

SITE HEALTH AND SAFETY PLAN

Site: PESTICIDE BUILDING DEMOLITION AND SOIL REMOVAL
NAVAL WEAPONS STATION EARLE

Location: COLTS NECK, NJ

Prepared By: FOSTER WHEELER ENVIRONMENTAL CORPORATION

Date Prepared: FEBRUARY 24, 2000

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Project Description: Demolition of Pesticide Building and Removal of Contaminated Soils

Delivery Order #: 0034

Waste Types: Solid
Characteristics: Toxic
Status: Active, Military
Background Review: Preliminary
Overall Hazard: Low

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APPROVALS

By their signature, the undersigned hereby certify that this SHSP has been reviewed and approved for use at the Pesticide Building Demolition and Soil Removal, Naval Weapons Station Earle, Colts Neck, NJ

DELIVERY ORDER MANAGER

DATE

PROGRAM HEALTH AND SAFETY MANAGER

DATE

SITE SUPERINTENDENT

DATE

SITE HEALTH AND SAFETY OFFICER

DATE

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1.0 INTRODUCTION

1.1 Purpose

This Site Health and Safety Plan (SHSP) addresses the health and safety practices that will be followed by all site workers participating in activities at the Pesticide Building Demolition and Soil Removal located at the Naval Weapons Station Earle in Colts Neck, NJ. This SHSP takes into account the specific hazards inherent to the building demolition and soil removal activities and presents procedures to be followed by Foster Wheeler Environmental Corporation (FWENC), its subcontractors, and all other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. Activities performed will comply with applicable parts of OSHA Regulations, 29 CFR Parts 1910 and 1926, USACOE EM 385-1-1, the Draft Master Site Health and Safety Plan, dated January 5, 2000 and the Foster Wheeler Environmental Corporation Health and Safety Program. A copy of the FWENC Health and Safety Program will be maintained on site. Modifications to this SHSP may be made with the approval of the PHSM using the Field Change Request Form.

1.2 Scope

1.2.1 Objectives

The objectives are to delineate the area to be excavated, demolition of the Former Pesticide Shop, clearing and grubbing of areas to be excavated, and excavation of contaminated soils.

1.2.2 Anticipated Tasks

The following major activities will be performed during the removal action:

- Mobilization and demobilization
- Subsurface soil sampling
- Demolition of the Former Pesticide Shop
- Clearing and grubbing
- Excavation of contaminated soils, including the former septic system
- Site restoration

1.2.3 Mobilization

The following tasks will be conducted by Foster Wheeler during site mobilization: mobilize equipment and supplies, conduct utility survey, install soil erosion control measures and ; install high visibility fencing for site control.

1.2.4 Subsurface Soil Sampling

In order to establish the area to be excavated, additional surface soil samples shall be obtained and analyzed to delineate the boundaries of the pesticide contamination above the NJDEP Non-Residential Cleanup Criteria. Subsurface soil samples shall be collected using a stainless steel

trowel or hand auger. The samples shall be collected 0 to 1.5 feet below grade. The soil will be field screened with a Photoionization Detector (PID). If the analytical results of the soil samples determine that the soils in a particular area are greater than the NJDEP Non-Residential Cleanup Criteria, additional soil samples shall be collected an additional 25 feet out from the area of known contamination. Soil samples shall be collected around the perimeter of the proposed excavation area until concentrations of pesticides are determined to be less than the NJDEP Non-Residential Cleanup Criteria.

1.2.5 Demolition of the Former Pesticide Shop

The existing structure that was the Former Pesticide Shop is a 12-foot by 28-foot concrete block structure set upon poured concrete. The building is approximately 12 feet tall and has a transite asbestos roof. It is also reported that the roofing material may be painted with a lead-based paint. There is a 10-foot by 14-foot concrete pad located immediately north of the building.

The scope of work includes the demolition of the building and the associated concrete pads.

- Disconnect Electrical Service

The existing electrical line that supplies the Former Pesticide Shop will be disconnected and checked for current by a licensed electrician. An overhead electrical line runs from the adjacent Building C-23 to the Former Pesticide Shop. The electrical line shall be disconnected at Building C-23.

- Removal of Transite Roof

A sample of the asbestos transite roof shall be analyzed for TCLP Metals to ensure that the past lead-based painting of the transit panels have not resulted in a hazardous classification of the material. Sections 4 and 5 provide details on the sampling and analyses. The transite panels will be removed from the building prior to demolition. A man-lift shall be used to lift a person to the required height to pry and remove the transit panels from the top of the structure. The nails attaching the panels to the support beams will be removed, and the panels pulled off as one piece, taking care not to break or damage the panels. The panels shall be adequately wetted down with water during the removal. The panels shall be removed, plastic double plastic bags, sealed, and placed in a lined roll-off container, with a cover, for transportation and disposal. Based upon the waste classification, the material shall be transported to a non-hazardous or hazardous waste landfill.

- Demolition of Building

A backhoe, equipped with a hydraulic hammer, shall be used to break apart the concrete block wall and concrete foundation and stage the broken debris on plastic. If necessary, a water spray shall be used to minimize dust during the demolition. The concrete block wall shall be placed in a separate pile from the concrete floor debris. Both the concrete and concrete block piles shall be sampled and analyzed for waste characterization and disposal. Sections 4 and 5 provide details on the sampling and analyses of the demolition debris. There are no water or sewer lines entering or

leaving the building. There is an old septic line that drains to a septic tank, to the north of the building. The septic tank, and the associated line, shall be excavated and removed as part of the soil excavation activities.

1.2.6 Clearing and Grubbing

Approximately 0.5 acres shall be clear cut in order to complete the soil removal activities around the Former Pesticide Shop. Mature trees and brush are located to the west, north and northeast of the Former Pesticide Shop, in the areas requiring soil excavation. Trees shall be cut down to the stumps and removed from the site for recycling. The stumps shall be excavated and disposed with the soils removed from the site. The brush removed from the site shall be chipped on site and removed for recycling. All clearing and grubbing will be conducted in accordance with ANSI Z133.1-1994, Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush – Safety Requirements. A copy of this standard is included as Appendix D.

1.2.7 Excavation of Contaminated Soils

The area to be excavated shall be staked out based on previous analytical results of soil samples, as well as the analytical results of additional soil delineation samples collected during this remedial action. Based upon the available analytical data, hazardous and non-hazardous soils will be generated during the remedial action at the Former Pesticide Shop. The majority of the excavated soil is anticipated to be non-hazardous. The soils on site shall be excavated and stock-piled based upon previous and newly obtained analytical results. The suspected hazardous soils shall be stock-piled in a separate location than the non-hazardous soils samples. All soils will be properly sampled and analyzed to determine the proper waste classification.

Based on the existing data, it appears the soils associated with the former septic tank, as well as soils located just north of the existing parking lot, contain concentrations of chlordane which may result in a hazardous classification. This assumption is based upon existing total pesticide and TCLP pesticide laboratory data of soil samples obtained from these areas. The TCLP sample (PS99SS03) obtained from north of the parking lot area had a chlordane concentration of 0.29 mg/l, which is above the criteria for hazardous constituents (0.03 mg/l) for chlordane. According to 40CFR A261.30, wastes exhibiting a TCLP chlordane concentration of 0.03 mg/l are hazardous (D020) due to the characteristics of toxicity. A soil sample from the former septic tank contained a chlordane concentration of 9,500 mg/kg. No TCLP Sample was obtained from the septic tank.

The soils from the septic tank, including the piping, shall be stock-piled with the soils excavated from the area to the adjacent to the northern edge of the asphalt parking lot. The soils suspected to be hazardous shall be excavated, stock-piled and sampled for waste characterization prior to any other soils to ensure that the soils are removed from the site before 90-days to comply with federal and state regulations.

The potentially hazardous soils will be placed on double-line polyurethane (poly). Hay bales will be placed around the soil piles, and the poly will be placed up and around the hay bales to prevent run-off from the piles as well as prevent surface run-on. The piles will be covered with poly and anchored down.

The area of excavation shall be delineated with stakes prior to excavation. Grading stakes shall also be used to determine the approximate depth of excavation below existing grade. The majority of the site shall be excavated to a depth of 1.5 feet below the existing grade. This depth is based on the available data depicting the soil concentrations greater than the Non-Residential Cleanup Criteria. Several areas will require excavation to a depth greater than 1.5 feet below grade. It is anticipated that the areas around the concrete slab, north of the Pesticide Shop, and the area north of the asphalt parking lot will be excavated to a depth of three to four feet below grade. The former septic tank, which is four feet below grade, shall also be excavated to five to six feet below grade in the immediate area of the tank.

1.2.8 Site Restoration

The excavation shall be backfilled and re-graded after a review of the confirmatory soil laboratory analytical results. The excavation shall not be backfilled until a review of the confirmatory soil laboratory analyses determine that all the soils with concentrations of pesticides and herbicides over the NJDEP Non-Residential Cleanup Criteria have been removed and Navy direction is received.

Certified-clean fill and topsoil will be placed in the excavation to restore the site to the original grade elevations. A tracked bulldozer and a vibratory roller shall be used to place, grade and compact the fill material. The fill material shall be placed to within 6 inches of the final grade. The final 6 inches of the surface shall be backfilled with topsoil and seeded in accordance to the Soil and Sediment Erosion Control Plan.

The topsoil shall be treated with lime and fertilizer, seeded and mulched upon the completion of the final grade. The topsoil will be tested in an approved laboratory to determine fertilization and liming ratios.

1.3 Application

The SHSP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- Client representatives
- Federal, state or local representatives
- Foster Wheeler Environmental employees and subcontractors
- Sub-contractors, if any, will provide activity hazard analysis and discuss them with Foster Wheeler Environmental prior to mobilization.

1.4 Summary of Major Risks

- Operation of heavy equipment
- Building demolition
- Excavation
- Electrocutation

Exposure to pesticide contaminated soils

2.0 PROJECT ORGANIZATION

Reference the Master Site HASP for specific duties and responsibilities. Names and positions for key project personnel are defined below:

Delivery Order Manager (DOM)-Michael Heffron

Project Health and Safety Manager (PHSM)-Grey Coppi, CIH

Site Superintendent – Rich Goldbeck

Site Health and Safety Officer – Rich Goldbeck

Site Personnel - Craft employees

Site Personnel - Subcontractor employees

3.0 BACKGROUND AND SITE DESCRIPTION

3.1 Location

NWS-Earle is located in east-central Monmouth County in the town of Colts Neck, New Jersey. Figure 3-1 depicts the facility location. Building S-186 (Old Pesticide Shop) is located on the Mainside portion of the base, north of the intersection of Esperance and Macassar Roads. Figure 3-2 depicts the Site Location. The building served as the former base pesticide shop. Apparently, containers and spraying containers were periodically rinsed out and some of the wastewaters were dumped outside the building.

3.2 Background and Site Description

The Former Pesticide Shop is located in a grassy wooded area between Building C-54 and Building C-23. The shop consists of small brick building (25 ft. x 12 ft.) with a 15 ft. x 8 ft. concrete pad on the northwest side of the building. The Former Pesticide Shop sits atop a small knoll, which slopes to the northwest and north. An in-ground former septic leach tank is reportedly located to the north of the building. The site is bounded to the east by a paved parking area, to the northwest by Building C-54, to the south by the ROICC Office, and to the north by a fenced storage yard associated with Building C-54.

Surface and subsurface soil samples were collected during investigation efforts in January and April 1998. The soil samples were analyzed for chlorinated organic pesticides by SW-846 Method 8081A. Chlordane and 4,4'-DDT were the most frequently detected pesticides found in the soil samples. Chlordane was found in 20 out of 23 surface soil samples; and 4,4' DDT was found in 13 of 23 surface soil samples. The laboratory analyses of soil samples collected in the area around the pesticide shop revealed chlordane (up to 75,000 ppm); 4,4' DDD (up to 1.5 ppm); 4,4' DDE (up to 1 ppm); and 4,4' DDT (up to 12 ppm). Figure 3-3 depicts the soil sample locations and analytical results.

4.0 POTENTIAL HAZARDS

4.1 Properties of Chemical Contamination

Based on previous investigations, the soils are known to be contaminated with pesticides, including Chlordane, 4,4' DDT, 4,4' DDE and 4,4' DDD. The laboratory analyses of soil samples collected in the area around the pesticide shop revealed chlordane (up to 75,000 ppm); 4,4' DDD (up to 1.5 ppm); 4,4' DDE (up to 1 ppm); and 4,4' DDT (up to 12 ppm).

Symptoms of acute DDT poisoning (via ingestion) include paresthesia of the tongue, lips and face; apprehension; irritability; dizziness; and tremors. Symptoms appear several hours after exposure to large doses. DDT is poorly absorbed through the skin, especially in the powder form. DDD and DDE are degradation products of DDT and have similar symptoms of exposure.

Symptoms of acute chlordane poisoning include vomiting, nausea, disorientation, tremors and convulsions. Symptoms can appear shortly after exposure. Chlordane is readily absorbed through the skin.

4.2 Physical Hazards

Most physical safety hazards are discussed in the Activity Hazard Analyses (AHA) in Appendix A for the different phases of the project. Reference the Master Site Health and Safety Plan, Section 4.3, for physical hazard descriptions.

4.3 Biological Hazards

During the course of the project, there is a potential for workers to come into contact with biological hazards such as animals, insects and plants. Reference the Master Health and Safety Plan for control measures for biological hazards.

Table 4-1

Chemical Data

Compound	CAS#	ACGIH TLV	OSHA PEL	Routes of Exposure	Symptoms of Exposure	Target Organs	Physical Properties
Chlordane	57-74-9	0.5 mg/m ³ skin	0.5 mg/m ³ skin	Inhalation Ingestion Skin Contact Skin Absorption	Blurred vision; confusion; delirium; cough; abdominal pain, nausea, vomiting, diarrhea; irritability, tremors, convulsions	CNS, eyes, lungs, liver, kidneys	Amber colored, viscous liquid with a pungent, chlorine-like odor VP: 0.00001 mm
DDT	50-29-3	1 mg/m ³	1 mg/m ³ skin	Inhalation Ingestion Skin Contact Skin Absorption	Irritate eyes, skin; paresthesia tongue, lips, face; tremors, apprehension, dizziness, confusion, malaise, headache, fatigue; convulsions; vomiting	Eyes, skin, CNS, kidneys, liver, PNS	Colorless crystals or off-white powder with a slight, aromatic odor

5.0 ACTIVITY HAZARD ANALYSES

The Activity Hazard Analysis is a systematic way of identifying the potential health and safety hazards associated with major phases of work on the project and the methods to avoid, mitigate and control these hazards. The AHAs follow the guidance of the Foster Wheeler Environmental Corporate Program EHS 3-5. AHAs will be developed for all activities as necessary, prior to start-up. The AHAs will be used to train workers in proper safety procedures during phase preparatory meetings.

AHAs are included in Appendix B of this SHSP. AHAs have been developed for the following tasks:

- Mobilization and demobilization
- Subsurface soil sampling
- Groundwater sampling
- Demolition of the Former Pesticide Shop
- Clearing and grubbing
- Excavation of contaminated soils
- Site restoration

6.0 PERSONAL PROTECTIVE EQUIPMENT

The personal protective equipment (PPE) detailed in the SHSP represents the hazard analysis and PPE selection required by 29 CFR 1910.132. For the purposes of PPE selection, the PHSM and SHSO are considered competent persons. The signatures contained in the approval section of the SHSP constitute certification of the hazard assessment. For activities not detailed below, the SHSO will conduct a hazard assessment and select the PPE using the appropriate form and will certify the assessment by signing the form. PPE selection will be made in consultation with the PHSM. The task-specific level of PPE required for each task is described in Table 6-1.

**TABLE 6-1
PERSONAL PROTECTIVE EQUIPMENT SELECTION**

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR
Mobilization							
Mobilize equipment and supplies	HH	SG	STB	LWG	WC	EP as needed	Level D
Conduct utility survey	HH	SG	STB	LWG	WC	EP as needed	Level D
Install soil erosion control measures	HH	SG	STB	LWG	WC	EP as needed	Level D
Install high visibility fence for site control	HH	SG	STB	LWG	WC	EP as needed	Level D
Subsurface Soil Sampling							
Collect soil samples using Geoprobe	HH	SG	STB	Nit, sur	WC, tyvek	EP	Level D
Groundwater Sampling							
Collect groundwater samples using Geoprobe	HH	SG	STB	Nit, sur	WC, tyvek	EP	Level D
Demolition of the Former Pesticide Shop							
Disconnect electrical service	HH	SG	STB	LWG	WC	EP as needed	Level D
Remove transite roof	HH	SG	STB	LWG, Sur	WC, tyvek	EP as needed	Level C with HEPA cartridges
Demolish building and concrete slabs using backhoe and hydraulic hammer	HH	SG	STB	LWG	WC	EP	Level D
Clearing and Grubbing							
Remove trees and brush	HH	SG, PFS	STB	LWG	WC	EP	Level D

Chip vegetative material	HH	SG, PFS	STB	LWG	WC	EP	Level D
Excavation of Contaminated Soils							
Excavate soil	HH	SG	STB, OB	LWG, sur	WC, tyvek	EP as needed	Level D
Stockpile soil	HH	SG	STB, OB	LWG, sur	WC, tyvek	EP as needed	Level D
Collect waste classification samples	HH	SG	STB, OB	LWG, sur	WC, tyvek as needed	EP as needed	Level D
Collect post-excavation samples	HH	SG	STB, OB	LWG, sur	WC, tyvek as needed	EP as needed	Level D
Backfill excavated areas	HH	SG	STB, OB	LWG	WC, tyvek as needed	EP as needed	Level D
Site Restoration							
Backfill excavated areas with common fill	HH	SG	STB	LWG	WC	EP as needed	Level D
Compact areas	HH	SG	STB	LWG	WC	EP as needed	Level D
Place top soil	HH	SG	STB	LWG	WC	EP as needed	Level D
Hydroseed areas	HH	SG	STB	LWG	WC	EP as needed	Level D
Heavy Equipment Decontamination							
Decontaminate equipment	HH	SG, PFS	STB, OB	Nit, Sur	WC, poly	EP as needed	Level D

HEAD PROTECTION

HH = Hard Hat

HEARING PROTECTION

EP = ear plugs

HAND PROTECTION

LWG = Leather work gloves

Nit = Nitrile

Sur = Surgical

EYE/FACE PROTECTION

PFS = Plastic face shield

SG = ANSI approved safety glasses with side shields

BODY PROTECTION

Tyvek = Uncoated paper Tyvek coveralls

Poly = Polyethylene coated tyvek coveralls

WC = Work Clothes

FOOT PROTECTION

STB = Leather work boots with steel toe

OB = Overboots

RESPIRATORY PROTECTION

Level D = No respiratory protection needed

Level C = Full face air purifying respirator P100 cartridge

7.0 AIR MONITORING

The following sections contain information describing the types, frequency and location of real time and integrated air monitoring.

7.1 Real-Time Air Monitoring

Based on real time readings and site conditions, the SHSO or designee may increase/decrease the frequency at which the readings are taken using professional judgment. A Mini-ram dust monitor, or equivalent, will be used for real time air monitoring during the soil excavation activities. Table 7-1 provides the real-time air monitoring action levels. Table 7-2 provides the frequency and location of real-time air monitoring. Real-time action level calculation for dust can be found in Appendix C.

Real-time air monitoring results for on-site activities will be reviewed with craft labor periodically by the SHSO in site daily health and safety briefings.

**Table 7-1
Real Time Air Monitoring Action Levels**

AIR MONITORING INSTRUMENT	MONITORING LOCATION	ACTION LEVEL	SITE ACTION	REASON
Mini Ram	Work area; other areas if determined visually	< 1.5 mg/m ³	Work upwind, use water for dust suppression as needed; wait for dust to settle before continuing work in area	Prevent exposure to contaminated dust
		> 1.5 mg/m ³	Upgrade to Level C respiratory protection	Increased potential for exposure to contaminated dusts

7.2 Frequency and Location of Real-Time Air Monitoring

Table 7-2 provides the frequency and location of real-time air monitoring.

**Table 7-2
Frequency and Location of Real Time Air Monitoring**

ACTIVITY	AIR MONITORING INSTRUMENT	FREQUENCY AND LOCATION
Soil Excavation Soil Load Out	Mini Ram	BZ and work area; every 30 - 60 minutes

7.3 Integrated Air Monitoring

Integrated air monitoring will not be conducted during this work activity.

7.4 Data Quality Assurance

Reference the Master Site Health and Safety Plan.

8.0 ZONES, PROTECTION AND COMMUNICATION

Reference the Master Health and Safety Plan.

9.0 MEDICAL SURVEILLANCE PROCEDURES

Reference the Master Health and Safety Plan.

10.0 SAFETY CONSIDERATIONS

Reference the Master Health and Safety Plan.

11.0 WASTE DISPOSAL PROCEDURES

Reference the Master Health and Safety Plan.

12.0 EMERGENCY RESPONSE PLAN

Reference the Master Health and Safety Plan.

13.0 TRAINING

Reference the Master Health and Safety Plan.

14.0 LOGS, REPORTS AND RECORD KEEPING

Reference the Master Health and Safety Plan.

16.0 REFERENCES

- American Conference of Governmental Industrial Hygienists, Inc., 1992, Documentation of the Threshold Limit Values and Biological Exposure Indices; 6th Ed., ACGIH, Cincinnati, Ohio.
- American Conference of Governmental Industrial Hygienists, Inc., 1987, Guidelines For The Selection of Chemical Protective Clothing; Third Edition, ACGIH, Cincinnati, Ohio, February 1987.
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- Federal Acquisition Regulation, F.A.R. Clause 52.236-13: Accident Prevention.
- Foster Wheeler Environmental Corporation, Foster Wheeler Environmental Corporation Health and Safety Program.
- NIOSH/OSHA/USCG/EPA, 1985, Occupational Safety and Health, Guidance Manual For Hazardous Waste Site Activities; October 1985.
- Sax, N. Irving, 1992, Dangerous Properties of Industrial Materials, 8th Ed; Van Nostrand Reinhold Co. Inc., New York, NY.
- U.S. Army Corps of Engineers, 1996, Safety and Health Requirements Manual; EM 385-1-1.
- U.S. Department of Labor, Occupational Safety and Health Administration, 1989, 29 CFR Part 1910 Hazardous Waste Operations and Emergency Response, draft rule, March 6, 1989; Construction Industry Standards, 29 CFR 1926; and General Industry Standards, 29 CFR 1910.
- U.S. Environmental Protection Agency, Standard Operating Safety Guides; July 1988.
- U.S. Environmental Protection Agency, no date, Response Safety Decision-Making; Course Manual, Office of Emergency and Remedial Response, Hazardous Response Support Division.

APPENDIX A

ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSIS

Project: Former Pesticide Shop Demolition and Soil Excavation

Location: Naval Weapons Station Earle, Colts Neck, NJ

Activity: Mobilization

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Mobilize equipment and supplies (Hazards and controls 1 - 8 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
2. Conduct utility survey (Hazards and controls 2, 3, 5, 6 apply)	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.
3. Install soil erosion control measures (Hazards and controls 1 - 8 apply)	3. Dropped Objects	3. Steel toe boots meeting ANSI Standard Z41 will be worn.
4. Layout excavation and work areas (Hazards and controls 1 - 8 apply)	4. Noise	4. Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers
5. Install high visibility fencing for site control (Hazards and controls 1 - 8 apply)	5. Exposure to temperature extremes	5. Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.
	6. Eye Injuries	6. Safety glasses meeting ANSI Standard Z87 will be worn.
	7. Pinch/Cut/Smash	7. Cut resistant kevlar work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.
	8. Hand and Power Tools	8. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Fire Extinguishers 6. Hand and Power Tools 7. Hay bales and silt fence	1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Monthly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected monthly 5. Monthly inspections will be performed on fire extinguishers. 6. Hand and power tools will be inspected before each use.	1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 5. Instruct personnel on proper use of fire extinguishers 6. Hand and power tools will be used according to manufacturer's directions

ACTIVITY HAZARD ANALYSIS

Project: <u>Former Pesticide Shop Demolition and Soil Excavation</u>		Location: <u>Naval Weapons Station Earle, Colts Neck, NJ</u>
Activity: <u>Subsurface Soil Sampling</u>		
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Collect soil samples using hand augers (Hazards and controls 1 - 12 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards, be aware when walking on/working in soft material.
	3. Dropped Objects	3. Steel toe boots meeting ANSI Standard Z41 will be worn.
	4. Noise	4. Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers
	5. Exposure to temperature extremes	5. Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.
	6. Eye Injuries	6. Safety glasses meeting ANSI Standard Z87 will be worn.
	7. Pinch/Cut/Smash	7. Cut resistant kevlar work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.
	8. Hand and Power Tools	8. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.
	9. Chemical Exposure	9. Appropriate protective clothing per Table 6-1 will be worn during site activities; air monitoring as per Tables 7-1 and 7-2 will be conducted; skin will be rinsed with water if contact with hazardous material occurs; a portable eye wash station will be located by work area.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Appropriate PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Hand Tools 6. Air Monitoring Equipment	1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Monthly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected monthly 5. Monthly inspections will be performed on fire extinguishers. 7. Hand tools will be inspected before each use. 8. Air monitoring equipment will be pre and post calibrated according to manufacturers recommendations.	1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 5. Instruct personnel on proper use of fire extinguishers 6. Hand tools will be used according to manufacturer's directions 7. Only qualified individuals will use air monitoring equipment.

ACTIVITY HAZARD ANALYSIS

Project: Former Pesticide Shop Demolition and Soil Excavation

Location: Naval Weapons Station Earle, Colts Neck, NJ

Activity: Demolition of the Former Pesticide Shop

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Disconnect electrical service (Hazards and controls 1, 2, 4 - 9, 13 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
2. Remove transite roof [work will be conducted by qualified subcontractor] (Hazards and controls 1 - 12 apply)	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards. A full body harness and lanyard will be used when working in a manlift
3. Demolish building and concrete slabs using backhoe and hydraulic hammer (Hazards and controls 1 - 12 apply)	3. Vehicular Traffic	3. Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
	4. Overhead Hazards	4. Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. All ground personnel will stay clear of suspended loads. All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. All overhead hazards will be identified prior to commencing work operations.
	5. Dropped Objects	5. Steel toe boots meeting ANSI Standard Z41 will be worn.
	6. Noise	6. Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers
	7. Temperature extremes	7. Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.
	8. Eye Injuries	8. Safety glasses meeting ANSI Standard Z87 will be worn.
	9. Hand and Power Tools	9. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.
	10. Fire	10. ABC type fire extinguishers shall be readily available; no smoking in work area; all equipment will be turned off during refueling; gasoline containers will be grounded to prevent build up of static electricity.
	11. Pinch/Cut/Smash	11. Cut resistant kevlar work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.
	12. Heavy Equipment	12. Equipment will have seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; spill and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; ground personnel will stay out of the swing radius; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; all equipment will be equipped with backup alarms.
	13. Electrocution	13. All equipment will be locked out/tagged out in accordance with EHS 6-4. Electrical work will be conducted by a licensed electrician

Project: Former Pesticide Shop Demolition and Soil Excavation
 Activity: Demolition of the Former Pesticide Shop

Location: Naval Weapons Station Earle, Colts Neck, NJ

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> 1. Appropriate PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Hand and Power Tools 6. Heavy Equipment 	<ol style="list-style-type: none"> 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Monthly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected monthly 5. Monthly inspections will be performed on fire extinguishers. 7. Hand and power tools will be inspected before each use. 8. Heavy equipment will be inspected daily, prior to use 	<ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 5. Instruct personnel on proper use of fire extinguishers 6. Hand and power tools will be used according to manufacturer's directions

ACTIVITY HAZARD ANALYSIS

Project: Former Pesticide Shop Demolition and Soil Excavation
 Activity: Clearing and Grubbing

Location: Naval Weapons Station Earle, Colts Neck, NJ

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Remove trees and brush using chain saws, hand saws (Hazards and controls 1 - 10 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
2. Chip vegetative material (Hazards and controls 1 - 10 apply)	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.
	3. Vehicular Traffic	3. Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
	4. Overhead Hazards	4. Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. All ground personnel will stay clear of suspended loads. All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. All overhead hazards will be identified prior to commencing work operations. Work area will be cleared of personnel prior to trees being felled.
	5. Dropped Objects	5. Steel toe boots meeting ANSI Standard Z41 will be worn.
	6. Noise	6. Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers
	7. Temperature extremes	7. Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.
	8. Eye Injuries	8. Safety glasses meeting ANSI Standard Z87 will be worn.
	9. Fire	9. ABC type fire extinguishers shall be readily available; no smoking in work area; all equipment will be turned off during refueling; gasoline containers will be grounded to prevent build up of static electricity.
	10. Pinch/Cut/Smash	10. Cut resistant kevlar work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools. No loose clothing, hair or jewelry will be worn while working with chipper. Leather chaps, rated for the chain saws to be used, will be worn during chain saw use.
	11. Hand and Power Tools	11. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.
	EQUIPMENT USED	INSPECTION REQUIREMENTS
1. Appropriate PPE 2. First Aid Kits 3. Portable Eyewash 4. Fire Extinguishers 5. Hand and Power Tools	1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Monthly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected monthly 5. Monthly inspections will be performed on fire extinguishers. 6. Hand and power tools will be inspected before each use..	1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 5. Instruct personnel on proper use of fire extinguishers 6. Hand and power tools will be used according to manufacturer's directions

ACTIVITY HAZARD ANALYSIS

Project: <u>Former Pesticide Shop Demolition and Soil Excavation</u>	Location: <u>Naval Weapons Station Earle, Colts Neck, NJ</u>	
Activity: <u>Excavation of Contaminated Soils</u>		
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Excavate soil (Hazards and controls 1 – 14 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
2. Stockpile soil (Hazards and controls 1 – 14 apply)	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.
3. Collect waste classification samples (Hazards and controls 1, 2, 5 – 8, 14 apply)	3. Vehicular Traffic	3. Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
4. Collect post-excavation samples (Hazards and controls 1, 2, 5 – 8, 14 apply)	4. Overhead Hazards	4. Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. All ground personnel will stay clear of suspended loads. All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. All overhead hazards will be identified prior to commencing work operations.
5. Backfill excavated areas (Hazards and controls 1 – 13 apply)	5. Dropped Objects	5. Steel toe boots meeting ANSI Standard Z41 will be worn.
	6. Noise	6. Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers
	7. Temperature extremes	7. Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.
	8. Eye Injuries	8. Safety glasses meeting ANSI Standard Z87 will be worn.
	9. Heavy Equipment (overhead hazards, spills, struck by or against)	9. Equipment will have seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; spill and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; ground personnel will stay out of the swing radius; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; all equipment will be equipped with backup alarms.
	10. Fire	10. ABC type fire extinguishers shall be readily available; no smoking in work area; all equipment will be turned off during refueling; gasoline containers will be grounded to prevent build up of static electricity.
	11. Pinch/Cut/Smash	11. Cut resistant kevlar work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.
	12. Excavation and Trenching	12. All trenching and excavation activities will be conducted in accordance with 29 CFR 1926, Subpart P and EHS 6-3. This includes, but is not limited to: excavations and

Project: Former Pesticide Shop Demolition and Soil Excavation

Location: Naval Weapons Station Earle, Colts Neck, NJ

Activity: Excavation of Contaminated Soils

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		trenches must be inspected daily by a competent person, atmospheric testing must be done prior to entry for trenches or excavations 4 feet deep or greater, a protective system must be used when an excavation or trench if 5 feet deep or greater or when depth is less than 5 feet and inspection by a competent person reveals conditions that may result in cave-ins; travel distance between ladders must be no more than 25 linear feet.
	13. Hand and Power Tools	13. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.
	14. Chemical Exposure	14. Appropriate protective clothing per Table 6-1 will be worn during site activities; air monitoring as per Tables 7-1 and 7-2 will be conducted; skin will be rinsed with water if contact with hazardous material occurs; a portable eye wash station will be located by work area.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> 1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Fire Extinguishers 6. Hand and Power Tools 	<ol style="list-style-type: none"> 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Monthly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected monthly 5. Monthly inspections will be performed on fire extinguishers. 6. Hand and power tools will be inspected before each use. 	<ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 5. Instruct personnel on proper use of fire extinguishers 6. Hand and power tools will be used according to manufacturer's directions

ACTIVITY HAZARD ANALYSIS

Project: Former Pesticide Shop Demolition and Soil Excavation
 Activity: Site Restoration

Location: Naval Weapons Station Earle, Colts Neck, NJ

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Backfill excavated areas with common fill (Hazards and controls 1 – 13 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
2. Compact areas (Hazards and controls 1 – 13 apply)	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.
3. Place top soil (Hazards and controls 1 – 13 apply)	3. Vehicular Traffic	3. Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
4. Hydroseed areas (Hazards and controls 1 – 13 apply)	4. Overhead Hazards	4. Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. All ground personnel will stay clear of suspended loads. All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. All overhead hazards will be identified prior to commencing work operations.
	5. Dropped Objects	5. Steel toe boots meeting ANSI Standard Z41 will be worn.
	6. Noise	6. Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); SHSO will determine the need for hearing protection; all equipment will be equipped with manufacturer's required mufflers
	7. Temperature extremes	7. Controls will be implemented to minimize exposure to temperature extremes including work rest regimens, warm or cool rest areas, protective clothing, and minimize exposure time.
	8. Eye Injuries	8. Safety glasses meeting ANSI Standard Z87 will be worn.
	9. Heavy Equipment (overhead hazards, spills, struck by or against)	9. Equipment will have seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; spill and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; ground personnel will stay out of the swing radius; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; all equipment will be equipped with backup alarms.
	10. Fire	10. ABC type fire extinguishers shall be readily available; no smoking in work area; all equipment will be turned off during refueling; gasoline containers will be grounded to prevent build up of static electricity.
	11. Pinch/Cut/Smash	11. Cut resistant kevlar work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.
	12. Excavation and Trenching	12. All trenching and excavation activities will be conducted in accordance with 29 CFR 1926, Subpart P and EHS 6-3. This includes, but is not limited to: excavations and trenches must be inspected daily by a competent person, atmospheric testing must be

Project: Former Pesticide Shop Demolition and Soil Excavation

Location: Naval Weapons Station Earle, Colts Neck, NJ

Activity: Site Restoration

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
		done prior to entry for trenches or excavations 4 feet deep or greater, a protective system must be used when an excavation or trench is 5 feet deep or greater or when depth is less than 5 feet and inspection by a competent person reveals conditions that may result in cave-ins; travel distance between ladders must be no more than 25 linear feet.
	13. Hand and Power Tools	13. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturer's instructions.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> 1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Fire Extinguishers 6. Hand and Power Tools 	<ol style="list-style-type: none"> 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Monthly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected monthly 5. Monthly inspections will be performed on fire extinguishers. 6. Hand and power tools will be inspected before each use. 	<ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 7. Instruct personnel on proper use of fire extinguishers 8. Hand and power tools will be used according to manufacturer's directions

ACTIVITY HAZARD ANALYSIS

Project: Former Pesticide Shop Demolition and Soil Excavation
 Activity: Heavy Equipment Decontamination

Location: Naval Weapons Station Earle, Colts Neck, NJ

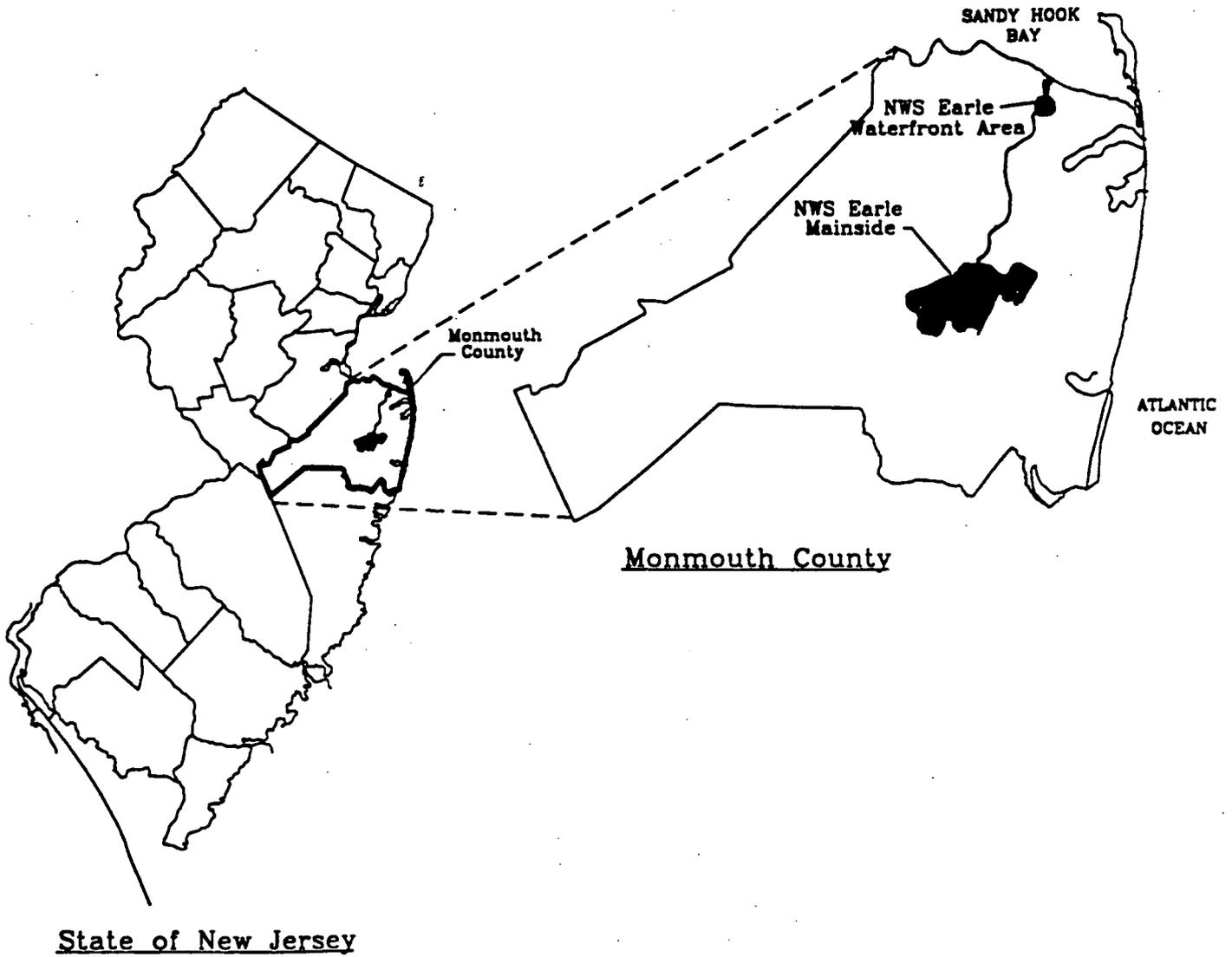
MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Pressure wash heavy equipment and accessories (Hazards and controls 1 – 13 apply)	1. Back Injuries	1. Site personnel will be instructed on proper lifting techniques; mechanical devices should be used to reduce manual handling of materials; team lifting should be utilized if mechanical devices are not available.
	2. Slips/Trips/Falls	2. Maintain work areas safe and orderly; unloading areas should be on even terrain; mark and repair if possible tripping hazards.
	3. Vehicular Traffic	3. Spotters will be used when backing up trucks and heavy equipment and moving equipment.
	4. Overhead Hazards	4. Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. All ground personnel will stay clear of suspended loads. All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. All overhead hazards will be identified prior to commencing work operations.
	5. Dropped Objects	5. Steel toe boots meeting ANSI Standard Z41 will be worn during all site activities.
	6. Exposure to Chemical Hazards	6. Appropriate protective clothing per Table 6-1 will be worn during site activities; skin will be rinsed with water if contact with hazardous material occurs; a portable eye wash station will be located by work area.
	7. Steam/Heat/Splashing	7. Use face shield and safety glasses or goggles; stay out of the splash/steam radius; do not direct stream at anyone; use shielding as necessary; personnel will be trained on the proper operation of pressure washer, pressure washer wand will be equipped with a dead man's switch.
	8. Pinch/Cut/Smash	8. Use hand tools properly and wear appropriate protective equipment, cut resistant work gloves will be worn when dealing with sharp objects; all hand and power tools will be maintained in safe condition; guards will be kept in place while using hand and power tools.
	9. Temperature Extremes	9. Drink plenty of fluids; train personnel of signs/symptoms of heat/cold stress; monitor air temperatures when extreme weather conditions are present; stay in visual and verbal contact with your buddy; and use Temperature Extremes program EHS 4-6.
	10. Hand and Power Tools	10. Daily inspections will be performed; remove broken or damaged tools from service; use the tool for its intended purpose; and use in accordance with manufacturers instructions.
	11. Eye Injuries	11. Safety glasses meeting ANSI Standard Z87 will be worn.
	12. Fire	12. ABC type fire extinguishers shall be readily available; no smoking in work area; all equipment will be turned off during refueling; gasoline containers will be grounded to prevent build up of static electricity.

Project: Former Pesticide Shop Demolition and Soil Excavation
 Activity: Heavy Equipment Decontamination

Location: Naval Weapons Station Earle, Colts Neck, NJ

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	13. Heavy Equipment Operation	13. Equipment will have seat belts; operators shall wear seat belts when operating equipment; do not operate equipment on grades which exceed manufacturer's recommendations; equipment will have guards, canopies or grills to protect from flying objects; ground personnel will stay clear of all suspended loads; spill and absorbent materials will be readily available; drip pans, polyethylene sheeting or other means will be used for secondary containment; ground personnel will stay out of the swing radius; eye contact with operators will be made before approaching equipment; equipment will not be approached on blind sides; all equipment will be equipped with backup alarms.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
<ol style="list-style-type: none"> 1. Hand and Power Tools 2. Heavy Equipment 3. Appropriate PPE 4. Pressure Washer 	<ol style="list-style-type: none"> 1. Initial inspection of heavy equipment will be performed upon arriving on-site. 2. Pressure washers will be inspected daily, prior to each days use. 3. Hand and power tools will be inspected prior to each days use. 4. PPE will be inspected before and after each use. 	<ol style="list-style-type: none"> 1. Personnel have read and comply with HASP. 2. Personnel will receive site specific training. 3. Only qualified operators can operate heavy equipment or vehicles. 4. Personnel have knowledge of proper use of hand and power tools. 5. At least 1 individual on-site will have current CPR and first aid training.

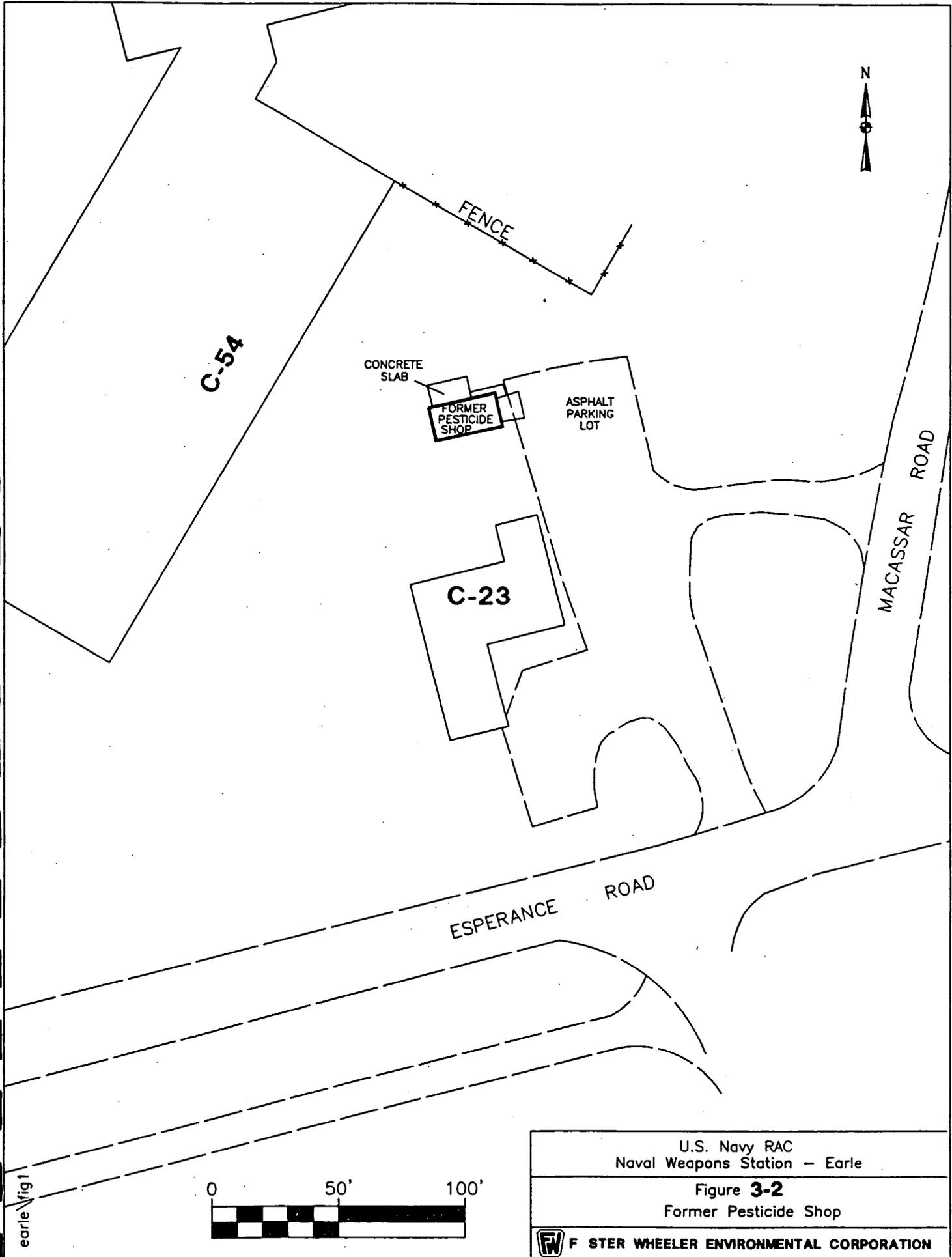
APPENDIX B
SITE LOCATION MAPS



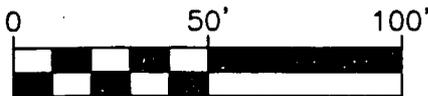
NOT TO SCALE

U.S. Navy RAC
NWS-Earle, Colts Neck, N.J.

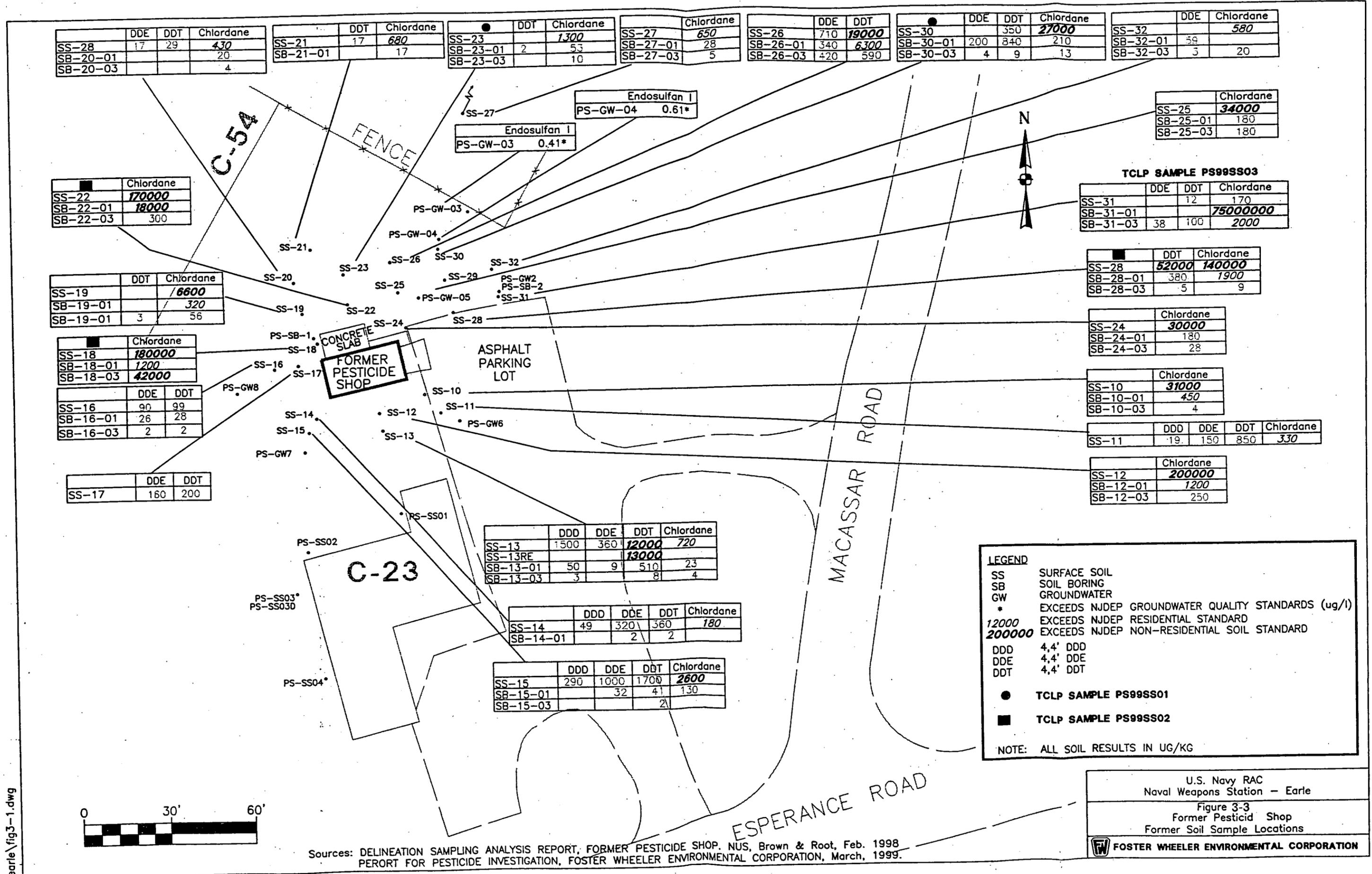
Figure 3-1
Regional Site Map



earle/fig1



U.S. Navy RAC Naval Weapons Station - Earle
Figure 3-2 Former Pesticide Shop
 FOSTER WHEELER ENVIRONMENTAL CORPORATION



	DDE	DDT	Chlordane
SS-28	17	29	430
SB-20-01			20
SB-20-03			4

	DDT	Chlordane
SS-21	17	680
SB-21-01		17

	DDT	Chlordane
SS-23		1300
SB-23-01	2	53
SB-23-03		10

	Chlordane
SS-27	650
SB-27-01	28
SB-27-03	5

	DDE	DDT
SS-26	710	19000
SB-26-01	340	6300
SB-26-03	420	590

	DDE	DDT	Chlordane
SS-30		350	27000
SB-30-01	200	840	210
SB-30-03	4	9	13

	DDE	Chlordane
SS-32		580
SB-32-01	59	
SB-32-03	3	20

	Chlordane
SS-25	34000
SB-25-01	180
SB-25-03	180

TCLP SAMPLE PS99SS03

	DDE	DDT	Chlordane
SS-31		12	170
SB-31-01			7500000
SB-31-03	38	100	2000

	DDT	Chlordane
SS-28	52000	140000
SB-28-01	380	1900
SB-28-03	5	9

	Chlordane
SS-24	30000
SB-24-01	180
SB-24-03	28

	Chlordane
SS-10	31000
SB-10-01	450
SB-10-03	4

	DDD	DDE	DDT	Chlordane
SS-11	19	150	850	330

	Chlordane
SS-12	200000
SB-12-01	1200
SB-12-03	250

	Chlordane
SS-22	170000
SB-22-01	18000
SB-22-03	300

	DDT	Chlordane
SS-19		6600
SB-19-01		320
SB-19-01	3	56

	Chlordane
SS-18	180000
SB-18-01	1200
SB-18-03	42000

	DDE	DDT
SS-16	90	99
SB-16-01	26	28
SB-16-03	2	2

	DDE	DDT
SS-17	160	200

	DDD	DDE	DDT	Chlordane
SS-13	1500	360	12000	720
SS-13RE			13000	
SB-13-01	50	9	510	23
SB-13-03	3		8	4

	DDD	DDE	DDT	Chlordane
SS-14	49	320	360	180
SB-14-01		2	2	

	DDD	DDE	DDT	Chlordane
SS-15	290	1000	1700	2600
SB-15-01		32	41	130
SB-15-03			21	



Sources: DELINEATION SAMPLING ANALYSIS REPORT, FORMER PESTICIDE SHOP. NUS, Brown & Root, Feb. 1998
 REPORT FOR PESTICIDE INVESTIGATION, FOSTER WHEELER ENVIRONMENTAL CORPORATION, March, 1999.

U.S. Navy RAC
 Naval Weapons Station - Earle
 Figure 3-3
 Former Pesticide Shop
 Former Soil Sample Locations
 FOSTER WHEELER ENVIRONMENTAL CORPORATION

earle\fig3-1.dwg

APPENDIX C

REAL TIME AIR MONITORING ACTION LEVEL CALCULATION

DUST EXPOSURE CALCULATION WORKSHEET

NWS Earle

Safety Factor for this site = 4

Chemical	Exposure Limit (mg/m3)	Maximum Soil Concentration (mg/kg)	Exposure Limit Based on Single Compound (EL Mix, mg/m3)	Dust Quotient for Each Compound (level/limit)
Aluminum	5	1 E-9	1.25E + 15	2.00E-10
Antimony	0.5	1 E-9	1.25E + 14	2.00E-09
Arsenic	0.01	1 E-9	2.5E + 12	1.00E-07
Barium	0.5	1 E-9	1.25E + 14	2.00E-09
Beryllium	0.002	1 E-9	5.E + 11	5.00E-07
Cadmium	0.005	1 E-9	1.25E + 12	2.00E-07
	1	1 E-9	2.5E + 14	1.00E-09
Chlordane	0.5	75,000	1.67	1.50E + 05
Chrome (hex)	0.01	1 E-9	2.5E + 12	1.00E-07
Cobalt	0.02	1 E-9	5.E + 12	5.00E-08
Copper	1	1 E-9	2.5E + 14	1.00E-09
Cyanides	5	1 E-9	1.25E + 15	2.00E-10
Endosulfan	0.1	1 E-9	2.5E + 13	1.00E-08
Fluorides	2.5	1 E-9	6.25E + 14	4.00E-10
Lead	0.05	1 E-9	1.25E + 13	2.00E-08
Manganese	1	1 E-9	2.5E + 14	1.00E-09
Mercury	0.05	1 E-9	1.25E + 13	2.00E-08
Nickel	1	1 E-9	2.5E + 14	1.00E-09
Oil Mist	5	1 E-9	1.25E + 15	2.00E-10
PCBs	0.5	1 E-9	1.25E + 14	2.00E-09
PNA's	0.2	1 E-9	5.E + 13	5.00E-09
Phthalates	5	1 E-9	1.25E + 15	2.00E-10
RDX	1.5	1 E-9	3.75E + 14	6.67E-10
Selenium	0.2	1 E-9	5.E + 13	5.00E-09
Silica	0.05	1 E-9	1.25E + 13	2.00E-08
Silver	0.01	1 E-9	2.5E + 12	1.00E-07
Thallium	0.1	1 E-9	2.5E + 13	1.00E-08
Tin	2	1 E-9	5.E + 14	5.00E-10
Titanium	10	1 E-9	2.5E + 15	1.00E-10
Trinitrobenzene	0.07	1 E-9	1.75E + 13	1.43E-08
Trinitrotoluene	0.5	1 E-9	1.25E + 14	2.00E-09
Vanadium	0.05	1 E-9	1.25E + 13	2.00E-08
Zinc	5	1 E-9	1.25E + 15	2.00E-10
			Sum	1.50E + 05
Dust Exposure Level at Mixture PEL =			1.667	

APPENDIX D

ANSI STANDARD Z133.1-1994

ANSI®
Z133.1-1994
Revision of
ANSI Z133.1-1988

**American National Standard
for Tree Care Operations –
Pruning, Trimming, Repairing, Maintaining, and
Removing Trees, and Cutting Brush –
Safety Requirements**

**Secretariat
International Society of Arboriculture**

**Approved August 1, 1994
American National Standards Institute, Inc.**

American National Standard

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Foreword (This foreword is not part of American National Standard Z133.1-1994.)

This standard was developed under the procedures of the American National Standards Institute by Accredited Standards Committee on Safety in Tree Trimming Operations, Z133. The secretariat of the Z133 Committee is held by the International Society of Arboriculture.

Accredited Standards Committee Z133 was organized on April 4, 1968, in response to efforts by Mrs. Ethel M. Hugg of Johnstown, NY. Mrs. Hugg's son had died while trimming trees, and this tragic incident caused her to write to federal and state authorities, and to various safety organizations, in an attempt to have measures initiated that would make tree trimming safer.

The Z133 Committee was organized with the National Arborist Association as secretariat. Committee delegates included representatives of industry, labor, the academic community, government, equipment manufacturers, insurance carriers, and other interested experts. The International Shade Tree Conference became the secretariat of the committee in November 1969. In 1975, the International Shade Tree Conference was renamed the International Society of Arboriculture.

Five subcommittees were formed to develop specific portions of the original standard. Each subcommittee prepared and edited material in its area of concern; the material was then combined and submitted to the full committee for review. One of the subcommittees also met with representatives of the Occupational Safety and Health Administration, U.S. Department of Labor.

An initial draft was submitted for committee ballot on March 2, 1971. A revised draft was unanimously adopted by the committee on July 14, 1971, and was approved as an American National Standard on December 20, 1972.

The Z133 Committee continued to monitor tree-trimming safety performance, providing interpretation and clarification of the intent of the requirements. Portions of the safety standard were adopted by the Occupational Safety and Health Administration under the "Telecommunications" Safety and Health Standard 29CFR Part 1910 - *Federal Register*, Volume 38, No. 166, August 28, 1973.

Based on the experience of users, minor amendments to the standard were approved on November 17, 1975. The need for additional revision became evident and the committee, after considerable effort, discussion, consideration, and balloting unanimously approved the first revision on June 19, 1978. On May 17, 1979, the first revision was approved and printed for distribution as an American National Standard.

To clarify and acknowledge additional changes to the standard, the committee initiated consideration of other revisions at three meetings held March 25, 1981, October 5, 1981, and March 24, 1982, at the U.S. Department of Labor Building, Washington, DC. After proper discussion and balloting, the committee approved the second revision on March 24, 1982. On August 23, 1982, the second revision was approved as an American National Standard.

In July 1987, the committee voted to adopt several changes in the 1982 standard. These changes were made owing to increased technology and understanding of safe working practices related to tree care. The committee approved the final content and editorial changes on September 16, 1987. The standard was approved by the American National Standards Institute on November 23, 1987.

The 1994 revision incorporates changes based on increased technology and understanding of safe working practices related to tree care as well as the OSHA 1910.269 standard released in January 1994. The committee approved the final content and editorial changes on April 27, 1994. The standard was approved by the American National Standards Institute on August 1, 1994.

The Z133 Committee will continue to be available for interpretation or clarification of the intent of the requirements in the standard and for any adjustments or revisions of the standard.

There are four annexes in this standard. All four are informative and not considered part of this standard.

Suggestions for improvement of this standard will be welcome. They should be sent to the International Society of Arboriculture, P.O. Box GG, 6 Dunlap Ct., Savoy, IL 61874.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Safety in Tree Trimming Operations, Z133. Committee approval of the standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the Z133 Committee had the following members:

Gerald Duke, Chair
Robert Felix, Vice-Chair
William P. Kruidenier, Secretary
Marion Feller, Recording Secretary

<i>Organization Represented</i>	<i>Name of Representative</i>
ACRT, Inc.	Richard Abbott Jeff Saltzman (Alt.)
American Association of Nurserymen.....	Craig Regelbrugge
American Insurance Association.....	George Klinger
Asplundh Tree Expert Company.....	James Allard
California Arborist Association.....	Don Blair
The F.A. Bartlett Tree Expert Company.....	Patrick Flynn
The Davey Tree Expert Company.....	Edward J. Johnson
Edison Electric Institute.....	Thomas O'Rourke M. C. Mingoia (Alt.) Herschel C. Hale (Alt.)
International Brotherhood of Electrical Workers.....	Stanley Hubbard James Ozzello (Alt.)
International Society of Arboriculture.....	David C. Shaw William P. Kruidenier (Alt.)
National Arborist Association.....	Robert Felix John Hendricksen (Alt.)
Pacific Coast Electric Association.....	Steven Alvarez
Sacramento Municipal Utility District.....	Jim Sweeney
Southeastern Public Service Corporation.....	Don Baetge
U.S. Department of Interior.....	J. Daniel Sullivan, Sr.
U.S. Department of Labor.....	David Wallis Chap Pierce (Alt.)
U.S. Forest Service.....	Marcia Sneed Robert F. Wilson (Alt.)
Utility Arborist Association.....	Thomas D. Mayer S. Dale Crutchfield (Alt.)
Honorary Members.....	Mrs. Ethel Hugg Gordon S. King Robert Herder

Individual Members

H. Dennis P. Ryan III
Vincent D. Morabit
Mark Tobin

American National Standard for Tree Care Operations –

Pruning, Trimming, Repairing, Maintaining, and Removing Trees, and Cutting Brush – Safety Requirements

1 Scope, purpose, and application

1.1 Scope

This standard presents safety requirements for pruning, trimming, repairing, maintaining, and removing trees and for cutting brush, and for the use of equipment in such operations.

1.2 Purpose

The purpose of this standard is to provide safety criteria for workers and the public. It is intended as a guide to federal, state, and municipal authorities in the drafting of their regulations and may be adopted by them in whole or in part.

1.3 Application

This standard is intended to apply to any employer engaged in the business, trade, or performance of tree pruning, trimming, repairing, maintaining, removal, or brush cutting who hires one or more persons to perform such work. It is also intended, through voluntary use, as a standard reference for safety requirements for those engaged in pruning, trimming, repairing, maintaining, or removing trees or cutting brush.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements

based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

Because of the many specialized operations utilized during professional tree care operations, it must be emphasized that exceptions to provisions of these standards may be acceptable and may require a flexible and/or applicability judgment decision for these professional operations.

ANSI A10.14-1991, *Requirements for safety belts, harnesses, lanyards, lifelines, and drop lines for construction and industrial use*

ANSI A14.1-1982, *Ladders – Portable wood – Safety requirements*

ANSI A14.2-1990, *Ladders – Portable metal – Safety requirements*

ANSI A1264.1-1989, *Safety requirements for workplace floor and wall openings, stairs and railing systems*

ANSI B175.1-1991, *Power tools – Gasoline-powered chain saws – Safety requirements*

ANSI Z87.1-1989, *Practice for occupational and educational eye and face protection*

ANSI Z88.2-1992, *Practices for respiratory protection*

ANSI Z89.1-1986, *Personnel protection – Protective headware for industrial workers – Requirements*

ANSI/SIA A92.2-1990, *Vehicle-mounted elevating and rotating aerial devices*

Title 29, part 1910, subpart i ¹⁾

¹⁾ Available from U.S. Department of Labor, OSHA, 200 Constitution Avenue, NW, Washington, DC 20201.

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29 CFR 1910.269, *Electric power generation, transmission, and distribution*¹⁾Cordage Institute specifications²⁾

3 Definitions

3.1 approved: Acceptable to the federal, state, or local enforcing authority having jurisdiction.

3.2 competent person: One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

3.3 drop started: The act of starting a chain saw by pushing the saw away from the body with one hand while simultaneously pulling on the starter cord handle with the other.

3.4 electrical conductor: Any overhead or underground electrical device, including communications wires and cables, power lines, and other such facilities.

3.5 electrical hazard: An electrical hazard exists when a worker, a tool, or any conductive object is closer than 10 ft (3.05 m) from an energized overhead conductor rated 50 kV, phase-to-phase or less, or closer than 10 ft + 4/10 in (3.05 m + 10 mm) for each kilovolt over 50 kV. When an electrical hazard exists, minimum clearances shall be maintained and only qualified line-clearance tree trimmers or qualified line-clearance tree trimmer trainees shall perform the work.

3.6 false crotch for a climbing line: A 5/8-in shackle (clevis) with a minimum breaking strength of 5000 lb (22.2 kN) supported by a line equal to the minimum requirements of a climbing line. The pin in the shackle (clevis) shall be secured in a positive manner (by safety wiring the pin in place or securing the pin in place with a cotter pin). In place of a shackle, a 1/2-in rope pulley with a minimum breaking strength of 5000 lb (22.2 kN) may be used.

3.7 improved crotch: Any tight or V-shaped tree crotch that has been altered so as to allow the climbing line to move freely.

3.8 leg protection: Garment designed to provide protection to the legs during chain saw operations.

3.9 line-clearance tree trimming: The pruning, trimming, or removal of trees or brush growing or existing in proximity to electrical conductors (as defined above) for the purpose of preventing such growth from interfering with the facilities involved.

3.10 personnel lanyard (buck strap, flip line): A short line or strap designed as a climbing aid.

3.11 proximity: Within 10 ft (3.05 m) of energized overhead conductors rated 50 kV phase-to-phase or less; for overhead conductors rated over 50 kV phase-to-phase, the minimum clearance shall be 10 ft + 4/10 in (3.05 m + 10 mm).

3.12 prusik knot: Sliding friction knot tied by passing one end of a prusik loop around a standing line (such as a climbing line placed in a tree) and through the other end of the loop two or three times. The knot or splice used to form the prusik loop should be kept out of the knot. The free end of the loop is pulled to form and tighten the knot.

3.13 prusik loop: Endless loop of rope that meets the minimum strength criteria for a climbing line. It may be spliced to form an endless loop or tied with a suitable knot.

3.14 qualified person: One who, by possession of a recognized degree, certificate, or professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated his/her ability to solve or resolve problems relating to the subject matter, the work, or the project.

3.15 qualified line-clearance tree trimmer: A tree worker who, through related training and on-the-job experience, is familiar with the hazards in line clearance and has demonstrated his/her ability in the performance of the special techniques involved. This qualified person may or may not be currently employed by a line-clearance contractor.

3.16 qualified line-clearance tree trimmer trainee: Any worker undergoing line-clearance tree-trimming training, who, in the course of such training, is familiar with the hazards in line clearance and has demonstrated ability in

²⁾ Available from the Cordage Institute, 350 Lincoln Street, Hingham, MA 02043.

the performance of the special techniques involved. Such trainees shall be under the direct supervision of qualified personnel.

3.17 qualified personnel: Any worker who by reason of training and experience has demonstrated the ability to perform duties safely and, where required, is properly licensed in accordance with federal, state, or local laws and regulations.

3.18 qualified tree worker: A worker who, through related training and on-the-job experience, is familiar with the hazards of pruning, trimming, repairing, maintaining, or removing trees, with the equipment used in such operations, and has demonstrated ability in the performance of the special techniques involved.

3.19 qualified tree worker trainee: Any worker undergoing on-the-job training who, in the course of such training, is familiar with the hazards of pruning, trimming, repairing, maintaining, or removing trees, and with the equipment used in such operations, and has demonstrated ability in the performance of the special techniques involved. Such trainees shall be under the direct supervision of qualified personnel.

3.20 shall: As used in this standard, denotes a mandatory requirement.

3.21 should: As used in this standard, denotes an advisory recommendation.

3.22 system operator/owner: The person or organization that operates or controls the electrical conductors involved.

3.23 taut-line hitch: A hitch used for securing all workers aloft to their climbing line, and consisting of either one or two wraps over two wraps. All wraps should go in the same direction. This standard does not exclude the use of a prusik loop or a mechanical ascender in lieu of a taut-line hitch.

3.24 tied in: The term that describes a tree climber whose climbing line has been properly crotched and attached to the saddle and whose taut-line hitch is tied.

3.25 tool lanyard: Short line or strap used to secure a tool while working aloft.

NOTE - A glossary of additional terms is given in annex A.

4 General safety requirements

4.1 General

4.1.1 Equipment and devices shall conform with the requirements of this standard and shall be properly maintained.

4.1.2 Employers shall instruct their employees in the proper use of all equipment provided for them and shall require that safe working practices be followed. A job briefing, work procedure, and assignment shall be worked out carefully before any tree job is begun.

4.1.3 All equipment, including ropes and lines, upon which the worker must rely for safety, shall be inspected and properly maintained by the worker each day before use.

4.2 Personal protective equipment

4.2.1 Personal protective equipment as outlined in 4.2 shall be required where there is a reasonable probability of injury or illness that can be prevented by such protection.

4.2.2 Head protection shall be worn by workers engaged in tree operations. It shall conform to the applicable provisions of ANSI Z89.1. Class B helmets shall be worn when working in proximity to an electrical conductor, in accordance with ANSI Z89.1. The tree worker shall not place reliance on the dielectric capabilities of such helmets.

4.2.3 Respiratory protection when required shall conform to the applicable provisions of ANSI Z88.2.

4.2.4 Eye and face protection when required shall comply to applicable provisions of ANSI Z87.1.

4.2.5 Employees shall wear clothing and footwear as approved by employer appropriate to the work location and condition.

4.2.6 Leg protection should be worn while operating a chainsaw during ground operations.

4.2.7 Tree climber's saddles as specified in ANSI A10.14 shall be worn to protect climbers above ground level.

4.2.8 Tree climbing saddles shall have dropped forged support dee rings. Additional support can be provided with dee rings on the waist for use with a lanyard. Snaps used in

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climbing shall be the self-closing type with a minimum breaking strength of 5000 lb.

4.2.9 Carabiners shall not be used to tie the climbing line into the saddle, unless the carabiner meets the minimum standards for rope snaps, and is designed such that it cannot unintentionally be opened during work operations.

4.2.10 Climbing lines shall have a minimum diameter of 1/2 in (12 mm) and be constructed of a synthetic fiber, with a minimum nominal breaking strength of 5400 lb (24 kN) when new or of equivalent or greater strength and durability. Maximum working elongation (elasticity) shall not exceed 7 percent at a load of 540 lb (10 percent minimum breaking strength). Climbing lines shall be identified by the manufacturer as suitable for tree climbing. Prusik loops and lanyards shall meet the minimum strength standards established for climbing lines. Climbing lines shall not be spliced to effect repair.

4.2.11 Tree climbing saddles and lanyards shall not be weakened by punching extra holes in them. All rope splicing shall be in accordance with Cordage Institute specifications.

NOTE - The Cordage Institute specifications that are necessary for this requirement are determined by the size of the rope being used. Contact the rope manufacturer for more specific information.

4.2.12 Climbing lines, lanyards, or prusik loops shall not be used to lower limbs or other parts of trees.

4.3 First aid and rescue procedures

4.3.1 A physician-approved first-aid kit adequately stocked and maintained shall be provided by the employer when and where operations are being carried on. Each employee shall be instructed in its use.

4.3.2 All employees shall be instructed in identification of, and preventive measures relating to, common poisonous plants such as poison ivy, poison oak, and poison sumac.

4.3.3 Aerial rescue procedures for employees working above ground, shall be established by the employer, and the employees trained accordingly. Under emergency conditions, any reasonable method of rescue may be used.

4.3.4 Employees should be instructed in cardiopulmonary resuscitation (CPR) and first aid.

4

4.4 Traffic control

4.4.1 Effective means for control of pedestrian and vehicular traffic shall be instituted on every job site where necessary following U.S. Department of Transportation (DOT) Standards and Guidelines Work Zone Traffic Controls, or applicable state/local laws and regulations.

4.4.2 Traffic-control devices used in tree operations shall conform to the applicable federal and state regulations.

4.5 Fire protection

4.5.1 Gasoline-powered equipment shall be refueled only after the engine has been stopped. Any spilled fuel shall be removed from the equipment before restarting.

4.5.2 Gasoline-powered equipment shall not be operated within 10 ft (3.05 m) of any refueling operation or any area in which refueling has recently taken place.

4.5.3 Flammable liquids shall be stored, handled, and dispensed only from approved safety containers.

4.5.4 Smoking shall be prohibited when handling or working around any flammable liquid.

4.5.5 Workers wearing clothing on which flammable liquid has been spilled shall avoid open flame and other sources of ignition, and change the contaminated clothing as soon as possible.

4.6 Noise

When employees are assigned to work in areas in which noise levels exceed acceptable standards, as established by federal regulations, the employer should take appropriate measures to suppress noise levels. When it is not practicable to decrease the noise or isolate the workers from it, the workers shall wear effective hearing-protective equipment as provided by the employer.

5 Electrical hazards

5.1 General

All overhead and underground electrical conductors and all communication wires and

cables shall be considered to be energized with potentially fatal voltages.

5.1.1 Every treeworker shall be instructed that

- a direct contact is made when any part of the body touches or contacts an energized conductor or other energized electrical fixture or apparatus;
- an indirect contact is made when any part of the body touches any object in contact with an energized electrical conductor or other energized fixture or apparatus;
- an indirect contact can be made through conductive tools, tree branches, trucks, equipment, or other conductive objects, or as a result of communication wires and cables, fences, or guy wires being accidentally energized;
- electric shock will occur when a tree worker, by either direct or indirect contact with an energized conductor, energized tree limb, tool, equipment, or other object, provides a path for the flow of electricity to a grounded object or to the ground itself. Simultaneous contact with two energized conductors will also cause electric shock that may result in serious or fatal injury.

5.1.2 The system operator/owner shall be advised before any work is performed in proximity to energized conductors. This rule shall not apply to persons working on behalf of, or employed by, the system operator/owner.

5.2 Working in proximity to electrical hazards

5.2.1 An inspection shall be made by a qualified tree worker to determine whether an electrical hazard exists before climbing, or otherwise entering, or performing any work in the tree.

5.2.2 Only a qualified line-clearance tree trimmer or qualified line-clearance tree trimmer trainee shall be assigned to the work if it is found that an electrical hazard exists. A trainee shall be under the direct supervision of a qualified line-clearance tree trimmer.

5.2.3 There shall be a second qualified line-clearance tree trimmer or line-clearance tree trimmer trainee within vision or voice communication during line-clearing operations aloft

when the line-clearance tree trimmer or line-clearance tree trimmer trainee must approach more closely than 10 ft (3.05 m) to any conductor or electrical apparatus energized in excess of 750 V or when

- branches or limbs being removed cannot first be cut (with a pole pruner/pole saw) sufficiently clear of the conductors and apparatus so as to avoid contact;
- roping is required to remove branches or limbs from such conductors or apparatus.

This does not apply to utility workers engaged in tree trimming incidental to their normal occupation.

5.2.4 Line-clearance tree trimmers and line-clearance tree-trimmer trainees shall maintain the clearances from energized conductors given in table 1.

5.2.5 All other tree workers shall maintain a minimum clearance of 10 ft (3.05 m) from energized conductors rated 50 kV phase-to-phase or less; for conductors rated over 50 kV phase-to-phase, the minimum clearance shall be 10 ft + 4/10 in (3.05 m + 10 mm) for each kilovolt over 50 kV.

5.2.6 Branches hanging on a conductor may be removed using nonconductive equipment.

5.2.7 Footwear, including those having electrical-resistant soles and lineman's overshoes, shall not be considered as providing any measure of safety from electrical hazards.

5.2.8 Rubber gloves, with or without leather or other protective covering, shall not be considered as providing any measure of safety from electrical hazards.

5.2.9 Ladders, platforms, and aerial devices, including insulated aerial devices, shall be subject to the working requirements in tables 1 and 2.

5.2.10 If an aerial lift device contacts an electrical conductor, the aerial device and attached equipment (such as a chipper) shall be considered as energized, and contact with the truck shall be avoided except where emergency rescue procedures are being carried out. Emergency rescue should only be performed by trained persons familiar with electrical hazards.

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Table 1 – Minimum working distances from energized conductors for qualified line-clearance tree trimmers and qualified line-clearance tree trimmer trainees

Nominal voltage kV phase-to- phase	Includes 1910.269 elevation factor, sea level to 5000 ft ¹⁾		Includes 1910.269 elevation factor, 5001–10,000 ft ¹⁾		Includes 1910.269 elevation factor, 10,001–14,000 ft ¹⁾	
	ft-in	m	ft-in	m	ft-in	m
0.05 – 1.0	Avoid contact		Avoid contact		Avoid contact	
1.1 – 15.0	2-04	0.71	2-08	0.81	2-10	0.86
15.1 – 36.0	2-09	0.84	3-02	0.97	3-05	1.04
36.1 – 46.0	3-00	0.92	3-05	1.04	3-09	1.14
46.1 – 72.5	3-09	1.14	4-03	1.30	4-07	1.40
72.6 – 121.0	4-06	1.37	5-02	1.58	5-07	1.70
138.0 – 145.0	5-02	1.58	5-11	1.80	6-05	1.96
161.0 – 169.0	6-00	1.83	6-10	2.08	7-05	2.26
230.0 – 242.0	7-11	2.41	9-00	2.75	9-09	2.97
345.0 – 362.0	13-02	4.02	15-00	4.58	16-03	4.96
500.0 – 550.0	19-00	5.80	21-09	6.63	23-06	7.17
765.0 – 800.0	27-04	8.34	31-03	9.53	33-10	10.32

¹⁾ Exceeds phase-to-ground; elevation factor per 29 CFR 1910.269.

Table 2 – Minimum approach distances to energized conductors for persons other than qualified line-clearance tree trimmers and qualified line-clearance tree trimmer trainees

Nominal voltage kV phase-to- phase ¹⁾	Distance	
	ft-in	m
0.0 – 1.0	10-00	3.05
1.1 – 15.0	10-00	3.05
15.1 – 36.0	10-00	3.05
36.1 – 50.0	10-00	3.05
50.1 – 72.5	10-09	3.28
72.6 – 121.0	12-04	3.76
138.0 – 145.0	13-02	4.00
161.0 – 169.0	14-00	4.24
230.0 – 242.0	16-05	4.97
345.0 – 362.0	20-05	6.17
500.0 – 550.0	26-08	8.05
785.0 – 800.0	35-00	10.55

¹⁾ Exceeds phase-to-ground.

5.3 Storm work and emergency conditions

5.3.1 Storm work and emergency conditions create special hazards; only authorized representatives of the system operator/owner shall perform tree work under such conditions.

5.3.2 When, during tree operations, an emergency condition develops that involves electrical conductors, work shall be suspended and the system operator/owner shall be notified immediately.

6 Mobile equipment

6.1 General

6.1.1 All vehicles and equipment, regardless of type, should be equipped and operated in accordance with manufacturer's operating instructions.

6.1.2 Seat belts should be worn by all occupants when a vehicle so equipped is in motion.

6.1.3 Equipment shall be turned off, keys removed, and rotating parts at rest when repairs or adjustments are made, except where manufacturer's procedures require otherwise. All defects or malfunctions affecting the safe operation of any equipment shall be corrected before placing such equipment into use.

6.1.4 Trucks with obscured rear vision, particularly those with trailed vehicles, should be backed up only when absolutely necessary and then should have outside, rear guidance, when available.

6.1.5 Equipment shall be operated by qualified personnel.

6.1.6 All material and equipment carried on the vehicles shall be stored so as to prevent it from falling off the truck or injuring occupants during transit.

6.1.7 Workers shall not be permitted to ride outside, or on top of the vehicle, unless they are riding in a designated place or places required by the nature of the operation, such as roadside spraying.

6.1.8 No hoisting or lifting equipment shall be used to lift more than its rated capacity as stated by the manufacturer's specifications.

6.1.9 Pads shall be set under outrigger feet when they are put on a soft or unstable surface. Traction for outrigger feet shall be ensured when ice or snow is present. Operator shall ensure that outriggers are set on stable footing which may require the use of pads. Operator shall ensure there is adequate clearance and warning prior to lowering outriggers.

6.1.10 The manufacturer's instructions should be followed in detecting hydraulic leaks. Workers shall not attempt to locate hydraulic leaks by feeling for them with their hands.

6.1.11 All step surfaces on equipment shall be skid-resistant.

6.1.12 The manufacturer's preventative maintenance and parts-replacement procedures should be followed.

6.1.13 Ignition keys shall be removed when the vehicle or equipment is left unattended.

6.2 Aerial devices

6.2.1 Prior to the daily use of an aerial device, a visual inspection and operational check shall be made in accordance with the manufacturer's and owner's instructions. Manufacturer's instructions shall be available to the operator. A guideline for inspection should be available.

6.2.2 Buckets, platforms, or booms of aerial device equipment shall be provided with some means of anchorage to which a body belt lanyard can be secured. When aloft, the operator shall be secured with a body belt and personnel lanyard.

6.2.3 The combined load, including workers, material, and tools, shall not exceed the rated lift capacity as stated by the manufacturer. Such rated lift capacity (load rating) shall be conspicuously and permanently posted on the lift in accordance with ANSI/SIA A92.2.

6.2.4 An aerial device or aerial ladder shall not be used as a crane or hoist to lift or lower materials, unless specifically designed to perform such operations by the manufacturer.

6.2.5 Wheel chocks shall be installed before using an aerial device, unless the device has no wheels on the ground.

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6.2.6 When hydraulic/pneumatic tools are being serviced or adjusted, they shall be disconnected, except where manufacturer's procedures require otherwise.

6.2.7 When operating an aerial device, the operator shall look in the direction of travel of the bucket and be aware of the booms in relation to all other objects and hazards.

6.2.8 When booms or buckets are operated over roads, clearances from passing vehicles shall be maintained or traffic control shall be provided.

6.2.9 A one-person bucket shall not have more than one person riding in it during work operations.

6.2.10 Except where quick-acting connectors are used, pressure shall be released before connections are broken to avoid the hazards of flying particles or the whipping of hydraulic or pneumatic hoses. Hydraulic or pneumatic hoses shall never be kinked in order to cut off pressure prior to disconnecting.

6.2.11 No part of the body shall be used to either locate or attempt to stop a hydraulic leak.

6.2.12 All hoses affecting the dielectric characteristics of equipment shall meet manufacturer's requirements. Flash point of hydraulic fluid shall meet the minimum set by manufacturer.

6.2.13 Booms or buckets shall not be run into conductors, cables, poles, trees, and similar objects.

6.2.14 When working in proximity to energized, overhead conductors, electric cables (as for an electric saw), lights, or other conductive material shall not be run from the truck to the bucket on insulated equipment.

6.2.15 An aerial device truck shall not be moved when the boom is elevated in a working position with an operator in the bucket, except for equipment that is specifically designed for this type of operation. The booms of a fully articulated aerial device shall not be considered elevated in a working position when the bucket is "landed" directly in front of or behind the truck with the booms held as low as feasible and low enough so

that the operator's head is below the highest point of the vehicle.

6.2.16 Holes shall not be drilled in the bucket or liner that would reduce dielectric integrity.

6.2.17 During aerial device operations, tree workers not engaged in line-clearance shall maintain a minimum clearance of 10 ft (3.05 m) from energized conductors rated 50 kV phase-to-phase or less; for lines rated over 50 kV phase-to-phase, the minimum clearance shall be 10 ft + 4/10 in (3.05 m + 10 mm) for each kilovolt over 50 kV phase-to-phase. Qualified line-clearance tree trimmers or qualified line-clearance tree-trimmer trainees using an insulated aerial bucket may operate in accordance with the clearances given in table 1910.269 in 29 CFR 1910.269.

6.2.18 Workers shall be instructed that insulated buckets do not protect them from other electric paths to the ground, such as those through trees, through a guy wire, or the path from one phase wire to the second phase wire, any one of which can be fatal.

6.3 Brush chippers

6.3.1 Access panels for maintenance and adjustment shall be closed and secured prior to operation of brush chippers.

6.3.2 A rotary drum or disc brush chipper not equipped with a mechanical infeed system shall be equipped with an infeed hopper not less than 85 in (2.15 m), measured from the blades or knives to ground level over the centerline of the hopper, and shall have sufficient height on its side members so as to prevent personnel from contacting the blades or knives of the machine during operations.

6.3.3 A rotary drum or disc brush chipper not equipped with a mechanical infeed system shall have a flexible antikickback device installed in the infeed hopper to reduce the risk of injury from flying chips and debris.

6.3.4 A brush chipper equipped with a mechanical infeed system shall have a quick stop and reversing device on the infeed. The activating mechanism for the quick stop and reversing device shall be located across the top, along each side of, and close to the feed end of the infeed hopper within easy reach of the operator.

6.3.5 Trailer chippers detached from trucks shall be chocked or otherwise secured.

6.3.6 The operator and workers in the immediate area shall wear vision, hearing, or other personal protective equipment as required by the federal Occupational Safety and Health Administration (OSHA) in Title 29, part 1910, subpart I as well as requirements in 4.2.1.

6.3.7 When in tow position, the chipper safety chains shall be crossed under the tongue of the chipper and affixed securely to the towing vehicle.

6.4 Sprayers and related equipment

6.4.1 Working and walking surfaces of all sprayers and related equipment shall be covered with nonskid material.

6.4.2 Equipment on which workers stand and spray while the vehicle is in motion shall be equipped with guardrailing around the working area. The guardrailings shall be constructed in accordance with ANSI A1264.1.

6.5 Stump cutters

6.5.1 Stump cutters shall be equipped with enclosures or guards that will reduce the risk of injury to the operator.

6.5.2 The operator and workers in the immediate area shall wear vision, hearing, or other personal protective equipment as required by OSHA.

6.6 Trucks

6.6.1 A steel bulkhead or equivalent protection shall be provided to protect the occupants of vehicles from load shifts.

6.6.2 Logs or brush shall be securely loaded into trucks in such a manner as not to obscure tail lights or brake lights and vision, or to overhang the sides.

6.6.3 In order to avoid the hazard of spontaneous combustion or the production of undesirable odors, wood chips should not be left in trucks for extended periods.

6.7 Log loaders, tree cranes, and related hoists

6.7.1 Tree cranes operated by qualified personnel shall be operated to maintain a minimum clearance of 10 ft (3.05 m) from ener-

gized overhead conductors rated 50 kV or less. The minimum clearance shall be 10 ft + 4/10 in (3.05 m + 10 mm) for each kilovolt over 50 kV; however, a nonconductive load line of a crane may be operated within the clearances set forth in tables 1 and 2.

6.7.2 A boom-angle indicator shall be provided on all cranes.

6.7.3 An operator of hoisting equipment shall remain at the controls while a load is suspended.

6.7.4 Riding the load line while it is under load is prohibited. However, a qualified tree worker may be hoisted into position utilizing the hook, provided that the worker is tied in with an approved type of climbing line and climbing saddle that is properly secured to the boom or line.

6.7.5 A daily visual inspection of wire ropes, gears, chain drives, and other parts shall be made by the operator, in accordance with the manufacturer's recommendations.

6.8 Off-road equipment and tracked vehicles

6.8.1 Vehicles shall not be operated at speeds that will endanger the driver, the workers, or traffic. Equipment shall be under control at all times and shall be kept in gear when descending grades.

6.8.2 Towing equipment for brushhogs and similar implements should be equipped with a deadman control. If a deadman control is not available, the operator shall disengage the power source to the rotary or cutter head before alighting.

6.9 Underground operations

The location of any underground utilities shall be determined before underground operations are begun.

7 Portable power hand tools

7.1 Portable electric power tools

7.1.1 Electrical tools (except those that are self-powered) shall never be used in trees near an energized electrical conductor where there is a possibility of the supply cord or tool

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contacting the conductor, whether in an aerial device or not.

7.1.2 All portable electric hand tools shall

- be equipped with three-wire cord having the ground wire permanently connected to the tool frame and means for grounding the other end; or
- be of the double insulated type and permanently labeled as "Double Insulated"; or
- be connected to the power supply by means of an isolating transformer, or other isolated power supply.

7.1.3 Extension cords shall be maintained in safe condition. Exposed metal sockets shall not be used.

7.1.4 Tool operators shall use electric hand tools in accordance with the manufacturer's instructions.

7.1.5 Tool operators should

- prevent cords from becoming entangled, damaged, or cut by blades and bits;
- avoid laying an extension cord in water;
- support an electrical tool and its power supply cord by a line, independent of the worker when the tool is used aloft.

7.2 Gasoline-driven power saws

7.2.1 The manufacturer's operating and safety instructions should be followed unless modified by this standard.

7.2.2 Power saws weighing more than 15 lb (6.8 kg) (service weight) that are used in trees shall be supported by a separate line, except when used from an aerial-lift device.

Where there are no lateral branches on which to crotch a separate support line for power saws weighing over 15 lb (6.8 kg), a false crotch shall be used. A false crotch is one that can hold power-saw lines without slipping or coming untied.

7.2.3 The operator shall have secure footing when starting the saw. Power saws weighing less than 15 lb (6.8 kg) (service weight) may be drop started. Drop starting of saws over 15 lb (6.8 kg) is permitted outside of the bucket of an aerial device only after ensuring that the area below the device is clear of personnel.

7.2.4 The engine shall be started and operated only when all coworkers are clear of the saw.

7.2.5 The engine shall be stopped when power saws are being carried. The saw need not be stopped between cuts during consecutive felling, bucking, limbing, or cutting operations where there is secure footing. The chain shall not be moving and the operator's hand shall be off the throttle lever while operators move between work locations. One-person saws should be carried by the worker on the side with the guide bar of the saw pointed to the rear; two workers should carry a two-person saw.

7.2.6 The engine shall be stopped for all cleaning, refueling, adjustments, and repairs to the saw or motor, except where manufacturer's procedures require otherwise.

7.2.7 The saw muffler/spark arrester shall be maintained in good condition.

7.2.8 The saw should periodically be cleaned.

7.2.9 Because of the many specialized chain saw operations utilized during the "professional tree trimming process," it must be emphasized that exceptions to provisions of ANSI B175.1 are acceptable and may require a flexible and/or applicability judgment decision for this professional chain saw operation.

7.3 Backpack power units (for use in pruning, clearing, etc.)

7.3.1 The manufacturer's operating manual of instructions should be followed unless modified by this standard.

7.3.2 During operations, no one except the operator shall be within 10 ft (3.05 m) of the cutting head of a brush saw.

7.3.3 The power unit shall be equipped with a quick shutoff switch readily accessible to the operator.

7.3.4 The operator shall observe the position of all personnel while the unit is running.

7.3.5 The engine shall be stopped for all cleaning, refueling, adjustments, and repairs to the saw or engine, except where manufacturer's procedures require otherwise.

8 Hand tools

8.1 General

8.1.1 The correct tool shall be selected for the job.

8.1.2 Tools that have been made unsafe by damage or defect shall not be used.

8.1.3 When climbing a tree, workers shall not carry tools in their hands other than tools that are used to assist them in climbing, such as pole pruners or pole saws. Tools (other than ropes) shall not be thrown into a tree, or from worker to worker while in the tree.

8.1.4 A climbing line or handline should be used for raising and lowering tools. Tools should be raised or lowered in a manner so the cutting edge will not contact the rope.

8.1.5 Workers shall maintain a safe working distance from other workers when using hand tools.

8.1.6 Tools shall be properly stored or placed in plain sight out of the immediate work area when not in use.

8.2 Chopping tools - Axes, brush hooks, machetes, and others

8.2.1 Chopping tools that have loose or cracked heads or splintered handles shall not be used.

8.2.2 Chopping tools should not be used while working aloft.

8.2.3 Chopping tools shall be swung away from the feet, legs, and body, using the minimum power practical for control.

8.2.4 Chopping tools shall not be driven as wedges or used to drive metal wedges.

8.3 Pruners and saws

Pole pruners, pole saws, and other similar tools shall be equipped with wood or non-metallic poles. The actuating cord shall be of nonconducting material (example: polypropylene line).

8.4 Injector tools for applying herbicides

8.4.1 The bit of injector tools shall be covered with a shield when not in use.

8.4.2 Injectors shall be laid flat on the ground when not in use.

8.4.3 The injector shall not be carried on the shoulders but shall be carried by the loop handle on the downhill side, with the bit properly shielded and facing to the rear.

8.4.4 The manufacturer's recommendations shall be used in handling chemical mixtures.

8.4.5 Workers shall have firm footing and shall clear all interfering limbs away before using the tool.

8.5 Grub hoes, mattocks, and picks

8.5.1 The blade eye shall be tight-fitting and wedged so that it cannot slide down the handle.

8.5.2 When swinging grub hoes, mattocks, and picks, the worker shall have a secure grip and firm footing and be clear of overhead hazards.

8.6 Cant hooks, cant dogs, peavies, tongs, and carrying bars

8.6.1 Hooks should be firmly set before applying pressure.

8.6.2 Tools with cracked, splintered, or weakened handles should not be used.

8.6.3 Workers shall be warned and shall be in the clear before logs are moved.

8.6.4 The points of hooks shall be at least 2 in (51 mm) long and shall be kept sharp.

8.6.5 Workers shall stand to the rear and uphill when rolling logs.

8.7 Wedges, chisels, and gouges

8.7.1 Wedges, chisels, and gouges shall be inspected for cracks and flaws before use.

8.7.2 Wedges and chisels shall be properly pointed and tempered. Tools with mushroomed heads shall not be used.

8.7.3 Only wood, plastic, or soft-metal wedges shall be used to stop pinching while operating power saws.

8.7.4 Wood-handled chisels should be protected with a ferrule on the striking end.

8.8 Hammers, mauls, and sledges

Wood, rubber, or high-impact plastic mauls, sledges, or hammers should be used when striking wood-handled chisels or gouges.

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8.9 Ropes and climbing line

8.9.1 Rope made unsafe by damage or defect, or for any other reason, shall not be used.

8.9.2 Rope shall be stored away from all cutting edges and sharp tools. Corrosive chemicals, gas, and oil shall be kept away from rope.

8.9.3 When stored, rope shall be coiled and piled, or suspended, so that air can circulate through the coils.

8.9.4 Rope ends shall be secured to prevent raveling.

8.9.5 Safety snaps shall be rotated from one end of the rope to the other, as needed, and the worn end cut off.

8.10 Tackle blocks and pulleys

Tackle blocks and pulleys shall be inspected immediately before use and shall be condemned if defective.

8.11 Ladders

8.11.1 Ladders made of metal or other conductive material shall not be used where an electrical hazard exists. Only wood ladders (constructed in accordance with ANSI A14.1) or nonconductive ladders made of synthetic material equal to or exceeding the strength of wood ladders shall be used.

8.11.2 Metal ladders used where no electrical hazards exist shall conform to ANSI A14.2.

8.11.3 All ladders shall be inspected daily before use.

8.11.4 The attaching of cleats, metal points, and nonskid feet; lashing; or other effective means of securing the ladder shall be used if there is danger of its slipping.

8.11.5 Ladders shall be supported while in storage so they will not sag. Except when on mobile equipment, ladders should be stored under suitable cover, protected from the weather, and kept in a dry location away from excessive heat.

8.11.6 Ladders shall not be used as bridges or inclined planes to load or handle logs or other material.

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9 Work procedures**9.1 Climbing**

Tree workers shall be tied in with an approved climbing line and a tree climber's saddle when working above the ground. This does not necessarily apply to a worker ascending into a tree. Work may be performed while standing on a ladder, including the top rung, but only when the worker is tied in as required.

9.1.1 Prior to climbing operations, a visual inspection of the entire tree (including root collar) should be performed. During climbing operations, tree limbs should be inspected before weight is applied to them. The climber should not trust the capability of a dead branch to support the climber's weight. Dead branches should be removed on the way up, if possible. Hands and feet should be placed on separate limbs, if possible, maintaining three points of contact with the tree while climbing. While climbing, the worker should climb on the side of the tree that is away from electrical conductors, if possible. Climbers should have a minimum of two means of attachment available.

9.1.2 When the climbing distance is greater than 25 ft. (7.6 m), or is beyond the worker's physical capabilities, the worker should not climb, shin, body thrust, or footlock the line, without being tied in, belayed, using a lanyard or a prusik loop.

9.1.3 The climbing line should be passed around the trunk of the tree as high above the ground as possible using branches with a wide crotch to prevent any binding of the climbing line.

EXCEPTION: Palms and other trees with similar growth characteristics that will not allow a climbing rope to move freely.

The crotch selected for tying in should be directly above the work area, or as close to such a position as possible, but located in such a way that a slip or fall would swing the worker away from any electrical conductor. The rope should also be passed around the main leader or an upright branch, using the limb as a stop. Feet, hands, and ropes should be kept out of tight V-shaped crotches.

9.1.4 A false crotch can be used at the discretion of the climber in lieu of a natural crotch.

9.1.5 A figure-eight knot should be tied in the end of the rope. This will prevent pulling the rope accidentally through the taut-line hitch and possible serious injury from a fall.

9.1.6 The climbing line shall be crotched as soon as practicable after the worker is aloft and then a taut-line hitch shall be tied and checked.

9.1.7 The worker shall be tied in and remain tied in until the work is completed and the worker has returned to the ground. If it is necessary to recrotch the rope in the tree, the worker shall retie in or use the personnel lanyard before releasing the previous tie.

9.1.8 A climbing line shall never be left in a tree overnight.

9.1.9 The climber shall inspect his/her equipment for damage, cuts, abrasion, and/or deterioration before each use and shall remove it from service if signs of wear or damage are found.

9.1.10 During all tree-working operations above a height of 12 ft (3.65 m) that are not subject to the requirements of 5.2.3, there shall be a second person within vision or voice communication. That person should be trained in emergency procedures.

9.1.11 Climbing spurs shall have gaffs of the type and length suitable for the tree being climbed.

9.1.12 Palm frond skirts that have 3 years or more of growth shall be removed from the top down. The climber doing this work will be supported by a climbing line and a false crotch. The climber shall never attempt to remove skirts of 3 years or more by positioning himself/herself below the work areas while being supported by a lanyard.

9.1.13 Dry conditions and dead fronds present an extreme fire hazard. When dry conditions exist, no worker shall smoke while working in or near dead palm fronds. All chain saws shall have spark arresters in good working condition. Care should be taken to ensure that chipper exhaust systems do not present a fire hazard to dead fronds.

9.2 Pruning and trimming

9.2.1 Pole pruners and pole saws shall be hung securely in a vertical position to prevent

dislodgement. Pole pruners or pole saws shall not be hung on utility wires or cables and shall not be left in the tree overnight. Pole saws and pole pruners shall be hung so that the sharp edge is away from the worker, if possible, and shall be removed when the climber leaves the tree.

9.2.2 A scabbard or sheath should be hooked to the climbing saddle to carry the handsaw when it is not in use.

9.2.3 Warnings, when necessary, shall be given by the worker in the tree before a limb is dropped. "Timber" or "heads up" are common terms used for this purpose.

9.2.4 A separate line should be attached to limbs that cannot be dropped safely or are too heavy to be controlled by hand. The line should be held by workers on the ground end of the rope. Use of the same crotch for both the climbing line and the work line shall not be permitted.

9.2.5 Cut branches shall not be left in trees overnight.

9.3 Cabling

9.3.1 Ground personnel should not stand under the tree when the cable is being installed.

9.3.2 Tools used for cabling, bark tracing, cavity work, etc., shall be carried in a bag or belt designed to hold tools and attached to a tool lanyard designed to hold a tool bag.

9.3.3 When a block and tackle or a hand winch are released, workers in the trees should be positioned off to one side in order to avoid injury in case of the cable system failure.

9.4 Topping/lowering limbs

9.4.1 Workers performing topping operations should inspect the trees to assure they can stand the strain of the lowering procedure. If not, some other means of lowering the branches should be provided.

9.4.2 If large limbs are lowered in sections, the worker in the tree should be above or to the side of the limb being lowered.

9.4.3 Guidelines, handlines, or taglines should be used when conditions warrant.

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9.4.4 When making large cuts in single spar trees, both ends of the lanyard should be attached to a single point of attachment to prevent injury to the climber if the spar should split. The waist or side dees should not be used for this purpose.

9.5 Felling

9.5.1 Before beginning any felling operation, the worker shall carefully consider and incorporate appropriate action into the planning of the following:

- The tree and the surrounding area including other trees for anything that may cause a hazardous condition;
- The shape of the tree and the type of wood;
- The lean of the tree;
- Wind force and direction;
- Decayed or other weak spots throughout the tree. Be aware of additional hazards if these conditions exist in the hinge area;
- The location and the means to protect other persons, property, and all utility wires.

9.5.2 The work area shall be cleared to permit safe working conditions, and an escape route shall be planned before any cutting is started.

9.5.3 Each tree worker shall be instructed as to exactly what to do. All workers not directly involved in the operation shall be kept clear of the work area, where practicable beyond the length of the tree.

9.5.4 A notch and backcut shall be used in felling trees over 5 in (127 mm) in diameter, measured at breast height.

9.5.4.1 The depth or penetration of the notch shall be about one-third the diameter of the tree. A crack, decayed area, or other weakness should be avoided in the hinge area on either side of the notch cut, where practicable.

9.5.4.2 The notch should be a minimum of 45° to a total of 90° to ensure proper felling accuracy all the way to the ground.

9.5.4.3 The backcut shall be made higher than the point or apex of the notch to prevent kickback and shall avoid penetration into the predetermined hinge area.

9.5.5 Before commencing the backcut, an audible warning shall be given to those in the area. All personnel in the vicinity shall be out of range when the tree falls, and visual contact should be maintained with the tree until the tree is on the ground.

9.5.6 If there is danger that the trees being felled may fall in the wrong direction or damage property, wedges, block and tackle, rope, or wire cable (except where an electrical hazard exists) shall be used. All limbs shall be removed from trees to a height and width sufficient to allow the tree to fall clear of any wires and other objects in the vicinity. Refer to 9.4.

9.5.7 Special considerations in roping rotten, dead, split, or otherwise hazardous trees shall be taken because they may act or fall in an unexpected manner.

9.5.8 A planned escape route shall be prepared before felling any log or trunk. The escape preferable is 45° on either side of a line drawn opposite the intended direction of the fall. (The only person permitted in this area as the tree falls is the saw operator.)

9.6 Brush removal and chipping

9.6.1 Brush and logs should not be allowed to create a hazard at the work site.

9.6.2 All workers feeding brush into chippers shall wear personal protective equipment as required. See 4.2 of this standard.

9.6.3 Brush chippers should be fed from the side of the feed table centerline, and the operator shall immediately turn away from the feed table when the brush is taken into the rotor or feed rollers. Chippers should be fed from the curbside whenever practical.

9.6.4 The chipper chute shall not be raised or removed while any part of the machine is turning or moving. The chipper shall not be used unless a discharge chute is of sufficient length or design to prevent contact with the blade in place.

9.6.5 Foreign material, such as stones, nails, sweepings, etc., shall not be fed into the chipper.

9.6.6 Operators shall not wear loose clothing or gauntlet-type gloves while feeding the chipper.

9.7 Limbing and bucking

9.7.1 The tree worker should always attempt to operate the chain saw away from the vicinity of the legs or feet. Where possible, employ natural barriers such as limbs between the saw and operator while assuring proper balance. Proper feet and leg protection are highly recommended, where possible.

9.7.2 The tree worker should stand on the uphill side of the work.

9.7.3 Branches bent under tension shall be considered hazardous.

9.7.4 The tree worker should block the log to prevent rolling.

9.7.5 When bucking up trunks of trees, wedges should be used as necessary to prevent binding of the guide bar or chain.

9.7.6 A cant hook or peavey should be used as an aid in rolling logs over to complete bucking.

9.7.7 When more than one worker is working on a tree, each should be aware of the other's location and activity.

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Annex A
(informative)

Glossary of additional terms for ANSI Z133.1

NOTE – The numbers that appear in parentheses after these terms are cross references to the clause or subclause in the text in which the term is used.

aerial devices (6.2): One of the following types of vehicle-mounted aerial devices used to elevate personnel to job sites above ground:

- Extensible boom platforms;
- Aerial ladders;
- Articulating boom platforms;
- Vertical towers;
- A combination of any of the above defined in ANSI A92.2.³⁾

backcut (9.5.4): The cut made in a tree limb or tree trunk on the side opposite the intended direction of fall.

brushhog (6.8.2): A heavy-duty rotary mower, normally pulled by a farm-type tractor, used for cutting and mulching brush.

bucket (6.2.2): A basket-type enclosure approximately 4 ft (1.22 m) high, which is attached to the end of the upper boom on an aerial lift providing a work platform for the operator who is working aloft.

bucking (7.2.5): The act of sawing a felled tree, limbs, or both, into smaller sections.

crotch (7.2.2): To pass a rope through the crotch of a limb, or false crotch, in such a way that the load will be supported by the main leader.

deadman control (6.8.2): A safety switch, electrical or mechanical, that deactivates the equipment's function when released by the operator.

dielectric (4.2.2): Nonconductive of electrical current.

drop started (7.2.3): The act of starting a chain saw by pushing the saw away from the

body while simultaneously pulling on the starter handle.

false crotch for rigging (7.2.2): A pulley, block, sling, lashing, or metal ring, affixed to a tree's leader or limb, through which a load line is passed, to lower or raise limbs or equipment.

footlock (9.1.2): To climb up a suspended rope by pulling with the hands and arms and pushing upward with the feet. The loose end of the rope is wrapped under the middle and over the top of one foot, and is locked in place with pressure from the other foot. A prusik loop should be used by the climber when foot-locking.

ground personnel (9.3.1): Worker or workers assigned to assist and carry out tree work activities on the ground.

guideline (handline, tagline) (9.4.3): Ropes used to provide guidance to the direction of fall during lowering operations.

handlines, taglines (groundlines) (9.4.3): Ropes used for lifting, lowering, or guiding limbs or equipment, or both, into or out of the tree.

kilovolts (5.2.5): The term for 1000 V, abbreviated as kV. Higher voltages are generally expressed in this unit, i.e., 12.5 kV (12,500 V) and 19.9 kV (19,900 V).

mushroomed (8.7.2): A condition that develops from constant hammering on the heads of the chisels and wedges that causes the metal to spread outward, fold under, and splinter off.

outrigger (6.1.9): Built-in device used to stabilize cranes, aerial lifts, and similar equipment.

phase (5.2.5): Any current-carrying conductor that has an electric potential other than ground.

phase-to-ground (tables 1 and 2): The electric potential (voltage) between a conductor and ground (assumed at 0 V).

³⁾ The full titles for all referenced American National Standards are listed in clause 2.

phase-to-phase (5.2.5): The electric potential (voltage) between two conductors, each having its own electric potential reference ground.

primary conductor (5.2.3): Any conductor including aluminum, copper, or aluminum conductor steel reinforced (ACSR), bare, covered, or insulated, generally considered as above 750 V.

quick-acting connectors (6.2.10): Hose connectors in a hydraulic or pneumatic system designed to allow connection or disconnection without leakage when the system is pressurized.

shin (9.1.2): To climb by alternately shifting the grip of the arms and legs upward on the leader or on the limbs of the tree, or on both.

volts (5.1 and 5.2.5): A unit of electric potential difference between two points. Lower voltage systems are generally expressed in terms of volts, abbreviated V, i.e., 120 V, 240 V, and so on.

wheel chocks (6.2.5): Wedge-shaped blocks of wood or other material, placed in front of or in back of a vehicle's tires or tracks to prevent unintentional movement. If necessary, the chocks can be placed both in front and in back of the tires or tracks.

ANSI Z133.1-1994

**Annex B
(Informative)**

**Recommended guidelines for standard performance
and safety training for qualified line-clearance personnel**

NOTE - The contents of this training outline are generic and may be customized to achieve equivalent levels of safe practice by substituting, or where deemed appropriate to the circumstances, omitting portions of this outline. Doing so, or determining not to use training aids that may be available, shall not be evidence of noncompliance with this standard or annex.

graphic area, such as identification, growth habits, structure, and wood strength.

B.1.3.2 Provide education and training for recognition and evaluation of potentially hazardous conditions related to tree structure. Refer to recommended resources in annex D.

B.1 General requirements

B1.1 Introduction and employer/employee responsibilities

B1.1.1 Provide employee orientation to include:

- job description appropriate to job assignment;
- introduction to immediate supervision and crew members;
- familiarization with appropriate personal protective equipment and its proper use and maintenance;
- familiarization with equipment;
- introduction to company policies and procedures;
- safe work practices as related to job assignments.

B.1.1.2 Employee shall acknowledge in writing participation in employee orientation.

B.1.2 Line-clearance pruning and trimming techniques appropriate to job assignment

B.1.2.1 Provide education and training in accordance with prevailing national standards for utility pruning. Refer to recommended resources in annex D for further information.

B.1.2.2 Provide education and training in accordance with prevailing local, state or regional standards for utility pruning as well as those specified by utility contracts.

B.1.3 Tree knowledge for line-clearance purposes appropriate to job assignments

B.1.3.1 Provide education and training relative to predominant tree species within geo-

B.2 General safety

B.2.1 OSHA standards

Familiarize employees with the requirements of federal and/or state OSHA standards as applicable to their job assignment. Refer to recommended resources in annex D.

B.2.2 American National Standards

Familiarize employees with the requirements in ANSI Z133.1 as applicable to their job assignment. Refer to recommended resources in annex D.

B.2.3 Public safety and traffic control

Provide education and training in the use of public safety and traffic control devices as applicable under federal, state, or local regulations.

B.2.4 Electrical hazards

Provide education and training in the recognition and avoidance of electrical hazards applicable to the employee's job assignment. Refer to recommended resources in annex D.

B.2.5 Emergency conditions

Provide education and training in the proper procedures for safely performing work in emergency conditions applicable to the employee's job assignment.

B.2.6 Job site briefings

Provide education and training in job-site-specific hazards associated with the job, work procedures involved, special precautions, and personal protective equipment requirements as applicable to the employee's job assignment.

B.3 Personal safety**B.3.1 Personal protective equipment**

Provide personal protective equipment as required for applicable job assignments, and instruct the employee in its proper use and maintenance. Refer to recommended resources in annex D.

B.3.2 Emergency response procedures

Furnish employees with appropriate information and training required to expedite a response to a work site emergency, such as training in first aid, CPR, and aerial rescue methods.

B.3.3 Back and other accidental injury prevention

Provide education and training in the techniques required to avoid back and other accidental injuries applicable to job assignments.

B.3.4 Poison plant/animal identification and avoidance

Provide education and training in the identification and the need to avoid contact with poison plants and instructions for treating insect stings/bites, snake bites, etc.

B.4 Equipment safety**B.4.1 Mobile equipment and aerial lifts**

Provide education and training in the inspection, operation, and maintenance of all vehicles and equipment. This would include equipment such as aerial lifts, brush chippers, stump grinders, log loaders, tree cranes, mowing equipment, and pesticide application equipment. All equipment shall comply with applicable federal and state regulations, local ordinances, and manufacturer's operating instructions. Such training to be appropriate to the employee's job assignment. Refer to annex D for recommended resources.

B.4.2 Aerial equipment and electrical hazards

Provide education and training so that employees understand the required and recommended procedures for operating aerial lifts in proximity to electrical hazards. Such training to be appropriate to the employee's job assignment. Refer to annex D for recommended resources.

B.4.3 Chain saw, power tool, and hand tool use and safety

Provide education and training in the use and safety of chain saws, power tools, and hand tools in accordance with manufacturer's instructions. Such training to be appropriate to the employee's job assignment. Refer to annex D for recommended resources.

B.4.4 Climbing equipment

Provide education and training in the inspection, maintenance, and storage of climbing equipment such as ropes, saddles, lanyards, carabiners, climbers, etc. Such training to be appropriate to the employee's job assignment.

B.5 Operational safety**B.5.1 Climbing techniques**

Provide education and training in climbing techniques as appropriate to the employee's job assignment. Refer to annex D for recommended resources.

B.5.2 Rigging and tree removal

B.5.2.1 Provide education and training appropriate to the employee's job assignment in areas such as knots and ropes, rigging techniques, tree strength and weight characteristics, and potential electrical hazards.

B.5.2.2 Provide education and training in the identification and possible removal of dangerous trees. Such training shall be consistent with the requirements of the system owner/operator and appropriate to the employee's job assignment.

B.5.2.3 Provide education and training in the identification of hazardous trees, such training to be appropriate to the employee's job assignment.

B.5.3 Hazard communications

Provide education and training necessary to comply with federal regulations appropriate to the employee's job assignment.

B.5.4 Pesticide use

Provide education and training necessary to comply with federal regulations appropriate to the employee's job assignment.

**Annex C
(Informative)**

General safety procedures that apply to all tree work

C.1 Lifting

Before lifting any weight, the tree worker should

- a) be sure clear ground is available if the weight is to be carried from one place to another;
- b) decide exactly how the object should be grasped to avoid sharp edges, splinters, or other things that might cause injury;
- c) make a preliminary lift to be sure the load can be safely handled;
- d) place feet solidly;
- e) crouch as close to the load as possible with legs bent at an angle of about 90°;
- f) keep back as straight as possible. It may be far from vertical but should not be arched;
- g) lift with the legs, not the back;
- h) use a second worker when necessary.

C.2 Load handling

Loads should be handled by the use of skids and winch equipment; cutting logs into shorter lengths should be considered.

C.3 Direct supervision

Direct supervision is when a qualified line-clearance tree trimmer or a qualified supervisor is present on the job site.

C.4 Federal regulations for noise levels

The acceptable noise levels as established by the Occupational Safety and Health Administration may be obtained by consulting 29 CFR 1910.95 (see annex D) or by contacting the following agency:

U.S. Department of Labor
OSHA - Noise Conservation Standards
200 Constitution Ave., NW
Washington, DC 20210

Annex D (Informative)

Available resources

D.1 Applicable American National Standards

- Z133.1, *Tree care operations, safety*;
- A300, *Standard practices for trees, shrubs and other woody plant maintenance* (publication pending);
- A10.14, *Requirements for safety belts, harnesses, lanyards, lifelines, and drop lines for construction and industrial use*;
- A14.1, *Ladders - Portable wood - Safety requirements*;
- A14.2, *Ladders - Portable metal - Safety requirements*;
- A92.2, *Vehicle-mounted elevating and rotating aerial devices*;
- B175.1, *Gasoline powered chain saws - Safety requirements*;
- Z87.1, *Practice for occupational and educational eye and face protection*;
- Z89.1, *Personnel protection - Protective headgear for industrial workers - Requirements*.

D.2 Applicable federal regulations⁴⁾

- U.S. Department of Labor - Occupational Safety and Health Administration:
 - CFR 29 1910.000, *General industry*
 - CFR 29 1910.67, *Vehicle-mounted elevating and rotating work platforms*
 - CFR 29 1910.95, *Occupational noise exposure*
 - CFR 29 1910.151, *Medical services and first aid*

- CFR 29 1910.268, *Telecommunication*
- CFR 29 1910.269, *Electric power generation, transmission, and distribution*
- CFR 29 1910.331-335, *Safety - Electric related work practices*
- CFR 29 1910.1200, *Hazard communication*
- 49 CFR (transportation regulations)

D.3 Training programs available from the National Arborist Association⁵⁾

- Video programs:
 - *Professional tree care safety*:
 - *General requirements*;
 - *Personal protection*;
 - *Equipment procedures*;
 - *Operational practices*;
 - *Electrical hazards and trees*;
 - *Aerial rescue*;
 - *Principles of pruning*;
 - *Pruning standards*;
 - *Chipper use and safety*;
 - *Back injury prevention program*;
 - *Chain saw selection and maintenance*;
 - *Chain saw use and safety*;
 - *Ropes, knots and climbing*;
 - *Tree wire contact/general electricity*.
- Written programs:
 - *Home study program in arboriculture - Series I & II*;

⁴⁾ All available from the U.S. Department of Labor, OSHA, 200 Constitution Avenue, NW, Washington, DC 20201.

⁵⁾ All available from National Arborist Association, P.O. Box 1094, Amherst, NH 03031.