. Information about local hazards.
4. Known animal problems.
5. Special concerns:
  - a. Weather: Thunderstorms (lightning, flash flooding), sun, wind.
  - b. Health: Topics including, but not limited to, dust inhalation from sifting soil, back injuries from lifting heavy equipment, skin irritations from soil fungi, hazardous waste exposure associated with mining sites, altitude sickness, hypothermia, hantavirus, snakes, and insects.
  - c. Caves: Refer to section 22.37 for direction on caving.

## **22.35e - Safety Practices**

The crew should begin each work day with a tailgate safety and health session.

## **22.36 - Mountaineering**

Participation in resource management, public safety, and visitor information activities may require employees to engage in rock, snow, ice, or mixed environment climbing.

### **22.36a - Standards**

The standards for selection criteria of mountaineering equipment are in the American National Standards Institute (ANSI) Standard A10.14.

### **22.36b - Qualifications**

In addition to providing the applicable training listed in section 22.07, ensure that inexperienced employees receive prior training in climbing and are accompanied by competent climbers. Determine competency based on employees' demonstrated proficiency.

1. Employees shall receive training designed for the specific environment of the climb. The hazards of each environment are different; therefore the needed equipment and techniques may also differ.
2. Employees shall meet all physical requirements as determined by the JHA.

### **22.36c - Personal Protective Equipment**

In the JHA, identify what PPE is required for the specific environment and activity. Where applicable, ensure that equipment meets the ANSI or OSHA requirements, whichever is stricter. Required PPE may include:

1. Appropriate footwear.
2. Properly fitted climbing helmet (Union Internationale des Associations D'Alpinisme (UIAA) approved).
3. Climbing chest and seat harness.
4. Climbing ropes.
5. Appropriate hardware for anchoring, descending/ascending rope, and belaying protection.
6. Emergency gear, such as first aid kit, headlamps, signal flares/mirrors, and fire starter device.
7. Appropriate communication system, such as a two-way radio, a cellular phone, or signal devices.
8. Clothing for various climatic conditions and site-specific considerations.

### **22.36d - Procedures**

Adequate planning and knowledge of safety and health practices are required for mountaineering activities.

1. Develop a project safety and health plan from the JHA to address the specific needs of the particular job site and climatic conditions.
2. Conduct a daily on-site safety and health session before climbing. Discuss all factors, including environmental hazards that might affect the day's work, such as inclement weather, rock/ice fall, avalanche, and impending darkness.
3. Inspect climbing equipment before each climb.
4. Establish a communication system and make sure everyone understands it and what is expected of them.
5. **Do not permit solo climbing (climbing alone with safety equipment) except by individuals competent in the technique and capable of using extreme caution. Documented prior approval by the appropriate Line Officer is required.**

### **22.36e - Safety Practices**

In most cases, the climbing party shall consist of a minimum of two qualified climbers.

1. After every climb, conduct a debriefing. Review the safety aspects of the climb and inspect all equipment for repairs or replacement.
2. Store climbing ropes in a cool, dry, dark place (direct sunlight rapidly deteriorates rope fibers). Untie all knots before storage, and never hang a rope over a nail, small diameter peg, or hook. Ideally, rope should be coiled and stored in a tightly closed rope bag.
3. Maintain a written history on each rope: date purchased, type, date placed in service, and a complete usage record (where, when, how, inspection date, and comments).
4. Damage to climbing equipment (especially ropes and slings) may occur without showing visual evidence. Always follow the manufacturer's replacement guidelines. Immediately take out of service ropes that sustain severe shock from a fall. Whenever there is uncertainty about a rope's condition, take it out of service.

## **22.37 - Caving**

### **22.37a - Standards**

The standards for the selection criteria of caving equipment are in the American National Standards Institute (ANSI) Standard A10.14.

### **22.37b - Qualifications**

In addition to providing applicable training listed in section 22.07, train employees in caving and mountaineering techniques. Teach and practice techniques on the surface under the supervision of a qualified instructor. Caving organizations, such as the National Speleological Society, can help identify local training opportunities and assist with other cave management needs. Ensure that employees receive training about special safety gear for caves.

### **22.37c - Personal Protective Equipment**

In the JHA, identify what PPE is required for cave-related activities. Where applicable, equipment must meet the ANSI or OSHA requirements, whichever is stricter. Required PPE may include:

1. First aid kit (refer to the Glossary).
2. Food and drinking water.
3. Gloves.
4. Climbing helmet with a non-elastic chin strap.
5. Electric or carbide headlamp.
6. Two additional light sources, extra bulbs, and batteries. (Each member of the party shall carry a total of three dependable light sources.)
7. Pack with no external protrusions for transporting equipment.
8. Appropriate communication system, such as a cellular phone.
9. Appropriate clothing for the specific cave environment:
  - a. Warm, dry caves. Lightweight clothing.

- b. Cold caves. Coveralls and layered clothing.
  - c. Wet caves. Waterproof coveralls or drysuits.
10. Appropriate boots.
11. Additional PPE as identified in the JHA.

### **22.37d - Procedures**

Prepare and discuss the JHA with all members of the cave exploration party for specific caving activities and before entering any cave (sec. 22.08).

### **22.37e - Safety Practices**

1. General.
  - a. Never jump across openings or down drops since a fall can lead to serious injury. Distances underground are hard to judge and are often greater than they appear.
  - b. When climbing, always maintain three points of contact with the rock, moving only one hand or one foot at a time.
  - c. Prior to initial entry into a wild cave, assess the cave in accordance with OSHA's permit-required confined space program requirements (sec. 38.2).
2. Cave Exploration Party.
  - a. The party leader shall consider the experience and capabilities of individuals when selecting members for the cave exploration party.
  - b. The party leader shall keep the party together while moving through the cave. Solo exploration is not permitted.
  - c. The party leader shall ensure that a belay is provided when necessary. Use fixed lines or belays in exposed areas, using appropriate cave climbing techniques and equipment.

d. If the cave requires technical climbing, the party shall consist of at least four members, two of whom are qualified technical rock climbers. In case of injury, one member shall stay with the victim, while two go for help.

e. In a cave where the use of climbing equipment is not necessary, a party of three is acceptable.

3. Weather.

a. Caves subject to flooding, such as those in canyon bottoms and in run-off pits, must not be visited during periods of heavy precipitation or unsettled weather.

b. In the winter, ice often forms on cliffs and in cave entrances. In the spring or during periods of warming, ice masses can detach and fall without warning. Cavers shall avoid walking beneath ice masses and crossing winter snow that has blown into and plugged the tops of pits.

4. Biological Hazards.

a. When entering caves, be aware of hazards associated with insects, reptiles, and mammals (sec. 53).

b. When traveling through dusty areas within caves, wear dust masks. In desert areas and warm climates, cave dust can act as a vector for histoplasmosis, a serious lung ailment.

5. Gases and Oxygen Deficient Atmospheres.

a. Determine that any wild cave designated for entry by employees is safe by assessing the air quality and abating any hazardous condition as identified in the JHA.

b. Regularly test and monitor for radon and other gas levels in commercialized caves. Establish safe and healthful working levels (time spent in the cave) and ensure adherence by employees.

Radon is not a hazard to persons who infrequently visit caves; it is a health hazard for people exposed to high concentrations over long periods of time. It is only necessary to monitor caves where employees are required to work underground for hundreds of hours each year.

A naturally occurring colorless and odorless radioactive gas, radon is a by-product of decaying radioactive minerals. Radon is found in nearly all basements, homes, and caves.

(1) Monitoring radon and establishing safe working levels should be done with the assistance of a knowledgeable industrial hygienist.

(2) Radon concentrations vary widely from region to region and between caves due to factors such as rock composition, degree of natural ventilation, and season. As a result, monitoring programs should include air testing every month for at least 2 years to establish safe working levels.

c. Carbon dioxide is a colorless, odorless gas, occasionally found in caves, which may reduce oxygen levels at the bottoms of pits or near stumps where it is produced by the biological decomposition of organic material, such as wood or leaves, which are washed into caves by floods. Carbon dioxide, in lethal concentration, is extremely rare and may never be encountered by a caver. Being heavier than air, carbon dioxide can concentrate in invisible pools near the floor or in depressions where it displaces air and reduces the availability of oxygen. Be aware of situations where organic material has collected in areas of poor air circulation. At any sign of reduced oxygen (dimming of carbide lamp flames and candles or rapid breathing) leave the area immediately by moving upslope.

## **22.4 - Forest Management**

Qualifications. In addition to providing the applicable training and certification listed in section 22.07, employees involved in timber-related activities shall be trained to recognize and abate associated hazards

### **22.41 - Thinning and Girdling**

#### **22.41a - Qualifications**

Train employees in the use of tools needed for specific projects and work activities. Refer to sections 22.48, 41, and 43.

#### **22.41b - Personal Protective Equipment**

The following PPE is required for thinning and girdling:

1. Forest Service-approved hardhat.
2. Gloves.
3. Eye protection.
4. First aid kit (refer to the Glossary).
5. Nonskid boots. Material and height of boot shall be determined by the specific tool or tools to be used.

For chain saw-specific PPE requirements, refer to section 22.48c.

### **22.41c - Safety Practices**

Basic safety and health practices for thinning and girdling include:

1. Keep members of a thinning crew separated by at least 2-1/2 times the height of the tallest tree being felled.
2. Be constantly alert for whiplash tops or chain kickback.
3. Refer to sections 22.48 and 52.4 for specific requirements and safety practices.

### **22.42 - Tree Pruning**

#### **22.42a - Qualifications**

Employees shall be trained in the use of handtools as needed (sec. 41). Tree climbing training is required for all employees who climb trees (sec. 22.49)

#### **22.42b - Personal Protective Equipment**

The following PPE is required for pruning:

1. Forest Service-approved hardhat.
2. Hearing protection (85 dB and above).
3. Eye or face protection.

4. Gloves.
5. First aid kit (refer to the Glossary).
6. Nonskid boots. Choose boots in a material and height appropriate to the specific tool or tools to be used.

For chain saw-specific PPE requirements, refer to section 22.48c.

### **22.42c - Safety Practices**

Basic safety and health practices for pruning are:

1. Always carry pole pruners with saw pointing forward.
2. Keep workers apart by at least 1-1/2 pole pruner lengths.
3. Never stand directly under limbs being pruned. Stand upwind to avoid wind-blown sawdust.
4. Regularly check saw bolts for tightness.
5. When pruning, always cut branches, do not break them. Notch larger diameter branches from below before through cutting from top to avoid breakage.
6. Suspend pruning during electrical (lightning) storms.
7. Never use metal pole pruners when working within 100 feet (31 m) of powerlines. Use only wooden or fiberglass poles within this 100-foot range. Perform no work within 30 feet (9 m) of powerlines.
8. Sheathe cutting edges when transporting or storing pruning saws.
9. When not in use, lay tools on the ground where they are not a tripping hazard.

### **22.43 - Tree Planting**

#### **22.43a - Standards**

The standard for PPE selection is in 29 CFR 1910.132. The standard for use of material handling equipment is in 29 CFR 1926.602.

### **22.43b - Qualifications**

Employees shall be trained in the use of hand and mechanized tools (sec. 41 and 43).

### **22.43c - Personal Protective Equipment**

The following PPE is required:

1. Handling Chemically Treated Trees. Forest Service-approved hardhat, eye protection, nonskid boots, impervious gloves, water, soap, and towels.
2. Hand Planting. Forest Service-approved hardhat, eye protection, nonskid boots, and gloves.
3. Auger Planting. Forest Service-approved hardhat, safety goggles or glasses, hearing protection (85 dB and above), nonskid boots, and gloves.
4. Machine Planting.
  - a. General. Forest Service-approved hardhat, eye protection, hearing protection (85 dB and above), and gloves. Foot guards on machine that completely cover the bottom and sides of feet.
  - b. Tractor Planting-Machine. Protected rearview mirror, shovel, axe, and fire extinguisher.
5. First aid kit (refer to the Glossary).
6. Other PPE as identified in the JHA (sec. 22.48c).

### **22.43d - Safety Practices**

Refer to section 53 for information on plant and animal hazards and section 52.4 for ergonomic concerns. Basic safety and health practices for tree planting are:

1. Hand Planting.
  - a. Be aware of overhanging hazards.
  - b. Avoid tool glance.

- c. Maintain planting tools.
- d. Be aware of the dangers of rolling logs and rocks.
- e. Work in staggered lines.
- f. Identify an escape route (pre-planned, safest, quickest route to avoid a hazard) if needed.

2. Handling Chemically Treated Trees. Follow instructions on the label and MSDS.

3. Auger Planting.

- a. Make sure the auger has a "kill" switch or throttle-release mechanism to prevent runaways. Use only those augers so equipped.
  - b. Before drilling, attempt to check for roots, rocks, clay pockets, and slash that might bind bits.
  - c. Keep equipment in optimum operating condition.
  - d. Be alert and prepared for binding when drilling each hole. Get help to retrieve the bit when it does bind.
  - e. Continually check the condition of operators and rotate hourly.
  - f. Maintain a safe working distance between crew members. Stagger crew positions on slopes.
  - g. Stop the engine when taking breaks and when moving between job areas and planting sites.
  - h. Refer to the manufacturer's instructions for additional safety information.
  - i. When refueling, refer to the MSDS for instructions on flammables/combustibles, such as gasoline.
- (1) Stop and cool the engine at least 5 minutes before refueling.

(2) Select bare ground for refueling spots. Store fuel in approved containers on shaded bare ground where possible. For fuel transportation requirements, refer to section 12.5.

#### 4. Machine Planting.

- a. Check foot guards for damage before each shift.
- b. Attach a heavy screen guard to the planter to protect the operator in heavy brush. Keep the rear of the machine unguarded so the operator can get out quickly in an emergency.
- c. Do not run a machine through areas of logs or heavy brush.
- d. Provide a safety device like a buzzer, an ignition cutoff switch, or drawbar release for machine operators. Use a prearranged stop signal that is understood by both operators.
- e. Watch for sticks, logs, or brush that may poke up through openings in the machine.
- f. Confine the power unit to limited degree turns to prevent tipping.
- g. If you must plant behind the planting machine, stay at least 100 feet (31 m) back.

### **22.44 - Scaling**

Scaling is the measurement of logs for merchantable volume. It is a high-risk activity generally performed in an industrial setting, often close to heavy equipment, and in various environmental conditions.

#### **22.44a - Qualifications**

Employees shall receive safety instructions for each scaling assignment

#### **22.44b - Personal Protective Equipment**

The following PPE is required for scaling:

All Scaling.

1. First aid kit (refer to the Glossary).
2. Forest Service-approved hardhat and high-visibility vest.
3. Eye protection.
4. Nonskid boots. For direction on boots and other clothing, see FSM 6716.03 - Condition of Hire. Refer to the JHA to determine when calk boots are appropriate.
5. Hearing protection (85 dB and above).
6. Other PPE as identified in the JHA (sec. 22.48c).

#### **22.44c - Procedures**

Forest product scaling covers a variety of methods and locations and is performed by scalers, check scalers, and sale administrators. In the JHA, include the relevant scaling methods, location, and specific job assignments of employees (sec. 22.08).

#### **22.44d - Safety Practices**

1. General.

Notify all woods workers when and where scaling will be conducted. Never depend on others for your personal safety.

- a. Be aware of changing conditions that create new hazards.
- b. Keep scaling areas clear of non-essential people. Never engage in horseplay.
- c. Maintain scaling tools and equipment in optimum condition.
- d. Permit night scaling only on landings or scaling platforms that are adequately lighted. Lighting is considered adequate when shadows do not obscure hazards normal to the scaling operation.
- e. In the woods or during truck scaling, as soon as scaling is completed, move to a safety zone to make notations in the scalebook.

2. Scaling in Woods and Landings.

- a. Stay clear for each turn of logs until chokers are clear and skidding equipment is out of the way. Ensure logs have stopped rolling and sliding and are secured. Never scale on landings where logs are being moved if there is a danger of a roll or slippage.
- b. Keep the scaling area clear of debris and unused rigging that may be snagged or rolled during the landing operation.
- c. Be alert for and keep away from running lines, moving chokers, swinging logs, rigging, jammers, or cranes in operation.
- d. Never walk between a truck and a loading operation.
- e. Never turn your back on a moving truck. Stay clear of the loaded truck as it leaves the landing.
- f. Move to a safety zone when not actually scaling. Safety zones are usually toward the front of the landing, away from turnarounds, swinging lines, and the loading/decking activity.
- g. If possible, arrange to scale at least one landing behind the active landing site.

### 3. Scaling on Trucks.

- a. Scale on trucks only after all logs are bound by chains or cables, and never scale during the loading operation.
- b. Never allow binder adjustments while scaling.
- c. Scale a loaded truck only when the vehicle is stopped, with brakes set, and the vehicle engine is turned off. (Diesel trucks may idle, provided wheels are chocked and brakes are set.)
- d. Use a standard scaling ramp equipped with platform catwalks or safety ladders. Provide tail and front boards where they are usable and will add to scaler's safety. Most falling accidents have occurred while descending from a load; never jump from the wing log to the platform or ground.

(1) If a fully equipped scale ramp or platform is not available, then use a safety ladder when climbing or descending the load. The ladder must be equipped with a nonskid base and extend a minimum of 3 feet (1 m) above the wing log. Refer to section 33.1 for further direction.

(2) Avoid falls by being constantly alert for loose or wet bark, knots, limbs, binder chains, and slick spots on logs.

e. Be aware of unguarded exhaust stacks and mud or ice build-up on truck frames.

#### 4. Millyard Scaling.

a. Make your presence known to millyard workers.

b. Be alert to millyard hazards while walking to and from your vehicle.

c. Scale logs only if they are presented in an orderly, safe fashion:

(1) The scaling area must be large enough to accommodate the amount of volume to be delivered. There should be adequate load separation between skids, and individual logs should be spread evenly on the ground to facilitate accurate scaling. Scaling bays should be located a safe distance from unloading areas, mill in feed, or decking operations. To avoid the possibility of rolling logs, never place scaling bays in front of log decks.

(2) Logs must be well spread out on solid ground or skids not exceeding 14 inches (1/3 m) in height. Do not scale logs jackstrawed in bays or otherwise improperly spread (refer to the Glossary).

(3) Stop scaling and move to a safety zone if machinery becomes active in the scaling area.

(4) Stand clear when logs are being handled in adjacent scaling bays. Be aware of logs interlaced between scaling bays that may be moved or rolled.

(5) Keep one hand on your log measuring tape while retracting to control speed. Avoid edges that could cut.

- (6) Do not carry calipers hooked over any part of your body.

## **22.45 - Mill Studies**

### **22.45a - Standards**

The standards for housekeeping, PPE, and compressed air (used for cleaning) are in 29 CFR 1910.22, 1910.132, and 1910.242.

### **22.45b - Personal Protective Equipment**

The following PPE is required for mill studies:

1. First aid kit (refer to the Glossary).
2. Hearing protection (85 dB and above).
3. Eye protection, Forest Service-approved hardhat, and high-visibility vest.
4. Nonskid boots.
5. Other PPE as identified in the JHA.

### **22.45c - Safety Practices**

The following are basic safety and health practices for mill studies:

1. Be familiar with and obey company rules and requirements on use of PPE.
2. Be aware of hazards posed by moving equipment and materials. Use extreme caution when passing close by moving machinery.
3. Never walk or run under suspended loads.
4. When required to cross a flow of materials, never step on powered rolls, belts, or chains.
5. Never use air under pressure for blowing dust from clothes or body.
6. Be aware of housekeeping and maintenance hazards.

## **22.46 - Timber Sale Administration**

### **22.46a - Standards**

The standards for logging operations are in 29 CFR 1910.266.

### **22.46b - Qualifications**

Employees shall be competent and qualified to administer contracts. They shall be familiar with multiple operations, road conditions, landmarks, safety signing, traffic and equipment locations and movements, and radio communications being used.

### **22.46c - Personal Protective Equipment**

The following PPE is required for timber sale administration:

1. First aid kit (refer to the Glossary).
2. Forest Service-approved hardhat and nonskid boots.
3. High-visibility vest.
4. Other PPE as identified in the JHA.

### **22.46d - Procedures**

1. Notify loggers when you are working in the area.
2. If you observe unsafe acts or operations, notify the purchaser through the proper delegated authorities under the timber sale contract. Document this notification.

### **22.46e - Safety Practices**

Basic safety and health practices include:

1. General.
  - a. Be alert for changing weather, falling trees, snags, hang-ups, rolling logs, and trees that have been notched and partially cut.
  - b. Stay away from the sides of loaded logging trucks. Approach and count logs from the end of the load.

- c. Maintain a safe distance from moving equipment and ensure the operator sees you before approaching equipment.
- d. Do not stand on any downed tree that could be struck by a skidded log or could roll downhill.
- e. Always approach sawyers from above. Locate them and be sure they see you. Always wait for them to complete a cut.
- f. Never stand in any loop (bight) of a line or in line with a cable under tension.
- g. If you must cross an active line in a cable logging operation, cross under the line at a place protected by a stump or draw; know the signals being used.
- h. Do not stand in front of any cable anchoring device, including stumps, rock bolts, and dead men.
- i. Never walk below an active skid road or downhill cable logging operation.

## 2. Landing Safety.

- a. Keep your vehicle off the landing.
- b. When loading is in progress, never cross the landing until the loader operator has given the signal.
- c. Observe landing operations a few minutes before approaching.
- d. Be aware of all landing hazards.
  - (1) Watch for the swing of the counterweight from loaders and swingboom yarders. Never walk through a pinch point (the area between the counterweight and the cutbank) while a swingboom yarder is operating.
  - (2) Never conduct business on landings. Move to a safety zone.
  - (3) Never walk past a loaded logging truck while the binders are being thrown.

(4) Never walk on or immediately downhill of unstable log decks. Snow covered logs in decks are especially dangerous.

### 3. Helicopter Logging Operations.

a. Never enter a drop zone until the helicopter is on the ground.

b. Do not enter helicopter flight paths. Wear head, eye, and hearing protection when near helicopter operations. Rotor downwash can break branches, dislodge loose materials, and stir up a large amount of dust and debris.

(1) Never approach a helicopter until the rotors have stopped.

(2) Always approach a helicopter where the pilot has you in view.

(3) Wait for the pilot to give the signal to approach.

(4) Leave in the same direction, keeping your head low.

## **22.47 - Timber Marking**

### **22.47a - Standards**

The standards for flammable/combustible liquids are in 29 CFR 1910.106.

### **22.47b - Qualifications**

Ensure that employees receive basic safety and health training specific to their work responsibilities.

Topics covered must include use of PPE, such as respirators, interpretation of MSDS, and application of safe and healthful work methods and practices.

### **22.47c - Personal Protective Equipment**

Identify required PPE in the JHA after considering the specific work project or activity, location, and weather (sec. 21.13 and 21.22).

#### 1. Timber Marking PPE.

- a. First aid kit (refer to the Glossary).
  - b. Appropriate respirator.
  - c. Vest (high-visibility during hunting season).
  - d. Eye protection.
  - e. Forest Service-approved hardhat.
  - f. Nonskid boots with sufficient ankle support. For direction on boots and other clothing, see FSM 6716.03, Condition of Hire.
  - g. Gloves.
  - h. Long-sleeved shirt.
2. Solvent-Handling PPE.
- a. Apron.
  - b. Chemical-resistant rubber gloves.
  - c. Eye and face protection.
  - d. Long-sleeved shirt.

#### **22.47d - Procedures**

1. Hold periodic tailgate safety and health sessions for the crew. This is a joint responsibility of the crew leader and crewmembers.
2. Obtain copies of the specifications and MSDS for the paint to be used. Refer to section 61.1 for further direction.

#### **22.47e - Safety Practices**

Basic safety and health practices are:

1. Timber Marking Operation.
  - a. Use only Forest Service-approved tree marking paint procured by the General Services Administration.

- b. Transport solvent, paint, guns, and other equipment in a cargo area suitable for transporting flammable/combustible liquids and secured to prevent movement (sec. 12.5). Prevent vapors, such as from a leaking paint can, from reaching the passenger compartment. Do not store timber marking supplies and equipment with personal gear.
- c. Be aware of changing wind conditions and direction to avoid spray when applying paint.
- d. Make available and use hand cleaner, soap, and water before eating or drinking.
- e. Keep paint and solvent away from food and drink.

2. Solvent-Handling Activities.

- a. In enclosed areas, use an appropriate and approved respirator.
- b. Wear PPE when cleaning and drying paint cans.
- c. Dispose of paint containers and remnants using the method identified in the JHA.
  - (1) Use approved can punctures.
  - (2) Store paint and solvent-soaked rags in an approved flammable/combustible container and dispose of daily.
- d. Use hand cleaner, followed by soap and water, which is generally sufficient for cleanup.

## **22.48 - Saw Operations**

Saw operations include but are not limited to use of a chain saw or crosscut saw by employees, volunteers, training consultants, and cooperators for felling, bucking, brushing, limbing, and specialized uses. Sawyers should say "NO" and walk away from any sawing situation they determine to be an unacceptable risk. Review job hazard analysis (JHA) for sawing projects and activities (FSH 6709.11, sec. 22.08) or Risk Assessment (RA) as appropriate. See FSM 2358 for training and certification requirements and definitions for the national saw program.

## 22.48a - Standards

The standards for noise exposure, explosives, personal protective equipment (PPE), hand and portable power tools, logging operations, first aid training, and hazard communication are found in Occupational Safety and Health Administration (OSHA) regulations at:

1. 29 CFR 1910.95, 1910.109, 1910.132, 1910.133, 1910.151, 1910.242, 1910.266, 1910.1030, and 1910.1200; and
2. 29 CFR 1926.50, 1926.52, 1926.100, 1926.102, 1926.301, and 1926.302.

## 22.48b - Qualifications

Forest Service sawyers using chain saws or crosscut saws must be trained, evaluated, and certified for use of those saws in accordance with FSM 2358.06 and 2358.1, exhibit 02. Cooperators' employees and volunteers are subject to this requirement per FSH 1509.11, section 91.2.

## 22.48c - Personal Protective Equipment

Maintain PPE in a clean and fully functioning condition (FSH 6709.11, sec. 20.13, p. 70-12). The following PPE is required for sawing operations.

Table 1- Non-fire PPE requirements for saw use

<b>PPE</b>	<b>Chain Saw Operations</b>	<b>Crosscut Saw Operations</b>
<b>Hard Hat</b>	Hard hat or cutting helmet meeting ANSI Z89.1	Same as chain saw
<b>Safety Glasses</b>	ANSI Z87.1 (clear safety glasses, at a minimum) or equivalent (mesh "bug-eye" type or mesh face shield type) (OSHA 1910.266(d) (1) (vii) (B) Note)	Same as chain saw
<b>Hearing Protection</b>	Hearing protection required for gasoline powered chain saw use	None required
<b>Gloves</b>	Gloves or chain saw mitts are required for all chain saw operations. Leather required for sharpening.  Alternative style of gloves	Same as chain saw

	may be used for inclement weather conditions, based on JHA.	
<b>Shirt, Pants<sup>1</sup></b>	Long sleeved shirt and long pants.	Long sleeved shirt and long pants.
<b>Leg Protection</b>	Chaps or cut-resistant pants for chain saw use shall meet the requirements of Forest Service 6170-4 or ASTM F-1897 (current version). Chaps shall overlap boots at least 2”.	None required
<b>Boots</b>	Cut-resistant or leather, laced 8 inch (204mm) high boots that provide ankle support and nonskid soles (hard toes are optional). OPTIONAL-Use JHA to determine proper footwear for the environment and/or related tasks.	Cut- resistant or leather, laced boots that provide ankle support and nonskid soles (hard toes are optional). Use JHA to determine proper footwear for the environment and/or associated tasks.

Table 2-Fireline PPE requirements for saw use<sup>2</sup>

<b>PPE</b>	<b>Chain Saw Operations</b>	<b>Crosscut Saw Operations</b>
<b>Specialized PPE</b>	Wear additional PPE as identified by local conditions, safety data sheets (SDS), or JHA/RA.	Same as chain saw
<b>Hard Hat</b>	Hard hat meeting NFPA 1977.	Same as chain saw
<b>Safety Glasses</b>	ANSI Z87.1 (clear safety glasses, at a minimum) or equivalent (mesh “bug-eye” type).	Same as chain saw
<b>Hearing Protection</b>	Hearing protection required for gasoline powered chain saw use.	None required
<b>Gloves</b>	Leather gloves are required for all chain saw operations and sharpening.	Same as chain saw
<b>Shirt, Pants</b>	Nomex long sleeved shirt and Nomex long pants.	Same as chain saw
<b>Leg Protection</b>	Chaps meeting the requirements of Forest Service	None required

<sup>1</sup> Short sleeved shirts may be used based on a JHA

<sup>2</sup> See FSH 6709.11 ch. 25.12

	specifications 6170-4. Chaps shall overlap boots at least 2”.	
<b>Boots</b>	Leather, laced 8 inch (204mm) high boots with nonskid soles.	Leather, laced 8 inch (204mm) high boots with nonskid soles.
<b>Specialized PPE</b>	Wear additional PPE as identified by local conditions, material safety data sheets (MSDS), or JHA/RA.	Same as chain saw

## 22.48d - Equipment Requirements

Use and maintain chain saws and crosscut saws in accordance with the manufacturer’s recommendations.

### 1. Chain Saw Requirements.

a. Required Features. The following features are required for chain saws used on NFS lands:

- (1) A fully functioning throttle trigger interlock, which prevents the throttle from engaging unless the interlock is depressed on the handle.
- (2) A fully functioning anti-vibration system.
- (3) A fully functioning chain brake.
- (4) A functional chain catch pin.
- (5) A functional spark arrestor screen.
- (6) Proper length bar and power head sized for the specific sawing project or activity.
- (7) A properly filed and maintained chain that is appropriate for the sawyer’s certification level and the specific sawing project or activity. For example, a reduced kickback chain is appropriate for less experienced sawyers. Longer bars and chisel or full/semi- skip chain is appropriate for more experienced sawyers.
- (8) A bar guard that is adequate to cover the muffler, chain, and bumper spikes when the saw is carried on the shoulder.

(9) A scabbard that is adequate for carrying the saw at the side.

b. Recommended Features. Bumper spikes are recommended for felling and bucking. A full wrap-around or three-quarter wrap-around handle bar is recommended for felling.

c. Required Additional Equipment. The following additional equipment is required for chain saw operations:

(1) A first aid kit that meets OSHA standards (29 CFR 1910.266, Appendix A).

(2) A chain saw bar wrench.

(3) A chain file with a handle and guard.

(4) An approved safety container for chain saw fuel.

(5) Proper wedges for the specific sawing project or activity. Wooden wedges are not permitted.

(6) A 3-to-5-pound single bit axe. Custom tools, ('pounders') are not acceptable.

c. Optional Additional Equipment. A pruning saw.

## 2. Crosscut Saw Requirements.

a. Required Features. The following features are required for crosscut saws:

(1) The proper length for the sawing project or activity.

(2) Proper type, tooth pattern and length of saw for task that is also properly sharpened and set.

(3) Handles.

(4) A sheath.

b. Required Additional Equipment. The following additional equipment is required for use of crosscut saws on NFS lands:

- (1) A first aid kit that meets OSHA standards (29 CFR 1910.266, Appendix A).
  - (2) Proper wedges for the specific sawing project or activity. Wooden wedges are not permitted.
  - (3) A 3-to-5-pound single bit axe. Custom tools ('pounders') are not acceptable.
  - (4) Crosscut saw lubricant.
- c. Optional Additional Equipment. The following additional equipment is optional:
- (1) A double-bit axe.
  - (2) An under-buck tool.
  - (3) A pair of hanging wedges.
  - (4) A pruning saw.
  - (5) Digging tools.

Refer to sections 12.2 and 12.5 of this chapter for further direction on equipment requirements for vehicles and for transporting saws and fuel. Refer to sections 41, 43, and 44 of this chapter for direction on requirements for handtools, power tools, and heavy equipment.

### **22.48e - Procedures**

Sawing projects and activities must be conducted by qualified sawyers (FSM 2358). Crew leaders will review the JHA/RA with sawyers and other affected personnel for each sawing project or activity before work commences (FSH 6709.11, sec. 22.08). Daily discuss how to accomplish the project or activity with the sawyers and others involved. Hold periodic tailgate safety sessions that include all personnel involved in or affected by the project.

1. Sawyers must be alert and able to conduct sawing operations commensurate with their certification level (FSM 2358).

2. All sawyers should work in a position or location that is within the sight or hearing of another sawyer or other employee involved in the sawing operation. When situations arise when a sawyer must work alone, such as incidental work to remove a tree blocking a roadway, the sawyer shall:

- a. Evaluate the situation to ensure the benefits of the operation outweigh the risk;
- b. Establish two-way communication with a dispatcher, a supervisor, or another Forest Service employee before commencing work;
- c. Report how long it will take to do the work;
- d. Report when the work commences;
- e. Provide an update if work takes longer than expected; and
- f. Report when the work is complete.

3. All work must terminate and each employee shall move to a place of safety when environmental conditions, such as but not limited to, electrical storms, strong winds which may affect the fall of a tree, heavy rain or snow, extreme cold, dense fog, fires, mudslides, and darkness, create a hazard for the employee in the performance of the job (29 CFR 1910.266(d)(5)).

## **22.48f - Safety Practices**

Contact the National Saw Program Manager, Regional Saw Program Manager, or local Saw Program Coordinator for more information about saw safety practices and a current list of Forest Service nationally recognized sawyer training courses.

## **22.49 - Tree Climbing**

### **22.49a - Standards**

The standards for tree climbing safety equipment are in 29 CFR 1910.268, 1926.104, and 1926.107, and the American National Standards Institute (ANSI) A10.14 and Z133.1 Standards.

## **22.49b - Qualifications**

The Regions, Stations, Area, and Institute shall develop a training and certification program for employees who climb trees in support of project work and activities (sec. 22.06, para. 7).

1. Tree climbing performed in support of smokejumper wildland fire suppression operations and activities must be in accordance with FSH 5709.14, Smokejumper and Paracargo Handbook and the Interagency Smokejumper Training Guide.
2. Smokejumpers who engage in tree climbing in support of project work and activities shall comply with the requirements in sections 22.49 - 22.49e.
3. The program must include the following annual components:
  - a. Review the manufacturer's specifications on the use, care, and storage of climbing equipment and systems, including serviceability and retirement of worn or defective equipment and components.
  - b. Perform practice sessions on the use of basic climbing equipment and techniques.
  - c. Conduct training sessions on care, use, and storage of climbing equipment and systems with emphasis on climbing techniques, practices, and procedures.
  - d. Conduct training sessions on rescue operations and activities. Training should include a practicum on proper rescue techniques.

## **22.49c - Personal Protective Equipment**

Climbing equipment must comply with the requirements of 29 CFR 1926.104 and 1926.107 and the ANSI A10.14. The following PPE is required for tree climbing:

1. Climbing helmet with a 3-point (minimum) chin strap (UIAA approved).
2. Harness with a breaking strength of at least 5,400 pounds (24 kN).
3. Lanyard with a breaking strength of at least 5,400 pounds (24 kN).

4. Long-sleeved shirt and sturdy pants or coveralls.
5. Eye protection meeting the requirements of the ANSI Z87.1.
6. Gloves during rappelling.
7. Appropriate footwear as identified by the JHA. Examples are soft-soled hiking boots, high-top tennis shoes, and crepe-soled work boots. When working with climbing spurs, wear boots with suitable heels to keep the spurs in place.
8. Other PPE as identified by the JHA.
9. An appropriate 10-person (minimum) first aid kit must be available to each climbing team (refer to the Glossary).

#### **22.49d - Procedures**

Prepare a JHA and discuss it with the climbing team before the climbing assignment (sec. 22.08). Discuss how to accomplish the project on a day-to-day basis. Hold periodic tailgate safety and health sessions. Tree climbing operations and activities must be conducted by climbing teams only.

1. Preparing for Climb.
  - a. Determine from where radio contact can be made. When direct radio contact cannot be maintained from the job site, establish procedures to obtain help without leaving the injured climbers alone.
  - b. Team inexperienced climbers with an experienced climber to monitor the new climbers' technique and equipment use and provide advice.
  - c. Have rescue equipment ready for use at the tree.
  - d. Inspect equipment for excessive wear or breakage.
  - e. Determine which safety systems will be utilized for a specific climb.
  - f. Be aware of changes in the weather throughout the day.
2. During Climb.

- a. Once the climber is in the tree, they shall observe the different characteristics of the tree that were not evident from the ground. Adjust procedures and techniques as necessary to maintain safety. If safety cannot be maintained, the climber shall immediately descend.
- b. Use a haul line for securing, supporting, and transporting equipment and tools that could hinder climbing activities. Keep protective coverings over sharp edges and pointed tips while not in use. Keep hands free of materials and tools while climbing.
- c. When climbing, secure equipment and tools to the climber or to the tree. Always secure large tools to the tree. When using cutting tools, secure climber to the tree with a steel cored lanyard or other cut-resistant lines.
- d. Ensure that the ground person is certified for the level of work being performed. The ground person shall remain on the ground except when it is necessary to assist the climber.

#### **22.49e - Safety Practices**

Refer to the National Tree Climbing Field Guide (sec. 22.06, para. 7) for guidelines on safe tree climbing practices.

#### **22.5 - Watershed and Air Management**

Prepare a separate JHA and discuss it with employees for each water, snow, or soil survey work project or activity (sec. 22.08).

#### **22.51 - Water Surveys**

Poor footing and changing conditions are an inherent part of streamflow measurement work. Other hazards include high flow velocities, poor weather, deep, turbid waters, and floating debris.

#### **22.51a - Qualifications**

In addition to training and certifications listed in section 22.07, employees shall receive training in or be familiar with the following topics when applicable:

1. Prevention, detection, and treatment of hypothermia as part of first aid training (sec. 54.22b).
2. Swimming competency as demonstrated by their ability to pass a Red Cross or equivalent swimmer's test.

### **22.51b - Personal Protective Equipment**

1. Required PPE for water surveys:
  - a. First aid kit (refer to the Glossary).
  - b. Personal communications device.
  - c. Tractionized footwear (felt or nylon soles, lace-on oversoles, or bonded carpeting).
  - d. Hip boots or belted waders. Never wear hip boots or waders while working from boats in swift water or in any water deeper than 3 feet (1 m).
  - e. 10- to 12-foot (3- to 4-m) wading pole for balance and exploring for drop offs.
2. Recommended PPE for water surveys:
  - a. Safety sunglasses and sunscreen.
  - b. Coast Guard approved personal flotation device (PFD).
  - c. International orange or yellow lifeline.
  - d. Backpack with quick-release harness.
  - e. Additional PPE as identified in the JHA.

### **22.51c - Procedures**

Work hazards, as identified in the JHA, may require extra precautions. Base work hazards on factors such as water depth, flow velocity (ft/sec), and turbidity. Employees shall:

1. Obtain reliable weather reports and suspend measurements during lightning storms or when a storm is approaching.
2. Wear Coast Guard approved PFD when needed.

3. Work in teams of two or more and within sight of one another.
4. Use the safest access to sample a site.
5. Exercise caution when the travel route becomes muddy and slippery.
6. Avoid crossing streams on logs. If necessary, cross by straddling rather than walking on a log.
7. Use lifelines securely anchored on the bank for hazardous water crossings.
8. Wear backpacks that have quick-release harnesses or slip off the upstream shoulder strap so the pack can be discarded in an emergency.
9. Secure a quick-release belt or rope around the top of chest waders to keep out water and prevent a loss of buoyancy.
10. If the stream proves too dangerous when wading, back out using a wading pole for balance. Turning around exposes a broader body surface to the current and increases the chances of losing footing.

#### **22.51d - Safety Practices**

Basic safety and health practices are:

1. Under supervision, practice emergency procedures with swamped boats, boots, and waders.
2. Follow the Rule of 10:
  - a. If a stream is 1 foot (1/3 m) deep and flowing at 10 ft/sec, it is too hazardous to wade.
  - b. If a stream is 2 feet (1/2 m) deep and flowing at 5 ft/sec, it is too hazardous to wade.

#### **22.52 - Snow Surveys**

Employees shall review and understand the direction on winter travel (sec. 11.3).

## **22.52a - Qualifications**

In addition to having the training and certifications listed in section 22.07, employees shall receive training in or be familiar with the following topics when applicable:

1. Prevention, detection, and treatment of hypothermia as part of first aid training (sec. 54.22b).
2. Emergency survival.
3. Use of snowshoes and skis.
4. Avalanche hazard recognition.
5. Oversnow vehicle operation.

## **22.52b - Personal Protective Equipment**

The PPE required for snow surveys includes:

1. Personal communications device.
2. First aid kit (refer to the Glossary).
3. Other PPE as identified in the JHA, which may include collapsible (sectional) probes, avalanche rescue transceivers, and other winter survival gear such as safety sunglasses, sunscreen, snowshoes, and cross-country skis.

## **22.52c - Safety Practices**

Basic safety and health practices are:

1. Never work alone unless the specific circumstances are expressly planned for in the JHA (sec. 11.2 and 21.14).
2. Select travel routes that avoid areas of known or suspected snowslide or avalanche hazard. Reroute snow courses if unusual hazards such as deep snow under a powerline are found, or if a safe approach is not available.
3. Carefully plan and pre-arrange any oversnow trip that is long or tiring. Include emergency shelter and supplies.

4. Follow the precautions for travel on ice (sec. 11.32) whenever the expected route is on ice.

## **22.53 - Soil Surveys**

### **22.53a - Standards**

The standards for excavating are in 29 CFR 1926.650 - 1926.652.

### **22.53b - Qualifications**

Besides having the training and certifications listed in section 22.07, employees shall receive training in or be familiar with the following topics when applicable:

1. Use and care of hand and power tools (sec. 41 and 43).
2. Back-country travel/camping techniques (sec. 11.2 and 18).
3. ATV/motorcycle use (sec. 13.2 and 13.3).

### **22.53c - Personal Protective Equipment**

1. Required PPE for soil surveys:
  - a. First aid kit (refer to the Glossary).
  - b. Personal communications device.
2. Recommended PPE for soil surveys:
  - a. Forest Service-approved hardhat.
  - b. Eye protection and sunscreen.
  - c. Padded gloves and wrist guards (ergonomic concerns).
  - d. Additional PPE as identified in the JHA.

### **22.53d - Safety Practices**

Basic safety and health practices are:

1. Use the JHA to identify and assess site-specific safety and health concerns.

2. Conduct tailgate safety and health sessions. Emphasize correct work methods to reduce risks of cumulative trauma disorders. Refer to section 52.4 for ergonomic concerns.
3. When backhoe pits are developed, adhere to all OSHA excavation regulations. Refer to section 31.2 for further direction.

## **22.6 - Wildlife, Fish, and Sensitive Plant Management**

### **22.61 - Electrofishing**

All electrofishing operations shall be conducted by trained crew members. All equipment must be constructed, maintained, and operated according to approved guidelines.

#### **22.61a - Qualifications**

1. Crew leaders (first-line Supervisors) must receive formal training in water safety, electrofishing theory, equipment use, and specific electrical safety.
2. Crew members shall receive training in water safety and equipment use.
  - a. The crew leader shall instruct employees in electrofishing safety techniques for the expected electrofishing type and water conditions.
  - b. At least two members of an electrofishing crew shall have current first aid and CPR certification.

#### **22.61b - Personal Protective Equipment**

1. When electrofishing, employees shall wear:
  - a. Belted chest-high waders or hipboots with nonskid soles. However, never wear waders or hip boots while working from a boat in swift water or in any water deeper than 3 feet (1 m).
  - b. Rubber insulating gloves. Test gloves for voltage resistance each year (ANSI J6.6-1967).

- c. Coast Guard approved personal flotation devices. The crew leader may designate them as optional on a particular stretch of water.
2. Polarized sunglasses and hearing protection (85 dB and above) are recommended.
3. Electrofishing boats must be equipped with a first aid kit and a fire extinguisher, which is mounted in an accessible location (sec. 15.13b). Spare clothing and fire-starter supplies packed in a waterproof storage bag are recommended.

### **22.61c - Safety Practices**

The crew leader shall have knowledge of water hazards at each worksite (shocking location). The JHA must identify these hazards, as well as guidelines associated with specific work projects and activities.

1. General safety practices include:
  - a. Select equipment suitable for the work project or activity, such as a proper boat for the water you are on.
  - b. Thoroughly inspect equipment before use. In the event of electric shock, shut down equipment until repaired. Report the incident to the Supervisor.
  - c. Check the weather forecast before electrofishing. Suspend operations if weather or water conditions change and pose safety problems.
2. Specific safety practices include:
  - a. Never touch the conductive end of a probe when operating the electrofishing unit. The anode should never touch the cathode or other metal.
  - b. Adjust the controls when the rectifying unit is not in operation. (For battery-powered units, ensure the cathode is in contact with the water when the unit is operating.)
  - c. Ensure that the equipment has both automatic and manual safety circuit breakers. Locate at least one employee near the unit to break the circuit in emergencies.

- d. Never use a breaker electrofisher unit in a boat unless it is dismounted and secured to the boat. Never operate an electrofisher unit alone.
- e. Never have backpack operators responsible for capturing fish unless one of the electrodes is in a net.
- f. When working in areas of heavy public use, make maximum use of buoys to warn away swimmers, divers, and boaters.

## **22.63 - Cavity Nesting Bird Work Projects and Activities**

Cavity nesting bird work projects and activities are complex and require skills in the use of chain saws, power drills, power blowers, ladders, climbing equipment, and handtools.

### **22.63a - Qualifications**

The first-line Supervisor shall ensure that employees possess all other required training, certifications, and skills in addition to the applicable training listed in section 22.07.

### **22.63b - Personal Protective Equipment**

The JHA must identify PPE required for cavity nesting bird work projects and activities (sec. 22.08).

### **22.63c - Safety Practices**

The first-line Supervisor shall conduct tailgate safety and health sessions to ensure that employees are thoroughly briefed before beginning work projects and activities. Employees shall follow up with periodic tailgate safety sessions. Refer to the appropriate sections of this Handbook for specific direction, such as sections 22.48, Chain Saw Operations; 22.49, Tree Climbing; and 41, Handtools. Basic safety and health practices for cavity nesting bird work projects and activities are:

1. Identify in the JHA the number of employees required to safely perform the specific work project or activity; for example, a minimum of 2 employees are required when using chain saws and ladders.

2. Before climbing, inspect trees for hazards such as bees in the cavity, dead limbs, and excessive structural weakening around the cavity. Refer to the National Tree Climbing Field Guide for hazard tree identification standards (sec. 22.06, para. 7).
  - a. Remove limbs when identified as hazardous.
  - b. Do not climb unsound trees.
3. Inspect safety belts, safety straps, climbing ropes, and hardware before and after each climb.
4. Inspect climbing ladders for defects.
  - a. Clearly identify defective equipment for removal from service, repair, or replacement (sec. 33.1).
  - b. Place a safety strap around the tree whenever climbers are on ladders.
5. Instruct the ground crew not to stand near the base of a tree. Make sure no one walks beneath the tree until the climber gives specific verbal permission to do so.
6. Weather Hazards. Be alert to changing climatic conditions, especially lightning and high wind.
  - a. Do not climb during lightning storms.
  - b. Do not climb when wind excessively sways the tree to be climbed.
  - c. When storms are threatening, stay away from trees rigged with climbing ladders. Give yourself plenty of time to get out of the tree.

## **22.7 - Special Uses [Reserved]**

## **22.8 - Minerals and Geology**

### **22.81 - Mine and Mineral Surveys**

#### **22.81a - Standards**

The standards for first aid are in 29 CFR 1910.151. The authority for air contaminant protection is 29 CFR 1926.55.

## **22.81b - Qualifications**

In addition to meeting the applicable training and certifications listed in section 22.07, employees shall comply with the following requirements:

1. Abandoned and Inactive Operations.
  - a. Employees who conduct mine safety assessments and mineral surveys shall be certified as mineral examiners in accordance with FSM 2807. A Certified Review Mineral Examiner (RME) or Certified Mineral Examiner (ME), appointed by the Regional Director responsible for the Regional Minerals program, shall determine which RME/MEs are qualified to conduct mine safety assessments and mineral surveys for abandoned/inactive underground mine workings and deep cuts. If an appointed RME/ME is not available or if there are no RME/ME's in the Region, then an RME/ME from an adjacent region may be appointed.
  - b. Employees who are not RME/MEs, but may need to enter abandoned/inactive underground mine workings and/or deep cuts to perform their jobs, shall obtain permission from the appropriate Line Officer in charge. The Line Officer shall consider the need to enter hazardous work areas, the training, and the work experience of the employee.
2. Active Operations.
  - a. The prescribed safety practices of those companies that have a designated Safety Officer and a formal safety training plan must be recognized.
  - b. Active underground operations that do not have a designated Safety Officer and a formal safety training plan must be given the same consideration as abandoned/ inactive workings.
3. All Operations.

- a. Each field crew and office group shall have at least one person currently certified by a nationally recognized organization to render first aid and perform CPR (29 CFR 1910.151, 1910.1030, and 1926.50).
- b. Any Federal or State employee who enters underground mine workings or deep cuts at the request of the Forest Service shall have valid first aid and CPR cards.

### **22.81c - Personal Protective Equipment**

Before employees or mineral examiners enter underground mine workings, they shall be trained in the use of PPE and must ensure equipment is in working order and suited for the work project or activity.

1. Required PPE includes:
  - a. Forest Service-approved hardhat.
  - b. Nonskid safety-toed boots.
  - c. Safety glasses, goggles, or face shield.
  - d. Headlamp (battery operated only).
  - e. Safety belt with ring for securing lifelines.
  - f. Multi-gas meter.
    - (1) Capable of detecting at least oxygen. Contact the Mine Safety and Health Administration, the state mine inspector, and/or local mining companies to determine additional gases to be detected based on regional geology and mineralogy.
    - (2) Audible and visual display alarm indicators.
    - (3) Calibrated for the gases to be detected (high/low alarm limits for toxic and combustible gases; and depletion/enrichment alarm limits for oxygen).
  - g. First aid kit (refer to the Glossary).
  - h. Two-way radio for check-in (for use outside the underground workings).

- i. Specific items for conditions requiring extra protective measures as identified in JHA.
2. Optional PPE includes a self-rescuer.

## **22.81d - Procedures**

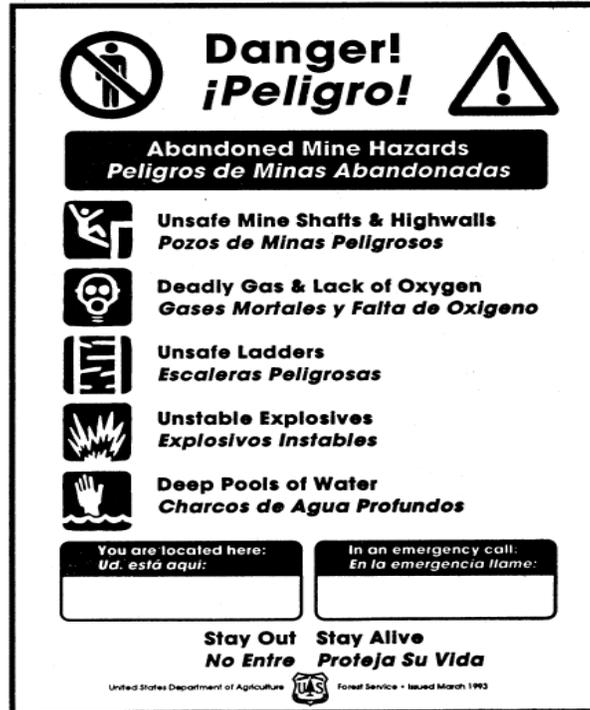
The basic safety procedures are:

1. Complete the JHA and discuss it with involved employees prior to the work project or activity (sec. 22.08).
2. Complete an itinerary that includes at least the following items and leave the itinerary with the radio dispatcher on duty.
  - a. List of personnel going to the field.
  - b. Addresses, home telephone numbers, emergency telephone numbers, and whom to contact in case of an emergency.
  - c. Predetermined check-in schedule.
  - d. A map showing the approximate location of entrances to the underground workings and/or the location of the deep cuts.
3. At a minimum, consider the following potential safety hazards within the JHA:
  - a. Slip, trip, and fall hazards around shaft collars, winzes, or other vertical mine openings.
  - b. Rock falls and collapse of unstable rock in mines and around mine openings.
  - c. Snakes, bats, spiders, and other insects and animals.
  - d. Rotten mine timbers and other unsafe mine support features.
  - e. Oxygen deficient atmosphere and/or an atmosphere containing toxic or combustible gases.
  - f. Abandoned explosive devices.

g. Chemicals/hazardous materials.

4. Ensure that a qualified RME/ME or State or Federal Mine Inspector determines that the underground mine workings or deep cuts are safe before other employees are allowed to enter such workings. This determination includes examining and testing the back (roof) and rib (walls) of the underground mine workings for loose rock and shall scale as appropriate to ensure the safety of personnel.
5. Ensure that noncertified employees allowed to enter abandoned/inactive underground mine workings or deep cuts enter such hazardous work areas only when accompanied by a qualified RME/ME or State or Federal Mine Inspector.
6. Consider all underground coal mine atmospheres explosive and keep open flames away.
7. Consider all underground atmospheres oxygen-deficient and containing toxic gases until testing and continuous monitoring prove otherwise.
8. Use a lifeline when working around hazardous openings and areas (sec. 32.2 and 33.3).
9. Display the Abandoned Mine Hazards Poster in a conspicuous place near the entrance of known abandoned/ inactive underground mine openings (ex. 01).

ABANDONED MINE HAZARDS POSTER



## **22.82 - Oil and Gas Operations**

### **22.82a - Qualifications**

Any employee working on or near exploration or production operations shall have hydrogen sulfide (H<sub>2</sub>S) awareness training.

### **22.82b - Personal Protective Equipment**

1. Before any employees are allowed to work on or near any oil and gas exploration or production operation in a known H<sub>2</sub>S area, ensure that all employees are trained in the use of PPE and that equipment is in working order and is appropriate for the work project or activity.
2. In the JHA, identify specific items for conditions requiring extra protective measures.

### **22.82c - Procedures**

Complete the JHA and discuss it with involved employees prior to the work project or activity. The JHA must include the potential safety hazards associated with H<sub>2</sub>S on or near oil and gas operations.

## **23 - STATE AND PRIVATE FORESTRY [RESERVED]**

## **24 - RESEARCH [RESERVED]**

## 25 - PROTECTION AND DEVELOPMENT

### 25.01 - Authority

1. The authority for PPE, fire extinguishers, and fire detection systems is in Title 29, Code of Federal Regulations (29 CFR), sections 1910.132 - 1910.138 and 1910.157 - 1910.165.
2. The authority for PPE, fire protection and prevention, flammable and combustible liquids, liquefied petroleum gas, temporary heating devices, and rollover protective structures (ROPS) is in 29 CFR 1926.100 - 1926.103, 1926.150 - 1926.155, and 1926.1000.
3. FSM 1500, External Relations, contains memorandums of understanding and agreements between the Forest Service and other Federal and State agencies and other organizations including those related to fire protection and law enforcement.
4. FSM 5130 contains direction on Structure and Vehicle Fires.
5. FSM 5140 contains direction on Prescribed Fire.
6. FSH 5109.32a, Fireline Handbook, issued by the National Wildfire Coordinating Group is the interagency authority for wildland fire agencies that use the Incident Command System. PMS 410-1, NFES 0065. National Interagency Fire Center. Boise, ID. (See sec. 01 for further information on obtaining copies.)

next page is 20-79