ATTACHMENT P1-4
VEGETATION MANAGEMENT PLAN

Vegetation Management Plan

Boardman to Hemingway Transmission Line Project

1221 West Idaho Street
Boise, Idaho 83702

September 2018

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ACRONYMS AND ABBREVIATIONS

ANSI	American National Standards Institute
BLM	Bureau of Land Management
IPC	Idaho Power Company
kV	kilovolt
NERC	North American Electric Reliability Council
ODOE	Oregon Department of Energy
OSHA	U.S. Department of Labor Occupational Safety and Health Administration
Project	Boardman to Hemingway Transmission Line Project
ROW	right-of-way
TVES	Terrestrial Visual Encounter Surveys
TVMP	Transmission Vegetation Management Program
USFS	United States Forest Service

Agency Review Process

The agency review process outlined in this section aligns with the OAR 345-025-0016 agency consultation process applicable to monitoring and mitigation plans.

To afford an adequate opportunity for applicable local, state and federal agencies to review the draft plan prior to finalization and implementation, and any future plan amendments, the certificate holder shall implement the following agency review process.

Step 1: Certificate Holder's Update of Draft Plan or Future Plan Amendment: The certificate holder may develop one Vegetation Management Plan to cover all construction activities for the entire facility; or, may develop individual plans per county, segment or phase, as best suited for facility construction. Based on the draft Vegetation Management Plan included as Attachment P1-4 of the Final Order on the ASC, the certificate holder shall update the draft plan(s) based on facility design and construction plans. If the plan(s) are amended following finalization, the certificate holder shall clearly identify and provide basis for any proposed changes.

Step 2: Certificate Holder and Department Coordination on Appropriate Review Agencies and Agency Review Conference Call(s): Prior to submission of the updated draft plan, or any future amended plans, the certificate holder shall coordinate with the Department's Compliance Officer to identify the appropriate federal, state and local agencies to be involved in the plan review process. Once appropriate federal, state and local agency contacts are identified by the Department and certificate holder, the Department's Compliance Officer will initiate coordination between agencies to schedule review/planning conference call(s). The Department and certificate holder may agree to schedule separate conference calls per county.

The intent of the conference call(s) are to provide the certificate holder, or its contractor, an opportunity to describe details of the updated draft or amended plan; and, agency plan review schedule. Agencies may provide initial feedback on requirements to be included in the plan during the call, or may provide written comments during the 14-day comment period. The Department will request that any comments provided be supported by an analysis and local, state or federal regulatory requirement (citation).

The certificate holder may coordinate with appropriate review agencies, in advance of or outside of the established agency review process; however, this established agency review process is necessary under OAR 345-025-0016 and may result in more efficient plan finalization and amendment if managed in a consolidated process, utilizing the Department's Compliance Officer as the lead Point of Contact.

Step 3: Agency Review Process: Either with, or prior to, the agency conference call(s), the certificate holder shall distribute electronic copies of the draft, or future amended, plan(s) requesting that the Department coordinate agency review comments within 14-days of receipt, or as otherwise determined feasible. Following the 14-day agency review period, the Department will consolidate comments and recommendations into the draft, or amended, plan(s), using a Microsoft Word version of the plan provided by certificate holder. Within 14-days of receipt of the agency review comments, the certificate holder shall provide an updated final version of the plan, incorporating any applicable regulatory requirements, as identified during agency review or must provide reasons supporting exclusion of recommended requirements. Final plans will be distributed to applicable review agencies by the Department, including the certificate holder's assessment of any exclusions of agency recommendations, and a description of their opportunity for dispute resolution.

Step 4: Dispute Resolution: If any review agency considers the final, or amended, plan(s) not to adhere to applicable state, federal or local laws, Council rules, Council order, or site certificate condition or warranty, the review agency may submit a written request of the potential violation to the Department's Compliance Officer or Council Secretary, requesting Council review during a regularly scheduled Council meeting. The Council would, as the governing body, review the violation claim and determine, through Council vote, whether the claim of violation is warranted and identify any necessary corrective actions.

1.0 INTRODUCTION

This Attachment to Exhibit P1 to Idaho Power Company's (IPC) Application for Site Certificate provides information on the Vegetation Management Plan that IPC will follow for the life of the Boardman to Hemingway Transmission Line Project (Project). The Project area, or Site Boundary, as defined in Oregon Administrative Rule 345-001-0010(55) includes "the perimeter of the site of a proposed energy facility, its related or supporting facilities, all temporary laydown and staging areas, and all corridors and micrositing corridors proposed by the applicant." The Site Boundary for this Project includes the following facilities in Oregon:

- The Proposed Route, consisting of 270.8 miles of new 500-kilovolt (kV) electric transmission line, removal of 12 miles of existing 69-kV transmission line, rebuilding of 0.9 mile of a 230-kV transmission line, and rebuilding of 1.1 miles of an existing 138-kV transmission line;
- Four alternatives that each could replace a portion of the Proposed Route, including the West of Bombing Range Road Alternative 1 (3.7 miles), West of Bombing Range Road Alternative 2 (3.7 miles), Morgan Lake Alternative (18.5 miles), and Double Mountain Alternative (7.4 miles);
- One proposed 20-acre station (Longhorn Station);
- Ten communication station sites of less than ¼ acre each and two alternative communication station sites;
- Permanent access roads for the Proposed Route, including 206.3 miles of new roads and 223.2 miles of existing roads requiring substantial modification, and for the Alternative Routes including 30.2 miles of new roads and 22.7 miles of existing roads requiring substantial modification; and
- Thirty temporary multi-use areas and 299 pulling and tensioning sites of which four will have light-duty fly yards within the pulling and tensioning sites.

The Project features are fully described in Exhibit B, and the Site Boundary for each Project feature is described in Exhibit C, Table C-24. The location of the Project features and the Site Boundary is outlined in Exhibit C. This Vegetation Management Plan includes a discussion of 1) the purpose, goals and objectives, 2) an overview of the vegetation community types within the Site Boundary where vegetation management will occur, and 3) methods of vegetation management.

1.1 Purpose

This Vegetation Management Plan describes the framework for the development of the final Vegetation Management Plan. The focus of this framework and the final Plan is to describe the methods in which vegetation along the transmission line will be managed during operation of the Project. The measures IPC will undertake to control noxious and invasive-plant species and prevent the introduction of these species within the Project Site Boundary are discussed in the Noxious Weed Management Plan (Exhibit P1, Attachment P1-5). The measures that will be taken to reclaim and revegetate areas that have been impacted by construction activities are discussed in the Reclamation and Revegetation Plan (Exhibit P1, Attachment P1-3).

This Plan is applicable Project-wide, and it is expected that modifications to this Plan will be made once final agreements are reached with the appropriate land management agencies and the Oregon Department of Energy (ODOE), as well as with counties and individual landowners. The final Vegetation Management Plan is intended to meet the applicable guidance contained in the Oregon Forest Practices Act (Oregon Administrative Rule Chapter 629), United States

Forest Service (USFS) Manual 2070 (USFS 2008) and 2900 (USFS 2011), as well as any applicable Bureau of Land Management (BLM) Resource Management Plans and local (i.e., county or city) management plans. Vegetation management specifications will follow those detailed in PacifiCorp's Transmission and Distribution Vegetation Management Program Specification Manual (Appendix A).

1.2 Goals and Objectives

IPC has two goals for conducting vegetation management during operation of the Project:

1. Access: IPC's access goal for conducting vegetation management is to maintain work areas adjacent to Project features but within the right-of-way (ROW), that will allow vehicle and equipment access; this access is necessary for operations, maintenance, and repair of the Project.
2. Safety/reliability: IPC's safety and reliability goal for vegetation maintenance is to maintain the safety and reliability of the transmission line, by preventing tall vegetation from coming into contact with conductors.

2.0 OVERVIEW OF EXISTING ENVIRONMENTS

Vegetation management activities may occur throughout the Project but will be heavily focused in forest and woodland areas, and forested riparian and forested wetlands where tall shrubs and trees may impact transmission lines and structures. IPC used data from the Terrestrial Visual Encounter Surveys (TVES) to identify the ecological systems and assign a habitat type and category based on vegetation characteristics. However, due to limitations on access to private lands, surveys have not been completed within the entire Site Boundary. Approximately 67 percent of the Site Boundary was surveyed for TVES (see Exhibit P1). In areas where survey information was not available due to unsigned right-of-entry agreements or changes in route alignment, biologists used desktop analysis methods to assign habitat type and category. The U.S Geological Service Gap Analysis Project data (USGS 2011) and aerial imagery interpretation were used to delineate habitat type and agency designated habitats (e.g., Oregon Department of Fish and Wildlife designated big game habitats). Known occurrences of special status species, and conditions in adjacent surveyed areas were used to approximate the appropriate category type. Detailed descriptions of the modeling and criteria used to identify and categorize habitats within the Site Boundary are included in Attachment P1-1, Habitat Categorization Matrix, and Attachment P1-6, Fish and Wildlife Habitat Mitigation Plan.

TVES and subsequent desktop analysis for the habitat categorization process identified various habitat types present within the Site Boundary. These habitat types were then assembled into vegetation cover types for purposes of this Vegetation Management Plan. Grouped cover types are useful in presenting and describing vegetation management methods used for specific habitat types, mainly forest and woodland. These vegetation cover types differ slightly from the "General Vegetation Type" identified as part of the habitat categorization process and are described below in Table 1.

The extent of each vegetation cover type and the habitat types included in each cover type within the Site Boundary are presented in Table 1. Descriptions of each cover type are provided in the Reclamation and Revegetation Plan (Exhibit P1, Attachment P1-3), but are described as Reclamation Zones in that plan. The vegetation cover types specific to the Vegetation Management Plan are described below.

Table 1. Vegetation Cover Types within the Site Boundary

Vegetation Cover Type	Percent of Site Boundary	Habitat Types Included in Each Vegetation Cover Type
Shrubland	37	Desert Shrub Shrub-Steppe with Big Sage Shrub-Steppe without Big Sage
Grassland	18	Native Grasslands
Agriculture	8	Agriculture
Forest and Woodland	13	Douglas-Fir / Grand Fir Ponderosa Pine Western Juniper / Mountain Mahogany Woodland Forested – Other
Wetland / Riparian	1	Emergent Wetland Scrub-Shrub Wetland Forested Wetland Aquatic Bed Wetland Ponds and Lakes Ephemeral, Intermittent, and Perennial Stream Herbaceous Riparian Introduced Riparian Riparian Woodland and Shrubland
Other	23	Introduced Upland Vegetation Developed / Disturbed Bare Ground, Cliffs, Talus

Forest and Woodland, where most vegetation management will occur, account for 11 percent of the Site Boundary. Forest and Woodland types are made up mostly of Douglas-fir (*Pseudotsuga menziesii*) forest and ponderosa pine (*Pinus ponderosa*) forest with lesser amounts of western juniper (*Juniperus occidentalis*) woodlands. Forested habitats are found predominantly in the Blue Mountains, in Umatilla and Union counties, from just south of La Grande to south and east of Pendleton. Small pockets of Douglas-fir forests are also mapped in the drainages and highest elevations southwest of the town of Durkee. Logging and other disturbance such as grazing is common in these cover types. Juniper woodlands are mostly found in Baker County northwest of Durkee to south of Weatherby.

Wetland and Riparian habitat occurs in 1 percent of the Site Boundary. These areas are found throughout the Site Boundary adjacent to rivers, springs, and seeps. Vegetation management may be required in forested wetland and riparian areas where trees and shrubs may grow sufficiently large to interfere with transmission lines and structures.

3.0 VEGETATION MANAGEMENT

General vegetation management strategies are described below, with specifications and methodologies detailed in the PacifiCorp Transmission and Distribution Vegetation Management Program Specification Manual (Appendix A).

IPC must maintain work areas adjacent to electrical transmission structures and along the ROW to allow access for vehicles and equipment necessary for operations, maintenance, and repair. Furthermore, vegetation management under the transmission line minimizes the potential for fires and power outages that can result when vegetation comes into contact with conductors.

Vegetation management is expected to be minimal for the Project, as the vast majority of the Project crosses through areas that contain low-growing vegetation cover types (e.g., grasslands and shrublands; Table 1). As these vegetation cover types will not grow to heights that could interfere with the transmission line, they will not be maintained or cleared under the line during operation of the Project. Forest and Woodlands make up 13 percent of the area within the Site Boundary and will account for the majority of the vegetation management activities. Some vegetation management may also be required in wetland/riparian areas that are dominated by trees or tall shrubs.

Vegetation management will be conducted in compliance with the American National Standards Institute (ANSI) Pruning Standards Best Management Practices for Utilities, Oregon Forest Products Act, the U.S. Department of Labor Occupational Safety and Health Administration (OSHA), North American Electric Reliability Council's (NERC) Standard FAC-003-3 Transmission Vegetation Management Program (TVMP)[1], and IPC's TVMP (Appendix A). The vegetation management program will accomplish the following tasks:

- Lines that are 138-kV, 161-kV, 230-kV, and above are patrolled, at a minimum cycle of once a year, to identify hazardous vegetation, within or adjacent to the ROW, that could fall in or onto transmission lines or associated facilities. Hazardous trees, snags, or "hot spots" are removed. Any trees that will become a clearance violation prior to the next scheduled maintenance cycle are evaluated, and trimmed or removed.
- Trim trees and tall shrubs to the extent that the clearance lasts for the duration of the cycle.
- Remove vegetation, as necessary, to provide required electrical clearance and improve access to facilities.
- Remove tall-growing vegetation within structures. Clear brush and grass around wood poles to help protect structures from range fires.
- Facilitate a low-growing plant community that stabilizes the site, inhibits the growth of tall-growing shrubs and trees, and provides habitat for wildlife.

Clearing of vegetation near Project components will be accomplished using manual (i.e., hand pulling, lopping by hand crews), and mechanical methods (i.e., chainsaws, weed trimmers, rakes, shovels, mowers, brush hooks, and Slash Buster [a track-driven machine]), or a combination of these methods. The specific methods depend on site-specific conditions, such as slope, access, size/extent of vegetation, previous agreements with landowners, and the presence of sensitive resources. In order to meet vegetation maintenance objectives, herbicides may also be used to control vegetation in selected areas as described in Section 3.3 of this Plan.

Forest and woodland habitats are concentrated in the portion of the Project that crosses the Blue Mountains, but are also found northwest of Durkee to south of Weatherby. Initial ROW clearing activities in forest and woodland habitats are detailed in Exhibit K, Attachment K-2 ROW Clearing Assessment. Unlike the portion of the Project that crosses low-lying vegetation (e.g., grasslands and shrublands), these forest and woodland habitats, as well as some wetland and riparian areas, contain vegetation that will need to be maintained within the ROW in order to maintain access, safety, and reliability of the Project. Maintenance of the ROW will require IPC to file with the Oregon Department of Forestry a Plan for an Alternate Practice under the Oregon

[1] FAC-003-1 requires transmission owners to prepare, and keep current, a formal TVMP. The TVMP shall include the transmission owner's objectives, practices, approved procedures, and work specifications. Available at: http://www.nerc.com/files/FAC-003-1.pdf

Forest Practices Act. IPC's Plan for an Alternate Practice is included in Exhibit BB, Attachment BB-1. The vegetation management that will be conducted along these forested and woodland portions of the Project is discussed in the following sub-section.

3.1 Right-of-Way Maintenance

Vegetation management practices along the ROW will be conducted in accordance with the TVMP in Appendix A. As stated above, these practices will comply with the standards set by the ANSI Pruning Standards Best Management Practices for Utilities, the Oregon Forest Products Act, and by OSHA and NERC requirements.

A wire-border zone method will be used during maintenance of the ROW in forested and woodland habitats to control tall vegetation and to ensure adequate ground-to-conductor clearances (Appendix A, Section 6.7.1.5.1). This method results in two zones of clearing and revegetation: the wire zone and the border zone. The wire zone includes the linear area along the ROW located under the wires as well as the area extending 10 feet outside of the outermost phase-conductor. After initial clearing, vegetation in the wire zone will be maintained to consist of native grasses, legumes, herbs, ferns, shrubs, and other low-growing vegetation that remain under approximately 5 feet tall at maturity. The border zone is the linear area along each side of the ROW extending from the edge of the wire zone to the edge of the ROW. Vegetation in the border zone will be maintained to consist of tall shrubs or short trees (up to 25 feet high at maturity), grasses, and forbs. These cover plants along the border zone benefit the ROW by competing with and excluding undesirable plants. No clearing will be conducted in areas where the height of mature trees will not come within 50 feet of the wires (e.g., a canyon or ravine crossing with high ground clearance at mid-span). Minimum clearance values are affected by circuit voltage, terrain, span length, ruling span length, conductor size and tension, anticipated wind conditions, and structure framing parameters. Figures 6.4a, 6.4b, and 6.5 in Appendix A illustrate specifications for the wire-border zones.

Transmission lines are inspected and cleared on long-term cycles; however, shorter clearing cycles may occur if conditions dictate out-of-cycle trimming is needed to maintain the wire-border zone objectives. During operations, vegetation growth will be monitored and managed to maintain the wire-border zone objectives. The methods for maintaining vegetation within the wire and border zones will be similar to those described above, with the exception that mechanical as opposed to manual methods will be employed due to the scope and extent of area to the treated.

In addition to the cyclical inspection cycles described above, Transmission Patrolmen patrol and inspect lines at a minimum once a year to identify any transmission defects and any vegetation hazards that may develop between the long-term clearing cycles. During these inspections, the Patrolman will identify hazardous vegetation, within or adjacent to the ROW, that could fall in or onto the transmission lines or associated facilities and cause an outage. The Patrolman will evaluate the hazardous vegetation as to the level of threat posed by categorizing the vegetation as an "imminent threat," "medium hazard," or "low hazard." Any issues found are reported to the grid operator and to vegetation management, and documented on an Emergency Tree Action Form. If possible, the Patrolman will take photos of the "imminent threat" vegetation for further evaluation by vegetation management staff.

Imminent threats are any vegetation issue that poses an imminent threat of causing a line outage and that has a high risk of failure in the next few days or weeks. These imminent threats are normally tall trees that have one or more drastic defects that could cause the tree to fail and fall in or onto transmission lines and cause an outage. An "imminent threat" could also be vegetation that is in good condition but that has grown so close to the transmission line that it could be brought into contact with the line through a combination of conductor sag and/or wind-

induced movement in the conductor or the vegetation. Hazards are any vegetation issue that poses a threat of causing a line outage, but that has either a low or medium risk of failure in the next month. These hazards are normally trees that have one or lesser defects that could cause the tree to fail and fall in or onto transmission lines and cause an outage.

On federal and state ground, IPC prefers to clear cut all tall-growing trees in the ROW. Clear-cut methods include crews that use chain saws, or track-driven machines such as Slash Buster and the Brontosaurus. On private property, removal is IPC's first choice, but if not approved, IPC will proceed to trim the trees. The typical trimming methods used are a top trim or side trim.

During tree- and shrub-trimming operations, strategies that minimize effects to wildlife will be used. Tree and shrub trimming will be avoided during the primary avian breeding season (April 1–July 15), especially in sensitive habitat (i.e., riparian). Upland habitat suitable to nesting migratory birds will be surveyed prior to ground clearing between April 1 and July 15 for active nests. A 100-foot no-construction-buffer around active nests will be implemented. No seasonal restrictions will be imposed on clearing upland habitat between July 15 and February 15. Ground clearance in riparian habitats will be allowed between August 1 and March 30, with the exception of a seasonal constraint for impacts to fisheries resources.

3.2 Slash and Debris Management

As the vast majority of the Project crosses through areas where little to no vegetation management will be conducted, substantial slash and debris is unlikely to be generated along most portions of the Project during operations. However, maintenance and construction along the portion of the Project that crosses forested and woodland areas could generate timber slash and debris. In general, this slash and debris can be either 1) chipped, with the chips scattered along the ROW or removed; 2) lopped and scattered on site; or 3) piled on site. IPC's preferred method for handling slash is to lop and scatter the slash on site, as long as the scattered material does not block access, represent a safety hazard, or adversely affect management goals for the area. The method for managing slash and debris in these areas will be determined based on the requirements and recommendations by the appropriate land management or regulatory agency and ODOE. Slash management strategies will be developed to minimize fuel loading and wildfire hazard.

3.3 Herbicide Use

On federally controlled lands, a Pesticide Use Proposal will be submitted prior to any application as recommended in the Final Environmental Impact Statement on Vegetation Treatments Using Herbicides on BLM Lands in Oregon (BLM 2010). The Pesticide Use Proposal will include the dates and locations of application, target species, herbicide, adjuvants, application rates and methods (e.g., spot spray vs. boom spray), and anticipated impacts to non-target species and susceptible areas. Private property will be sprayed only if written approval is obtained from the landowner. All herbicide applications will comply with U.S. Environmental Protection Agency label instructions; federal, state, and/or county regulations; permit stipulations; and landowner agreements. Herbicide contractors, certified and approved in the state of Oregon, will have current safety data sheets and will take all reasonable precautions to prevent spills.

Herbicide use near special status species and waterbodies will follow label requirements, state and federal law, and BLM and USFS recommendations. Only herbicides approved by the land-managing agency as safe to use in aquatic environments and reviewed by IPC for effectiveness will be used within 100 feet of aquatic resources, and no herbicides will be applied within 100 feet of known threatened and endangered plants or waterbodies during preconstruction activities. Areas of flowing water, wetlands, or other sensitive resources where herbicide use will be prohibited will be described in the Final Noxious Weed Plan and be identified on construction

maps and flagged. IPC will also comply with the Idaho and Oregon National Pollutant Discharge Elimination System permits related to the use of herbicides in and adjacent to waterbodies.

Care will be taken during transport and storage to minimize the potential for leaks. In the event of an herbicide spill, the spill will be promptly cleaned up by appropriately trained personnel, and contaminated materials will be transported to a disposal site that meets local, state, and federal requirements. If a spill occurs whose cleanup is beyond the capability of on-site equipment and personnel, an Emergency Response Contractor available to further contain and clean up the spill will be identified. Potential contractors will be identified prior to the start of construction activities. Emergency spill response kits will be maintained at all locations where hazardous materials, including herbicides and pesticides, are stored in sufficient quantities based on the amount of materials stored on-site. Spill kits will include materials to address spills both on land and into water. If a spill occurs, the applicator will report it in accordance with applicable laws and will contact Construction Contractor(s) supervisory personnel, the appropriate land management agency, and the ODOE. Spill preventive and containment measures or practices will be incorporated as described in Exhibit G, Materials Analysis, and Attachment G-4, Draft Spill Prevention, Control, and Countermeasures Plan.

Additional information pertaining to herbicide use is listed in the Noxious Weed Plan (Exhibit P1, Attachment P1-5).

4.0 PLAN UPDATES

Once the preferred route is selected and final engineering is completed, an updated Vegetation Management Plan will be prepared. The Vegetation Management Plan will be updated prior to the start of construction.

5.0 LITERATURE CITED

BLM (Bureau of Land Management). 2010. Final Environmental Impact Statement Vegetation Treatments Using Herbicides on BLM Lands in Oregon. BLM, Oregon State Office. Portland, Oregon. Available online at: http://www.blm.gov/or/plans/vegtreatmentseis/documents.php.

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USFS. 2011. FSM 2900 – Invasive Species Management. 2900-2011-1. December 5. Available online at: https://www.invasivespeciesinfo.gov/docs/toolkit/fspolicy_2900_20111205.pdf

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APPENDIX A
PACIFICORP'S TRANSMISSION AND DISTRIBUTION VEGETATION MANAGEMENT PROGRAM SPECIFICATION MANUAL

PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

Transmission & Distribution
Vegetation Management Program

Standard Operating Procedures

Revision	Status	Date	Author	Change Tracking
00	Issued for implementation	12/15/2008	R. H. Miller	Manual created
01	Reviewed/Updated	06/15/2012	R. H. Miller	1. Clarified language throughout 2. Revised Chapter 4 to reflect a process checklist used for project management. 3. Modified Clearance 2 to strictly reflect table 5 in IEEE 516-2003 Table 5. 4. Section 6.4.1 changed so that if contract utility foresters identify an imminent threat, they contact the appropriate line patrolmen to initiate the imminent threat procedure.
02	Reviewed/Updated	09/06/2013	R.H. Miller	1.Clarified language throughout. 2. Revised distribution action thresholds and clearance standards to accommodate three and four year cycles. 3. Modified transmission clearance requirements to accommodate FAC-003-02
03	Reviewed/Updated	06/24/2015	R.H. Miller	1. Clarified language 2. Brought specification manual into line with FAC-003-03
04	Reviewed/Updated	07/01/2015	R.H. Miller	1. Corrected Table of Contents 2. Updated Figures 2.1 and 6.6 with Rocky Mt. Power 3. Corrected reference to Table 2.2 4. Added substation inspection Section (2.6 and 4.2.4.6) 5. Clarified definition of interim work. 6. Clarified side work.
05	Reviewed/Updated`	06/01/2016	R.H. Miller	1. Changed document to "Standard Operating Procedures" 2. Clarified language 3. Chapter 2. a. Added "At Fault" tree crew caused outages language – Section 2.1.6 b. Added language to contact media – Section 2.4.2.1 c. Added language to contact legal – Section 2.4.2.2 d. Added language that mechanical cutting (Jarraff's and helicopters) to comply with ANSI A300. e. Added language for storm emergency response 2.10. f. Added language assigning responsibility for property damage to contractors 2.12. 4. Chapter 4 a. Added language to requiring rules be followed on hydroelectric facilities and communicate with plant manager – Section 4.2.4.7. b. Added language requiring limited visual hazard tree inspections around substations and transition stations – 4.2.4.8.

Revision	Status	Date	Author	Change Tracking
				c. Added language on working around schools – Section 4.2.7.1. d. Added language regarding working near mobile home parks and apartment complexes – Section 4.2.7.2. e. Simplified language on accounting for pruning in – Section 4.3.1 5. Chapter 5 a. Updated interim maintenance language – Section 5.3 b. Added a section on distribution herbicide maintenance – Section 5.5 c. Updated work thresholds and clearances – Table 5.1 d. Added table on interim work thresholds and clearances – Table 5.2 e. Added section on padmount transformers – Section 5.7. 6. Chapter 7 a. Added section on closed chain of custody – Section 7.1 b.

Approval: Steve Anderton, Managing Director, T&D Support Services Date: 06/01/2017

Transmission & Distribution
Vegetation Management Program

Standard Operating Procedures

June 1, 2017

PacifiCorp, Director, Vegetation Management
1407 West North Temple, Room 230
Salt Lake City, Utah 84116
801.220.2271

Transmission & Distribution
Vegetation Management Program

Standard Operating Procedures

Mission Statement:

Manage trees and vegetation around PacifiCorp's transmission and distribution facilities in a professional, cost effective and environmentally conscientious manner to provide safe, reliable and outstanding service to our customers.

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Figures and Tables

1. PROGRAM OVERVIEW

Trees growing into or near power lines are a concern for PacifiCorp because they can create safety and service reliability risks. Close growing branches can provide access for children and others to high-voltage lines, exposing them to the potential danger of serious injury or death due to electric contact. Branches touching power lines can spark and start fires and cause interruptions in electric supply. Trees whipped by winds or weighed down by rain or snow can interrupt power, which disrupts businesses, homes, and compromises critical community infrastructure, such as hospitals and emergency services.

Three major electric grid failures, including the catastrophic blackout on August 14, 2003, were initiated by tree-caused outages on transmission lines (U.S.-Canada Power System Outage Task Force 2003).

For these reasons and others, the National Electrical Safety Code (ANSI 2016) Section 2l8-A-l, states:

> *Trees which may damage ungrounded supply conductors should be pruned or removed. Note: Normal tree growth, the combined movement of trees and conductors under adverse weather conditions, voltage and sagging of conductors at elevated temperatures are among the factors to be considered in determining the extent of pruning required.*

PacifiCorp's distribution system averages scores of trees for every mile of line, any of which could potentially create problems. With that level of exposure, it is impossible to secure the system completely. Electric utilities, such as PacifiCorp, manage their systems to reduce electric supply and service reliability risks by clearing trees from power lines.

Often, particularly in the case of transmission lines, the best solution is to remove tall-growing trees in favor of low-growing species that will never interfere with the high-voltage lines. However, it is not always possible to remove conflicting trees. Trees that cannot be removed must be pruned to clear the utility space using modern, arboriculturally-sound pruning practices.

PacifiCorp's standard operating procedures cover the vegetation management program for both distribution and transmission facilities. It includes program descriptions, specifications and protocols for customer relations. Its intent is to provide direction for foresters as well as contract GF/supervisors, contract utility foresters and utility tree workers on PacifiCorp's system, and helps inform PacifiCorp employees about vegetation management.

1.1 Applicable References

The following standards and best practices shall be followed:

- *American National Standard for Tree Care Operations: ANSI A300 (Part 1) Pruning*
- *American National Standard for Tree Care Operations: ANSI A300 (Part 7) Integrated Vegetation Management*
- *American National Standard for Tree Care Operations: ANSI A300 (Part 9) Tree Risk Assessment.*

- *American National Standard for Arboricultural Operations ANSI Z133 Safety Requirements*

The following best practice should be followed:

- International Society of Arboriculture: *Best Management Practices, Utility Pruning of Trees*
- International Society of Arboriculture: *Best Management Practices, Integrated Vegetation Management*
- International Society of Arboriculture: *Best Management Practices, Tree Risk Assessment*
- Utility Arborist Association Best Management Practices: *Field Guide to Closed Chain of Custody for Herbicides in the Utility*

1.2 Professionalism

PacifiCorp employs a staff of professional foresters to manage its vegetation program and communicate effectively the community service it provides. Contractor front line managers, supervisors or general foreman (GFs) must be Society of Arboriculture (ISA) Certified Arborists and ISA Certified Utility Specialists. PacifiCorp promotes Board Certified Master Arborist credentials among its staff foresters.

1.2.1 Contract utility forester Qualifications

Contract utility foresters should have the following qualifications:

- Contract utility forester 1: No experience required. ISA certification and a certified applicator card not required. Maximum of 90 days in this position.
- Contract utility forester 2: Minimum of an associate's degree and up to two (2) years' experience. ISA certification and a certified applicators license required.
- Contract utility forester 3: Minimum of an associates degree and over two (2) years' experience. Certified applicator's license and ISA certification required.
- Contract utility forester 4: Minimum of a bachelor's degree or four (4) years' experience. Certified applicator's license, ISA certification and Utility Specialist certification are required.
- Contract utility forester 5: Minimum of a bachelor's degree and five (5) years' experience. Certified applicator's license, ISA certification and Utility Specialist certification are required. This is the preferred classification.

PacifiCorp vegetation management is founded on the industry's best practices, including systematic maintenance, scientifically-based pruning, tree removal, tree replacement, cover type conversion, herbicide use and tree growth regulator applications; as well as specialized tools and equipment. PacifiCorp is progressive in trying innovative methods, products and equipment in order to improve safety and productivity.

1.3 Tree Line USA

PacifiCorp has been a Tree Line USA recipient utility every year since 2002. Tree Line USA is an award from the National Arbor Day Foundation, which recognizes utilities for utilizing practices that protect America's urban forests. To qualify, utilities must apply scientifically-based tree care, conduct annual worker training, plant trees, and conduct public education, including participating in Arbor Day celebrations. Contract

employees should participate in annual worker training to cooperate with and help PacifiCorp continue to merit this award.

2. GENERAL PROCEDURES

General specifications cover safety, the environment, how to approach archeological sites, communication, tree growth rate definition, tree removal, mechanical and helicopter cutting, slash disposal, emergency disposal, facility inspection, property damage, freelance work and miscellaneous procedures.

2.1 Safety Federal and state OSHA requirements governing vegetation management activities shall be followed at all times. ANSI Z133.1 (ANSI 2012) and OSHA 1910.269, are examples of these requirements. Activities shall be conducted in a manner that minimizes both tree crew and public safety risks. Crews shall have functional radio or telephone communication on the job site at all times.

PacifiCorp's electrical system will continue in normal operations during routine vegetation management work. Contract employees shall be aware of the potential dangers and qualified to work in the vicinity of energized facilities. Contract personnel performing line clearance work shall hold one of the following designations as defined by ANSI Z13:

- Qualified Line Clearance Arborist
- Qualified Line Clearance Arborist Trainee

2.1.2 Holds and Clearances

Minimum approach clearances for qualified line clearance arborists specified in ANSI Z133 or PacifiCorp's *Accident Prevention Manual* (Joint Safety Committee 2003 [Table 2.1]), should not be compromised. If there is a difference in the distances required in the two standards, the greater of the two is operative. If work requires violating minimum approach distances, or if a crew leader determines conditions to be unsafe, crew leaders should contact their supervisor/GF before proceeding. The GF/supervisor should determine whether or not a clearance or hold is necessary at that work site.

A hold means deactivating automatic line reclosers on a circuit. It is intended to protect PacifiCorp facilities and should not be considered a safety measure. If, in the judgment of the crew leader, an energized line cannot be worked safely, the GF/supervisor should arrange a clearance. A clearance is de-energizing a line.

PacifiCorp does not issue holds or clearances to tree crews. Rather, the Company will issue holds or clearances to a journeyman lineman, who shall be present at the site during work. Holds require at least 48 hours' notice to dispatch, vegetation management and the district operations manager. In some cases, a clearance on transmission lines must be requested weeks or even months in advance. Customers do not need to be notified if a clearance is necessary to safely work trees from lines in an emergency.

Customers who will be affected by planned power outages associated with clearances must also receive 48 hours notice, except during emergency situations such as storm restoration work. De-energized lines; whether due to a planned outage, wind or storm damage, or some other reason; must be worked as if they are energized. If a line cannot be worked safely assuming it is energized, it must be grounded. Linemen must set the grounds and be present during work, and

give approval prior to tree crew members breaching minimum approach distances to ensure safety.

Figure 2-1 Emergency procedure for a tree on line incident.

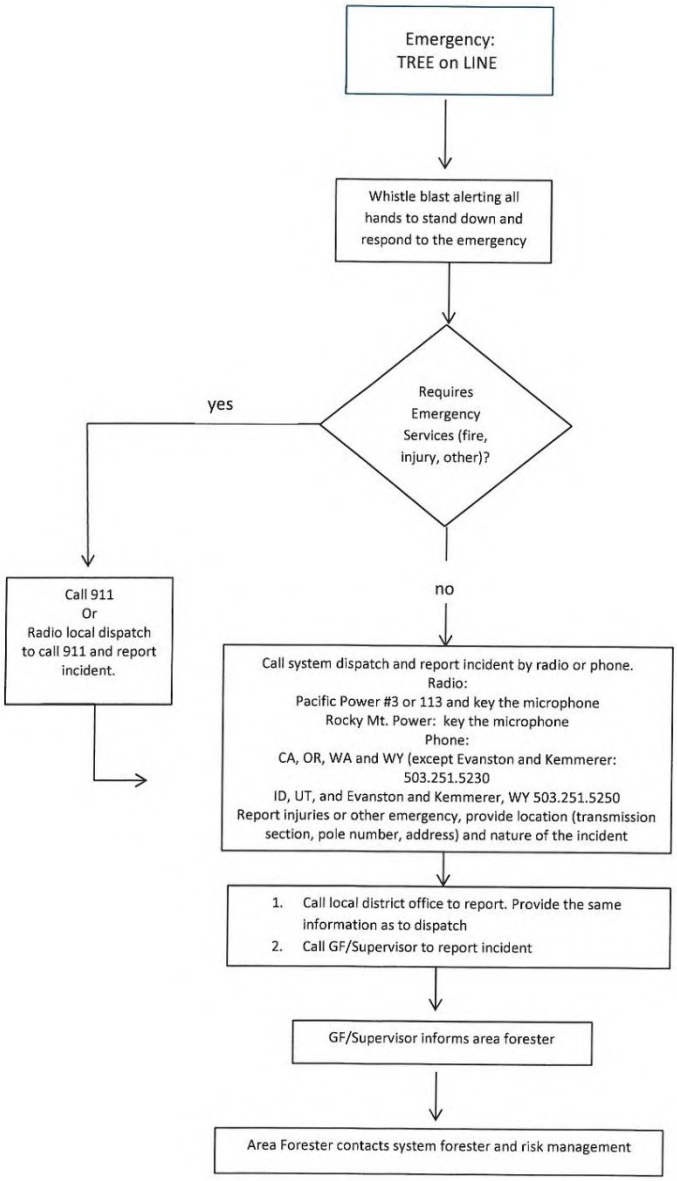

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Table 2-1 Minimum approach distances for qualified line-clearance arborists and line-clearance arborist trainees

Voltage Phase-to-Phase	Minimum Approach Dist.	Source
50-300 v	Avoid contact	APM/Z133
301-750 v	1 foot	APM/Z133
301 v-15 kV	2 feet, six inches	APM
15-46 kV	3 feet	APM/Z133
46-72 kV	4 feet, 2 inches	Z133
72-121 kV	4 feet, 6 inches	Z133
138-145 kV	5 feet, 2 inches	Z133
161-169 kV	6 feet	Z133
230-242 kV	7 feet 11 inches	Z133
345-362 kV	13 feet 2 inches	Z133
500-550 kV	19 feet	Z133

Note: APM is PacifiCorp's *Accident Prevention Manual* (Joint Safety Committee 2003). Z133 is the *American National Standard for Tree Care Operations*. Z133 distances are for sea level up to 5,000. Distances increase for elevations above 5,000 feet (ANSI 2012).

2.1.1 Emergencies

An emergency is major storm (as declared by PacifiCorp), or situation where vegetation has either caused or presents a clear, imminent threat of causing an outage, fire or public electric contact.

2.1.1.1 Whistles

Every crew member, supervisor/GF and forester shall carry a whistle at all times while on work sites. A whistle shall be used as an alarm, commanding all crew members to immediately stop work and respond to the emergency. Whistle blasts should also be used to initiate aerial rescue drills. Whistles are not to be used for non-emergency situations, such as getting another crew member's attention.

2.1.1.2 Tree on Line

If a tree or tree part accidentally falls onto an energized line, work shall stop immediately, and procedures outlined in Figure 2.1 followed.

2.1.2 Readily Climbable

Readily climbable trees have low limbs that are accessible from the ground and sufficiently strong and close together to support a child or average person so that the tree and can be accessed without using a ladder or special equipment. Access into a tree by a vehicle does not render a tree climbable.

Readily climbable trees pose a high risk when a main stem would allow a child or average person to climb either within arm's reach of an uninsulated, energized electric line or within such proximity to the electric line that the climber could be injured by direct or indirect contact. They are located near homes, schools, parks, businesses or other locations where people (particularly children) frequent.

If readily climbable trees are identified, within two weeks, steps shall be taken to reduce the safety risk by removing the tree or pruning it to specification clearances. If possible, branches should be removed to at least 8 feet above the ground or altering facility construction so energized lines can no longer be accessed through the tree.

2.1.3 Tree Houses

Tree houses built in trees growing near high voltage lines present possible electric safety risks. Safety risks in these cases could materialize if a tree house is sufficiently close to the conductors so that children or others may contact the line either directly or indirectly. Indirect contact may occur through any conductive object, including a tree or tree parts that are contacting power lines.

Tree houses built in trees growing in proximity to power lines must meet two criteria in order to remain where they are located. First, no part of the structure may be any closer than twice the minimum approach distances for persons other than qualified line-clearance arborists as specified in Table 2 of ANSI Z133 (Table 2.2). Second, the tree must be pruned so that it grows no closer than ANSI Z133 Table 2 (Table 2.2) distances, at least until the next scheduled work. Maximum line sag and sway should be taken into consideration. Tree houses that do not meet these conditions shall be removed within two weeks of their identification.

Tree house safety risks may be managed by changing facility construction so tree house clearances can be maintained. Facility reconfiguration for this purpose may be done at a property owner's request, provided they cover the expense of the facility modification.

2.1.4 Fire Protection

Federal, state and local fire protection laws and regulations shall be followed, and the contractor performing the work must obtain necessary work permits. Crews shall have all firefighting tools and equipment required by the responsible governmental agency. Contractors shall also adhere to fire restrictions concerning work hours, fire watch following work and other policies of the pertinent jurisdiction. Crews working in fire-prone rural areas should receive fire prevention and suppression training from the competent authorities.

2.1.5 At Fault Tree Crew-Caused Outages

Primary distribution and transmission outages caused by tree crews shall be assessed by a committee made up of the managing director of distribution and transmission support, director of vegetation management, business analyst and two contract representatives. The conduct of the subject crew during the incident will be compared to requirements in ANSI Z133, OSHA 1610.269, contractor safety rules and the PacifiCorp Accident Prevention Manual. Outages determined to be "at fault" by the majority of committee members will result in a credit to PacifiCorp from the contractor in an amount specified contractually.

2.2 Environment

Environmental respect is a MidAmerican Energy Holding Company core value, requiring strict adherence to all environmental rules and regulations.

2.2.1 Species of Concern

Tree work should not disturb or harm any rare, threatened, endangered, or protected plant or animal species. Nesting season work restrictions are examples of

important scheduling considerations necessary to accommodate threatened and endangered species. Prior to beginning projects on federal and state lands, PacifiCorp foresters shall contact the responsible agency to determine whether or not such species are present on the right-of-way. If there are, foresters should contact PacifiCorp environmental services for support.

All tree and brushwork shall conform to guidelines of the responsible governing agency. Field data inventories of threatened or endangered species may be on file in PacifiCorp district offices. PacifiCorp environmental services should be contacted whenever threatened and endangered species are identified.

2.2.2 Wetlands

Wetlands are lands where water saturation is the dominant factor determining the nature of soil development and the types of plant and animal communities present living in and on the soil (EPA 2004). Wetlands shall be worked by hand. Federal, State and local laws and regulations concerning wetlands shall be followed.

2.2.3 Stream Protection

Work shall not pollute water. Trees shall not be felled into streams or drainage ditches in a way that could obstruct or impair the flow of water, unless instructed otherwise by the responsible governing agency. Machine work shall not be performed within fifty feet of a stream. Soil or debris shall not be placed below the high water mark of streams, unless instructed otherwise by a responsible authority. Equipment shall use existing or designated stream crossings. State forestry or fish and wildlife agencies shall be contacted if tree removal in and around streams could cause erosion or if resulting exposure could increase water temperature. Federal and state laws and regulations shall be followed concerning stream protection.

2.2.4 Bird Protection

Migratory birds are protected by the *Migratory Bird Treaty Act of 1918* (16 USC 703-712). The act was most recently amended in 1998. All but a handful of bird species are protected under the act. Vegetation management's policy is that all bird species should be considered subject to the law's provisions. Foresters should provide annual training on bird protection to every tree crew.

The Migratory Bird Treaty Act prohibits removal of bird nests that have eggs or chicks, and killing protected species. Active nests may be disturbed in rare cases of urgent fire or electrical safety risk (in the judgment of the responsible Company regional forester). If tree crews identify a possible immediate risk, they should contact the regional forester for authorization. Foresters should consult PacifiCorp environmental services regarding whether or not work may be approved. If it may not, work should be postponed until after young have left the nest.

Eagle and colonial water bird nests (such as those of cormorants and herons) may not be disturbed regardless of whether or not they are active. Eagles are subject to additional protection insofar as it is illegal to disturb them near their nests or winter roosting sites.

Figure 2-2 Bird nest procedure

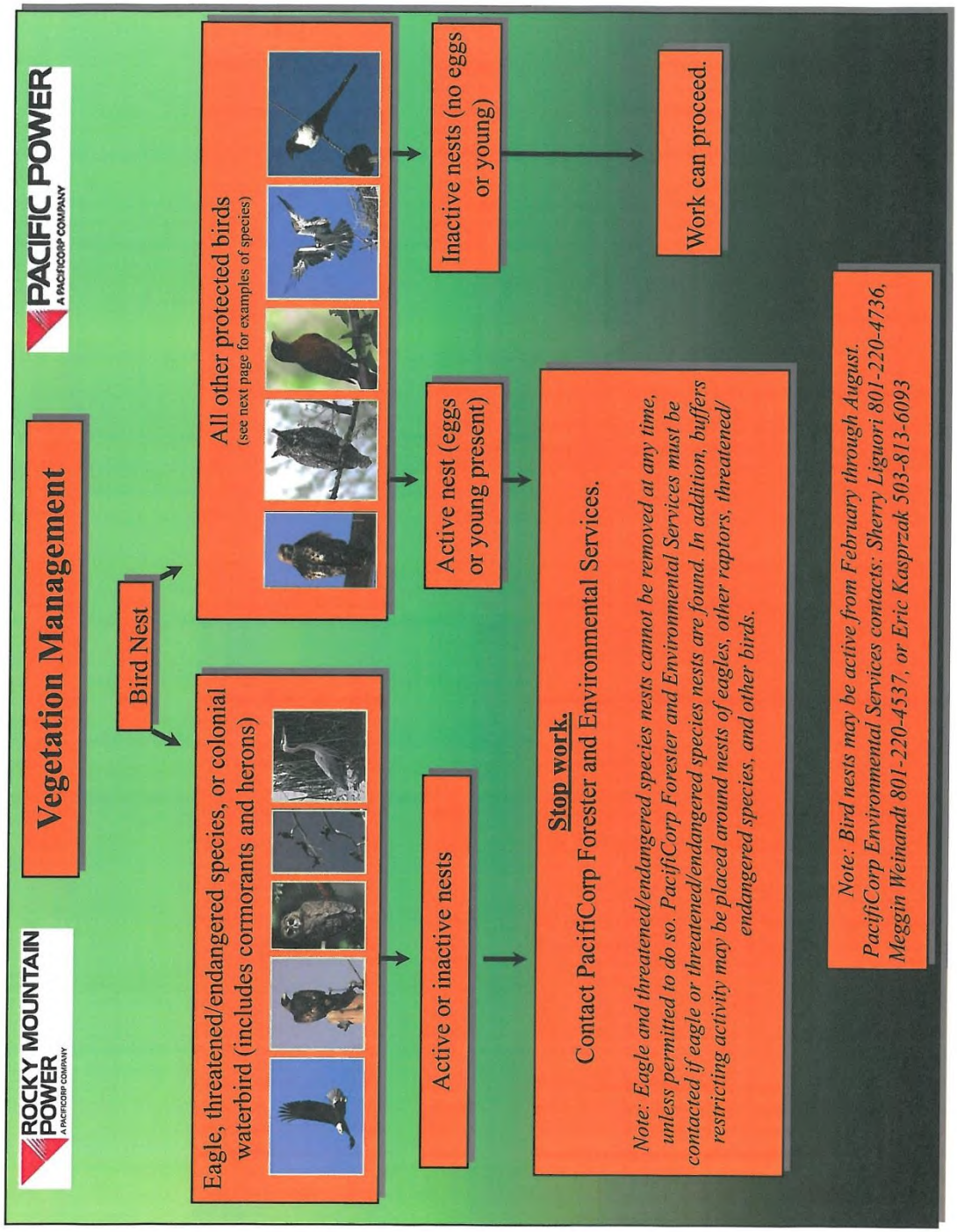


Table 2.2. Tree house clearances.

Tree houses may only be allowed in a tree if they are more than minimum distances from conductors and the tree can be pruned to kept to clearances specified in this table at all times. Specified tree clearances are those for persons other than qualified line-clearance arborists specified in Table 2 of ANSI Z133. Minimum tree house distances are twice ANSI Z133 Table 2 distances.

Voltage (kV phase to phase)	**Minimum Tree House Distance From Conductors (ft.-in)**	**Tree Clearance** (If tree house is built in a tree more than minimum distance from conductors)
0.31-0.75	20-00	10-00
0.751-15	20-00	10-00
15.1-36.0	20-00	10-00
36.1-50.0	20-00	10-00
50.1-72.5	21-06	10-09
72.6-121.0	24-08	12-04
138.0-145.0	26-04	13-02
161.0-196	28-00	14-00
230.0-242.0	32-10	16-05
345.0-362.0	40-10	20-05
500.0-550.0	53-04	26-08

Table 2.3. Work buffers around active nests of eagles and herons.

Species	**Work Buffer**
Herons	1000 feet
Owls	¼-mile
Hawks, ospreys, golden eagles	½-mile
Bald eagles	1 mile

Figure 2.3. Valuable archeological sites.

An ancient food storage structure along the Camp Williams-Four Corners 345 kV right-of-way in Southern Utah. This is an example of the type of valuable archeological site that needs to be identified and protected during vegetation management work.

Rich Buelte photo

Raptors (birds of prey) and herons require buffers around active nests to prevent them from being disturbed (Table 2.3), unless instructed otherwise by competent environmental or fish and wildlife authorities. In general, if a bird leaves a nest and does not return within an hour, it is being disturbed and the buffer should be increased. In these cases, environmental services should be contacted within 24 hours to monitor the nest and respond appropriately if the adults fail to return.

2.2.4.1 Reporting

Active bird nests and inactive eagle nests should be reported to the appropriate forester and environmental services following the procedure outlines in Figure 2.2. Anyone working in vegetation management encountering a dead bird should report it to environmental services.

2.2.5 Spills

To prepare for accidental spills, absorptive material shall be available. Mixing, loading and cleaning equipment are critical activities that present the greatest exposure to accidents or spills (Miller 1993).

In the event of a spill or herbicide misapplication:

- STOP, CONTAIN, ISOLATE
  - Stop the source of the spill
  - Contain the spill (it is especially important to prevent the spill from entering waterways)
  - Isolate the area – prevent people or vehicles from passing through the area.
- Report the spill to the Spill Hotline: 800.94.SPILL and provide:
  - Caller and manager's name
  - Date and time spill was discovered
  - Location (address or longitude and latitude)
  - Manufacturer name and serial number
  - Cause of spill
  - Amount of spill
  - Types of surfaces contaminated
  - Containment and/or clean-up activities performed so far
- Request the help of and notify supervisor/GF and PacifiCorp forester and environmental services.
- Remediate the spill
  - Clean up the spill or have it cleaned up, following directives from the Spill Hotline
  - Wash equipment and vehicles.
  - Properly dispose of cleanup materials
  - Follow up with appropriate cleanup documentation.
- Clean-up at or near PacifiCorp generating sites or substations must comply with site specific spill prevention and remediation plans.

2.3 Archaeological Sites

Vegetation management activities shall not disturb archeological sites. Known archaeological sites (Figure 2.3) shall be identified on the process checklist described in Chapter 4. If a contract utility forester or tree crew identifies something that might have archeological significance, they should move off site and contact the appropriate forester. The forester should contact environmental services for advice on whether or not to continue. Work should not proceed without environmental service's authorization.

Prior to beginning work on federal and state lands, PacifiCorp vegetation management shall contact the appropriate agency to determine whether or not such sites are present on or near the right-of-Way. PacifiCorp district offices may have field data inventories of known sites to assist in the determination. If present, foresters should secure the assistance of PacifiCorp environmental services.

Archeological sites shall be located and marked. Work must conform to guidelines of the responsible governing agency. If archaeological artifacts are located on private lands, the finding shall be reported to PacifiCorp environmental services. Field data inventories of known sites could be on file in PacifiCorp district offices.

2.4 Communication

Communication should be open and interactive. It should include everyone involved: management, planners, vegetation management crews, property owners, public land managers, appropriate governmental officials, members of organizations dedicated to related causes and others.

2.4.1 Internal Communication

Communication within the vegetation management department needs to be clear and concise to ensure everyone involved understands the desired results. Decision

making authority should be delegated throughout the origination, as appropriate.

Communication between vegetation managers and workers ought to be both written and verbal. Written instruction should include PacifiCorp Vegetation Management Standard Operating Procedures. It should also include details regarding concerned customers and locations of environmentally sensitive or archeological areas. Written instruction should be reviewed verbally. Appropriate communication also involves post work debriefings to review challenges and prevent problems from recurring.

Communication between utility vegetation management staff and other internal employees, such as engineers and operations managers, includes why, where, when and how vegetation management projects will be conducted. This is important because people within PacifiCorp, but outside vegetation management, can help set priorities, anticipate and prevent potential problems, and provide historical perspectives. Communicating with operations staff during work can also add a margin of safety. By knowing there is a vegetation management job underway, operations staff may be able to provide a timelier and more appropriate incident response than they would if they were unaware of the project. At the beginning of every week, districts in which vegetation management work is being conducted shall be emailed a spreadsheet with the approximate tree crew work locations for the coming week.

2.4.1.1 Communication of Vegetation Conditions that is Likely to Cause an Outage At Any Moment)

Members of the vegetation management team must comply with *Transmission Grid Operations Operating Procedure PCC-215,* which is designed to meet Requirement 4 of the *NERC Transmission Vegetation Management Program* standard FAC-003. Requirement 4 instructs utilities to notify the control center with switching authority for the applicable line of vegetation conditions that could cause an outage at any moment (see Figure 6.6 for the appropriate PacifiCorp dispatch center). PacifiCorp may implement temporary action, such as rating reductions or taking transmission lines out of service until vegetation can be cleared. Inspectors should report the exact location of the subject trees (providing longitude and latitude if possible) as part of the process.

2.4.1.2 Media

Requests from media (print, electronic, radio or television) shall be referred to PacifiCorp Media Relations and the community relations manager responsible for the area in which the request was made. Media Relations can be reached for each business unit at:

- Pacific Power: 800.570.5838
- RMP: 800.775.7950

Vegetation management personnel and contractors shall not speak to media representatives without prior authorization from PacifiCorp Media Relations.

2.4.1.3 Legal

No response shall be made to an attorney unless through PacifiCorp's General Counsel's office.

2.4.2 Communication with External Stakeholders

Public land managers, property owners, regulators, and civic organizations have interests in utility vegetation management activities.

Educating potentially affected parties about the need for, benefits of and science behind vegetation management can clarify expectations. Members of the vegetation management team, including crewmembers, should know the facts about the program, be prepared to answer basic questions and refer more complex issues through to their GF/Supervisor.

Communication should begin well in advance of work and involve listening to and understanding people's concerns. Work on governmentally-managed property can involve administrative procedures that take months of advance work, including navigating through permit processes and the concerns of specialists who have responsibility for stewardship over public lands. It is not always clear to lands specialists how vegetation management helps balance their (the land manager's) responsibilities against the public's need for a safe and reliable electric grid. A memorandum of understanding among Edison Electric Institute (EEI) member utilities and federal land management agencies (EEI 2006) established a framework for developing cooperative rights-of-way integrated vegetation management (IVM) practices among EEI shareholder-owned electric companies, federal land management agencies and the Environmental protection agencies. The MOU is expired and being renewed as of this writing.

2.5 Growth Rate Definitions

Slow-growing trees grow vertically less than one-foot a year. Moderate growing trees grow between one and three feet a year and fast-growing trees grow more than three feet a year.

2.6 Tree Removal

Tree removal is an important component of PacifiCorp's vegetation management program. Tree removal can reduce safety risks; improve access to facilities, clear lines of sight and moderate future workloads. Tree conditions are site and tree specific.

Tree removal on distribution facilities requires either written notification to or signed permission from the property owner, unless there is a right-of-way, easement or permit that expressly authorizes tree removal. If such an easement or permit exists, notification to the property owner may be verbal, provided it is documented. Signed permission may be obtained on the removal door hanger (see Section 8.2.1.3) or *Property Owner Permission Form* (see Section 8.2.2).

Stumps shall be cut to within six inches of the ground or as close to it as practical (for example, at the top of a barbed wire fence that has become imbedded in the trunk). Stumps of all deciduous trees, brush and vines that are removed shall be treated with an approved herbicide, where permitted (see Section 7.3.5).

PacifiCorp prefers to remove the entire tree in the following situations:

- Transmission rights-of-way where the conductors are fewer than 50 feet off the ground or between 50 and 100 feet off the ground depending on the size of the tree (see Table 6.1 and Figure 6.3).
- High risk trees (dead, dying, clearly diseased, deformed, or unstable trees which have a high probability of falling and contacting transmission or distribution conductors). Note that every tree is potentially hazardous. With millions of trees under management, it is impossible to

identify and correct every potentially hazardous tree. Nevertheless, PacifiCorp has a responsibility to maintain its system by making a reasonable effort to identify trees that are clearly hazardous, and correct the problems they could cause in a timely manner.

- Trees that will take no more than twice the time to remove than to prune during distribution cycle work. High risk trees are not limited by this constraint.
- Trees that take no more time to remove than to prune during interim and ticket work. High risk trees are not limited by this constraint.
- Readily climbable trees.
- Trees with tree houses not meeting the clearance to transmission or distribution conductors shown in (Table 2.2)
- Fast-growing trees that, through growth could interfere with distribution conductors or violate specific state regulatory clearances before the next scheduled maintenance work (cycle-busters).
- Volunteer trees less than six-inches in diameter (DBH), which, through growth, could eventually interfere with distribution conductors.

2.6.1 Equipment Mowing

Mowing is often more cost effective than manual methods of tree removal and should be pursued wherever practical (Figure 2.4). Mowing should be limited to fifteen feet either side of distribution primary wires within transmission rights-of-way and along access roads serving Company facilities

2.7 Mechanical and Helicopter Cutters

Mechanical and helicopter cutters can improve productivity in rural, densely vegetated areas (Figure 2.5). Mechanical cutting shall comply with ANSI A300 (Part 1) section 9.3.2. It should be limited to rural or remote locations and cuts should be made close to the main stem, outside of the branch bark ridge and branch collar. Precautions should be taken to avoid stripping or tearing of bark or excessive wounding.

In subsequent cycles, mechanical work should be monitored and repaired if need be to prevent high risk conditions from developing.

2.8 Slash Disposal

Slash is brush and limbs less than six-inches in diameter removed during tree operations.

2.8.1 Developed Areas

In developed areas, slash should be chipped and removed from the site unless an agreement has been reached with the property owner to leave it. Slash may be left temporarily, provided the crew has notified the property owner or tenant, and arrangements made to clean it up to the customer's reasonable satisfaction within two business days. Tree stems greater than six-inches in diameter should be left on site. Work locations shall left in a safe and orderly condition.

2.8.2 Rural Areas

In rural areas, slash should be disposed of on-site whenever possible. For off-road, wooded areas, brush should be lopped into three-foot maximum lengths, and scattered in piles no more than two-feet high. Stems larger than six-inches in diameter should be left on site.

Limbs and slash should be piled separately. Limbs and slash should be disposed of at the sides of distribution rights-of-way, and outside the wire zone of transmission rights-of-way, unless specified otherwise by the regional forester. If brush is chipped, it should be broadcast on site wherever possible. Resulting chip piles should be no higher than two-feet. Debris piles should not limit or block access to the right-of-way, or create fire risk.

2.9 Emergency Response

Tree work will be required from time to time on emergency storm restoration. Crews shall be properly equipped to perform the work. PacifiCorp will be the sole determiner of equipment appropriateness. Travel and lodging during the storm is billable. Double occupancy is expected for crew members.

Contractor should provide a designated contact person for each region. Requests for crews should be routed through that contact. Contractor shall be responsible for dispatching crews whenever emergency restoration services are needed.

Crew rosters shall be provided by the contractor and maintained during restoration efforts. At a minimum, rosters shall include: crew member names and position, location, contact information, equipment and identification number.

Debris from storm work is left on site and not chipped or cleaned up, so chippers should not be taken into the field during restoration work. Notification is not required during emergency restoration work, but crews should conduct themselves respectfully.

Emergency work shall be reported on a *Weekly Vegetation Report* according to section 4.2.1.

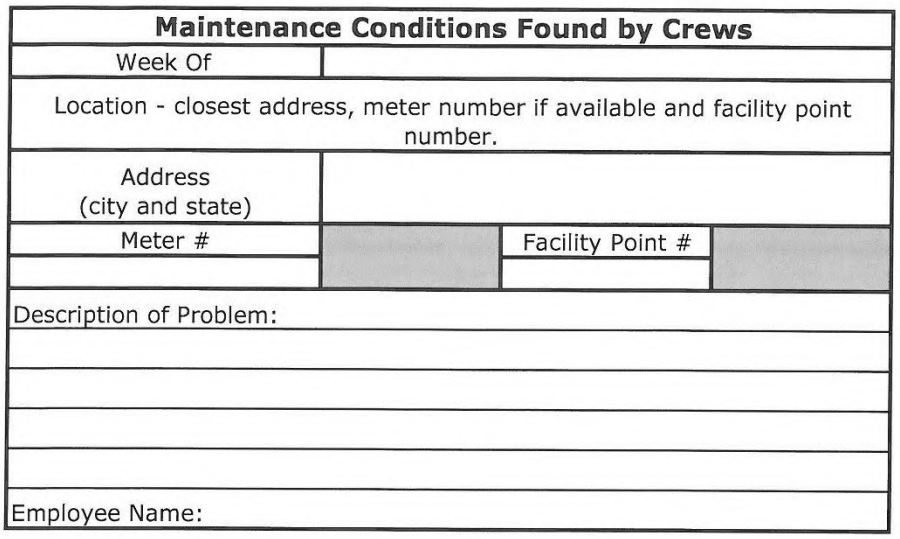
Emergency work is done under the authority of the district operations managers in cooperation with Company foresters. Tree crews and contract utility foresters assigned to storms should work under the direction of circuit captains assigned by operations. Tree crews should report their progress at least daily to both the circuit captain and their GF/supervisor. The supervisor should report crew progress to the appropriate forester.

Figure 2.4. Side mower used on distribution rights-of-way.

Figure 2.5. Jarraff mechanical "trimmer" that may improve productivity in remote areas.

Figure 2.6. Cracked pole – an example of the type of conditions tree crews should report.

Figure 2.7. PacifiCorp Vegetation Management Maintenance inspection report form.



Maintenance Conditions Found by Crews			
Week Of			
Location - closest address, meter number if available and facility point number.			
Address (city and state)			
Meter #		Facility Point #	
Description of Problem:			
Employee Name:			

All storm work must be conducted as if the line is energized. If the line cannot be worked safely under the assumption it is energized, it must be grounded in accordance with section 2.1.1. In general, PacifiCorp does not dispose of slash or debris resulting from storm damage. Trees that fall during storms would do so regardless of whether or not the lines are present. It should not be the Company's responsibility to clear the debris simply because the tree or trees from which it originated damaged Company facilities on the way down. However, if an outage is preventable, slash may be cleaned-up and removed from a property at the forester's discretion.

2.10 Facility Inspection

While tree crew members are not facility inspectors, they can be helpful in identifying pronounced conditions, such as cracked poles (Figure 2.6) broken cross arms or insulators, loose guy wires, and other problems. Tree crew members should report the condition on the *Maintenance Condition Report Form* (Figure 2.7).

When contract utility foresters are lining out work, they should inspect the perimeter around substations for trees that could interfere with or hazard trees that could fall into the facility, or for climbable trees that could allow access into the substation.

2.11 Property Damage

Contractor shall be responsible for property damage arising out of or related to work. Restoration of surfaces and repair of property damage in the execution of the Contract shall be part of the work. Such restoration shall include, but is not limited to, ruts, disturbed drainage ditches,

broken drain tiles, cut fences and damaged fence posts.

Contractor shall inform PacifiCorp of claims within 24 hours of damaging the property. Contractor has 15 business days to resolve any damages or PacifiCorp will settle the claim and bill the contractor. Contractor must inform PacifiCorp personnel and get permission for an extension if the time frame cannot be met.

Contractor shall be responsible for any damage or claims against PacifiCorp resulting in violations of conservation measures as a consequence of Contractors actions.

2.12 Freelance Work

No one employed in PacifiCorp's vegetation management department or their contractor may solicit or perform arboricultural-consulting or tree work (pruning, removal, insect or disease control, fertilization etc.) for interests outside of officially authorized PacifiCorp projects on open feeders, grids, transmission projects, tickets, storm orders, work orders or other PacifiCorp assigned project. Outside projects may include side jobs for cash, work for private arboricultural firms (whether or not they are owned by the tree crew members doing the work), consulting or any other arboriculturally related enterprise.

2.13 Miscellaneous Items

2.13.1 Fences and Gates

Gates should be left open or closed as they were found, or as the property owner instructs. Damage to fences or gates shall be reported to the property owner and the appropriate supervisor/GF, and repaired as soon as possible.

2.13.2 Climbing Spurs

Climbing spurs shall not be used when climbing to prune trees.

Exceptions:

- when limbs are more than throw line distance apart and there is no other safe means of climbing the tree.
- when the bark is sufficiently thick to prevent spur damage to the cambium.
- when working high risk trees that are to be reduced in height and left for wildlife.

2.13.3 Winching Vehicles**.**

Winch cables or ropes should not be wrapped directly around anchor trees. Doing so damages a tree's bark and cambium and can not only reduce its health and value, but also eventually create high risk to overhead lines. If the need arises to winch a vehicle (including an all-terrain vehicle), a nylon strap (or equivalent) at least 2-inches wide shall be used around the tree, and cables or ropes attached to the strap. Utility poles or towers shall not be used as winch anchors.

3. TREE BIOLOGY AND PRUNING

The primary purpose of utility line clearance work is to minimize safety and service reliability risks caused by tree-power line conflicts. Pruning is primarily performed on distribution facilities, although it can have application to transmission lines in some cases.

Pruning to clear conductors shall adhere to the principles of modern arboriculture. The *American National Standard for Tree Care Operations* A300 (ANSI 2012a), International Society of Arboriculture (ISA) *Best Management Practices: Tree Pruning* (Gilman and Lilly 2002), *Best Management Practices: Utility Pruning of Trees* (Kempter 2004), and *An Illustrated Guide to Pruning* (Gilman 2002), among other references, convey those principles.

While proper utility line clearance work should be consistent with practices that promote tree health, utilities cannot place tree health over public welfare. Sometimes, there is no way to obtain proper clearance in a manner that ensures the health of a tree (Lilly 2010). This is particularly true regarding foliage retention. In cases were the tree cannot be pruned without harming its health, tree removal is often best for the tree, tree owner and utility. If tree removal is not permissible or practical, the tree should be pruned to specification clearances, even if that work is against a customer's wishes or could harm the tree.

3.1 Pruning for Clearance (directional pruning).

Directional pruning is natural target pruning applied to routing tree growth away from utility lines (Miller 1998). ANSI A300 (2012a) and ISA's *Best Management Practices* (Kempter 2004) instruct that pruning to clear the utility space involves thinning cuts: removing at natural targets entire branches that are growing toward (or once cut will produce sprouts that will grow toward) the power lines.

While heading cuts produce sprouts that grow quickly back into the power lines, branch removal and reduction promotes growth away from conductors. Since the point of utility pruning is to train trees around power lines wherever practical, branches growing away from the electric facility should not be pruned. Instead, these stems should be allowed to develop to their natural height or length, provided that growth does not create unreasonable safety risks. This cannot be accomplished with strongly excurrent trees trapped directly beneath conductors.

Topping, round-overs, flush cuts, branch tipping and rip cuts are improper because they damage trees. Directional pruning is consistent with natural tree structure. Remaining branches retain their taper, strong attachments, growth regulators and spacing. They continue to grow and function normally, allowing the tree to reach to its natural height.

"V" shapes often result on properly pruned trees growing under power lines, particularly on decurrent, deciduous trees (Miller 1998, Shigo 1990, Gilman 2002, Kempter 2004) [Figure 3.1]). Limbs growing upward and toward the facility should be cut back to the trunk or to limbs growing away from the conductors.

Remaining branches should have sufficient clearance so they do not damage

the conductors in inclement weather common for the locality (high wind, freezing rain, snow or other conditions). Excurrent trees (such as many conifers) are more problematic, but should be reduced to appropriate laterals or whorls.

"L" or one-sided shapes often result on properly pruned trees to the side of conductors. (Shigo 1990, Gilman 2002 [Figures 3.2]). Limbs on the wire side of trees located adjacent to facilities should be cut back to the trunk; or to limbs growing vertically, sideways or downward; depending on the distance to the line or available natural target.

3.2 Tree Biology

Understanding fundamental tree biology is essential to applying proper pruning to utility line clearance (Miller 1998).

3.2.1 Leaves

Leaves are the tree's food source. Tree survival depends on the leaves' ability to manufacture carbohydrates from the sun's energy, carbon dioxide and water. Current thinking among scientists is that if a tree abruptly loses a large portion of its foliage, as can happen with over-pruning, it could lack the energy resources to meet its needs. Trees with insufficient foliage could be weakened to the point where they become subject to attack by opportunistic insect and disease pests. Damage can extend to the roots as well as to above ground portions of the tree (Shigo, 1986). Trees can suffer sun injury after sudden excessive foliage loss (Miller 1998).

Authorities disagree over how much foliage removal trees can tolerate in a given year. ANSI A300 (2008) recommends no more than 25%, while Gilman (2002) suggests less than 10 to 15 percent. Often, much more than 25% of foliage must be removed from the tree in order to appropriately maintain electric facilities. The ANSI committee did not intend the 25% provision to impede utilities from achieving appropriate clearances (Smith 2002). Utility arborists faced with the choice of maintaining public welfare by clearing the tree to specifications and removing more than 25% of the foliage have no choice but to remove more than 25% of the foliage

3.2.2 Stem Anatomy

Trunks and branches are tree stems. Their function is support, energy storage, and water, mineral, carbohydrate and growth regulator transport. The point of origin of a branch or limb is a node. A lead is an upright trunk or major limb with a dominant role in the tree crown, and a lateral is a branch off a parent stem. Some leads can also be laterals.

3.2.3 Xylem

Xylem is wood tissue. Sapwood is young, living xylem that stores carbohydrates, provides support, and conducts water and essential elements. Heartwood is old, dead xylem that provides support, and often contains anti-microbial compounds.

Long, hollow conducting cells (trachieds or vessels) predominate xylem structure. While trees need this vascular structure to conduct water and essential elements, it can be exploited by pathogens to spread up and down the stem. Trees attempt to block or "wall" off disease spread by plugging conducting cells in various ways, but pathogens can use energy stored in the trunk or branch to breach these walls (Shigo1986).

Figure 3.1. "V"-shapes can develop from crown reduction on deciduous trees (left). The ultimate objective is to train trees up and around the wire wherever possible, so the facility is clear and the tree is healthy. These two photos are of the same tree, in 1992 (left) and 2007 (right).

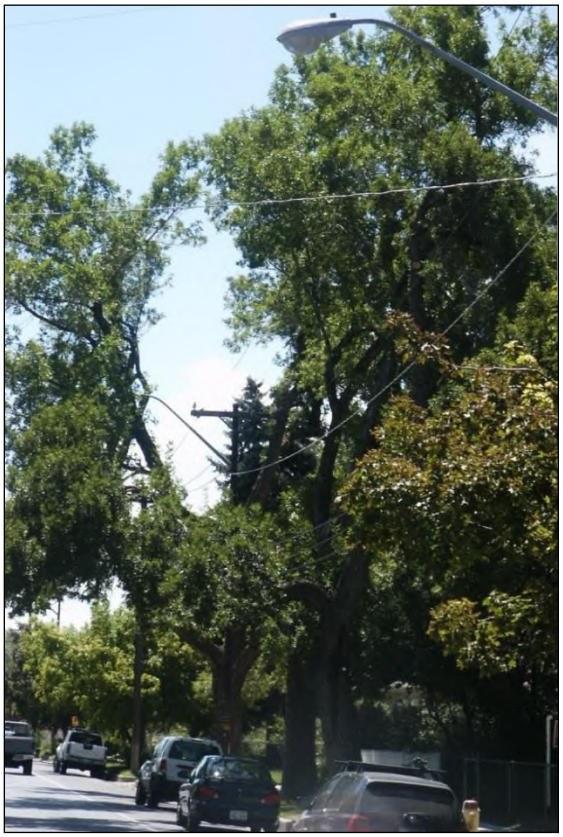


Figure 3.2 "L" or one-sided shapes.

"L" or one-sided shapes often result on properly pruned trees growing to the side of conductors. Pruning may be mechanical in rural areas, below right

3.2.4 Cambium

The tree's cambium is a thin layer of rapidly dividing cells around the outside of the sapwood. One of the functions of the

cambium is to produce wood to its inside, creating diameter growth. This is the only source of wood production in the tree system, and the tree has no ability to replace damaged or decayed wood.

Pathogens gain access to wood through wounds. In response to wounding, the cambium generates a "barrier zone" containing antimicrobial compounds (Figure 3.3). It protects new wood by separating it from potentially infected wood that existed at the time of wounding. Following infection, a "race" develops between the cambium and wood-rotting microorganisms, with the structural integrity of the tree at stake. The cambium must produce new wood faster than pathogens can digest the former stem if the tree is to remain viable (Figure 3.3).

While the barrier zone contains strong antimicrobials, it is weak structurally. This structural weakness can be problematic, as cracks may develop along the barrier zone when the stem twists and flexes due to wind, ice or other stress loads. These cracks allow pathogens to breach the barrier zone and enter new wood, further threatening the tree (Figure 3.3 [Shigo 1986]).

3.2.5 Branch Collars

Branch collars are a combination of parent stem and branch tissue generated through coordinated growth around the branch attachment (Figure 3.4). In the spring of the year, diameter growth begins at branch tips, and works toward the base. When new wood meets the branch base, it turns at 90°, and wraps around the juncture. Later in the growing season, wood from the parent stem envelops branch wood laid down earlier. As a result, two layers of wood secure the branch every year, and the attachment increases in strength as the branch grows (Shigo1986).

3.2.6 Branch Bark Ridge

An important structure associated with branch attachment is the branch bark ridge. The branch bark ridge is a line of raised bark, formed as the branch and parent stem grow together. It marks where branch wood meets stem wood Figure 3.5). A raised branch bark ridge is often a sign of a strong attachment.

3.2.7 Branch Protection Zone

Branch protection zones are areas of antimicrobial compounds that form internally at the base of diseased or injured branches (Shigo 1986). They inhibit pathogens in the branch from passing to the parent stem. While protection zones are effective, pathogens can overcome them using energy stored in the branch.

3.2.8 Taper

Tree stems taper from their bases, where they are widest, to twig tips, where they narrow to buds or apical meristems. Taper provides flexibility and strength that disperses loads from branch weight and from wind, snow or ice loads. The adaptation reduces the likelihood of failure under stress.

Figure 3.3 The cambium creates a barrier zone that contains discoloration and decay in old wood, protecting new wood. Note on the right, a ring shake formed along the old barrier zone. This is a structural flaw.

Figure 3.4. Branch collars form at branch bases.

Figure 3.5. A raised branch bark ridge i

A raised branch bar ridge s often a sign of a strong attachment. It marks where the branch meets the parent stem.

Figure 3.6. Codominant stems are at least 50% of the diameter of their parent stem.

They have no branch collars or branch protection zones. Codominant stems can grow together and have bark included (embedded) between the stems in the attachment.

Figure 3.7. A before and after collar cut.

3.2.9 Codominant Stems

Codominant stems are stems that are at least half the diameter of their parent stem, and compete for dominance in the tree crown (Gilman 2002). They are similar to branches, but have no branch collars or branch protection zones. Disease moves from one codominant stem to another as readily as it moves through ordinary stems. Codominant stems can have a branch bark ridge. However, they are structurally flawed because they do not have room to develop (Figure 3.6). As crowded branches grow in diameter, they can press together, creating wounds and squeezing bark in between the two stems (Figure 3.6).

The resulting wounds allow disease entry and weaken branch attachments. Moreover, stems with included bark often pry one another apart as they grow, further weakening their attachments. Attachments with included bark often fail, and can be recognized by a crease between stems near their juncture (Figure 3.6).

3.2.10 Growth Regulators

Growth regulators are chemicals that coordinate plant growth. A growth regulator can have confusing, even contradictory roles depending on its concentration, the concentration of other growth regulators, environmental conditions the species of tree, and other factors. Nevertheless, scientists understand that growth regulators are responsible for orderly plant growth and development.

For example, auxin is a growth regulator produced in apical meristems, while cytokinin is another type synthesized in root tips. In response to environmental factors, roots grow and make cytokinens that stimulate shoot growth, which can result in auxin production that promotes root development. The resulting cycle is one way the tree system "communicates" to stay in balance as it grows. Auxin also functions in apical dominance. Auxin produced in apical meristems inhibits lateral growth, and helps to account for orderly branch development and spacing. Conversely, removing an apical bud or

meristem promotes lateral growth, which alters the tree's normal growth habit, and can lead to codominant stems, poor spacing, and included bark.

Gibberellins are another class of growth regulators. Among other functions, gibberellins promote cell elongation. Marketed chemicals commonly known as "Tree Growth Regulators" (TGRs) are actually gibberellin inhibitors. By inhibiting gibberellins synthesis, TGRs reduce cell elongation, which in turn slows growth.

3.3 Natural Target Pruning

Natural targets are proper final pruning cut locations at strong points in the tree's disease defense system. Removing branches at natural targets rarely damages the joining trunk or limb (Miller 1998). The ISA *Best Management Practices: Tree Pruning* (Gilman and Lilly 2002) and *A300* (ANSI 2008) describe the technique. Targets vary depending on whether a branch is removed or reduced.

3.3.1 Collar Cuts

Branches should be removed at the collar (Figure 3.7). Cutting into the collar, known as flush cutting, is inappropriate because it creates a direct port of disease entry into the parent stem.

Disease can weaken stems, potentially creating safety risks. On the other hand, proper branch removal does not leave stubs that pathogens can use as an energy source to overcome the tree's defense system and spread into the trunk. If the branch is removed correctly, only the branch protection zone is exposed, giving an advantage to trees in keeping out disease. As a result, collar cuts virtually prevent decay from entering the parent stem (Figure 3.7 [Miller 1998]).

3.3.2 Approximating the Collar

Occasionally, branch collars are not readily evident and the collar must be approximated using the branch bark ridge (Figure 3.8). Start the cut in the branch crotch, just outside the branch bark ridge, and follow an outward angle that mirrors the inward angle the branch bark ridge makes with the trunk or parent stem. The cut should end roughly opposite the bottom of the branch bark ridge (Figure 3.8).

3.3.3 Reduction Cuts

Reduction cuts shorten leads to appropriate laterals. An appropriate lateral is no less than one-third the diameter of the original limb and retains at least three-quarters of the lead's foliage (ANSI 2008 [Figure 3.9]). The reason for these requirements is that branches are autonomous in their energy requirements. Removing too much foliage from a limb could deprive it of sufficient energy to establish apical dominance, maintain its taper, close the wound, and compartmentalize and "out-race" disease which will enter the wound.

As a result, the lateral will not develop into a structurally viable leader. Moreover, shortening a lead removes apical meristems and other points of growth regulator production, which can disrupt orderly growth. If, for example, auxin concentrations are insufficient, on some species a crowded mass of upright, rapidly growing, poorly attached shoots can sprout from the cut and grow directly back into the lines.

Therefore, removing more than 25% of foliage from a limb has the same damaging result as a random topping cut (Figure 3.10), regardless of whether or not the cut is made to a proper-sized lateral. Even under the best circumstances, reduction cuts are potentially harmful,

acting more like a heading than a thinning cut (Gilman 2002). Consequently, if a lead cannot be shortened to a limb at least one-third the diameter of the original lead, or if a cut removes more than 25% of the foliage, that limb should be either targeted for removal, or not pruned. Removal may be gradual over the course of several cycles.

3.3.4 Large Branches

Large branches (those 3-inches in diameter or greater) can seldom, if ever, be removed without harming the tree, particularly if they are codominant stems. Yet, large branches must be prevented from growing toward the utility space, and that nearly always means heading or removing them entirely. Either option can be harmful, but heading large branches not only injures the tree, but fails to effectively clear the conductors (Figure 3.10).

Removal may take a measured approach. For example, one or two large limbs might be removed out of three that are growing toward the conductors, and the remaining limb(s) targeted for removal on subsequent cycles.

Large branches selected for later removal can be subordinated, or removed gradually over subsequent cycles (either interim or cycle). Subordination thins a portion of a limb's foliage. Reducing a fraction of the foliage in this way suppresses the stem's growth, and allows the remaining tree parts to adjust and develop. In some cases, subordination can allow a codominant stem to develop into a branch over time, enabling a branch protection zone to form so a limb can be removed without unnecessarily subjecting a tree to disease (Gilman 2012). Using subordination over multiple cycles to remove large branches can reduce the effect of structural limb removal on tree health, while ultimately circumventing the permanent problems heading cuts can cause, even if that means temporarily heading the branch.

3.3.5 Old Heading Cuts

Removing large stems that have been headed often leaves wide gaps in the tree, because shoots that proliferate from the old heading cuts often dominate the crown (Figure 3.10), and gaps result when branches containing these shoot clusters are removed. Moreover, previously headed branches usually lack natural targets. When such branches are growing toward the conductors, there might be no alternative but to remove them entirely. However, in some cases, headed limbs may be left as a temporary measure. Such headed branches could be removed on subsequent cycles.

Headed branches growing away from the facility space should not be pruned as a matter of standard practice. However, shoots growing from the old heading cuts should be inspected for structural integrity during subsequent visits. Corrective action, such as crown restoration (ANSI 2008), could be necessary if these sprouts are found to be structurally weak.

However, in some cases, structural defects resulting from heading cuts are so severe that they cannot be corrected (Dahle et al. 2006). In these cases, the customer should be contacted about removing the entire tree, or at least the subject branch or branches. If tree or branch removal is not possible, there could be no choice but to remove the weak growth with a new heading cut. This should be done only when extensive decay or hollow exists in the remain-ing branch, with the approval of the forester or GF/supervisor, for safety (not "aesthetic") purposes.

Figure 3.8 Approximated collar cut.

Figure 3.9. Crown reduction cut.

Figure 3.10. Old heading cut.

Shoots that proliferate from these cuts often dominate the tree's crown, and gaps result when branches containing these shoot clusters are removed.

3.3.6 Reduction

Reduction is selective pruning applied to reduce the top or side of a tree or individual limb (ANSI 2008). In a utility context, the goal of reduction is to promote future tree growth away from the conductors, at least on decurrent trees (Figure 3.1)

3.3.6.1 Deciduous Trees

The "V" in many crown reduced deciduous trees quickly fills in with shoots. These shoots eventually require pruning to be kept from interfering with the lines (Figure 3.1) In subsequent cycles, it is important not to strip all these sprouts away, since that causes lion's tailing and can stimulate resurgent growth in many species. Rather, about half of the shoots should be removed, and the other half retained (Figure 3.11).

Shoots selected for removal should be the largest and most vigorous, leaving smaller sprouts behind. Growth selected for retention should be pencil-thin at the point of attachment. If need be, these remaining shoots may be headed back to obtain specification clearances. In this way, a rotation can be established where the largest, most vigorous shoots are removed each cycle, but smaller, suppressed shoots are left to soften the negative visual effect that many customers find objectionable.

Moreover, leaving shoots in the interior of a "V" provides shade and retains auxin production, both of which suppress vigorous sprouting, and helps the trees hold (Figure 3.11). Eventually the sides of the tree will overtop the wires, resulting in more of a "U," and shade the interior of the tree, suppressing shoot growth even more. In time, this top growth decreases the proportion of the crown occupied by the cleared utility space, and softens the negative aesthetics.

3.3.6.2 Conifers

Many conifers; such as pine (*Pinus spp.*), spruce (*Picea spp.*) and Douglas-fir

(*Pseudotsuga menziesii*); have strong central leaders (excurrent form). When these types of trees grow directly under the lines, they should be reduced to the whorl or largest available lateral that provides specification clearance. Cuts made to conifer whorls are typically flat-topped in order not to damage any branches in the whorl (Figure 3.12). Laterals should be tipped on conifers, which prevents them from forming compression wood and bending up toward the conductor.

Figure 3.11 On return visits to "V-Outs", under pruning should leave the smaller, suppressed shoots to retain foliage and soften the visual effect of crown reduction.

Figure 3.12.

Crown reduction.

4. SCHEDULING AND REPORTING WORK

Scheduled work involves systematic cycle or interim projects on both distribution and transmission lines. Schedules should be based on the time elapsed since the last scheduled work, compliance, voltage (particularly for transmission lines), the frequency of tree-caused outages, customer count, the existence of important accounts (hospitals, factories, mines or other high demand facilities), tree conditions, the number of customer complaints, the growth rate of predominant tree species, geography, customer density, rainfall and other environmental factors.

4.1 Process Checklist

Scheduled distribution and transmission work should follow the *PacifiCorp Vegetation Management Process Checklist* (Figure 4.1). The purpose of the process checklist is to facilitate systematic project management. The project should be identified along with the start date on the top of the process checklist.

4.1.1 Authorize Project Work

PacifiCorp foresters are responsible for work authorization. No work should begin on a project until foresters have authorized it to proceed as outlined.

4.1.1.1 Contractor Work Release

Before beginning a scheduled project, the forester shall open a *Work Release* (Figure 4.2). The *Work Release* authorizes a contractor to proceed with a specific maintenance project, and provides written instructions for the work. Contractors will not get compensated for work performed on projects that have not been authorized through a work release.

The *Work Release* specifies the project type (distribution cycle or interim, transmission cycle or interim, TGR or chemical). It provides instructions on tree removals, tree replacement, tree growth regulators (TGRs) and other particulars. It also assigns desired starting and ending dates. Before work begins, the GF/supervisor shall distribute copies of the *Work Release* to each crew assigned to the project, and review instructions for proceeding.

After the project is finished, the supervisor/GF shall sign the *Work Release* to certify the project is completed and closed. The contractor shall provide the actual starting and completion dates, as well as any pertinent comments. Comments should note work that is either incomplete (due to refusals, for example) or does not meet specifications at the time the *Work Release* is closed. By signing off on a project, the contractor guarantees that the work has been completed to PacifiCorp's specifications, and assumes responsibility for any failures to meet Company requirements, outside of exceptions noted in the comments.

4.1.1.2 Set Labor-hour Goals

The forester should set goals for labor-hours a tree and mile for time and equipment distribution cycle and interim work. These goals should be based on production data drawn from the last work on the feeder or grid, with a stretch goal of 10% improvement. Goals should also be established for transmission facilities at labor-hours a mile from previous or similar projects.

Figure 4.1 Process Checklist

PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

Vegetation Management Process Checklist

Work ID: _____

Date: _____

Authorize Project Work - Utility Forester

- ☐ Open Work Release and Set Goals. Distribute and Discuss with Vegetation Contract Supervisor
- ☐ Labor-hour Goals Set for Trees, Miles or acre (for transmission lines)
- ☐ Work Release Sent to Consultant LD/SR, Service Coordinator and System Forester
- ☐ ☐ N/A Notify Operations Managers, Community Relations Managers, Communications

Project Plan - Forester, Contract Supervisor and Forest Technician

- ☐ ☐ N/A Identify Overbuilt Transmission and Open Transmission Work Release
- ☐ ☐ N/A Research and Identify Governmental, Tribal, and Environmentally sensitive areas
- ☐ ☐ N/A Identify External Agencies and Notify if Necessary (Federal, State County, City and pertinent NGOs
- ☐ ☐ N/A Conduct Pre-job Meetings With Government Agencies
- ☐ ☐ N/A Contract Expert to Delineate Sensitive Sites or Areas and Identify On Maps
- ☐ Forester Inventories, Compiles, Assembles, Checks Out Maps to Vegetation Contract Supervisor

Project Plan Developed - Contract Supervisor and Forest Technician

- ☐ Pre Job Meeting With Forester, Supervisor and Forest Tech Date: _____
- ☐ Identify Concerned/Dangerous Customers
- ☐ ☐ N/A Identify and Obtain Federal Special Use Permits:
- ☐ ☐ N/A Identify and Obtain Federal, State, and Local Herbicide Use Permit(s)
- ☐ ☐ N/A Identify and Obtain Other Required Permits: Specify:
- ☐ ☐ N/A Identify Outstanding Ticket Work
- ☐ ☐ N/A Identify Flagging Work
- ☐ ☐ N/A Distribution Configuration ☐ Wye ☐ Delta

Work Identification - Contract Forest Technician

- ☐ ☐ N/A Review of Special Precautions: (list)
- ☐ ☐ N/A Follow-up: Personal Contact Requirements, Special Access, Time Sensitive Instructions
- ☐ ☐ N/A Verify Facility Point Inspections Locations
- ☐ ☐ N/A Verify Aerial Waypoint Locations
- ☐ ☐ N/A Review Environmental and Cultural Requirements:
- ☐ Inspect, Prioritize Work Areas
- ☐ Notify Private Landowners and Public Land Managers

Work Assigned to Project Crews - Contract Forest Technician and Supervisor

- ☐ Activity Reports And Other Pertinent Feeder/grid Information Issued to Crews
- ☐ ☐ N/A Required Permits Issued to Crew
- ☐ Work Release and Project Specifics Communicated and Issued To Crews
- ☐ ☐ N/A Sensitive Sites or Areas Reviewed With Crews Date: _____
- ☐ ☐ N/A Special Instructions: (list below in comments section)

Figure 4.1. Continued

Project Closure - Contract Supervisor and Forest Technician

- ☐ Post Inspection of Work to Verify Completion — Date: _____
- ☐ Inventory and Check In Maps
- ☐ Maps and Documentation Submitted
- ☐ ☐ N/A Concerned Customer Forms Submitted
- ☐ ☐ N/A Refusal Information Submitted
- ☐ ☐ N/A Dangerous Customer Information Submitted
- ☐ ☐ N/A Tree Replacement Voucher Copies Submitted
- ☐ ☐ N/A Hazard Forms - Copy in File and Copy to Utility General Foreman
- ☐ Daily Logs for Project Sent to Utility Area Forester

Project Closure - Forester

- ☐ Verify Receipt of All Maps, Daily Logs, Activity Reports, Tree Replacement Vouchers, and Hazard Forms
- ☐ Verify Receipt of Refusal and Concerned/Dangerous Customer Information
- ☐ Verify Receipt of Signed Work Release
- ☐ Close Work Release (Send to Consultant LD/SR, Service Coordinator and System Forester)

X_____ X_____

Contract Supervisor / Date — Area Forester/ Date

Comments:

Figure 4.2. Vegetation Management Contractor Work Release

PacifiCorp Vegetation Management

Contractor Work Release

This work release authorizes *Contractor* to proceed with the specified maintenance project. All work shall conform to PacifiCorp's Vegetation Management Specifications. Following project completion, a *Contractor* representative shall sign this work release, and return it to PacifiCorp. Refusals or any work performed that does not conform to PacifiCorp Specifications shall be noted.

District: **Project #:**

Contractor: **Supervisor/GF:**

_____ **Distribution Cycle Maintenance** **Feeder/Grid #:**
Work according to PacifiCorp *Specifications*. Identify and correct all climbable tree and tree house hazards, and remove danger trees.

_____ **Tree Removals:** Limit removals to cases where removal time equals twice pruning time. Forester approval is required for removals outside of this constraint.

_____ **Tree Replacement:** Use coupons to pursue removals as needed.

_____ **Tree Growth Regulators:** Pursue TGRs on cycle busters.

_____ **Bulk Transmission:** Work bulk transmission with distribution.

_____ **Other:** _____

Desired Starting Date: _____ **Completion Date:** _____

Area Forester Approval: _____ **Date:** _____

To be completed by the Contractor:

Starting Date: _____ **Completion Date:** _____

Comments: _____

Supervisor/GF Signature: _____

4.1.1.3 Work Release Forwarded to Senior Business Specialist and Director of Vegetation Management

The forester should forward the work release and goals to the PacifiCorp senior business specialist and director of vegetation management. The consultant will authorize payment for work on the project.

4.1.1.4 Notify Appropriate Company Personnel

The forester should notify internal stakeholders of a project prior to beginning work. Internal stakeholders include operations managers, customer-community managers, line patrolmen, hydro facility site managers and other personnel. PacifiCorp tariff policy should be notified if work will be conducted in a location where either past or current state public utility commission complaints have been received. PacifiCorp communications department should be informed if work will be conducted in the vicinity where public relations issues have surfaced in the past or could be reasonably expected to arise during currently planned work.

4.1.2 Project Plan

The project plans section provides direction for foresters, contract supervisors and contract utility foresters.

4.1.2.1 ID Overbuilt Transmission and Open Transmission Work Release

Transmission overbuilt on distribution lines should be worked in conjunction with distribution feeder or grid projects.

4.1.2.2 Research and Identify Governmental, Tribal and Environmentally Sensitive Areas.

Governmental, tribal and environmentally sensitive lands present particular demands. Lands under governmental or tribal management and environmentally sensitive areas should be identified early to allow time to work through the required processes.

4.1.2.3 Identify External Agencies and Notify if Necessary.

Identify federal, state, county, city and pertinent non-governmental organizations potentially affected by the project. The appropriate entity should be notified of the impending project, and asked whether or not they have any concerns.

4.1.2.4 Conduct Pre-job Meetings with Governmental Agencies

Before any field work begins, a meeting shall be conducted with governmental agencies that have interest in the project. This is especially important for federal land managers and tribal leaders. In particular, no work may begin on Bureau of Land Management or Forest Service managed lands without a pre-work meeting among federal officials and vegetation management. Multiple projects and multiple agencies may be covered by a single meeting.

The meeting(s) shall be organized by the forester and PacifiCorp's environmental services must be notified and invited to attend. The meeting may be held either in person or through a conference call. Work shall not begin until vegetation management receives written notice to proceed from the appropriate agency.

4.1.2.5 Contract Expert to Delineate Sensitive Areas

If environmentally or culturally sensitive areas are identified on governmentally-managed lands, a contractor with appropriate expertise should be retained to delineate subject sites or areas. Target locations should be marked on maps and on site. Care should be taken with field marking to ensure it is sufficiently clear to alert crews, while at the same time being sufficiently discreet to avoid casual detection.

4.1.2.6 Forester Inventories, Compiles, Assembles, Checks Out Maps to Vegetation Contract Supervisor

It is critical for foresters to be gatekeepers over company maps in order to ensure there is only a single master version of each. If paper map copies are necessary, the forester will check out copies of the master version, which should include sensitive environmental or cultural sites. Effort should be made to work off of digitized maps wherever possible. Contract utility foresters should work with mapping to secure digital maps and communicate with the Company forester responsible for the region. Foresters should ensure that there is a digital master with all pertinent information.

4.1.3 Project Plan Developed

The contract supervisor and contract utility forester are responsible for developing the project plan.

4.1.3.1 Pre-Job Meeting

The contract supervisor and contract utility forester must have a pre-job meeting to discuss the upcoming project. They should discuss elements of the project plan and focus on solving problem issues that arose during the initial stages of the planning process.

4.1.3.2 Identify Concerned or Dangerous Customers

Contract utility foresters should research the feeder or grid file to identify customers with a history of concerns. Contract utility foresters should be proactive in working with these customers. Contract utility foresters, supervisors/general forepersons and foresters should discuss strategies for avoiding violence with dangerous customers.

4.1.3.3 Identify and Obtain Federal Special Use Permits

PacifiCorp facilities that cross federally-managed lands are in place under the authority of special use permits. Contract utility foresters and supervisors should study and ensure the conditions in the pertinent special use permits are satisfied. Any concerns about the potential of not complying with provisions in special use permits shall be communicated to the forester.

4.1.3.4 Identify and Obtain Federal, State and Local Herbicide Use Permits.

Herbicide or pesticide use permits are required in certain jurisdictions, particularly on federally-managed land. If a permit is required, foresters must ensure that contract utility foresters or supervisors/GFs have obtained it before herbicide application may proceed.

4.1.3.5 Identify and Obtain Other Required Permits.

Permits may be required. Examples may include projects along state road rights-of-way, in some communities, county or state forests or riparian areas. All required permits shall be obtained by the contractor before work may proceed.

4.1.3.6 Identify Outstanding Ticket Work.

From time to time, customers who have called in work requests have been told that their request did not present an immediate threat to safety or electric service and could wait until regularly scheduled work. Contract utility foresters should research tickets associated with a feeder or grid, ensure contact is made with those customers, and either explain the reasons why the work does not need be done or schedule it for completion

4.1.3.7 Identify Flagging Work.

Many areas require flaggers and traffic control. Contract utility foresters should identify areas where flagging support is necessary. Those locations should be identified on both the *Activity Report* and a map. Planning should maximize the number of tree crews working with each flagging crew.

4.1.3.8 Identify Circuit Configuration

The overwhelming majority of PacifiCorp distribution circuits are built with wye configuration, which includes a neutral wire. However, delta construction, which does not have a neutral wire, is found in some areas.

The difference is of little consequence on wires attached to cross arms, as all cross arm-mounted wires should be cleared to primary specifications (see section 5.6.5). However, there is a significant distinction on lines without cross arms. Wye construction has a low neutral, while the low wire on delta carries primary voltage. This could lead to safety and clearance risks if the low primary is mistakenly identified as a neutral. In noting that a circuit is delta construction, contract utility foresters should alert tree crew leaders of the potential of a low-mounted primary, so safe work practices can be conducted and proper clearances obtained.

4.1.4 Work Identification

Contract utility foresters are responsible for work identification.

4.1.4.1 Review Special Precautions

Before beginning field work on a project, contract utility foresters should review special precautions. These might include areas where difficulties have arisen in the past, such as a particularly sensitive community or neighborhood, areas where the media has been called to help oppose line clearance work, locations where there is a concentration of people who object to herbicide application, environmentally or culturally sensitive areas, or other matters of concern.

4.1.4.2 Follow-up On Items of Concern

Contract utility foresters should follow-up with customers who requested personal contact in the past, note special access (property owners who have requested tree crews not use a gate or drive, for example), or time sensitive instructions. Examples of time sensitive instructions include advisories not to work prior to hay harvest, not to drive in a field during the raining season in the Pacific Northwest, or some other matter.

4.1.4.3 Verify Facility Point Locations

Contract utility foresters should print outstanding facility points for the feeder, grid or transmission lines on which they are planning work. They should inspect outstanding conditions and assign work where necessary.

4.1.4.4 Verify Aerial Waypoint Locations

For transmission projects, contract utility foresters should print outstanding locations from recent aerial patrols and ensure they are inspected and worked if necessary.

4.1.4.5 Review Environmental and Cultural Requirements

For work crossing governmentally managed land, contract utility foresters should review any existing environmental and cultural requirements. These can include threatened and endangered species, riparian areas or the location of culturally sensitive sites.

4.1.4.6 Inspect, Prioritize Work Areas

Contract utility foresters shall document their contact with property owners or land managers, and organize work for tree crews on an *Activity Report* (Figure 4.3).

The *Activity Report* should identify the district in which work is to be conducted, the project number (the discrete number assigned to the district), the contractor assigned to the job and the feeder or grid number for distribution or plant locality number for transmission.

For each work location, the contract utility forester should note the date they inspected the site, a detailed location, the identity of the tenant or property owner (if known), the type of contact (door hanger, letter, personal visit, telephone or no contact), the crew type required to perform the work (lift, climb, flagging, mowing or other), a description of the work, and comment, if necessary. Comments could include special considerations such as how to access the work, whether or not there is a dog on site, a sensitive area of the yard such as flower beds, cultural or environmental sites, or other matters.

4.1.4.7 Hydroelectric Facilities

PacifiCorp hydroelectric facilities and adjacent rights-of-way could have restrictions on vegetation management activities. PacifiCorp's hydro operations and implementation (compliance group), PacifiCorp right-of-way services, or PacifiCorp environmental services shall be contacted before activities on or adjacent to hydroelectric facilities begin.

Herbicide use on or adjacent to PacifiCorp hydroelectric facilities shall be reported to the plant manager weekly. Tree crews working on property that is part of a hydroelectric project site should check in with the plant office before beginning work and check out after work each day.

4.1.4.8 Substations and Transition Stations

Contract utility foresters should provide a limited visual assessment of the vicinity around substations and transition stations for trees that have a high probability of falling into or interring with the facility. Trees identified in the limited visual assessment should undergo a basic assessment. If the basic assessment indicates trees are likely to interfere with or fail and strike the sub or transition station, the trees should be assigned to a tree crew for removal or mitigation. Limited visual and basic assessments are described in Smiley, Matheny and Lilly (2011). Climbable trees that could provide access into the fenced area should

also be identified and corrected along with any vegetation growth that could interfere with the facility. Tree crew substation activity should be charged to a work order supplied by sub operations.

4.1.4.9 Notify Private Landowners and Public Land Managers

Prior to any tree crew work, contract utility foresters should attempt to contact the property owner or tenant on whose property the work will occur. Customer contact shall follow procedures outlined in Section 8.2.

Public land managers should have been consulted before this stage (see section 4.1.2.4). However, during the notification process, contract utility foresters should follow-up with appropriate land managers to inform them that work is proceeding as planned, and provide an update on when crews are expected to begin work.

4.1.4.10 Schools

School main or administrative offices should be notified of work to be done within school grounds or on property adjacent to schools. An effort should be made to schedule work without children present or specific accommodations made for pupils' safety. Particular effort should be made to identify targets within drop zones, climbable trees, access issues and other safety matters on site.

4.1.4.11 Mobile Home Parks and Apartment Complexes

Mobile home park and apartment complex managers should be notified in advance of planned work. Managers could be aware of tenants with specific concerns. Mobile home park and apartment managers should be encouraged to communicate with affected renters. Individual units may still need notification of impending work.

4.1.5 Work Assigned to Project Crews

Work assignments are the responsibility of both contract utility foresters and supervisors/GFs.

4.1.5.1 Activity Reports and Other Pertinent Information Issued to Tree Crews

Contract utility foresters or supervisors/GFs should distribute completed *Activity Reports* to the tree crews.

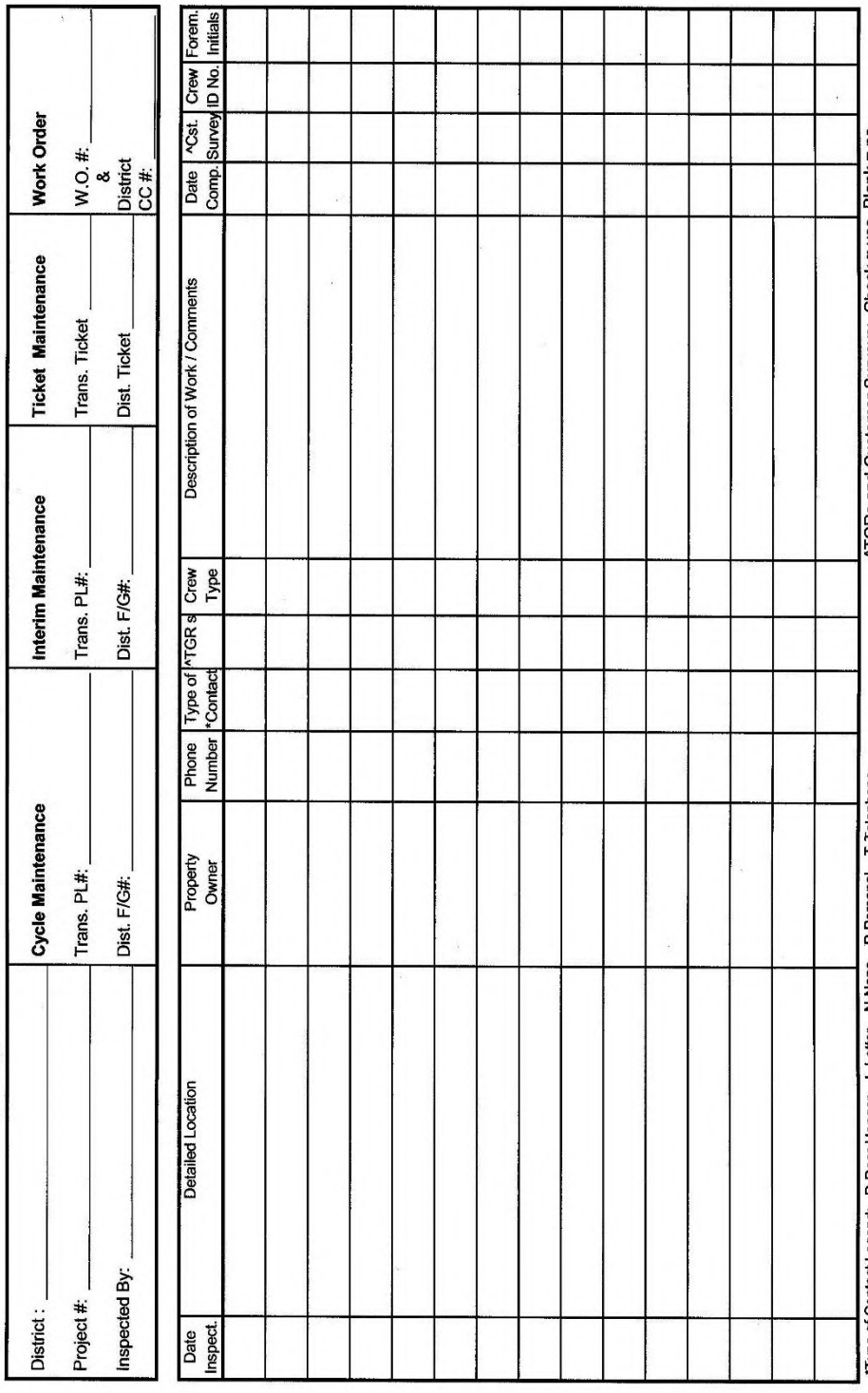
4.1.5.2 Required Permits Issued to Tree Crews

Appropriate permits shall be issued to tree crews. Tree crew members should have them available to produce to the appropriate authorities on demand.

4.1.5.3 Work Release and Project Specifics Communicated and Issued to Crews

Before beginning work on a project, the tree crew should be issued the pertinent work release. Tree crews should be able to produce the work release to foresters during audits.

Figure 4.3. PacifiCorp Vegetation Management Activity Report.



District : _____ **Cycle Maintenance** **Interim Maintenance** **Ticket Maintenance** **Work Order**

Project #: _____ Trans. PL#: _____ Trans. PL#: _____ Trans. Ticket _____ W.O. #: _____ & District CC #: _____

Inspected By: _____ Dist. F/G#: _____ Dist. F/G#: _____ Dist. Ticket _____

Date Inspect.	Detailed Location	Property Owner	Phone Number	Type of *Contact	^TGR s	Crew Type	Description of Work / Comments	Date Comp.	^Cst. Survey	Crew ID No.	Forem. Initials

*Type of Contact Legend: D-Door Hanger, L-Letter, N-None, P-Personal, T-Telephone ^TGRs and Customer Surveys: Check = yes, Blank = no

4.1.5.4 Sensitive Site or Area Review With Crews

Sensitive site locations should be communicated to tree crews.

4.1.5.5 Special Instructions

If there are special instructions, such as working in sensitive areas, contract utility foresters should communicate this in writing and ensure that tree crews have read and understand them.

4.1.6 Project Completion

After completing work, the crew leader shall note the date it was performed and initial the location entry.

4.1.6.1 Post Inspection to Verify Completion

The vegetation management contractors are ultimately responsible for ensuring that all work on a project is completed to PacifiCorp specifications. Supervisors/GFs should either inspect the work themselves, or delegate that inspection. If the work is delegated to the contract utility foresters, supervisors/GFs still have the responsibility for ensuring the project is completed to specifications. Any exceptions to specifications for any reason must be noted on the work release (see section 4.1.1.1).

4.1.6.2 Inventory and Check in Maps

Supervisors/GFs and contract utility foresters should collect all maps that have been distributed to tree crews and return them to the forester from whom they were initially issued. Foresters shall account for all maps originally issued, and file them appropriately.

4.1.6.3 Maps and Documentation Submitted

Supervisors should submit maps, completed activity reports and other pertinent documentation to foresters.

4.1.6.4 Concerned Customer Tracking

Contract utility foresters and supervisors should gather information on customers that might require follow-up the next time a project is worked. Examples are customers who refuse to allow work or access, customers who express concerns about work or customers or property owners who threaten vegetation management employees. Information should be presented to the forester in writing on the customer refusal form and appropriately filed, preferably digitally.

4.1.6.5 Tree Replacement Voucher Copies Submitted

Contract utility foresters and supervisors should submit digitized copies of tree replacement coupons to the forester.

4.1.6.6 Hazard Forms Copied, Filed and Submitted to the Utility General Foreman

Forms documenting facility points (Figure 2.7) that need to be corrected (broken cross arms, broken insulators, leaning or unstable poles, for example) should be submitted to the PacifiCorp district general foreman or operations manager.

4.1.6.7 Daily Logs for Project Submitted to Area Forester

Supervisors should collect *Daily Logs* from each crew member under their direction. These should be digitized and emailed to the forester, as well as filed by the forester.

4.1.6.8 Sign Work Release

Once they have determined that all work on a project is completed to specifications, GF/supervisor should sign and date the work release. Any locations that have not been worked to specifications should be documented on the work release with an explanation of the circumstances (see section 4.1.1.1).

4.1.7 Project Closure

Foresters are responsible for closing projects by completing the tasks in 4.1.7.1-4.1.7.3.

4.1.7.1 Verify Receipt of Maps and Other Pertinent Information

Foresters should inventory maps and collect daily logs, tree replacement vouchers, hazard forms as well as concerned customer, dangerous customer and refusal information from the supervisor. Foresters should file this information digitally so it can be retrieved when work is conducted the next time through. Foresters should ensure to keep one master digital map.

4.1.7.2 Verify Receipt of Signed Work Release

Foresters should ensure they have received and filed a copy of the signed work release from the contractor. They should examine the comment section for any work that was not completed to specification, and if necessary, make provisions to correct those outstanding conditions.

4.1.7.3 Close Work Release

The forester should close the work release and inform the lead/senior consultant and director of vegetation management of the closure by electronic mail.

4.2 Reporting Work

After completing work, the crew leader shall document tree work on *Weekly and Daily Reports*. Note the date the work was performed, the crew ID number and the crew leader's initials.

4.2.1 Weekly Vegetation Report

Tree work shall be reported on the *Weekly Time & Vegetation Report* (Figure 4.4) or other approved method. The report is a combination contractor time sheet and PacifiCorp weekly production report. The back of the report provides instructions and definitions for each cell (Figure 4.5). Weekly Reports, along with the corresponding invoice should be submitted to the forester responsible for the area in which the report was completed,

Most of the items on the *Weekly Report* are self explanatory. A few cells warrant clarification, (reference Figures 4.4 and 4.5).

- Item 23. General Work Location: The general location should be the approximate address. For example, the 4000 block of Dead Elm Memorial Road. Note that for audit purposes, crew leaders will be responsible to find and identify all the trees they worked over the course of a week. Consequently, more detailed information should be kept in the *Daily Report* (covered in Section 4.2.2 [Figure 4.6]).
- Items 31 and 32. Woody plants (including vines) less than 4-inches in diameter at breast height are classified as saplings. The actual square footage occupied by the above ground portion of the plant should be measured and recorded, with a 100 ft^2 maximum per plant for both pruned and removed vegetation. Note that multi-stemmed

woody plants where no single stem is over 4-inches in diameter are classified as saplings, with a maximum of 100 ft^2 per plant.

- Item 37. Stump Spraying: Document the time spent treating stumps of trees and brush feet that have been removed during the day. Use quarter-hour increments.
- Items 43-45. To obtain the diameters of multi-stemmed trees, add the diameters at breast height of individual stems. For example, if a tree has three stems of 8, 4 and 3- inches in diameter, the tree would be 15 inches in diameter and reported as a 12-24 inch removal. An exception would be if no stems on the plant are over 4-inches in diameter at breast height, in which case the plant should be classified as a sapling (see items 31 and 32). If only one stem is over 4-inches in diameter and the remaining stems are less, report the diameter of that specific removal as the diameter of the single largest stem.
- Item 47 and 48. Saplings pruned and removed. Saplings are trees under four-inches in diameter at breast height (they could also be 6-inches or less in diameter at the stump). Report area covered by the crown of the plant, with a 100 ft^2 maximum for each plant. There must be six inches of soil between stems of the same species to count as multiple plants.
- Items 54 and 55. For transmission cycle work, capture the number of acres cleared or sprayed respectively using linear feet.

4.2.2 Daily Report

The *Daily Report* shall be used by crew leaders to keep detailed records on their productivity (Figure 4.6). It is particularly important as a reference for locating trees during audits and tracking chemical use. Like the *Weekly Report*, the *Daily Report* provides instructions on a cell by cell basis. The *Daily Report* is the property of PacifiCorp, and when completed, supervisors/GFs shall digitize it, and sent to the appropriate forester.

4.3 Tree Crew Audits

The primary purpose of a crew audit is quality control. Furthermore, crew audits offer an opportunity for the forester to provide tree crew leaders and their supervisors/GFs with a clear understanding of PacifiCorp's expectations.

Foresters shall audit one full week of work as many times a year as specified in their goals. All work, including transmission and pole clearing, shall be audited. Each audit should have the forester, the crew's GF/supervisor and the crew leader in the field together reviewing completed work. Audits should begin with the first tree, and progress in order to the last tree worked during the week. Over the course of the audit, the forester, supervisor/GF and crew leader should open a dialog regarding the week's results.

The audits should objectively assess quality, adherence to specifications, tree counts, herbicide and other matters. Moreover, audits should provide the tree crew leader with feedback on production, professionalism, equipment, safety and crew efficiency. Results shall be documented on a *Tree Crew Audit Report* (Figure 4.8).

4.3.1 Objective Components

Objective audit components shall be determined on the straight percentage of trees that meet expectations compared to the total trees worked in each category. The percent score shall be averaged for the final rating.

4.3.1.1 Quality

The quality component documents crew adherence to natural target pruning as described in Section 3.3. Before conducting an audit, the forester and supervisor/GF should agree on a day to examine cut quality. One way would be to roll a die. In this case, 1 would designate Monday as cut quality day, 2 Tuesday and so on. Six would represent Saturday, so it would require further rolls until a different number turns up.

All final cuts made by the crew that day should be counted and examined for proper technique. A minimum of 20 cuts shall be inspected. If a crew did not make 20 cuts on the selected day, another day should be added until a minimum of 20 cuts have been evaluated. Note that if Friday is the selected day and 20 cuts were not made, the crew leader should alert the forester and GF/supervisor before the audit begins so another day can be added for cut quality.

Rip cuts, flush cuts and improper lateral selections violate the principles of natural target pruning, and shall be counted against the category score. Foresters should grant tree crews one grace faulty cut (the "Mulligan"). In addition, each "hanger" left in the tree will count as one improper cut per inch of the hanger's diameter. For every two hangers under one-inch in diameter, a single cut penalty should be assessed.

Lombardi poplar, Douglas hawthorn and other species are exempted from cut quality examination at the PacifiCorp director of vegetation management's discretion.

4.3.1.2 Specification Adherence

The *Specification* section examines all trees worked over the course of a week, both pruned and removed. It takes a straight percentage of trees that comply with clearances specified in Chapters 5 and 6 against all those worked during the week. Brush feet sprayed may be counted as brush feet removed. In addition, if climbing spurs were used in violation of section 2.6.3, the crew will be penalized for a tree out of specification.

4.3.1.3 Tree Count

The tree count section is used to validate numbers in the *Weekly Report* against those actually identified in the field on a straight percentage basis. Reported trees pruned, secondary trees, and brush feet equivalents ($ft^2 \div 100\ ft^2$ of saplings pruned or removed) should be validated for discrepancies in these categories. Note that no plant should be reported at more than 100 ft^2. Smaller, pencil-diameter stems may be counted at 10 ft^2 each.

Figure 4.4. Weekly Time and Vegetation Report

WKLY TIME REPORT & PACIFICORP WKLY VEGETATION REPORT

1 W/E _____ State _____ Local Union # _____ Crew _____ Contract# _____

Last 4	Employee Name	Code	T	Pay Rate	Sun	Mon	Tue	Wed	Thur	Fri	Sat	ST	OT	DT	Total	HOL	VAC	Other	PAD

Explain Other Hours: PAD- Paid Absent Day

Eq Name	Equipment Number	Mileage	TOTAL	Sun	Mon	Tue	Wed	Thur	Fri	Sat

MAN HOURS	TOTAL	Sun	Mon	Tue	Wed	Thur	Fri	Sat
28 Travel & Misc.								
29 Inspection/Notification								
30 Traffic Flagging								
31 Chp/Cleanup/Dmp/Stmp Grnd								
32 Tree Prune								
33 Tree Removal								
34 Saplings Pruned								
35 Saplings Remove								
36 TGR								
37 Pole Clear/Treating								
38 ROW Clearing								
39 ROW Spraying								
40 Stump Spraying								
41 Total Man-Hours								

PRODUCTIVITY	TOTAL	Sun	Mon	Tue	Wed	Thur	Fri	Sat
42 # Intentionally Blank								
43 # Primary Pruning								
44 # Intentionally Blank								
45 # Sec/Serv. Pruning								
46 # Removals 4"-11"								
47 # Removals 12"-23"								
48 # Removals 24"-Up								
49 TOTAL PRUNED/REMOVED								
50 Ft^2 Saplings Pruned								
51 Ft^2 Saplings Removed								
52 # Stump Application								
53 # Stumps Ground								
54 # TGR Application								
55 # Poles Cleared								
56 # Poles Treated								
57 # ROW Ac Cleared								
58 # ROW Ac Sprayed								
59 Ft^2 Sprayed								
59 # Loads of Chips								
60 # Survey Cards								

2 District _____

3 Project _____

Crew Information

4 Crew Leader _____

5 PacifiCorp # _____

6 Crew Type _____

7 Cert. Appl# _____

8 Supervisor _____

Work Activity

Local Transmission Maintenance

9 Trans Cycle (TRN) TID# _____

10 Trans Ticket (TTK) ☐

11 Trans Hot-Spot (THS) TID# _____

12 Trans Chemical (TCM) TID# _____

13 Trans Inspection (TNT) TID# _____

14 Trans Pole Clear (TPL) TID# _____

Distribution Maintenance

15 Dist Cycle (DST) F/G # _____

16 Dist Ticket (DTK) ☐

17 Dist Hot-Spot (DHS) F/G # _____

18 Dist Chemical (DCM) F/G # _____

19 Dist Pole Clear (DPL) F/G# _____

Main Grid Transmission Maintenance

20 MG Cycle (MGT) TID# _____

21 MG Hot-Spot (MHS) TID # _____

22 MG Chemical (MCM) TID# _____

23 MG Inspection (MGI) TID# _____

24 MG Pole Clear (MPL) TID# _____

25. District Work Order or Storm #s

PM Order # _____

26 Shop Location _____

27. General Work Location

Mon _____

Tue _____

Wed _____

Thrs _____

Fri _____

Sat _____

Sun _____

62 Crew Leader Signature _____

PAGE _____

Vegetation Weekly Report 07/2014

Figure 4.5. PacifiCorp Weekly Time and Vegetation Management Report Instructions and Definitions.

Instruction & Definitions

1. Week Ending: The week ending date (Saturday).
2. District: The PacifiCorp district where the work occurred.
3. Project #: District identification number
4. Cr. Leader: Crew Leader's name.
5. Crew #: Three-digit crew number assigned to crew leader.
6. Crew Type: Two-character crew-type code (2-Lift, 2-Mow, 3-Lift, 3-Climb. 4-Climb, 5-Climb, F. Tech, Others)
7. Certified Appl. #: The certified applicators license number.
8. Supervisor: Crew's Supervisor's name.
9. Local Trans Cycle, TID#: Transmission line six-digit Tech ID number.
10. Local Trans Ticket: Check when working transmission tickets. Tech ID number not required.
11. Local Trans Hot-Spot, TID#: Transmission line six-digit Tech ID number.
12. Local Trans Chemical: Transmission line six digit Tech ID number.
13 Local Trans Inspection: Transmission line six digit Tech ID number.
14. Local Trans Pole Clear: Transmission line six digit Tech ID number California Only
15. Dist. Cycle, F/G#: Feeder or grid number, maximum eight characters.
16. Dist. Ticket: Check when working distribution ticket. Feeder or grid numbers not required.
17. Dist. Hot-Spot, F/G#: Feeder or grid number, maximum eight characters.
18. Dist. Chem. F/G#: Chemical Cycle Maintenance: Enter Feeder/Grid #.
19. Dist. Pole Clear F/G#: Feeder or grid number. maximum eight digits. This activity is only in California.
20. Main Grid Cycle: Transmission line six digit Tech ID number
21. Main Grid Hot-Spot: Transmission line six digit Tech ID number
22. Main Grid Chemical: Transmission line six digit Tech ID number
23. Main Grid Inspection: Transmission line six digit Tech ID number
24. Main Grid Pole Clear: Transmission line six digit Tech ID number California Only
25. District Work Order or Storm Work: Plant Maintenance (PM) Order and Cost Center.
26. Shop Location: Shop location.
27. General Work Location: General work location for the day. Detailed locations are to be kept separately in the "yellow books." For audit purposes, crew leaders are responsible to find and identify all trees they worked.
28. Travel & Misc. Man-hours: Number of travel and miscellaneous (meetings, stand-by, etc.) man-hours a day.
29. Inspection/Notification: Number of inspection and notification man-hours a day. Includes facility inspection property owner notification.
30. Traffic Flagging: Number of traffic flagging man-hours a day.
31. Chip/Cleanup/Dump: Number of chipping, cleanup, and dumping man-hours a day. Stump grinding shoud be accounted for here.
32. Tree Prune: Number of man-hours a day spent pruning, including setup.
33. Tree Removal: Number of tree removal man-hours a day, including setup.
34. Saplings Pruned: Man-hours a day spent pruning saplings, including setup. Saplings are woody plants under 4" DBH (diameter at 4.5 feet above the ground) of species which have the potential to reach wire height at maturity. Report no more than 10 ft2 a plant.
35. Sapling Removed: Man-hours a day removing saplings, including setup. Saplings are woody plants under 4" DBH (diameter at 4 .5 feet above the ground) of species which have the potential to reach wire height at maturity. Report no more than 10 ft2 a plant.
36. TGR: Man-hours a day applying TGRs. including setup.
37. Pole Clear/Treating: Pole clearing man-hours a day.
38. ROW Clearing: Transmission ROW clearing man-hours a day.
39. ROW Spraying: Transmission ROW spraying man-hours a day.
40. Stump Spraying: Man-hours a day spent spraying stumps and stubble from removed saplings. Use 1/4 hour increments
41. Total Man-Hours: Total number of man-hours a day and week. Use 1/4 hour increments.
42. Intentionally blank.
43. Primary pruning. Total trees pruned on primary conductor each day.
44. Intentionally blank.
45. Sec/Serv. Pruning: Total trees pruned each day for secondary, service, or street light where there is no primary.
46. Removals 4"-11": Total trees removed between 4"-11" DBH
47. Removals 12"-23": Total trees removed between 12"-23" DBH
48. Removals 24" and greater: Total trees removed 24" DBH and greater.
49. TOTAL PRUNED/REMOVED: Total trees pruned or removed a day and week.
50. Sq. Ft. Saplings Pruned: Square feet (length x width) of saplings pruned. Saplings are woody plants under 4" DBH (diameter at 4.5 feet above the ground) of species which have the potential to reach wire height at maturity. Report no more than 100 ft^2 a plant.
51. Sq. Ft. Saplings Removed: Square feet (length x width) of saplings removed. Saplings are woody plants under 4" DBH (diameter at 4.5 feet above the ground) of species which have the potential to reach wire height at maturity. Report no more than 100 ft^2 a plant.
52. Stump Application: Total trees that were stump treated with herbicides.
53. Stumps Ground: Stumps ground out.
54. TGR Application: Trees treated with Tree Growth Regulators (TGRs [(Implants, soil drench, and soil injection]).
55. Poles Cleared: Poles cleared of trees and brush. This activity is only in California.
56. Poles Treated: Poles treated with herbicides.
57. ROW Acres Cleared: Transmission ROW acres cleared of trees and saplings.
58. ROW Acres Sprayed: Transmission ROW acres where trees and saplings were treated with herbicides.
59. Sq. Ft. Sprayed: Report the square feet of undesirable vegetation sprayed.
60. Loads of Chips: Loads of chips dumped.
61. # Survey cards: Total number of survey cards distributed
62. CREW LEADER SIGNATURE: Crew leader signs the report to authenticate its accuracy.

Figure 4.6 Daily Report

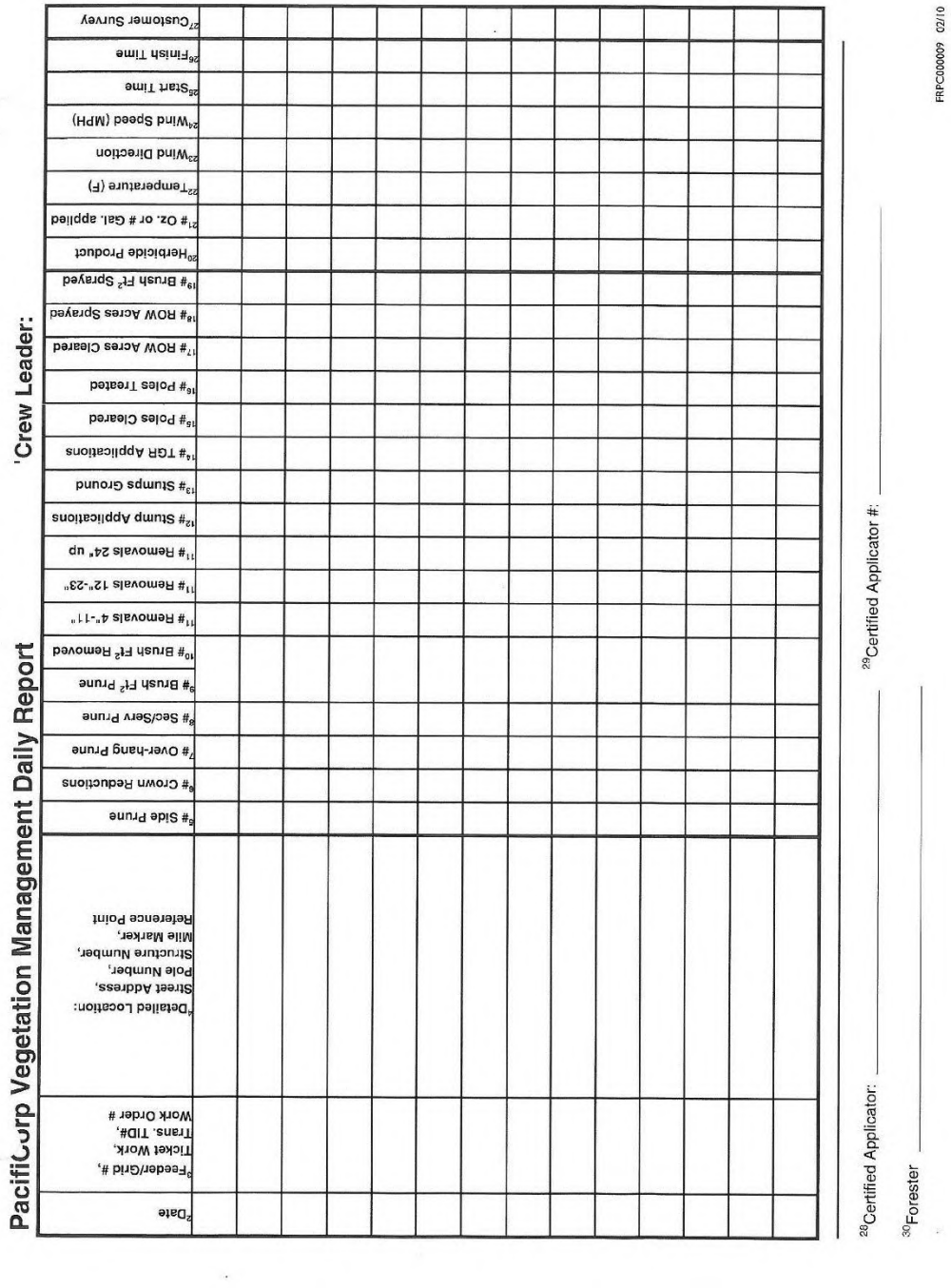


Figure 4.7 Vegetation Management Daily Report

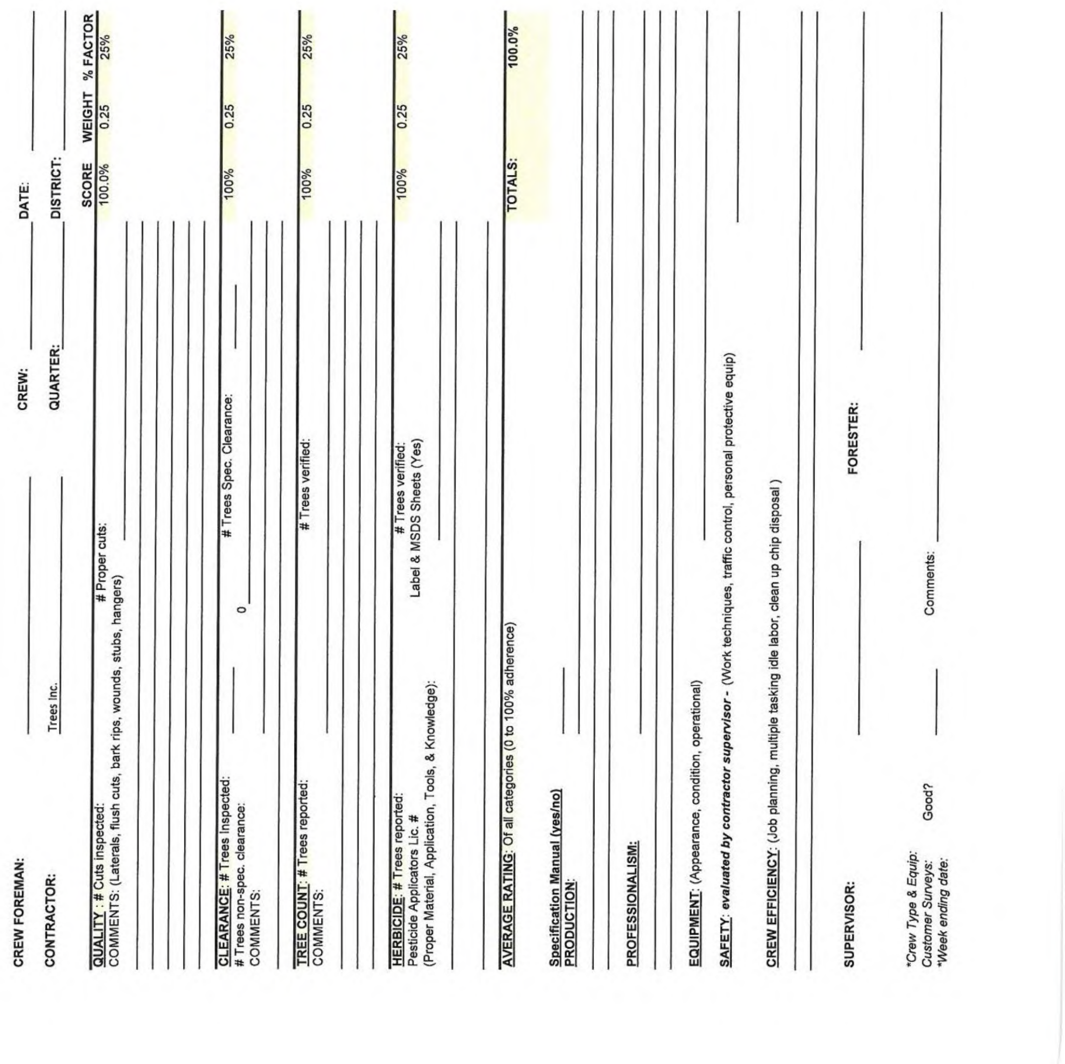
PacifiCorp Vegetation Management Daily Report

Instruction and Definitions

1. **Crew Leader:** The name of the crew leader for the day.
2. **Date:** Date work was performed.
3. **Feeder/Grid #, Ticket work, Trans TID #, After Hours Trans or Dist. Storm Work, Worker Order #:** Identify the work with the appropriate number, or as ticket work.
4. **Detailed Location:** Report a detailed work location for each job site.
5. **Side Pruning:** Report the number of trees pruned to the side of the primary conductors.
6. **Crown Reductions:** Report the number of trees pruned under the primary conductors.
7. **Overhang Pruned:** Report the number of pruned overhanging the primary conductors.
8. **Sec/Service Pruned:** Report the number of trees pruned for secondary, service, or street lights where there is no primary.
9. **# Ft^2 Saplings Pruned:** Report the area of power line right-of-way where saplings were pruned. Report the area occupied by the crown of the plant(s), with no more than 10 ft2 reported for an individual plant. Saplings are defined as woody plants under 4" DBH (diameter at breast height) of species which have the potential to reach wire height at maturity.
10. **# Ft^2 Saplings Removed:** Report the area of power line right-of-way where saplings were removed. Report the area occupied by the crown of the plant(s), with no more than 10 ft2 reported for an individual plant. Saplings are defined as woody plants under 4" DBH (diameter at breast height) of species which have the potential to reach wire height at maturity.
11. **# Removals 4"-11", 12"-23", and 24" and up:** Report the number of trees removed in each size class measured 4½ feet above the ground).
12. **# Stump Applications:** Report the number of trees that were stump treated with herbicides.
13. **# Stumps Ground:** Report the number of stumps that were ground.
14. **# TGR Applications:** Report the number of trees treated with tree growth regulators.
15. **# Poles Cleared:** Report the number of poles cleared of trees and brush to bare ground.
16. **# Poles Treated:** Report the number of poles treated with herbicides.
17. **# ROW Acres Cleared:** Report the number of transmission ROW acres were cleared.
18. **# ROW Acres Spayed:** Report the number of ROW acres sprayed with herbicides.
19. **# Ft^2 Sprayed:** Report the number of square feet of right-of-way sprayed with herbicides.
20. **Loads of chips:** loads of chips dumbed that day.
21. **Herbicide Product:** Report the herbicide product used at the site. Refer to Herbicides A-F.
22. **# Oz., or # Gal. Applied:** Report the number of herbicide ounces or gallons applied at the site.
23. **Temperature (F):** Report the temperature when the herbicide application is made.
24. **Wind Direction:** Report the wind direction at the site when the herbicide application was made.
25. **Wind Speed (MPH):** Report the wind speed in miles per hour at the site when the herbicide application was made.
26. **Start Time:** Report the time when the herbicide application was started.
27. **Finish Time:** Report the time when the herbicide application was completed.
28. **Certified Applicator:** The name of the liscensed applicator.
29. **Certified Applicator #:** The number of the applicator's license.

FRPC000009

Figure 4.8 Tree Crew Audit Form.



CREW FOREMAN: ______ CREW: ______ DATE: ______

CONTRACTOR: Trees Inc. ______ QUARTER: ______ DISTRICT: ______

	SCORE	WEIGHT	% FACTOR
QUALITY : # Cuts inspected: # Proper cuts: COMMENTS: (Laterals, flush cuts, bark rips, wounds, stubs, hangers)	100.0%	0.25	25%
CLEARANCE: # Trees Inspected: # Trees Spec. Clearance: # Trees non-spec. clearance: 0 COMMENTS:	100%	0.25	25%
TREE COUNT: # Trees reported: # Trees verified: COMMENTS:	100%	0.25	25%
HERBICIDE: # Trees reported: # Trees verified: Pesticide Applicators Lic. # Label & MSDS Sheets (Yes) (Proper Material, Application, Tools, & Knowledge):	100%	0.25	25%
AVERAGE RATING: Of all categories (0 to 100% adherence)	TOTALS:		100.0%

Specification Manual (yes/no) ______

PRODUCTION: ______

PROFESSIONALISM: ______

EQUIPMENT: (Appearance, condition, operational) ______

SAFETY: ***evaluated by contractor supervisor -*** (Work techniques, traffic control, personal protective equip) ______

CREW EFFICIENCY: (Job planning, multiple tasking idle labor, clean up chip disposal) ______

SUPERVISOR: ______ FORESTER: ______

**Crew Type & Equip:*
Customer Surveys: Good? ______ Comments: ______
**Week ending date:*

Table 4.1 Herbicide category deductions. Deductions are added together.

Penalty Description	Deduction
Failing to treat stumps or ft^2 of brush requiring treatment	Percentage of stumps or ft^2 of brush missed against the total of those requiring treatment.
Misreported stumps or ft^2 of brush	Percentage of over or under reported stumps, or ft^2 of brush against the total that were actually treated
Crews without a crew leader or an applicator (if required by state regulations) holding a current applicator's license	100% (crew may be shut down at the forester's discretion).
Crew leader or applicator (if required by state regulations) who have a current applicator's license, but does not have it on site.	10%
Missing herbicide SDS or Label	10% for each missing chemical document of on the truck

On transmission projects, work in the right-of-way should be reported as acres cleared if there are more than 40 trees per acre. If there are fewer than 40 trees per acre, work should be reported as individual trees. Trees outside the right-of-way should be reported as individual trees.

4.3.1.4 Herbicide

The herbicide component should compare total treated stumps and brush feet equivalents (total $ft^2 \div 100\ ft^2$) against those that should have been treated. It should also compare stumps and brush feet equivalents treated with herbicide against the total number reported. Deductions for over or under treatment or reporting should be made on a straight percentage basis and added together (Table 4.1). For example, if in an area where herbicide use was acceptable, a tree crew removed five deciduous trees, but only treated four stumps, they would receive a 20% deduction ([1÷5]×100 = 20%). Moreover, if they reported only three out of the four stumps actually treated, the crew would receive an additional 25% demerit. The total deduction in this example would be 45%, and the crew's herbicide score would be 55% (assuming everything else was in order).

Moreover, foresters should apply penalties for violations of herbicide policy. Penalties include a 100% category deduction for cases where the crew leader or applicator did not hold a valid applicator's license (California excepted). The crew may be shut down until the crew is properly credentialed. Further penalties include a 10% penalty for crew leaders or applicators that have valid applicator's licenses, but do not have it on site, and a 10% penalty for each required pesticide

document that is missing (SDS and labels, for example [Table 4.1]).

Failing to report treated trees is a violation of law, in addition to not providing PacifiCorp with accurate information. Examples of trees and brush that do not require treatment include conifers that do not sprout from the stump (pines, firs, spruces, cedars and others), and stumps located in areas where herbicide use is prohibited (certain Federal jurisdictions, municipal watersheds and private property where the owner objects to herbicide use).

4.3.2 Subjective Components

While not included in the final audit score, subjective factors such as productivity, professionalism, equipment and safety are also critical to program success. The audit process allows the forester to comment on these items.

4.3.2.1 Production

For time and equipment work, foresters should provide the tree crew's *Statistics Report* (Figure 4.11) and a *Crew Productivity Report* from PVM for the year to date. On the *Statistics Report,* foresters should review the percentage of removals, the type of removals, the amount of nonproductive time and other factors that affect a tree crew's productivity and quality. The *Crew Productivity Report* compares the subject crew's data with the average productivity of crews working in similar areas. It enables crew members to compare their performance against that of their peers.

While productivity data is objective, valid comparisons involve subjective judgment because specific work types are different from one another. For example, a climb crew's production results will invariably be lower than those of lift crews, ticket work will be worse than cycle work, and one cycle crew working in a vegetation-dense area will have different production from crews working in urban areas. Nevertheless, 70% of PacifiCorp's contractor performance formula is based on productivity; so, audits should stress productivity's importance to program success.

4.3.2.2 Professionalism

Since vegetation management has more interaction with PacifiCorp customers than any other department, it is vitally important for tree crews to exhibit professionalism. Foresters should comment on factors such as ISA Certification, appearance, and other considerations.

4.3.2.3 Equipment

The condition of equipment relates to professionalism and productivity. Well cared for equipment and organized tool boxes are not only a positive reflection on the crew, but they also make work safer and more efficient. Foresters should comment on the appearance and functionally of equipment and organization of the bins.

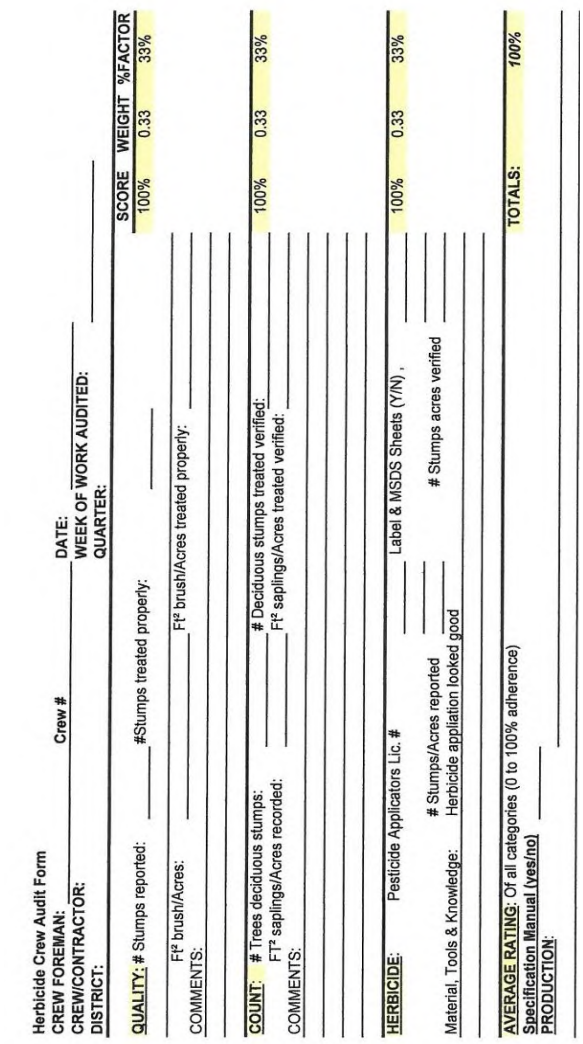
4.3.2.4 Safety

Safety should be evaluated by the supervisor/GF. However, if a forester observes unreasonable safety risks or obvious safety violations (such as someone failing to wear personal protective equipment), he/she should relate their concerns to the crew, and inform that crew's GF/supervisor so that he or she may correct the situation. All crew members should know the safety requirements applicable to their positions and take responsibility for following those requirements.

4.3.2.5 Crew Efficiency

Reviewing work systematically from the first to last tree worked allows foresters and supervisors/GF to gain an

Figure 4.9. Herbicide Audit Form.



Herbicide Crew Audit Form
CREW FOREMAN: _____ Crew # _____ DATE: _____
CREW/CONTRACTOR: _____ WEEK OF WORK AUDITED: _____
DISTRICT: _____ QUARTER: _____

		SCORE	WEIGHT	%FACTOR
QUALITY: # Stumps reported: _____	#Stumps treated properly: _____	100%	0.33	33%
Ft² brush/Acres: _____	Ft² brush/Acres treated properly: _____			
COMMENTS: _____				
COUNT: # Trees deciduous stumps: _____	# Deciduous stumps treated verified: _____	100%	0.33	33%
FT² saplings/Acres recorded: _____	Ft² saplings/Acres treated verified: _____			
COMMENTS: _____				
HERBICIDE: Pesticide Applicators Lic. # _____	Label & MSDS Sheets (Y/N) , _____	100%	0.33	33%
# Stumps/Acres reported _____	# Stumps acres verified _____			
Material, Tools & Knowledge: Herbicide appliation looked good _____				
AVERAGE RATING: Of all categories (0 to 100% adherence)		TOTALS:		*100%*
Specification Manual (yes/no) _____				
PRODUCTION: _____				

impression of job planning, which is a reflection of crew efficiency. Foresters should share their impression of crew efficiency and also comment on methodology, clean up and chip disposal. Inefficient work organization may be the responsibility of the contract utility forester who originally lined-out the work. Trends in disorganization may require contract utility forester counseling.

4.3.2.6 Crew Composition

Foresters will note the number of crew members and equipment type on the crew being audited. The field notes will be compared to an itemized invoice for accuracy. Foresters should also note the week ending date to help access the proper invoice. Results should be reported monthly on the invoice audit.

4.3.2.7 Customer Surveys

Foresters should compare surveys distributed against the occupied buildings along the audit. The score will be based on the number of surveys distributed against the number that ought to have been distributed. It will not count toward the overall audit score.

4.4 Herbicide Crew Audit

The primary purpose of the herbicide crew audit is quality control. Audits should evaluate one full week of herbicide crew work. Each audit should have the forester, the crew's GF/supervisor and the crew leader in the field together observing completed work. Audits should begin with the first area treated, and progress in order to the last area worked during the week. Over the course of the audit, the forester, supervisor/GF and crew leader should open a dialog regarding the week's results.

Moreover, audits should provide the herbicide crew leader with feedback on production, professionalism, equipment, safety and crew efficiency. Results shall be documented on an *Herbicide Crew Audit Report* (Figure 4.9).

4.4.1 Objective Components

Objective audit components shall be determined on the straight percentage of trees that meet expectations compared to the total trees reported in each category. The percent score shall be averaged for the final rating.

4.4.1.1 Quality

The quality section examines proper square footage of brush treated following specifications described in Chapter 7. Calculate the score by using percentages of proper brush or acres treated against the total number reported.

4.4.1.2 Count

To complete the *Count* section, the square feet of brush or acres treated against which should have been sprayed.

4.4.1.3 Herbicide

Foresters should apply penalties for violations of herbicide policy. Penalties include a 100% category deduction for cases where the crew leader or applicator did not hold a valid applicator’s license (California excepted). The crew may be shut down until the crew leader or applicator are properly credentialed. Further penalties include a 10% penalty for crew leaders or applicators that have valid applicator's licenses, but do not have it on site, and a 10% penalty for each required pesticide document that is missing (SDS and labels, for example [Table 4.1]).

Failing to report treated trees is a violation of law, in addition to not providing PacifiCorp with accurate information. Examples of trees and brush that do not

require treatment include conifers that do not sprout from the stump (pines, firs, spruces, cedars and others), and stumps located in areas where herbicide use is prohibited (certain Federal jurisdictions, municipal watersheds and private property where the owner objects to herbicide use). Foresters should also comment on material, proper tools and crew knowledge.

4.4.2 Subjective Components

While not included in the final audit score, subjective factors such as productivity, professionalism, equipment and safety are also critical to program success. The audit process allows the forester to comment on these items.
Failing to report herbicide treatment or not having a licensed applicator on the crew is a violation of the law.

4.4.2.1 Professionalism

Same instructions as 4.3.2.2

4.4.2.2 Equipment

Same instructions as 4.3.2.3

4.4.2.3 Safety

Same instructions as 4.3.2.4

4.4.2.4 Crew Efficiency

Same instructions as 4.3.2.5

4.4.2.5 Crew Composition

Same instructions as 4.3.2.6

4.4.2.6 Customer Surveys

Same instructions as 4.3.2.7

4.5 Worksite Inspection

PacifiCorp has a *Worksite Inspection Form* (Figure 4.10), which is designed to check tree crew safety. Foresters are required to perform a number of worksite inspections as specified in their annual goals. Foresters may use the form during crew visits. The form provides a general review, as well as tailboard, bucket or climb setup, vehicle, herbicide and other safety provisions.

4.6 PVM

PacifiCorp Vegetation Management (PVM) is a PacifiCorp intranet-based program available at: http://pdxappw51vp.pacificorp.us:8080/BOE/BI?startFolder=AVPSDml489dAlLbJ3JVVZzE&isCat=false. The databse organizes data downloaded from the *Weekly Report* (Figure 4.4). PVM offers a variety of reports, such as the *Statistics Report* (Figure 4.11), which enable program analysis.

The statistics reports are designed to be flexible. They allow data examination on a program level (it contains data since 1996 for Pacific Power, for example), down to a crew level for a specific week of work. They also provide cost and man-hours per tree, the percentage of various work types (tree removals, the size of trees removed, the number of side pruned trees, crown reduction and others), the percentage of time spent on travel, flagging, cleanup and other activities.

Other PVM reports compare the productivity of individual crews, or breakdown production by district, state, and work code. The reports provide objective information upon which foresters and supervisors/GFs can make sound management decisions based on objective information.

4.7 Monthly Reports

Vegetation management has monthly reports tracking distribution cycle and

Figure 4.10. Vegetation Management Worksite Inspection Form.

PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY

VEG. MANAGEMENT WORKSITE INSPECTION FORM

Employee Name(s)

Feeder/Grid #

District

Inspection Date

0
Crew Leader

Work Location (Address or GPS)

Required? Yes	Required? No	General	In Use? Yes	In Use? No
☐	☐	Hard Hat	☐	☐
☐	☐	Safety Glasses/Face Shield	☐	☐
☐	☐	Hearing Protection	☐	☐
☐	☐	Hand Protection	☐	☐
☐	☐	Chaps	☐	☐
☐	☐	Appropriate Footwear	☐	☐
☐	☐	Safety Vest	☐	☐
☐	☐	Job-site Housekeeping	☐	☐
☐	☐	Proper Clothing	☐	☐
☐	☐	Whistle	☐	☐
☐	☐	Communication	☐	☐
☐	☐	First Aid Kit	☐	☐
☐	☐	Fire Extinguisher	☐	☐
☐	☐	Backpack Water Fire Sprayer	☐	☐
☐	☐	Shovel and Pulaski	☐	☐
☐	☐	Fire Wagon	☐	☐
☐	☐	Dispatch Notified	☐	☐
☐	☐	Seasonal Tools	☐	☐

Required? Yes	Required? No	Tailboard	In Use? Yes	In Use? No
☐	☐	Electric Hazard	☐	☐
☐	☐	Traffic	☐	☐
☐	☐	Parked Vehicles	☐	☐
☐	☐	Structures	☐	☐
☐	☐	Fences	☐	☐
☐	☐	Pets/Livestock	☐	☐
☐	☐	Trip Hazards	☐	☐
☐	☐	Slope	☐	☐
☐	☐	Public/Property Owner Access	☐	☐
☐	☐	Yard Ornaments	☐	☐
☐	☐	Other	☐	☐

Required? Yes	Required? No	Herbicide	In Use? Yes	In Use? No
☐	☐	Labels	☐	☐
☐	☐	MSDS	☐	☐
☐	☐	Containers Labeled	☐	☐
☐	☐	Sprayers Labeled	☐	☐

Required? Yes	Required? No	Bucket Work	In Use? Yes	In Use? No
☐	☐	Bucket Lanyard/Harness	☐	☐
☐	☐	Minimum Separation	☐	☐
☐	☐	Wheel Chocks in Place	☐	☐
☐	☐	Clearance Over Roadway	☐	☐
☐	☐	Outrigger Placement	☐	☐
☐	☐	Hydraulic Saw Use/Storage	☐	☐
☐	☐	Chain Saw Use/Storage	☐	☐
		Climb Work		
☐	☐	Pre-Climb Inspection	☐	☐
☐	☐	Saddle	☐	☐
☐	☐	Rope	☐	☐
☐	☐	Lanyard	☐	☐
☐	☐	2-point Attachment	☐	☐
☐	☐	Proper Tie-in Position	☐	☐
☐	☐	Figure 8 knot	☐	☐
☐	☐	Carabineers/Snaps	☐	☐
☐	☐	Minimum Separation	☐	☐
☐	☐	Ladder Use/Placement	☐	☐
☐	☐	Pole Pruners Hung Safely?	☐	☐

Required? Yes	Required? No	Vehicle	In Use? Yes	In Use? No
☐	☐	Wheels Chocked	☐	☐
☐	☐	Positioning and Set-up	☐	☐
☐	☐	Loads Secure	☐	☐
☐	☐	Emergency Brake	☐	☐
☐	☐	Conned off	☐	☐
☐	☐	Signage	☐	☐
☐	☐	Chipper Use	☐	☐
☐	☐	Seatbelt Use	☐	☐

Required? Yes	Required? No		In Use? Yes	In Use? No
☐	☐	Rubber Gloves	☐	☐
☐	☐	Proper Application	☐	☐
☐	☐	Wetland Product	☐	☐
☐	☐	Current Applicator's Lisc.	☐	☐

COMMENTS: _____

CREW LEADER:

FORESTER: _____

interim progress, distribution spray progress, tree crew deployment, cycle progress, California Pole Clearing and transmission progress reports. These reports can be found at the PacifiCorp T&D Support Services Website: http://idoc.pacificorp.us/pacificorp_organization/rmp/rmpto/rtss/vm.html. A description of three prominent reports follows.

4.7.1 Distribution Progress Report

The distribution progress report (Figure 4.12) accounts for line miles achieved on systematic distribution work compared to goals for a given year. Systematic distribution work is cycle work throughout the six state service territory, as well as interim work in the Pacific Power service territory. The goal is the recommended scheduled miles prorated by the week of the year.

The report provides a summary of line miles achieved, breaks down progress by Pacific Power and Rocky Mountain Power's service territory, includes monthly miles ahead or behind goals, a chart depicting monthly line mile progress, and progress in each state by district and where appropriate, by forester.

4.7.2 Distribution Cycle Progress Report.

The distribution cycle report records line miles achieved over the course of the current recommended cycle compared to goals (Figure 4.13). Goals are prorated monthly and compared to actual progress.

4.7.3 Tree Crew Deployment Report

The tree crew deployment report (Figure 4.14) lists tree crews, contract utility foresters and supervisors/general foremen by forester and district as of the first of each month. In addition to providing information on tree crew locations, the tree crew deployment is used for budget projections.

4.7.4 Invoice Audit Report

Foresters will compare invoices to crew composition information obtained during the crew audits (see sections 4.3.2.6 and 4.4.2.5). Each month, results will be submitted to the director of vegetation management and senior business specialist on the Invoice Audit Report (Figure 4.15). The senior business specialist will ensure discrepancies are reconciled with the appropriate contractor.

Figure 4.11. A sample PVM Statistics Report showing distribution cycle data for Oregon 2010.

PacifiCorp Vegetation Management

Data Updated on 6/13/11 15:10:25 PM

Statistics Report

FISCAL YEAR: 2011

WORK ENDING: 01/03/2010 TO 01/01/2011 INVOICE

COMPANY NAME CREW CODE

STATE OR CREW TYPE

DISTRICT CODE DST

PROJECT WORK ID

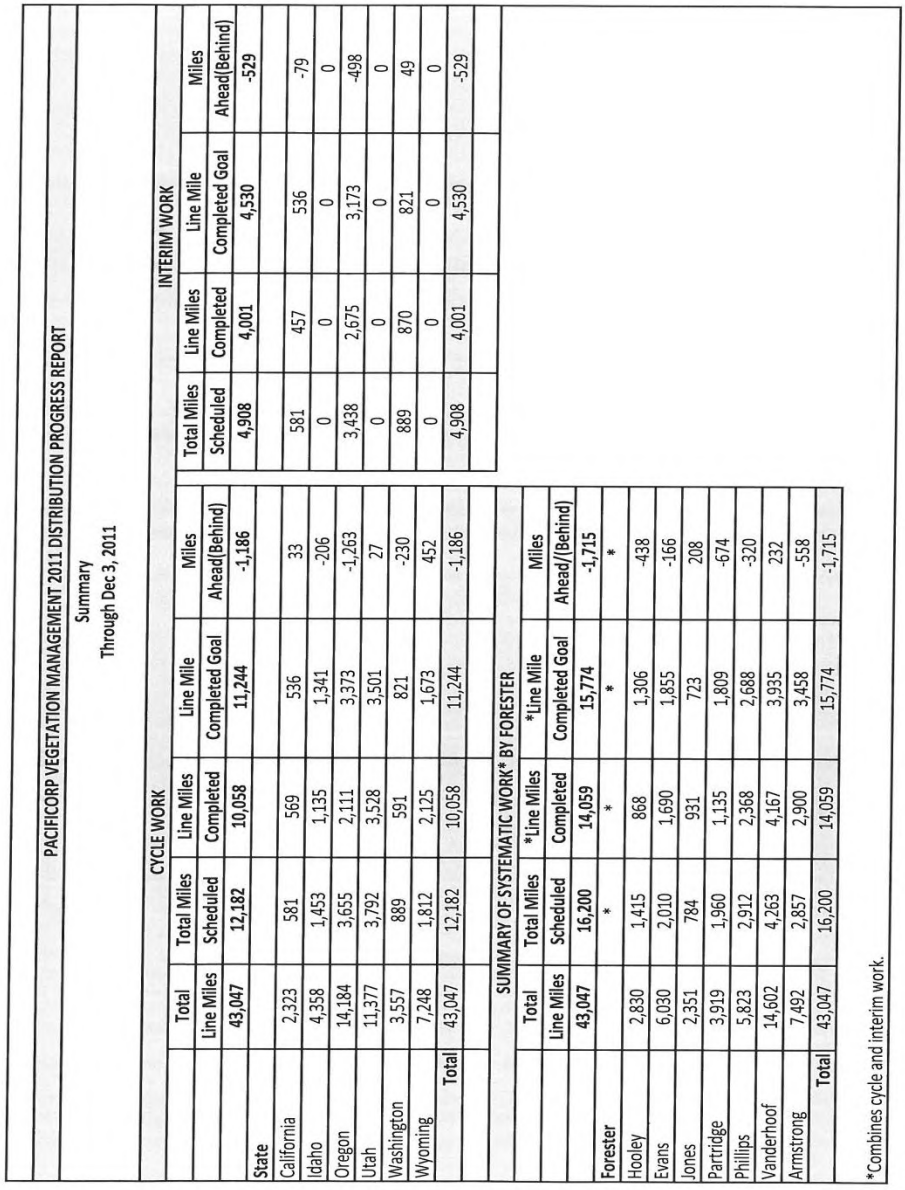
SUPERVISOR FOREMAN

FORESTER

TRIM TOTAL	% SIDE TRIMS	%CROWN REDUCTION TRIMS	%OVERHANG TRIMS	SEC/SERV TRIMS	# BRUSH TRIMS	
103,658	44.99	41.95	1.90	4,563.00	70,109	
REMOVALS TOTALS	**%TREE REMOVALS**	**#BRUSH FT REMOVED**	**% BRUSH FEET REMOVED**	**% 4 - 11 REMOVED**	**% 12 - 23 REMOVED**	**% 24+ REMOVED**
90,956	46.74	772,283	84.91	12.56	2.02	0.51
TOTAL TREESBRUSH	**#STUMP APPLICATIONS**	**#ACRES SPRAYED**	**#ACRES CLEARED**	**#TGR APPLICATIONS**		
194,614	6,098	0	0	668		
	#STUMP GROUND	**#POLES CLEARED**	**#POLES TREATED**			
	6	15	0			
TOTAL MANHOURS	**%TRAVEL./ MISC MANHOURS**	**%INSPECT/ NOTIFY MANHOURS**	**%TRAFFIC/ FLAGGING MANHOURS**	**%CHIP/ CLEANUP MANHOURS**		
147,737	7.66	13.09	9.73	41.35		
%TRIM MANHOURS	**%REMOVAL MANHOURS**	**%TGR MANHOURS**	**%POLE CLEARING MANHOURS**	**%ROW CLEARING MANHOURS**	**% SPRAYING MANHOURS**	**%STUMP TREAT MANHOURS**
22.42	3.64	0.17	0.00	0.00	0.00	0.28
TOTAL COST	**TOTAL $/TREE**	**TRIMMING $/TRIM**	**REMOVAL $/REMV**			
$7,797,560	$40.07	$63.34	$11.73			
TOTAL MH/TREE	**TRIMMING MH/TRIM**	**REMOVAL MH/REMV**	**TRIM MH/10FT2 SAPPRUN**	**REMV MH/ 10FT2 SAPREM**		
0.76	1.20	0.22	0.06	0.03		

06/14/2011 Page 1 of 1

Figure 4.12 Monthly Distribution Progress Report



PACIFICORP VEGETATION MANAGEMENT 2011 DISTRIBUTION PROGRESS REPORT

Summary
Through Dec 3, 2011

	CYCLE WORK					INTERIM WORK				
	Total Line Miles	Total Miles Scheduled	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)	Total Miles Scheduled	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)
	43,047	**12,182**	**10,058**	**11,244**	**-1,186**	**4,908**	**4,001**	**4,530**	**-529**
State									
California	2,323	581	569	536	33	581	457	536	-79
Idaho	4,358	1,453	1,135	1,341	-206	0	0	0	0
Oregon	14,184	3,655	2,111	3,373	-1,263	3,438	2,675	3,173	-498
Utah	11,377	3,792	3,528	3,501	27	0	0	0	0
Washington	3,557	889	591	821	-230	889	870	821	49
Wyoming	7,248	1,812	2,125	1,673	452	0	0	0	0
Total	43,047	12,182	10,058	11,244	-1,186	4,908	4,001	4,530	-529

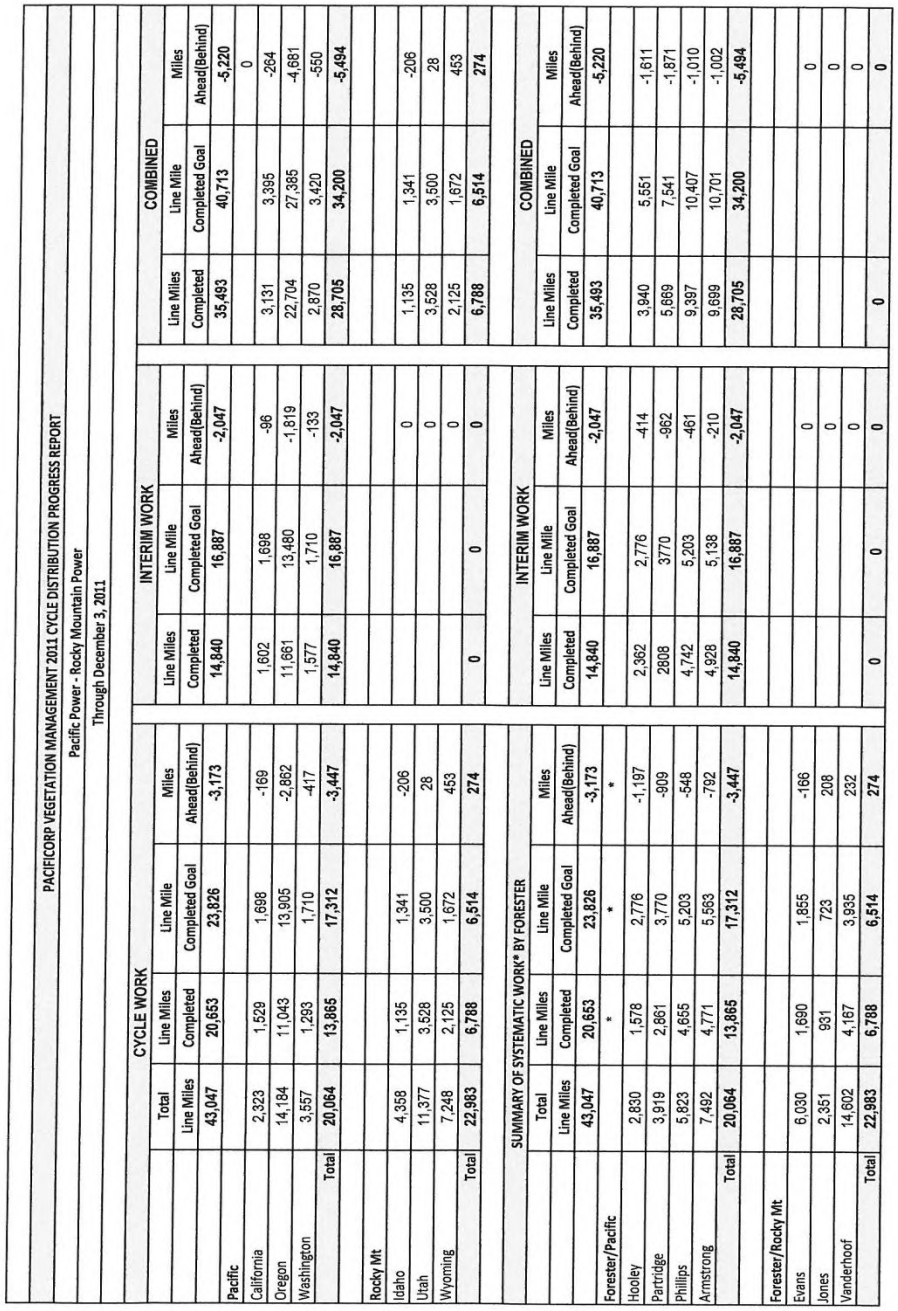
SUMMARY OF SYSTEMATIC WORK* BY FORESTER

	Total Line Miles	Total Miles Scheduled	*Line Miles Completed	*Line Mile Completed Goal	Miles Ahead/(Behind)
	43,047	**16,200**	**14,059**	**15,774**	**-1,715**
Forester		*	*	*	*
Hooley	2,830	1,415	868	1,306	-438
Evans	6,030	2,010	1,690	1,855	-166
Jones	2,351	784	931	723	208
Partridge	3,919	1,960	1,135	1,809	-674
Phillips	5,823	2,912	2,368	2,688	-320
Vanderhoof	14,602	4,263	4,167	3,935	232
Armstrong	7,492	2,857	2,900	3,458	-558
Total	43,047	16,200	14,059	15,774	-1,715

*Combines cycle and interim work.

Weeks 48

Figure 4.13. Cycle Progress Report.



PACIFICORP VEGETATION MANAGEMENT 2011 CYCLE DISTRIBUTION PROGRESS REPORT

Pacific Power - Rocky Mountain Power

Through December 3, 2011

	CYCLE WORK				INTERIM WORK			COMBINED		
	Total Line Miles	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)
	43,047	20,653	23,826	-3,173	14,840	16,887	-2,047	35,493	40,713	-5,220
Pacific										
California	2,323	1,529	1,698	-169	1,602	1,698	-96	3,131	3,395	-264
Oregon	14,184	11,043	13,905	-2,862	11,661	13,480	-1,819	22,704	27,385	-4,681
Washington	3,557	1,293	1,710	-417	1,577	1,710	-133	2,870	3,420	-550
Total	20,064	13,865	17,312	-3,447	14,840	16,887	-2,047	28,705	34,200	-5,494
Rocky Mt										
Idaho	4,358	1,135	1,341	-206			0	1,135	1,341	-206
Utah	11,377	3,528	3,500	28			0	3,528	3,500	28
Wyoming	7,248	2,125	1,672	453			0	2,125	1,672	453
Total	22,983	6,788	6,514	274	0	0	0	6,788	6,514	274

SUMMARY OF SYSTEMATIC WORK* BY FORESTER

	Total Line Miles	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)
	43,047	20,653	23,826	-3,173	14,840	16,887	-2,047	35,493	40,713	-5,220
Forester/Pacific		*	*	*						
Hooley	2,830	1,578	2,776	-1,197	2,362	2,776	-414	3,940	5,551	-1,611
Partridge	3,919	2,861	3,770	-909	2808	3770	-962	5,669	7,541	-1,871
Phillips	5,823	4,655	5,203	-548	4,742	5,203	-461	9,397	10,407	-1,010
Armstrong	7,492	4,771	5,563	-792	4,928	5,138	-210	9,699	10,701	-1,002
Total	20,064	13,865	17,312	-3,447	14,840	16,887	-2,047	28,705	34,200	-5,494
Forester/Rocky Mt										
Evans	6,030	1,690	1,855	-166			0			0
Jones	2,351	931	723	208			0			0
Vanderhoof	14,602	4,167	3,935	232			0			0
Total	22,983	6,788	6,514	274	0	0	0	0		0

Figure 4.14. Monthly Tree Crew Deployment Report.

PacifiCorp Vegetation Management

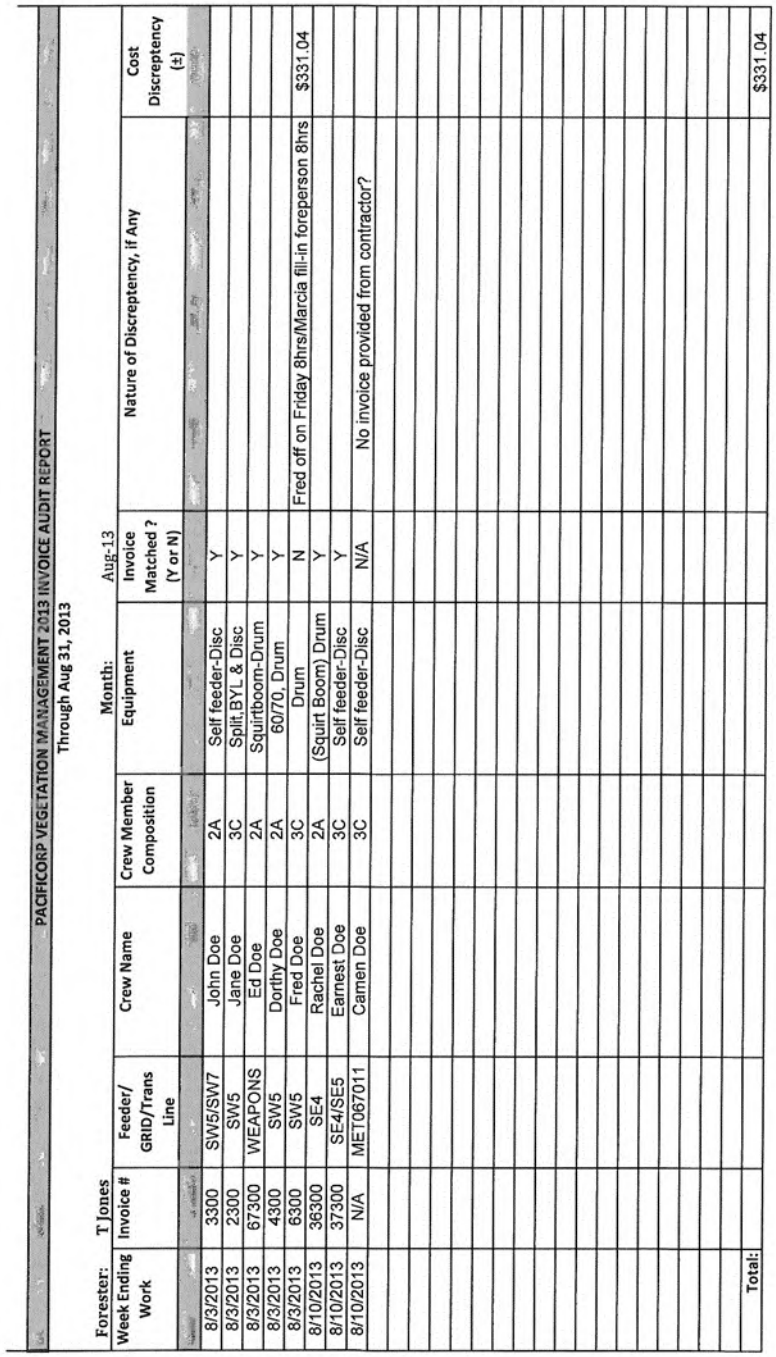
Monthly Crew Report: Summary

Date: 12/1/2011

State	Distribution & Local Trans													Main Grid Trans							Total Crews
	2 Man Lift	3 Man Lift	3 Man Climb	4 Man Climb	3 Man Skidder	2 Man Mow	2 Man Slash	2 Man Pole Clear	1 Man Chem	2 Man Flagger	For. Tech	Billed Super	Sub Total	3 Man Climb	3 Man Skidder	2 Man Slash	2 Man Pole Clear	1 Man Chem	Forest Tech	Sub Total	
California	5.0	1.0	3.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	3.0	2.75	15.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0
Idaho	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	1.00	5.0	1.0	0.0	0.0	0.0	0.0	0.3	1.0	6.0
Oregon	30.0	12.0	6.0	0.0	0.0	0.0	0.0	0.0	0.5	6.5	12.5	8.25	55.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	57.0
Utah	27.0	2.0	38.0	0.0	0.0	0.0	0.0	0.0	6.0	0.0	13.0	10.50	73.0	4.0	0.0	0.0	0.0	0.0	2.0	4.0	77.0
Washington	5.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	1.5	2.00	10.0	2.0	0.0	0.0	0.0	0.0	0.5	2.0	12.0
Wyoming	5.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.50	8.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	8.0
TOTAL	77	17.0	49.0	0.0	0	0	0	2	13	8.5	32.3	26.00	166.0	9.0	0.0	0.0	0.0	0.0	3.3	9.0	175.0

Forester	Distribution & Local Trans													Main Grid Trans							Total Crews
	2 Man Lift	3 Man Lift	3 Man Climb	4 Man Climb	3 Man Skidder	2 Man Mow	2 Man Slash	2 Man Pole Clear	1 Man Chem	2 Man Flagger	For. Tech.	Billed Super	Crew Sub-Total	3 Man Climb	3 Man Skidder	2 Man Slash	2 Man Pole Clear	1 Man Chem	Forest Tech	Sub Total	
Hooley	5.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	2.0	2.00	11.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.5
Evans	9.0	1.0	8.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	6.0	3.00	20.0	2.0	0.0	0.0	0.0	0.0	0.0	2.0	22.0
Jones	11.0	1.0	20.0	0.0	0.0	0.0	0.0	0.0	3.0	0.0	5.0	4.00	35.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	35.0
Partridge	12.0	7.0	5.0	0.0	0.0	0.0	0.0	0.0	2.5	3.0	5.5	3.50	29.5	2.0	0.0	0.0	0.0	0.0	0.0	2.0	31.5
Phillips	15.0	1.0	4.0	0.0	0.0	0.0	0.0	0.0	4.0	1.0	7.0	5.00	25.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	25.0
Vanderhoof	17.0	1.0	12.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	4.3	6.00	31.0	3.0	0.0	0.0	0.0	0.0	1.8	3.0	34.0
Armstrong	8.0	1.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	3.0	2.5	2.50	14.0	2.0	0.0	0.0	0.0	0.0	0.5	2.0	16.0
TOTAL	77.0	17.0	49.0	0.0	0.0	0.0	0.0	2.0	12.5	8.5	32.3	26.00	166.0	9.0	0.0	0.0	0.0	0.0	4.3	9.0	175.0

Figure 4.15. Monthly Invoice Audit Form.



PACIFICORP VEGETATION MANAGEMENT 2013 INVOICE AUDIT REPORT

Through Aug 31, 2013

Forester: T Jones Month: Aug-13

Week Ending Work	Invoice #	Feeder/ GRID/Trans Line	Crew Name	Crew Member Composition	Equipment	Invoice Matched ? (Y or N)	Nature of Discreptency, if Any	Cost Discreptency (±)
8/3/2013	3300	SW5/SW7	John Doe	2A	Self feeder-Disc	Y		
8/3/2013	2300	SW5	Jane Doe	3C	Split BYL & Disc	Y		
8/3/2013	67300	WEAPONS	Ed Doe	2A	Squirtboom-Drum	Y		
8/3/2013	4300	SW5	Dorthy Doe	2A	60/70, Drum	Y		
8/3/2013	6300	SW5	Fred Doe	3C	Drum	N	Fred off on Friday 8hrs/Marcia fill-in foreperson 8hrs	$331.04
8/10/2013	36300	SE4	Rachel Doe	2A	(Squirt Boom) Drum	Y		
8/10/2013	37300	SE4/SE5	Earnest Doe	3C	Self feeder-Disc	Y		
8/10/2013	N/A	MET067011	Carmen Doe	3C	Self feeder-Disc	N/A	No invoice provided from contractor?	
Total:								$331.04

PACIFICORP VEGETATION MANAGEMENT 2013 INVOICE AUDIT REPORT

Through Aug 31, 2013

Forester: T Jones **Month:** Aug-13

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8/10/2013	N/A	MET067011	Camen Doe	3C	Self feeder-Disc	N/A	No invoice provided from contractor?	
Total:								$331.04

5. DISTRIBUTION

Distribution lines are overhead facilities that are energized less than 46 kV. Distribution primary voltage ranges from 600 to 45,000 volts, while lines energized below 600 volts are secondary.

5.1 Distribution New Construction Clearing

Every effort should be made by the Company not to build new line over or through trees that will need to be cleared from the facilities in the future. New distribution rights-of-way should be cleared to specification before the lines are energized. Initial clearing is important because it sets a pattern for future work.

5.2 Distribution Cycle Maintenance

Trees and vegetation should be cleared from distribution facilities on scheduled cycles. Cycle work is methodical, and facilities shall be worked systematically, either by feeder or grid map. Cycles should be based on considerations such as the time elapsed since the last scheduled work, the type of facilities, tree conditions, the number of customer complaints, the growth rate and density of predominant tree species, geography, the frequency of tree-caused outages, customer count, the existence of important accounts (hospitals, factories, mines or other facilities) customer densities, single or multiple phase wires and other factors. Trees and vegetation should be cleared from distribution facilities to last until the next scheduled cycle work.

SPECIFICATIONS

The intent of the cycle program is to:

- Systematically obtain specification clearance and maintain compliance with state regulatory rules, laws or regulations.
- Reduce inventories of trees that could potentially grow into Company facilities. This includes removing non-landscape trees 6-inch DBH or less, after providing the property owner notification (following Section 8.2).
- Improve access to facilities.
- Identify and correct readily climbable trees.
- Identify and remove tree houses built inside of criteria specified in Table 2.2.
- Clear insulated services that have stems causing strain to the point of deflection (Figure 5.1) or that are abrading the insulation to the extent they could cause an outage before the next scheduled cycle. If pruning or removal is not practical, arrangements should be made with operations to re-route facilities or have suitable material or devices installed to avoid insulation damage by abrasion.
- Prune non-insulated services and streetlight wire for one-foot of clearance.
- Prune pole to pole insulated secondaries to 2-feet of clearance from the conductors
- Prune pole to pole non-insulated services. and secondaries for three feet of clearance from the conductors
- Identify and remove high risk trees that could fall through facilities.
- Apply herbicide to saplings (< 4" DBH) of tall-growing species after property owner notification (presuming the property owner has not expressed objection to herbicide application) on the property on which other work is being performed. Spray work in other locations may be authorized at foresters discretion as directed in a work release.

- Apply tree growth regulators (TGR's) to fast-growing tree species after providing property owner notification.

5.3 Distribution Interim Maintenance

Interim work is a cycle performed half way between cycles to address fast-growing trees that will not hold for an entire cycle.On PacifiCorp's system, interim work should be prescribed in California and Oregon. Identified tree conditions on a feeder or grid should be corrected systematically in the interim half way through the scheduled cycle. Work should be limited to trees that grow six feet or more a year or hazard trees.

Interim work should be restricted to critical conditions, including:

- High risk trees.
- Trees violating specific state regulatory agency regulations.
- Trees that have grown within work thresholds specified in Table 5.2.
- Readily climbable trees inside of work thresholds in Table 5.2
- Identifying and removing tree houses built inside of criteria specified in Table 2.2.
- All work should be completed to company specifications. Non-critical conditions should be monitored until the next scheduled cycle work.
- Non-primary facilities do not require work on interim cycles unless they present a clear safety or service reliability risk.

5.4 Distribution Ticket Maintenance

Customers, district operations staff, governmental bodies, regulatory agencies or others alert vegetation management to real or perceived conflicts between trees and power lines from time to time. The intent of ticket maintenance is to determine whether or not the reported conditions present immediate, unreasonable safety or electrical service risks, and if they do, correct them.

Emergency situations should be corrected within 24 hours. Critical conditions reported by regulatory agencies and other urgent situations should be inspected within 48 hours and corrected within 7 days. Other tickets should be inspected within 10 business days from the date of request, and a determination made regarding whether or not the reported condition warrants work.

The concerned party shall be contacted regarding the inspection determination. This contact may be face to face if the customer is present, or by door hanger, letter, or telephone if they are not present.

Ticket work should be limited to critical conditions, including:

- Trees representing an unreasonable safety risk as determined by the responsible contract utility forester.
- Trees that have caused an outage.
- Trees violating specific state regulatory regulations.
- Limbs that are deflecting secondary conductors to the extent they present a high probability of tearing down the wire before the next scheduled cycle work.
- Trees that are likely to start a fire.
- Readily climbable trees.
- Trees where the property owner requires clearance so non-utility line clearance workers may work the tree. This work complies with various state line safety act and may be billed to the requesting party.

All work should be completed to Company specifications. Non-critical conditions should be monitored and corrected on the next scheduled maintenance work.

5.5 Distribution Herbicide Maintenance

Distribution herbicide maintenance should be prescribed in the interim between cycles. Saplings (< 4" DBH) of tall-growing species after property owner notification (presuming the property owner has not expressed objection to herbicide application). Procedures outlined in Chapter 7 shall be followed.

5.6 Distribution Clearance Specifications

Removal of trees that could potentially grow into distribution facilities should be pursued. When trees are pruned, branches should be cut to natural targets rather than predetermined clearance limits (following section 3.3). Consequently, the clearances in these standard operating procedures should not be used as strict boundaries requiring cuts at the precise distances indicated. Rather, they are guidelines to use in obtaining proper clearances. Accurate natural target pruning is the overriding principal, with tree structure dictating appropriate cut locations. In many cases, the best targets are outside established clearance limits. So, many properly pruned trees will have more than specified clearance from conductors.

The type of facility, tree growth rate and perscription determine distribution clearance. Trees should be removed or pruned to provide for specification clearances as described in Figures 5.2, 5.3 and 5.4 and tables 5.1, 5.2 and 5.3. The figures and table provide work thresholds and specification clearances for slow, medium and fast-growing trees. Trees that exceed work threshold distances should hold until the next scheduled cycle and not need to be pruned. However, these trees should still be considered to be removal candidates if they could grow into distribution facilities or they present a high risk of failure. If trees violate thresholds, they shall be removed or pruned to provide specification clearances.

5.6.1 Growth Rate Definitions

Slow-growing trees grow vertically less than one-foot a year. Moderate growing trees grow between one and three feet a year and fast-growing trees grow more than three feet a year.

5.6.2 Side Clearance

Side work thresholds and side clearances from conductors can be found in Tables 5.1, 5.2 and 5.3, as well as Figures 5.2 to 5.4.

Side clearances from conductors may be reduced to 18-inches for structurally sound limbs greater than 6-inches in diameter at wire height, provided the tree is not readily climbable and the tree shows no evidence of conductor contact due to wire or tree sway. High risk trees should be removed or pruned to reduce the potential threat they pose.

5.6.3 Under Clearance

Under clearances work thresholds and clearances from conductors can be found in Tables 5.1 and 5.2, as well as Figures 5.2 to 5.4.

5.6.4 Overhang Clearance

Trees overhanging primary conductors should be removed or pruned to provide at least ten feet of clearance from the conductors (Figures 5.2, 5.3 and 5.4). Increased clearance should be considered by the forester or GF/supervisor under the following types of circumstances: three-phase lines (particularly to the first protective device), rural or difficult to access areas, for weak-

wooded or fast-growing tree species, on poorly-structured trees and to accommodate foreseeable weather conditions such as frequent high wind, heavy rains, ice and snow. Dead wood that could fall or be blown into the primary conductors shall be removed. In some cases, such as three phase lines or remote areas, all overhanging branches may be removed. Overhang may be tapered, with the greatest side clearance at minimum clearance height, with gradually more overhang higher in the tree.

Figure 5.1. Trees with branches applying sufficient pressure to cause damage to insulated service and street light lines should be pruned on cycle to relieve the pressure.

Figure 5.2 Vegetation Management Distribution Primary Clearnances – Slow Growing Trees

Figure 5.2. PacifiCorp Vegetation Management Distribution Primary Clearances

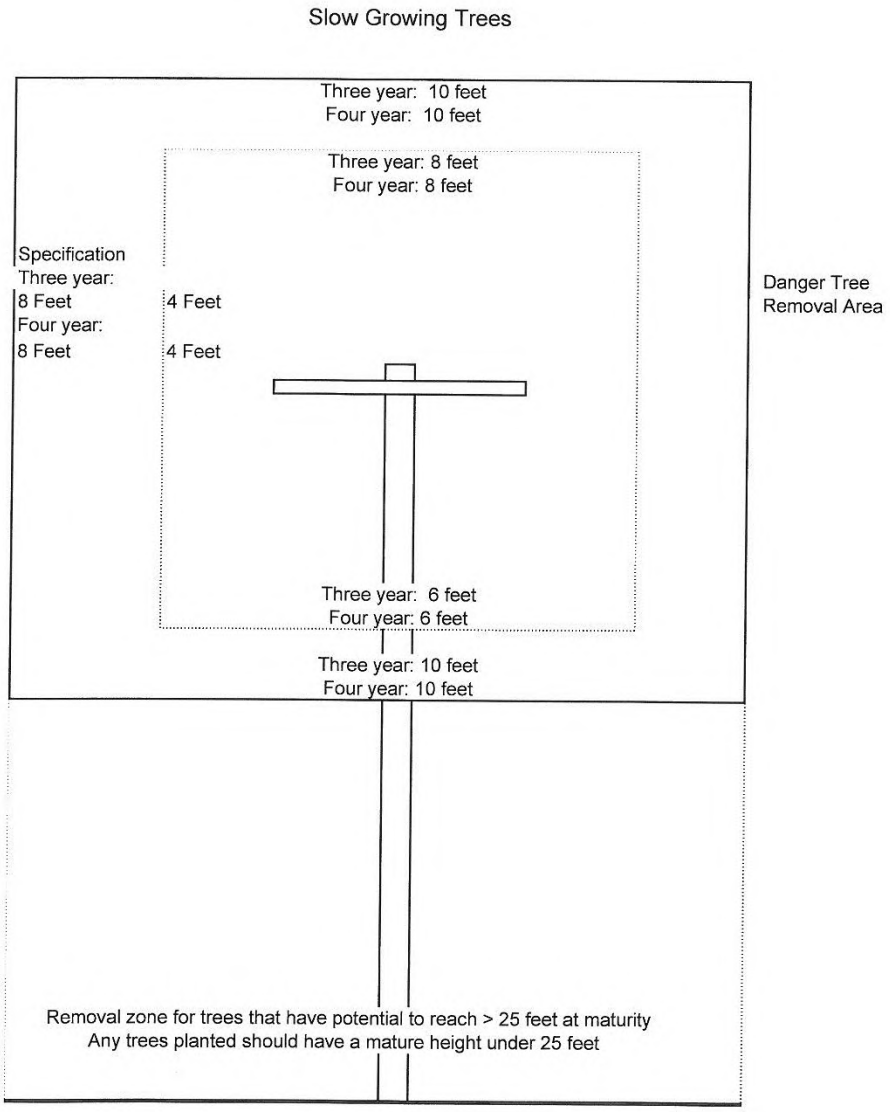


Figure 5.3 Vegetation Management Distribution Primary Clearnances – Moderate Growing Trees

Figure 5.3. PacifiCorp Vegetation Management Distribution Primary Clearances

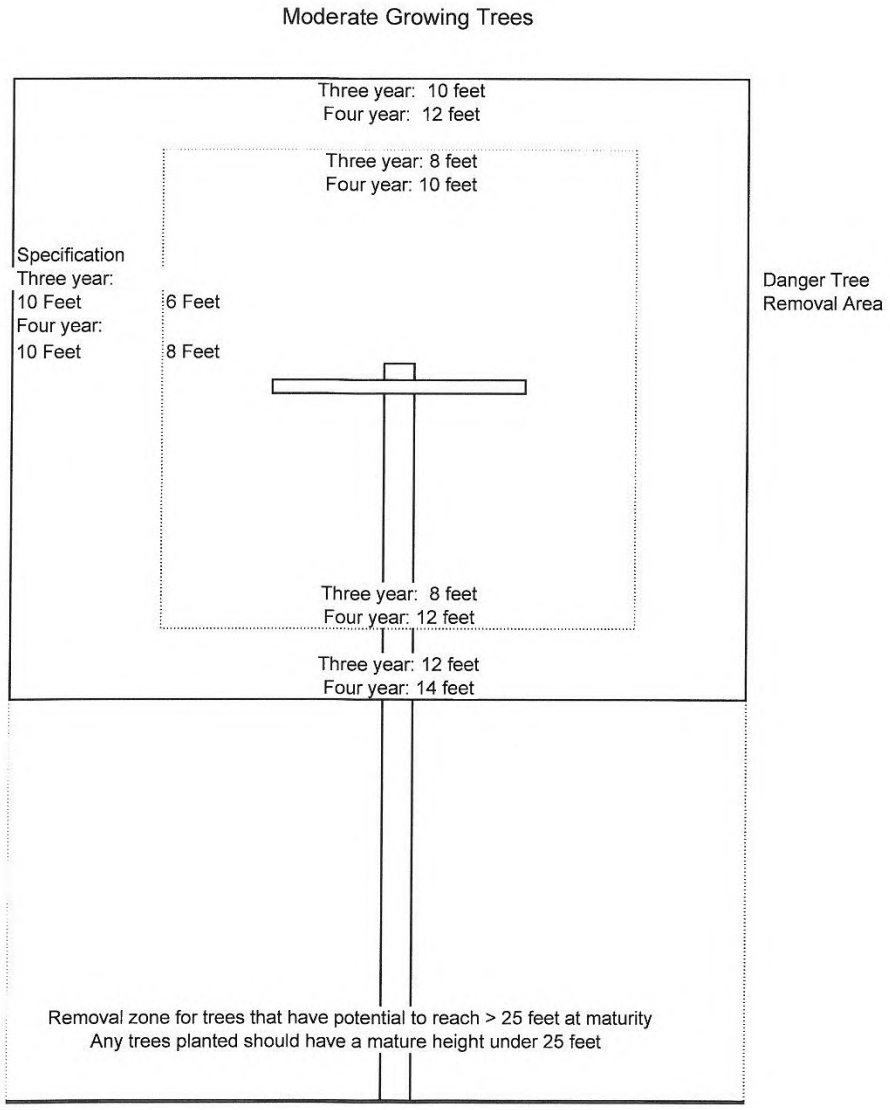


Figure 5.4 Vegetation Management Distribution Primary Clearnances – Fast Growing Trees

Figure 5.4. PacifiCorp Vegetation Management Distribution Primary Clearances

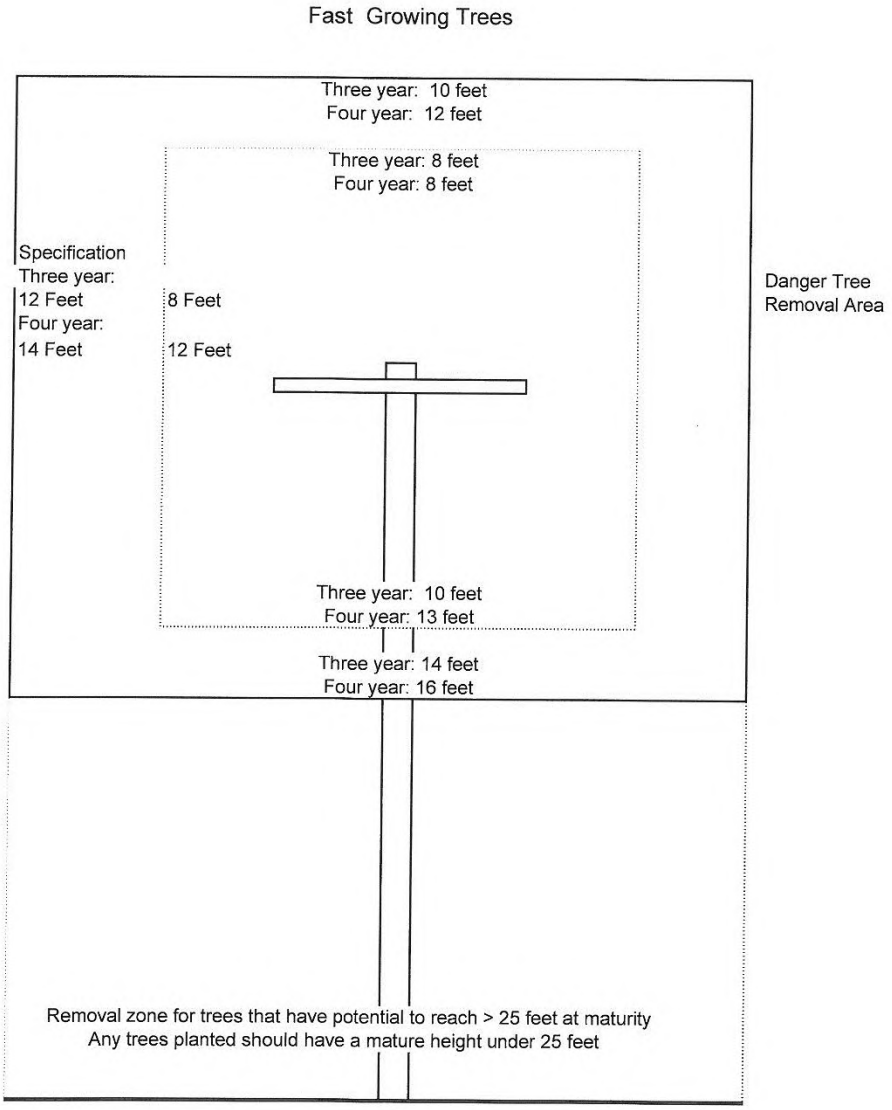


Table 5.1. Distribution primary cycle clearances.

	Slow-Growing < 1 foot/year		Moderate-growing 1-3 feet/year		Fast-growing > 3-feet/year*	
	Work Threshold	***Specification Clearance***	***Work Threshold***	***Specification Clearance***	***Work Threshold***	***Specification Clearance***
Three-year cycle						
Side Clearance	4 feet	8 feet	6 feet	10 feet	8 feet	12 feet
Under Clearance	6 feet	10 feet	8 feet	12 feet	10 feet	14 feet
Overhang Clearance	8 feet	10 feet	8 feet	10 feet	8 feet	10 feet
Four-year cycle						
Side Clearance	4 feet	8 feet	8 feet	10 feet	12 feet	14 feet
Under Clearance	6 feet	10 feet	12 feet	14 feet	13 feet	16 feet
Overhang Clearance	8 feet	10 feet	10 feet	12 feet	8 feet	12 feet

*Note: Specified clearance distances are assumed to be from conductors, Growth-rate definitions refer to vertical growth. Side and overhang growth toward the conductors are assumed to be slower. Specification clearances are minimum, and actual distances achieved at the time of work will often need to exceed those itemized above. Trees with clearances that exceed the pruning threshold should not require work, provided they will not interfere with the primary conductors or violate state tree clearance requirements before the next scheduled cycle work. Work thresholds may have to be expanded for fast-growing trees.

*Fast-growing work thresholds on four-year cycles assume interim work. Wyoming will require at least 25% greater clearances.

Table 5.2. Minimum Distribution primary interim clearances.

	Slow-Growing < 1 foot/year		Moderate-growing 1-3 feet/year		Fast-growing > 3-feet/year	
	Work Threshold	***Specification Clearance***	***Work Threshold***	***Specification Clearance***	***Work Threshold***	***Specification Clearance***
Four-year cycle						
Side Clearance	2 feet	8 feet	3 feet	10 feet	8 feet	14 feet
Under Clearance	2 feet	10 feet	5 feet	14 feet	9 feet	18 feet
Overhang Clearance	2 feet	10 feet	3 feet	10 feet	8feet	10 feet

Table 5.3. Non-primary wire cycle clearances.

Line Type	Work Threshold	Specification Clearance
Triplex service	Deflection/abrasion	Relieve pressure
Triplex pole-to-pole secondary/streetlight wire	Deflection/abrasion	2-feet
Non-insulated wire service/street light wire	Contact	1-foot
Non-insulated wire pole-to-pole secondary	Contact	3-feet
Neutral low position	Contact	2-feet
Neutral on cross arm	Primary as in Table 5.1	Primary as in Table 5.1
Guy wire	2-inch or greater diameter limb applying pressure, threatened by high risk trees	Relieve pressure or remove high risk trees.

5.6.5 Neutral and Insulated Pole-to-Pole Secondary Clearance

During cycle work, trees should be maintained to provide at least two-feet of clearance around insulated pole-to-pole secondary and neutral conductors (Table 5.3). Except trees that have already reached their maximum anticipated mature height. Tree limbs should not be allowed to remain between primary and neutral or insulated secondary conductors. Neutral conductors in a raised (primary) position should be provided secondary clearance distances during ticket or interim work, and primary specification clearance distances during cycle work.

5.6.6 Non-Insulated Open/Spaced Secondary Clearances

Trees growing around non-insulated open/spaced secondary conductors shall be pruned on cycle to provide a minimum of three-feet of clearance from the secondary wires (Table 5.2). During cycle work, trees shall be cleared from the space between primary and non-insulated open/spaced secondary conductors. Side clearances may be reduced to one foot for structurally sound limbs greater than 6-inches in diameter at wire height.

5.6.7 Insulated Service and Insulated Street Light Line Clearances

Stems that are causing strain to the point of deflection (Figure 5.1) or that are abrading the insulation to the extent they could cause an outage before the next scheduled cycle should be pruned to relieve the pressure (Table 5.2). If pruning or removal is not practical, arrangements should be made with operations to have the facility re-routed or have suitable

material or devices installed to avoid insulation damage by abrasion.

If the customer desires to remove other limbs or trees around these lines, they must arrange for a temporary disconnection to allow the desired work to be done safely. PacifiCorp does not clear trees for street light illumination, unless required to by specific language in a franchise agreement.

5.6.8 Non-insulated Service Line and Non-Insulated Street Light Line Clearances

Trees should be pruned on cycle to provide at least one-foot of clearance around non-insulated service and street light lines (Table 5.3). If the customer desires to remove other limbs or trees around these lines, contract utility foresters or crew leaders should inform the customer to call the customer service line to arrange for a temporary disconnection of the facilities to allow safe completion the desired tree work, as required by law.

5.6.9 Other Facility Clearances

5.6.9.1 Guy Wires.

Trees or branches two-inches or more in diameter applying direct pressure to or threatening to fall on or through
poles or guy wires shall be removed or pruned on cycle (Table 5.3).

5.6.9.2 Poles

One-third of the circumference around poles shall be cleared of vegetation to a distance of 5-feet to allow linemen a climbing path.

5.6.9.2.1 Vines

Vines shall be removed on cycle from poles and guys, cut at ground level, and treated with an approved herbicide (see Section 7.3). They shall be reported as brush or tree removed (if they are over 4" in dbh). Vines clearly part of a landscape and rooted well away from the pole may be pruned and reported as saplings pruned. Vines shall be pulled off the bottom 5-feet of poles after they have been cut. The facility point shall be documented by the tree crew and given to their supervisor/GF, who shall report it to operations to clear the remainder of the pole, and arrangements made with PacifiCorp journeymen linemen for the job.

5.6.9.3 Telecom and Private Electrical Lines

Trees should not be pruned or removed expressly to provide clearance for television cable, telephone lines or private electrical facilities unless authorized in advance by the appropriate forester.

5.6.9.4 Street Light Illumination

Trees shall not be pruned to improve street light illumination, unless required by specific language in a franchise agreement.

5.7 Pole Clearing

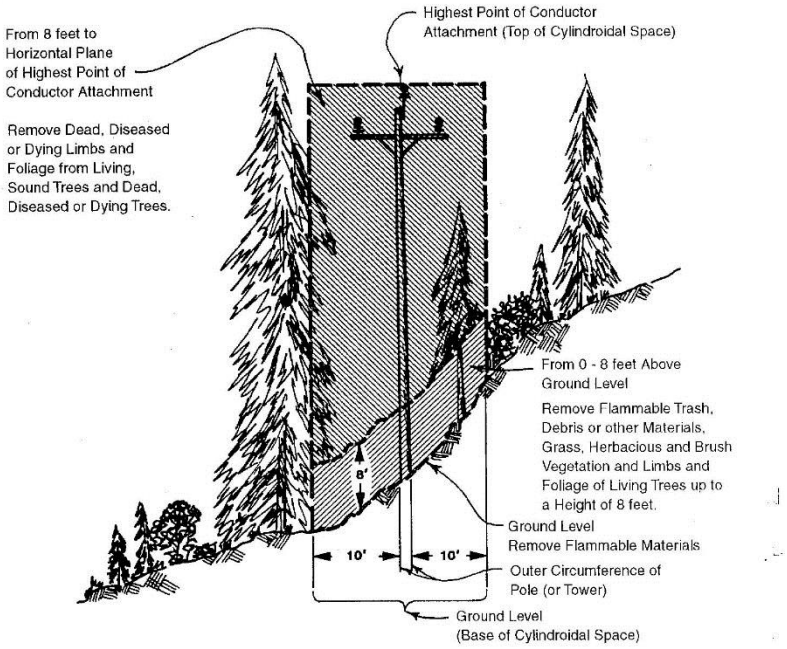
California Resource Code 4292, requires a ten-foot radius cylinder of clear space from pole top to bare ground around "subject" poles in delineated resource areas during designated fire season. Trees or saplings with trunks within clearance zone should have eight feet of vertical clearance from the ground to the highest limb (Figure 5.5.
Subject poles have fuses, air switches, clamps or other devices that could create sparks and start fires (Nichols et al. 1995). This cleared space should be established and maintained by pruning and removing above ground branches and plant parts. After removingvegetation to bare ground for a 10-foot radius around subject poles,

herbicides, including soil sterilants, should be applied, unless expressly prohibited or is against the customer's wishes.

5.8 Padmount Transformers

Padmount transformers should not be cleared as part of normal distribution cycle or interim maintenance. They may be cleared in response to facility point inspection requests should operations require access and a work order is provided. Qualified line clearance tree workers are not required to clear padmount transformers, so contractors responsible for landscape maintenance around substations may be assigned to remove shrubs and other low-growing vegetation that is interfering with padmount transformers

Figure 5.5. California pole clearing requirements (from Nichols et al. 1995).



6. TRANSMISSION VEGETATION MANAGEMENT PLAN (STANDARD OPERATING PROCEDURES)

Transmission facilities are overhead lines energized to greater than 45kV. Typical transmission voltages on PacifiCorp's system are 46kV, 69kV, 115kV, 138kV, 161kV, 230kV, 345kV and 500kV. Facility voltage and type determine the amount of transmission clearance needed. Table 6.1 provides specification clearances for transmission rights-of-way.

Transmission work shall comply with the ANSI A300 (Part 7): *American National Standard for Tree Care Operations (Integrated Vegetation Management a Electric Utility Rights-of-way* [ANSI 2012a]) and the ISA *Best Management Practice: Integrated Vegetation Management for Electric Utility Rights-of-way* (Miller 2014). As well as Tree Risk A300 (Part 9): *American National Standard for Tree Care Operations (Tree Risk Assessment)* and ISA *Best Management Practice: Tree Risk Assessment* (Smiley, Matheny and Lilly, 2011).

Transmission work on lines at or above 200 kV and those designated by the Western Electricity Coordinating Council as an element of the major transfer path in the bulk electric system, including those that extend greater than one mile beyond the fenced area of the generating station switchyard to the point of interconnection with a Company facility or do not have a clear line of site form the generating station switchyard fence to the point of interconnection with a Company facility shall also conform to the North American Electric Reliability Corporation's (NERC) Reliability Standard FAC-003 (NERC 2008) along with other chapters in this manual.

6.1 Work Objective

The objective of systematic transmission work is to improve the reliability of PacifiCorp's transmission system by preventing outages from vegetation located on transmission rights-of-way and minimizing outages from vegetation located adjacent to the right-of-way.

6.2 Philosophy

PacifiCorp's vegetation management philosophy for transmission lines is to utilize integrated vegetation management best practices wherever possible to conduct cover type conversion and to cultivate stable, low-growing plant communities comprised of plants that will never interfere with transmission lines in their lifetime.

Reliability and safety are most effectively protected through establishing and maintaining a right-of-way consistent with the wire-border zone concept (see section 6.8.1.4.1). When the line is less than 50 feet off the ground, the wire-border zone should be cleared of all incompatible vegetation unless an easement fails to provide appropriate authority or there are legal impediments preventing it.

6.3 Initial Clearing and Construction

Newly constructed transmission lines should be cleared to full specifications prior to being energized. In densely vegetated areas, rights-of-way usually have to be completely cleared as the initial stage of establishing a wire-border zone (Figures 6.1 and 6.1)

6.4 Inspection

Transmission lines falling under the auspices of FAC-003 should be inspected at least once a year by ground or air, depending on the anticipated growth of vegetation and any other environmental or operational factors that could affect the relationship of vegetation to the transmission line.

Local transmission (non-FAC-003 lines) over built on distribution should be inspected in conjunction with distribution cycle work.

Line Patrolmen have responsibility for inspecting transmission lines subject to FAC-003 and reporting conditions to vegetation management. In addition, each area forester shall meet twice each year to discuss vegetation conditions with the line patrolman assigned to the area.

Line Patrolmen encountering a tree that poses a threat of causing a transmission outage at any moment shall follow procedures in PacifiCorp Operating Procedure PCC-215, in order to comply with Requirement R4 of NERC Standard FAC-003 (*Transmission Vegetation Management Program*). Line patrolmen must:

- Immediately notify the grid operator by phone and describe the nature and extent of the threat.
- Complete and process the Emergency Tree Action Form.
- Communicate the vegetation conditions to vegetation management for urgent attention.

Examples of tree conditions that pose a threat of causing a transmission outage at any moment include (but are not limited to) trees that violate or pose a risk within 72 hours of violating NERC Minimum Vegetation Clearance Distance (MVCD), uprooted trees that are leaning toward the line and pose a risk of immediate failure and trees with structural failures that may cause them to break in part or whole onto the transmission facilities (See Smiley, Matheny and Lilly 2011).

6.4.1 Additional Inspection

Foresters should annually select lines among those subject to FAC-003 for annual inspection. This inspection is to be done in addition to that performed by line patrolmen. These inspections supplement, rather than substitute for, those conducted by line patrolmen. Foresters should assign representatives to complete these inspections. Using Level 1 assessments from the ISA *Best Management Practices: Tree Risk Assessment (Smiley Matheny and Lilly 2011).*

Such inspection should identify trees that pose a threat of causing an outage at any moment, and trees that could possibly violate work thresholds within the next year. Company plan and profiles should be used in the field itemizing maximize sag and sway along with range finders to confirm the MVCD has not been violated. Locations should be noted on an activity report, and assigned to a tree crew for work, with the appropriate forester's approval.

If the inspections discover a tree that poses a high likelihood of posing an outage at any moment, contract utility foresters shall contact the appropriate forester within three hours. Foresters shall immediately request the appropriate line patrolman to inspect the line according to the imminent threat procedure described in section 6.4.

6.5 Work Plan

The Vegetation Management A300 standard (ANSI 2012a) and the ISA integrated vegetation management best management practice (Miller 2014) recommend against cycle-based

transmission work thresholds. Rather, work should be scheduled depending on line voltage, line importance, vegetation conditions that violate the action thresholds in Table 6.1, location, predominant species' growth rates, threatened and endangered species, archeological sites, topography and other factors.

A comprehensive approach that exercises the full extent of legal rights is superior to incremental management in the long term because it reduces overall encroachments, and it ensures that future planned work is sufficient at all locations on the right-of-way. Removal of trees in the right-of-way is superior to pruning and shall be pursued whenever legal rights exist to do so. Removal minimizes the possibility of conflicts between energized conductors and vegetation.

6.5.1 Annual Work Plan

PacifiCorp performs vegetation management work in accordance with annual work plans that details the circuits and facilities to be managed during a calendar year. MS Project is encouraged as planning software. Plans should include:

- A list of facilities subject to scheduled work.
- If only a portion of a line is scheduled, the line segment must be identified (e.g. structure to structure).
- Dates when work is anticipated to start and end on each project (Gantt charts are recommended).
- A description of the type of control methods, (cycle, herbicide, mowing, aerial, etc.)

6.5.1.1 Annual Work Plan Adjustments

The annual work plan may be adjusted during the year to account for changes in conditions that require a circuit, line segment or project to be moved into or out of the work plan. Examples of reasons for adjustments include, but are not limited to, vegetation growth in excess of anticipated levels, vegetation inspection results, new construction projects or removal of existing facilities. Adjustments to the annual work plan shall be documented as they occur and shall be authorized by the director of vegetation management.

6.6 Action Thresholds

The action thresholds in Table 6.1 provide roughly ten-foot buffers from the NERC MVCD. Trees identified within the action thresholds should be scheduled for work within twelve months.

6.7 Clearances

6.7.1 Minimum Clearances Following Work

Minimum clearances from conductors to be achieved at the time of work are in Table 6.1. These distances should be increased, depending upon local conditions and the expected time frame to return for future vegetation management work. Local conditions may include appropriate vegetation management techniques, fire risk, reasonably anticipated tree and conductor movement, species types and growth rates, species failure characteristics, local climate and rainfall patterns, line terrain and elevation, location of the vegetation within the span, worker approach distance requirements and other factors.

6.7.1.1 Side Clearance in Transmission Rights-of-Way

Specification side clearances to be obtained following work s are presented in Table 6.1. Consider potential sway of

conductors in fresh gale-force (36 mph) or greater wind, particularly mid span, where clearances could need to be increased to accommodate conductor sag and swing in high temperature and winds. If there is any question regarding the need to extend clearances, error should be made on the side of caution.

Table 6.1. Transmission clearance requirements (in feet).

	500 kV	345 kV	230 kV	161 kV	138 kV	115 kV	69 kV	45 kV
Maximum Flash Distances (MVCD)	8.5	5.3	5.0	3.4	2.9	2.4	1.34	N/A
Action thresholds	18.5	15.5	15.0	13.5	13.0	12.5	10.5	5
*Minimum clearances following work	50	40	30	25	25	25	25	20

The Minimum Vegetation Clearance Distance (MVCD) represents minimum clearances that should be maintained from conductors at all times, considering the effects of ambient temperature on conductor sag under maximum design loading, and the effects of wind velocities on conductor sway. MVCDs in this chart are for 10,000-11,000 feet above sea level (the maximum in Table 2 of FAC-003-04) and apply across PacifiCorp's service territory regardless of elevation. Action thresholds indicate work should be scheduled within the next year. They are roughly MVCD plus 10 feet, with the exception of the 46kV, for which no MVCD exists.

6.7.2 MVCD

NERC Minimum Vegetation Clearance Distances (MVCD) are established in FAC-003 (NERC 2008), and represent radial distances from the lines inside of which trees should not encroach (Table 6.1) Trees that violate MVCDs shall be corrected within 24 hours of their identification following PacifiCorp SOP-PCC-215. *Transmission Grid Operations Operating Procedure.*

6.7.3 Structure Clearances

Trees and brush should be cleared within a twenty-five foot radius of transmission "H" or metal structures, a ten-foot radius of single pole construction and a five-foot radius of guy anchors. Clearing activities shall not damage poles, structures, guys or anchors. Grasses, forbs, ferns and other herbaceous species may be left around structures and guys.

6.7.4 Guy Wires

Trees or branches two-inches or more in diameter applying direct pressure to or threatening to fall on or through poles or guy wires shall be removed or pruned.

6.8 Integrated Vegetation Management

The purpose of vegetation management on utility rights-of-way is to Establish sustainable plant communities that are compatible with the electric facilities, wherever possible. These communities are stable, low-growing, compatible with conductors, diverse, and establish a sustainable supply of forage, escape and nesting cover, movement corridors for wildlife, reduced fire risk, and more open access to the line (Yanner and Hutnik 2004). Establishing native vegetation will also reduce the invasion of noxious weeds into the corridor (BPA 2000).

6.8.1 IVM Control Methods

Control methods are the processes used to achieve objectives. Many cases call for a combination of methods. There are a variety of controls from which to choose, including manual, mechanical, chemical, biological, and cultural options (Miller 2014). Ground disturbance shall be minimized on all rights-of-way.

6.8.1.1 Manual Control Methods

Manual methods involve workers using hand-carried tools, such as chainsaws, handsaws, pruning shears. Manual techniques are selective and can be used where others may not be appropriate, including urban or developed areas, environmentally sensitive locations (such as wetlands or places inhabited by sensitive species), in the vicinity of archeological sites and on steep terrain.

6.8.1.2 Mechanical Control Methods

Machines are used for mechanical control. They are efficient and cost effective, particularly for clearing dense vegetation during initial establishment, or reclaiming neglected or overgrown rights-of-way (Figure 6.3). On the other hand, mechanical control methods can be non-selective and disturb sensitive sites, such as wetlands, archeologically rich localities or developed areas. At times, machines leave behind petroleum products, leaks and spills from normal operation. Furthermore, heavy equipment can be risky to use on steep terrain, where they may be unstable. So, they are not always appropriate.

6.8.1.3 Chemical Control Methods

Tree growth regulators and herbicides must be used according to directives on

their labels. Applicators are not only required to comply with label instructions, but also all other laws and regulations pertaining to tree growth regulator and herbicide use (see Chapter 7).

6.8.1.3.1 Tree Growth Regulators

Tree growth regulators (TGRs) are designed to reduce growth rates by interfering with natural plant processes. TGRs can be used to slow some fast-growing species, and be helpful where removals are prohibited or impractical.

6.8.1.3.2 Herbicides

Herbicides control plants by interfering with specific botanical biochemical pathways. There are a variety of herbicides, each of which behaves differently in the environment and in their effects on plants, depending on the formulation and characteristics of the active ingredient. While appropriate herbicide use reduces the need for future intervention, if misused they can cause unintended environmental harm due to drift, leaching and volatilization.

6.8.1.4 Biological Control Methods

Biological control uses natural processes to control undesirable vegetation. For example, some plants, including certain grasses, release chemicals that suppress other species growing around them. Known as allelopathy, this characteristic can serve as a type of biological control against incompatible species. Promoting wildlife populations is also a form of biological control. Birds, rodents and other animals can encourage compatible plant communities by eating seeds or shoots of undesirable plants.

A biological control known as cover-type conversion provides a competitive advantage to short-growing, early successional plants, allowing them to thrive and eventually out-compete unwanted tree species for sunlight, essential elements and water. Cultural methods also take advantage of seed banks of native, compatible species lying dormant on site. In the long run, cultural control is the most desirable method where it is applicable.

The early successional plant community is relatively stable, tree-resistant and reduces the amount of work, including herbicide application, with each successive treatment.

While it is a type of biological control, cover-type conversion employs a combination of manual, mechanical, herbicide and cultural methods. For example, although encouraging allelopathic plants and increasing wildlife populations by improving habitat are types of biological controls, they are also forms of cultural control.

Tree-resistant communities are created in two stages. The first involves non-selectively clearing the right-of-way of undesirable trees using the best applicable control method or methods. The second develops a tree-resistant plant community using selective techniques, including herbicide applications to release the seed bank of native, compatible species for germination.

Cover type conversion, uses herbicides to remove incompatible tall-growing trees and other vegetation from the right-of-way in order to establish a stable, low-growing plant community. The specific IVM technique selected for a particular site is based upon various conditions, which include terrain, accessibility, environmental considerations (wetlands, streams, etc.) cultural factors, worker and public health, economics and other factors.

6.8.1.4.1 Wire-Border Zone

Over sixty years of research on transmission rights-of-way has demonstrated that integrated vegetation management applied to creating distinct, compatible plant communities not only effectively manages vegetation on rights-of-way, but also enhances wildlife habitat, at least in forested areas (Yanner and Hutnik 2004). The wire zone-border zone concept was developed by W.C. Bramble and W.R. Byrnes (Bramble et al 1991).

On flat terrain, the wire zone is the right-of-way portion directly under the wires and roughly 10-feet to the field side of the outside phases. The border zone ranges from ten-feet outside the outer phases to the right-of-way edge (Figure 6.4a). The border zone should be reduced or eliminated on up-slopes where wire sag and sway may preclude leaving trees of any type. It may also extend on down-slopes (Figure 6.4b). Species that could grow into the wires at any time in their lives should not be allowed in the border zone.

Properly managed, wire zone-border zone linear corridors not only effectively protect the electric facilities, but also can become an asset for forest ecology and forest management (Bramble et al 1991, Yanner, Bramble and Byrnes 2001, Yanner and Hutnik 2004).

6.8.1.4.1.1 Region A

Region A is the area where lines are less than 50 feet off the ground (Figure 6.5). The 50 foot height should be from maximum engineered sag mid-span, with attention to side slope and potential sway of conductors in high wind. The right-of-way in Region A should be cleared following the wire zone - border zone recommendations of Bramble and Byrnes (Bramble et. al. 1991 [Figure 6.4a]).

After clearing, the Region A wire zone should consist of grasses, legumes, herbs, ferns and low-growing shrubs (under 5-feet at maturity). The border zone should consist of tall shrubs or short trees (up to 25 feet in height at maturity), grasses and forbs. These cover types benefit the right-of-way by competing with and excluding undesirable plants.

6.8.1.4.1.2 Region B

Region B occurs where the lines are between 50 and 100 feet off the ground from maximum engineered sag (Figure 6.5). In Region B, a border zone regime should be established throughout the right-of-way.

Note that many transmission structures are over 50 feet high. In cases where they are, a border zone community can be maintained near structures. Care should be taken to maintain access to the structure.

6.8.1.4.1.3 Region C

Region C is where the lines are 100 feet or more off the ground (Figure 6.5). Tall-growing trees may be allowed in Region C, provided they have at least 50 feet of clearance. Trees with less than 50 feet of clearance should be selectively removed.

6.8.1.5 Cultural Control Methods

Cultural methods modify habitat to discourage incompatible vegetation. Cultivated landscapes of compatible plants and agricultural crops are examples of cultural control.

6.9 Transmission Rights-of-Way - Widths

Right-of-way clearing should conform to the width indicated on the easement or permit. Removals in Regions A and B shall be done in transmission

rights-of-way wherever legal rights allow. They should also be done when trees have grown within 50 feet of the line in Region C.

Transmission lines may be constructed on the edge of dedicated road right-of-way where there may or may not be an easement or permit on the adjoining property allowing encroaching vegetation to be cleared. In these cases or others where the easement or permit does not specify a width, right-of-way dimensions in Table 6.2 apply. However, if no authority exists to remove trees, at minimum work should conform to Tables 6.1.

Easements should be researched through PacifiCorp Right-of-Way Services referencing the *Plan and Profile.* The *Plan and Profile* may also be useful in determining if the age of the line qualifies it for a prescriptive easement (see Section 8.3.1.1 and Table 8.1). Ground disturbance should be minimized on all rights-of-way.

6.10 Post Work Assessment

Foresters should audit transmission work following procedures outlined in Section 4.4. The audits should objectively assess quality, adherence to specifications, production, herbicide and other matters. Moreover, audits should provide the tree crew leader with feedback on production, professionalism, equipment, safety and crew efficiency. Results shall be documented on an *Audit Report* (Figure 4.7). Following systematic work, the entire length of completed line shall be inspected by the contractor to verify work complies with PacifiCorp specifications.

6.11 Mitigation Measures

NERC Requirement R5 directs transmission owners to develop mitigation measures to achieve sufficient clearances for protection of the transmission facilities when it identifies locations on the right-of-way where the transmission owner is restricted from performing work that may lead to a vegetation encroachment into the MVCD prior to the implementation of the next annual work plan, the owner shall take corrective action to ensure continued vegetation management to prevent encroachments.

Whenever the restriction is caused by a landowner, the refusal process in Chapter 8 shall be followed. If the refusal process has been completed without attaining clearances that would prevent encroachment into the MVCD before the next scheduled work, such locations should be documented on the *Work Release* (Figure 4.2). These sites should be reported in writing to the appropriate line patrolmen within 30 days. The line patrolmen should report annually on these site's status. Moreover, foresters or their contract designee should inspect the site biannually.

Figure 6.1 In densely vegetated areas, rights-of-way usually have to be completely cleared as the initial stage of establishing a wire-border zone.

Figure 6.2. Line 4 in California following work (note the trees mid-span where the line is more than 100-feet off the ground).

Lorelei Phillips photo

Figure 6.3. Right-of-way reclamation using mechanical control. In this case, a slashbuster.

TABLE 6.2. Active transmission right-of-way widths.

Facility	Distance from Center	Urban Width	Rural Width
46 kV Single pole	25 feet	50 feet	50 feet
69 kV Single pole	25 feet	50 feet	50 feet
115 kV Single pole	30 feet	60 feet	60 feet
138 kV Single pole	30 feet	60 feet	60 feet
161 kV Single pole	40 feet	80 feet	80 feet
230 kV Single pole	40 feet	80 feet	80 feet
69 kV H frame	40/50 feet	80 feet	100 feet
115 kV H frame	40/50 feet	80 feet	100 feet
138 kV H frame	40/50 feet	80 feet	100 feet
161 kV H frame	40/50 feet	80 feet	100 feet
230 kV H frame	62½ feet	125 feet	125 feet
345 kV H frame	75 feet	150 feet	150 feet
345 kV Steel tower	75 feet	150 feet	150 feet
500 kV Steel tower	87½ feet	175 feet	175 feet

Note rights-of-way should be cleared to those specified in the easement. If no easement exists or if no width is specified in the easement, rights-of-way in this table apply. Widths conform to PacifiCorp Transmission Construction Standard TA 181.

Figure 6.2. Line 4 in California following work (note the trees mid-span where the line is more than 100-feet off the ground).

Lorelei Phillips photo

Figure 6.4a. Bramble and Byrnes Wire Zone - Border Zone (adapted from Yahner, Bramble and Byrnes, 2001).

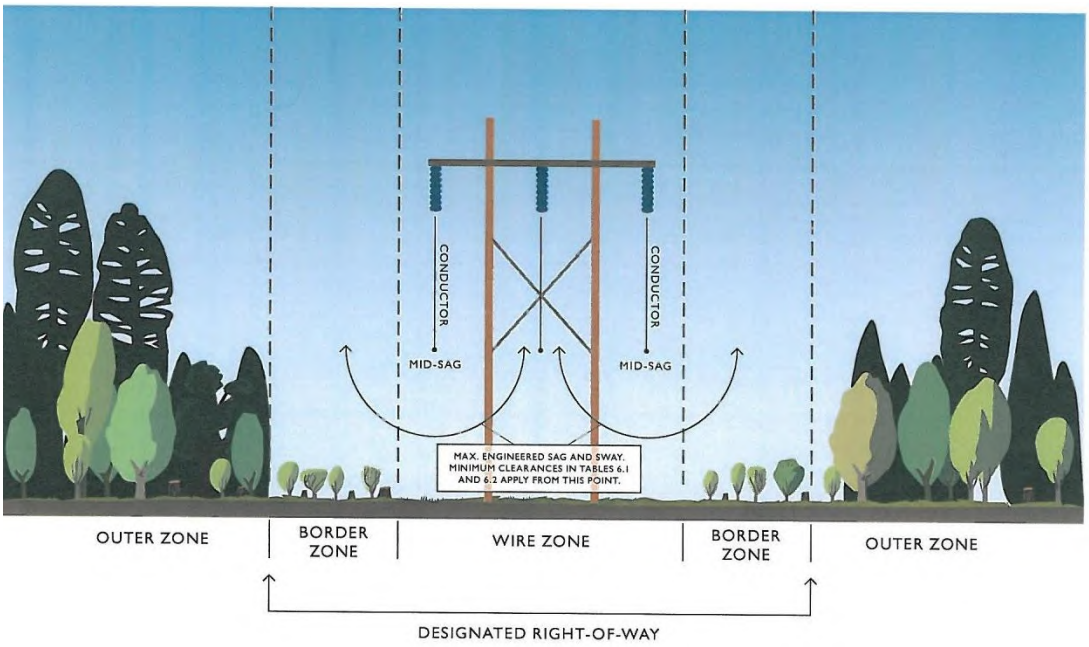
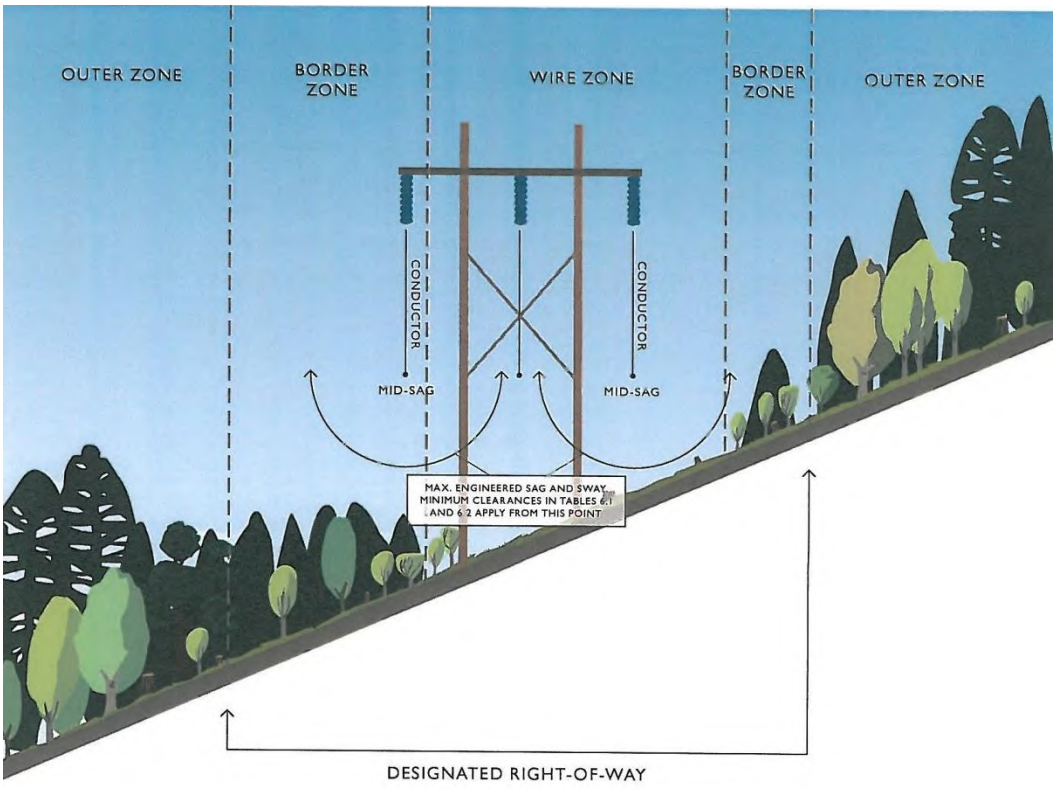
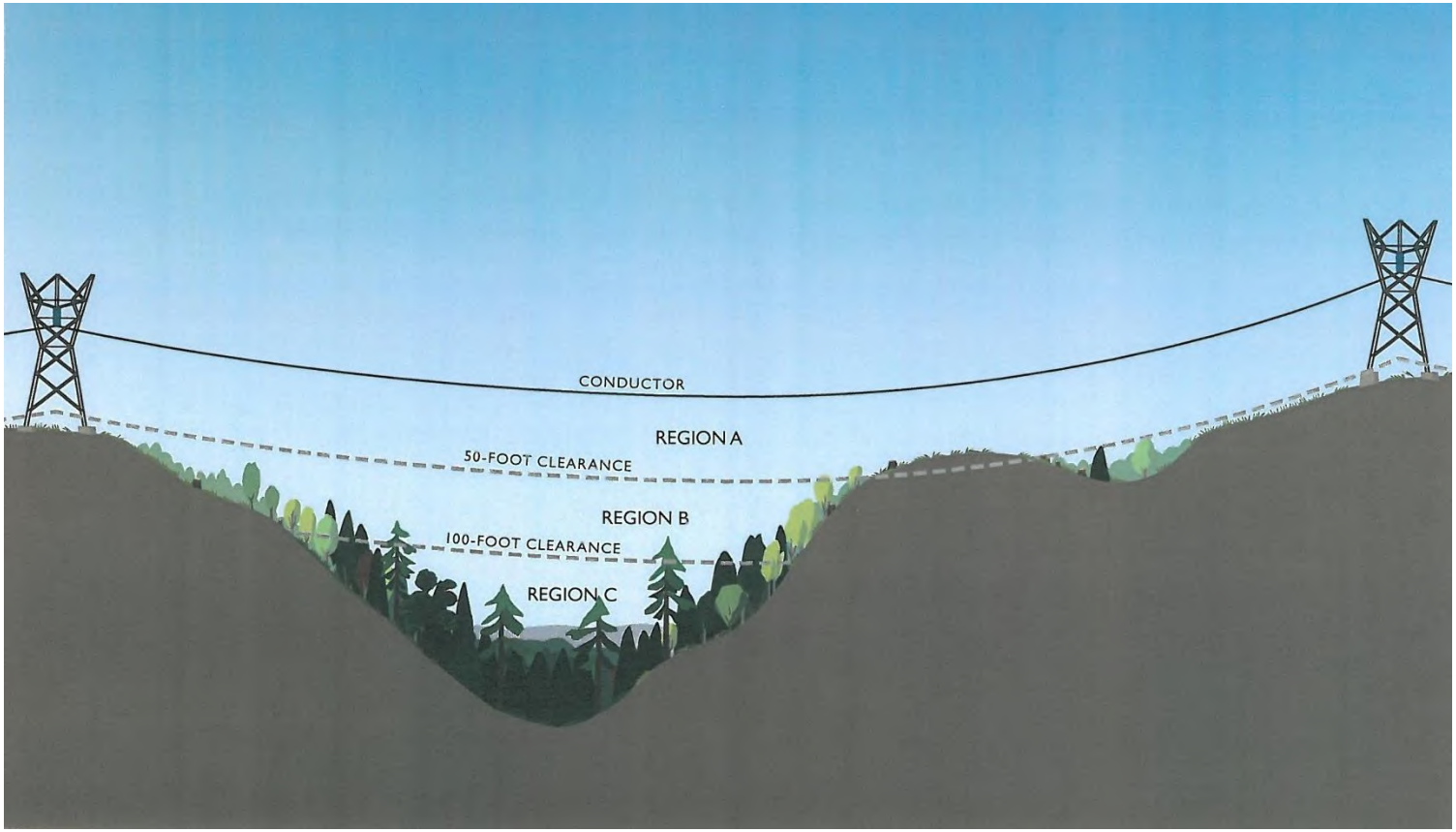


Figure 6.4b. The border zone may be reduced or eliminated on up-slopes where wire sag and sway could bring it into contact with trees, and can be extended on down-slopes.



Brad Gouch drawings (Figures 6.4 and 6.5).

Figure 6.5. Under clearance regions.



Region Definitions:
Region A: Where conductor to ground clearance is less than 50 feet (from maximum engineered sag and sway.
Region B: Where the conductor to ground clearance is 51-100 feet (from maximum engineered sag and sway.
Region C: Where the conductor to ground clearance is over 100 feet (from maximum engineered sag and sway.

Appropriate Region Plant Species:
Region A: Grasses, legumes, ferns and low-growing shrubs (<5' at maturity).

Region B: Region A species as well as large shrubs and short-growing trees (<25' at maturity).
Region C: All tree and shrub species.

6.12 High Risk Trees

High risk trees are structurally unsound and could strike a target (such as electric facilities) when they fail. Off right-of-way hazard trees shall be identified following Smiley, Matheny and
Lilly (2011) using an initial Level 1 assessment and bearing prevailing winds in mind.

Trees on the uphill and windward sides of rights-of-way should receive particular scrutiny. Hazard trees should be either removed or pruned to reduce the exposure. Work shall be performed in a manner that neither damages trunks nor disturbs root systems of adjacent trees. Damaged trees could decline, decay or die, threatening the conductors if they fall.

Federal and state agencies could request high risk trees to be topped to create "wildlife trees". PacifiCorp may honor such requests provided the safety of the tree workers or the integrity of facilities are not compromised, and the trees are topped below a height that would allow them to contact Company facilities should they fall.

PacifiCorp manages multitudes of trees across its over 15,000 mile transmission system. In every mile of line, the Company potentially has hundreds or thousands of trees, any one of which could compromise public safety and electrical service reliability. It is impossible to completely secure an electrical system from that level of exposure. Nevertheless, PacifiCorp has a responsibility to make a reasonable effort to maintain vegetation to reduce risks to both the public and power supply.

6.13 Vegetation Screens

Vegetation screens may be required by federal or local authorities in some locations at high visibility areas such as major road crossings. Where these mandates exist, vegetation screens should consist of border zone communities and be located near structures (where the line is unlikely to sag), if possible. If no border zone species are present, tall-growing trees may be left provided they have at least the minimum clearances in Table 6.1 following scheduled work.

Leaving tall-growing trees in transmission rights-of-way should be discouraged because they impede cover type conversion. So, trees should be removed (gradually over a number of years, if need be), rather than be pruned to obtain proper clearances, if at all possible. Vegetation screens should be no more than twenty-five feet from frequented vantage points into the right-of-way. Areas where tall-growing species are retained as screens shall be documented and monitored annually by line patrolmen. If remaining trees violate work thresholds specified in Table 6.1, within 30 days line patrolmen should report them to Vegetation Management for correction.

6.14 Merchantable Timber

Rights-of-way could contain merchantable timber. Merchantable timber is defined as trees with at least six-inch diameter at breast height (DBH), that are recoverable and have a market in the local area. Merchantable timber belongs to the property owner unless the easement or permit states otherwise. If merchantable timber needs to be felled, the property owner should be contacted regarding timber recovery.

After the merchantable timber is felled, it should be de-limbed and left in total tree length on the right-of-way for recovery by the owner. In limited cases, PacifiCorp may decide to purchase merchantable timber from the property owner and retain or transfer ownership to

another party. A forest practice permit from the appropriate state department of forestry may be required for timber recovery.

6.15 Transmission Safety Procedures

The following safety procedures shall be followed by all tree crews on PacifiCorp transmission facilities.

6.15.1 Pre-work Communication with Dispatch

Operative communication capability is mandatory at all times on transmission rights-of-way Communication with dispatch is critical for tree crew safety. Every morning before starting transmission work, tree crews shall call the dispatcher from the right-of-way by radio or telephone and provide the following information to comply with *Power Delivery System Operations System policy SOP-152* (Figure 6.6):

- Name of crew leader
- Name of company
- Contact information (radio or cell number)
- Name of transmission line
- Line section (substation names between which work is to occur, such as "Alvey to Dixonville," or "Ben Lomond to Terminal")
- Location of work (structure number, address or both)
- How long the crew will be working at that location
- Radio or cellular telephone number of the crew
- Name of GF/supervisor and their cellular telephone number

If radio or telephone contact cannot be made with the dispatcher from the right-of-way, non-emergency work shall not be performed at that site. The crew should relocate to work where they can communicate with the dispatcher. Satellite phones might be necessary in remote locations to provide the required communication.

6.15.2 Post-Work Communication with Dispatch

Each afternoon after completing transmission work for the day, tree crews shall call the dispatcher and provide the following information (Figure 6.6):

- Name of crew foreman
- Name of company.
- Contact information (radio or cell number)
- Name of transmission line
- Line section (substation names between which work occurred, such as "Alvey to Dixonville," or Ben Lomond to Terminal").
- Location where work was performed
  Crew members and equipment are off the right-of-way or in the clear.

6.15.3 Safe Working Procedure

If a tree cannot be felled or pruned safely, work shall not proceed. If a tree or limb falls into the conductors, work shall stop immediately and emergency procedures outlined in Figure 2.1 followed Minimum approach distances (Table 2.1) shall not be violated. Remember, transmission conductors can sag considerably at mid-span during hot

weather, ice buildup and heavy electrical loads. Trees that have safe clearance in the morning may not have safe clearance in the afternoon. Conditions could require a hold or clearance. Clearances on some transmission lines can take weeks or months to schedule. See Section 2.1.1 for hold and clearance instructions.

*6.16*Monthly Progress Tracking

Figure 6.6. Transmission communication procedure with Dispatch (operative communication is mandatory at all times on transmission rights-of-way. Satellite phones could be necessary in remote locations).

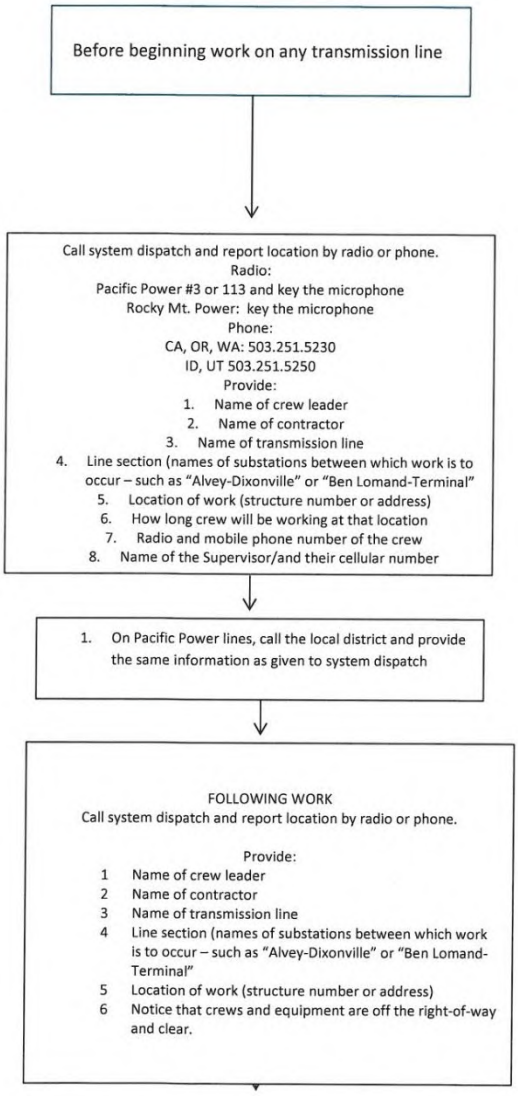


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Figure 6.7. Summary pages of main grid and local transmission monthly reports.

PACIFICORP VEGETATION MANAGEMENT 2011 MAIN GRID TRANSMISSION PROGRESS REPORT

Through Dec 31, 2011

STATE SUMMARY

	TOTAL Line Miles	Line Miles Scheduled	Line Miles Completed	Line Miles Goal	Line Miles Ahead/Behind
	7,160	**795**	**803**	**795**	**8**
State					
California	129	23	11	23	-11
Idaho	1,206	99	99	99	0
Misc States	66	0	0	0	0
Montana	137	46	30	46	-16
Oregon	1,131	224	224	224	0
Utah	2,329	207	230	207	23
Washington	284	160	168	160	8
Wyoming	1,877	37	41	37	4
TOTAL	7,160	795	803	795	8

FORESTER SUMMARY

	TOTAL Line Miles	Line Miles Scheduled	Line Miles Completed	Line Miles Goal	Line Miles Ahead/Behind
	7160	**795**	**803**	**795**	**8**
Forester					
Armstrong	609	306	311	306	5
Evans	1865	127	142	127	14
Jones	64	21	21	21	0
Partridge	284	35	42	35	8
Phillips	734	58	46	58	-12
Vanderhoof	3,534	239	237	239	-2
Hooley	71	9	4	9	-5
Total	7,160	795	803	795	8

PACIFICORP VEGETATION MANAGEMENT 2011 LOCAL TRANSMISSION PROGRESS REPORT

Summary

Through Dec 31, 2011

LOCAL TRANSMISSION WORK

	Total Line Miles	Total Miles Scheduled	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)
	7,936	**2,136**	**2,316**	**2,136**	**180**
State					
California	572	106	116	106	10
Idaho	797	38	46	38	8
Oregon	1,836	279	340	279	61
Utah	3,747	1,445	1,587	1,445	142
Washington	324	131	89	131	-42
Wyoming	660	137	138	137	1
Total	7,936	2,136	2,316	2,136	180

SUMMARY OF WORK BY FORESTER

	Total Line Miles	Total Miles Scheduled	Line Miles Completed	Line Mile Completed Goal	Miles Ahead(Behind)
	7,936	**2,136**	**2,316**	**2,136**	**180**
Forester		*	*	*	*
Hooley	356	9	41	9	32
Evans	2,304	977	1,035	977	58
Jones	766	330	413	330	83
Partridge	594	259	191	259	-68
Phillips	1,038	90	138	90	48
Vanderhoof	2,134	313	323	313	10
Armstrong	744	158	176	158	18
Total	7,936	2,136	2,316	2,136	180
Weeks					
52					

Progress on the annual work plan for NERC Transmission Lines shall be tracked on the *PacifiCorp Main Grid Transmission MASTER* for lines under the auspices of NERC Standard FAC-003. Progress on the annual work plan for other transmission lines shall be tracked on the monthly *Local Transmission Progress Report.* Both reports track miles achieved against plan on a monthly basis (Figure 6.7).

6.17 Quarterly WECC Audit Report

PacifiCorp is required to report outages on transmission lines subject to FAC-003.

7. CHEMICAL PRODECURES

Herbicides and tree growth regulators (TGRs) are an integral part of PacifiCorp's Vegetation Management program. Chemical applications shall be performed according to federal, state and local regulations. Labels are the law, and chemical use must comply with labeling. PacifiCorp's director of vegetation management shall approve all products and mixes. Property owners shall be notified at least five days, but no more than six weeks in advance, whenever chemicals are to be used on their property. Property owner objection to herbicide use shall be honored.

The company making the application is responsible for chemical purchase and storage, record keeping as well as container disposal. Crew leaders in all states except California shall hold a valid applicator's license. Applicators shall either hold that license, or work under the direct supervision of a certified applicator as required in the state in which they are working. Tree crews found working without a crew leader or applicator without a valid applicators license for the state in which they are working may be shut down at the forester's discretion. Supervisors/GFs of qualified applicators shall hold a certified applicator's license in the state or states in which they supervise crews**.**

7.1 Closed Chain of Custody

Closed chain of custody best practices are encouraged. CU*tility Arborist Association Best Management Practices: Field Guide to Closed Chain of Custody for Herbicides n the Utility Vegetation Management Industry* (Goodfellow and Holt 2011).

Closed chain of custody is a concept in which ready-to-use, diluted concentrate formulations are utilized in closed delivery systems. Closed chain of custody includes herbicide shipping, distribution, storage, and mixing, which includes returning empty containers for refilling and reuse.

7.2 Chemical Reports

All chemical applications shall be documented in the *Daily Report* (Figure 4.6) or other method approved by a Company forester. The company making the application shall be responsible for maintaining reports for review by the state departments of agriculture.

When chemical work is done on or adjacent to PacifiCorp Hydro properties, copies of chemical reports shall be provided to the plant manager weekly.

7.3 Herbicide Applications

Herbicide applications shall be pursued wherever possible as a vegetation management tool. Herbicides prevent sprouting from stumps of deciduous trees and should be used on saplings of tall-growing species to reduce future inventories (Figures 7.1 and 7.2). Herbicides are essential in cover type conversion necessary in establishing the wire zone-border zone method on transmission lines.

When properly used, herbicides are effective and efficient, minimize soil disturbance, and enhance plant and wildlife diversity. Herbicide application can benefit wildlife by improving forage as well as escape and nesting cover. In some instances, noxious weed control is a desirable objective on utility rights-of-way that can be satisfied through herbicide treatment.

Herbicide use can control individual plants that are prone to re-sprout or sucker

after removal. When trees that re-sprout or sucker are removed without herbicide treatment, dense thickets develop, impeding access, swelling workloads, increasing costs, blocking lines-of-site, and deteriorating wildlife habitat (Yanner and Hutnik 2004 [Figures 7.1 and 7.2]).

Treating suckering plants allows early successional, compatible species to dominate the right-of-way and out-compete incompatible species, ultimately reducing work.

7.3.1 Selectivity

Herbicides can be selective or non-selective depending on their type. Selective herbicides only control specific kinds of plants, when applied according to the label. For example, synthetic auxins are a class of selective herbicides that control broadleaved plants, but do not harm grass species. By contrast, non-selective herbicides work against both broadleaved plants and grasses. Non-selective herbicides can be effective where a wide variety of target plant species are present, like those often found during initial clearing or reclaiming dense stands of invasive or other undesirable vegetation.

Application techniques can also be either selective or non-selective. Selective applications are used against specific plants or pockets of plants. Non-selective techniques target areas rather than individual plants (see *Application Methods*). Non-selective use of non-selective herbicides eliminate all plants in the application area. Non-selective use of a selective herbicide controls treated plants that are sensitive to the herbicide, without differentiating between compatible or incompatible species. Selective use of either would only control targeted vegetation. Selective use is preferable unless target vegetation density is high.

7.3.2 Herbicide Best Management Practices

PacifiCorp is dedicated to ensuring proper application of approved herbicides to minimize the effects on non-target vegetation, human health, fish and wildlife species, and water quality (Childs 2005).

Herbicide applications shall (Childs 2005):

- Follow all product label mandatory provisions such as registered uses, maximum use rates, application restrictions, worker safety standards, restricted entry levels, environmental hazards, weather restrictions, and equipment cleansing.
- Follow all product label advisory provisions such as mixing instructions, protective clothing and others matters.
- Have on site a copy of the label and SDS sheets.
- Be made in the presence of a licensed applicator valid for the state in which work is performed.

7.3.3 Wetlands and Waterbodies

The effects of herbicides on wetland and water resources should be minimized by utilizing buffer zones (Table 7.1). Buffer zones reduce the movement of herbicides from the application site into adjoining water bodies. They must be followed unless instructed otherwise by competent authorities. Climate, geology and soil types should be considered when selecting the herbicide mix with the lowest relative risk of migrating to water resources (Childs 2005)

Figure 7.1. Untreated rights-of-way quickly fill in with thickets of sprouts following mowing

Jay Neil photo

Figure 7.2. Incompatible species treated in the Line 72 right-of-way in, Oregon two years after reclamation. Herbicide treatments help maintain the right-of-way and are used to convert it to a wire zone-border zone prescription (Figure 6.3)

Table 7.1. Buffer Widths to Minimize Impacts on Non-Target Resources (adapted from Childs 2005).

Herbicide Ecological Toxicities and Characteristics	Buffer Width from Water Resource per Application Method			
	Spot	Localized	Broadcast	Mixing, Loading, Cleaning
Practically Non-toxic to Slightly Toxic	Up to the Edge	Up to Edge	50 feet	100 feet
Moderately Toxic, or Label Advisory for Ground/Surface Water	25 feet	35 feet	300 feet	250 feet
Highly Toxic to Very Highly Toxic	35 feet	100 feet	Noxious weed control only. Buffers shall comply with local regulations	250 feet

7.3.4 Spills

Mixing, loading and cleaning equipment are critical activities that present the greatest exposure to accidents or spills (Miller 1993). Spills should adhere to Section 2.2.5. Spills can be avoided by using closed chain of custody best management practices.

7.3.5 Inappropriate Applications

There are situations where herbicide applications are inappropriate. If application company representatives are uncertain whether or not applications are appropriate, they shall consult the appropriate forester. Inappropriate situations include (but are not limited to):

- Areas where the property owner expresses objections to herbicide use.
- Areas where herbicide could drift or leach into organic farms.
- Governmental lands where herbicides are prohibited.
- Conditions of heavy precipitation or strong winds. If these conditions exist, the treatment should be deferred until weather improves.
- Periods of high temperatures, which can cause product volatility and damage off-target plants. This is particularly important for foliar applications. During high temperatures, treatment should be deferred until weather cools. Note that vineyards can be especially sensitive to synthetic auxins.
- Trees that could be root grafted to desirable trees.
- Trees that are near desirable plants where the herbicide could move into contact with off target foliage or roots.
- Trees that are sufficiently close agricultural crops or harvestable, edible plants that contamination could be reasonably expected

If there is any uncertainty regarding whether or not an application is appropriate, contact the forester with responsibility for the area.

7.3.6 Application Methods

Herbicide application methods are categorized by the quantity of herbicide

used, the character of the target, vegetation density and site parameters. Dyes can be used in the herbicide mix to mark areas that have been treated. Treatments include individual stem, broadcast and aerial treatments. Ninety-five percent control shall be obtained.

7.3.6.1 Individual Stem Treatment

Individual stem treatments are selective applications. They include stump, basal, injection, frill, selective foliar and side-pruning applications. Due to their specific nature, proper individual stem applications work well to avoid damage to sensitive or off target plants. However, they are impractical against broad areas or sites dominated by undesirable species.

Stump applications are a common individual stem treatment, where herbicides are applied to the stump cut surface around the cambium and to the top side of the bark. Water-based formulations require immediate stump treatment, while oil herbicides can be applied hours, days or even weeks after cutting.

Injections involve inserting herbicide into a tree. Frill (commonly called "hack and squirt") treatments, consist of herbicide application into cuts in the trunk. Injections or frill treatments are especially useful against large incompatible trees to be left standing for wildlife.

Basal applications often use a herbicide in an oil-based carrier at the base of stems and root collar. The oil penetrates the bark, carrying the herbicide into the plant. Although basal applications can be made year round, dormant treatment is often best on deciduous plants, when they do not have foliage that can obstruct access to individual stems.

Selective foliar applications are done by spraying foliage and shoots of specific target plants. They can be either low or high volume treatments. For low volume applications, comparatively high concentrations of herbicide active ingredient are made in lower volumes of water than would be used with high volume treatment. Foliar applications are only made during the active growing season, normally late spring to early fall.

Side pruning is a technique where non-translocatable herbicides are applied to control specific branches growing toward the electric facility. Treating large branches could damage trees in the same way as removing them through pruning.

7.3.6.2 Broadcast Treatment

Broadcast treatments are nonselective because they control all plants sensitive to a particular herbicide in a treatment area. They can provide a degree of selectivity with proper herbicides. Even then, broadcast treatments do not differentiate between compatible and incompatible plants that the herbicide controls. Broadcasting is particularly useful to control large infestations of incompatible vegetation (including invasive species) in rights-of-way or along access roads.

Broadcast techniques include high-volume foliar, cut-stubble and bare ground applications. High volume foliar applications are similar to high volume selective foliar applications. The difference is that broadcast high volume foliar treatments target a broad area of incompatible species, rather than individual plants or pockets of plants. Cut-stubble applications are made over areas that have just been mowed. Bare-ground treatments are used for clearing all plant material in a prescribed area, such as in substations or around poles to protect against fire. Bare-ground applications are usually granular or liquid applications following mechanical removal of

vegetation, or used as a pre-emergent in maintaining graveled areas such as substations.

7.3.6.3 Aerial Treatment

Aerial treatments are made by helicopter (rotary wing) or small airplane (fixed wing). Rotary wing aircraft provide the most accuracy, because helicopters can fly more slowly and are more maneuverable than airplanes. However, airplanes are less expensive to operate than helicopters. Aerial control methods are also nonselective, but can provide a level of selectivity with proper herbicides. Aerial applications can be useful in remote or difficult to access sites, and be cost effective and quick, especially if large areas need to be treated. They also can be used where incompatible vegetation dominates a right-of-way. The primary disadvantage of aerial application is that it carries the threat of off-target drift, so it must be performed under low-wind conditions with low toxicity herbicides.

7.4 Approved Herbicides

A list of approved products appears in the following sections. PacifiCorp's director of vegetation management must authorize other chemicals.

7.4.1 Stump Application

- 2, 4-D
- Glyphosate
- Picloram
- Triclopyr

7.4.2 Low Volume Basal Application

- Imazapyr
- Triclopyr

7.4.3 Foliar Application

- 2, 4-D
- Aminopyralid
- Fosamine ammonium
- Glyphosate
- Imazapyr
- Metasulfuron methyl
- Picloram
- Sulfometuron methyl
- Triclopyr

7.4.4 Soil Application

- Diuron
- Imazapyr
- Picloram
- Sulfentrazone
- Tebuthiuron

7.5 Tree Growth Regulators

Tree Growth Regulator (TGR) applications are intended to retard fast-growing trees so that they will not interfere with facilities or violate state regulatory agency tree policy before the next scheduled maintenance.

7.5.1 Approved TGR Application Chemicals

- Fluprimidol
- Paclobutrazol

8. CUSTOMER RELATIONS

Representatives of vegetation management meet with more customers than any other Company department. As a result, customers often develop an impression of the entire Company based on their experience with PacifiCorp vegetation management. Since vegetation management work is often controversial, excellent customer service is imperative for a successful program. Company and contract personnel must be professional, prompt, fair and courteous to customers.

8.1 Educational Information

PacifiCorp has a variety of educational materials about tree-power line conflicts and planting the right tree in the right place.

8.1.1 Trees and Power Lines Brochure

The *Trees and Power Lines* brochure is a companion to the "yellow door card" (see Section 8.2.1). It explains the need for line clearance work, as well as natural target pruning. It also provides color pictures of how properly pruned trees could look following line clearance.

8.1.2 Small Trees for Small Places

The *Small Trees for Small Places* is a publication in PDF format available at PacificPower.net or RockyMountainPower.net. It provides tree selection tree planting and electrical safety information. It offers an easy to use chart on ornamental and adaptive characteristics of 100 different species that can be used adjacent to power lines. Not all these trees can be used everywhere in PacifiCorp's service territory. However, with a choice of 100 small-statured trees, there should be several to use in any given location around PacifiCorp's system.

8.1.3 Right Tree in the Right Place Poster

The *Right Tree in the Right Place* poster provides illustrations and descriptions of small trees that are suitable across PacifiCorp's service territory. It also relates information about proper utility tree pruning and tree planting.

8.2 Notification for Tree Work

Notification for tree work is not required by any state tariff in PacifiCorp’s service territory. However, PacifiCorp vegetation management attempts to notify property owners or tenants prior to vegetation management work at home and business sites. PacifiCorp area foresters should authorize any line clearance work to be done without property owner or tenant notification. In cases of municipal, county, state or federal properties, the proper agency representative shall be notified. The appropriate customer and community relations manager should be notified prior to meeting with governmental officials.

Notification, including that for tree or chemical work, should be by letter, phone, personal visit or door card at least five business days, but no more than six weeks, prior to the crew arriving. Notification shall be documented on an *Activity Report* (Figure 4.3). Notification cards shall not be placed in U.S. Mail boxes. Notification cards should be used only where the owner or tenant is likely to be present on a regular basis. Some circumstances, such as work on historic, unique or unusual trees, could

warrant personal contact with the customer.

8.2.1 Door hangers

PacifiCorp has a variety of door hangers (Figure 8.1). These door hangers come in Pacific Power and Rocky Mountain Power versions. Pacific Power door hangers shall be used in California, Oregon and Washington. Rocky Mountain Power printings shall be used in Idaho, Utah and Wyoming.

8.2.1.1 Distribution (Yellow)

PacifiCorp's yellow distribution door hanger, and should be used to notify customers of upcoming distribution cycle or interim work. The door hanger has contract utility forester contact information, an explanation of the need for line clearance work, of how the work will be performed and how much clearance is required. The door hanger informs customers that volunteer trees (those not planted as part of a landscape) six or fewer inches in diameter at breast height will be removed. It also includes drawings of shapes customers could expect from the work, and tips about tree planting (Figure 8.2). Grow into facilities at some time in their life approx. 10 ft. each side of center

8.2.1.2 Ticket (Blue)

The blue door hanger should be used to communicate with customers who have called in requests for tree work. It has four check boxes with the most common responses to customer requests. The tree(s):

- Do not pose an immediate threat to electric service.
- Are not affecting PacifiCorp facilities.
- Are growing in proximity to service lines, but do not threaten electric service. If a customer wishes to have the tree pruned, PacifiCorp can disconnect the line to enable the customer to safely perform the work or hire a professional tree care company to do it for them.
- Are the customer's responsibility because they have more than ten feet from distribution primary conductors.

The form also has space for comments, and contract utility forester contact information.

8.2.1.3 Distribution Removal (Ivory)

The white door hanger is a tree removal request, to fulfill PacifiCorp's requirement for written permission to remove trees where no easement granting authority exists to do so (see Section 2.7.1). The white door hanger identifies trees to be removed, has check boxes indicating whether or not the logs will be cut to firewood length and the stumps treated with herbicide. The door card also provides contact information for the forest tech, or comments and a sketch to help the customer understand the request.

8.2.1.4 Rural Transmission (Purple)

The rural transmission door hanger explains the need to remove trees under transmission lines. It relates the process the customer can expect, how trees and debris will be left. It informs customers that herbicide could be used on their property, and that we have a coupon program for tree replacement. It provides information on the voltage of the line and widths of the right-of-way. The door hanger also has a wire zone-border zone

Figure 8.1 Various PacifiCorp Vegetation Management door hangers .

illustration and offers contract utility forester contact information.

8.2.1.5 Urban Transmission (Forest Service Green)

The green transmission door hanger is for use in urban or developed areas. It differs from the rural door hanger insofar as it doesn't have a diagram of the wire-border zone concept. It still stresses removal.

8.2.1.6 TGR (Grey)

The grey TGR door hanger is for notifying customers about upcoming tree growth regulator application on their property. It provides space to see what trees will be treated and contract utility forester contact information.

8.2.1.7 Herbicide (Grey)

The grey herbicide door hanger is for notifying customers about upcoming herbicide application on their property.

8.2.1.8 Tree Crew Request (Orange)

The orange door hanger is for tree crews to use to ask customers for their cooperation with upcoming tree work. It provides information about when a tree crew will arrive on site, and has check

Figure 8.2. "Yellow" door hanger.

The Steps for Tree Removal, Pruning and/or Herbicide Application

- This door card is the first step in the process. We are leaving it between one and six weeks before work on your property is planned.
- Please call the arborist listed on the other side of this door card within a week of receiving the verbal or this written notice, with questions or to notify us of any issues on your property.
- Tree crews will remove, prune or treat the trees with herbicides or tree growth regulators as indicated on the front of the card. The main trunk and large limbs will be left for your use. In addition, brush and trees that are under 6-inches in diameter and not intentionally planted as part of the landscape will be removed and treated with herbicide.
- We offer coupons to replace incompatible trees with utility-friendly species that you can plant in appropriate locations on your property. Talk with the forest technician about this option.
- This service is provided at no cost to you.
- If you have questions, please contact the arborist listed on the other side of this door card.

Here are some shapes you may expect from proper pruning around power lines.

For more information on electrical safety, tree pruning or planting the right tree in the right place, we invite you to visit **rockymountainpower.net/trees**.

Para más información, llame al 1-888-225-2611 y podrá hablar con un representante que hable español. ***Este servicio se ofrece sin ningún costo para usted.***

Tree Maintenance & Power Line Safety

It's a pleasure to provide you with safe, reliable, reasonably priced electricity. Keeping trees away from power lines is one of the most important ways to ensure you and your neighbors receive reliable electric service. It also helps keep you and our employees safe.

☐ After routinely inspecting the power lines on your property it's prudent to remove the following trees:

_____

☐ Additionally, we need to prune trees on your property to provide clearance of at least 10 to 14 feet of the overhead power line and/or from the power line running along the side of the trees:

_____

☐ The trees listed below will be treated with tree growth regulator to reduce the rate at which the tree(s) regrow into overhead power lines and also to reduce the frequency in which the tree(s) need to be pruned by our tree crews.

_____

☐ An herbicide will be applied in low volumes to non-landscape trees and brush stumps to prevent future growth. The herbicide is registered with the U.S. Environmental Protection Agency and will be applied in accordance with label requirements and federal, state and local regulations.

We hope you understand the reasons for the actions mentioned above and apologize for any inconvenience. **To understand what happens next, please review the steps for this work on the reverse side of this card.**

For more information on electrical safety, tree pruning or planting the right tree in the right place, we invite you to visit **rockymountainpower.net/trees**.

If you have questions please call:

Arborist: _____

Phone: _____ Date: _____

Comments: _____

_____

Para más información, llame al 1-888-225-2611 y podrá hablar con un representante que hable español. ***Este servicio se ofrece sin ningún costo para usted.***

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VMRMP026
yellow

ROCKY MOUNTAIN POWER

boxes for requests to move something (like a car) from under the tree or secure a dog. It also can be used for permission to dive on property and has space for comments.

8.2.1.9 Pole Clearing

The pole clearing door hanger is to notify California customers of upcoming work to comply with California Resource Code 2492 (see Section 5.6)

8.2.2 Other Customer Contact Forms

In addition to door hangers, PacifiCorp has two forms for use in customer communication. The *Property Owner Permission* form has check boxes requesting authorization for tree removal, tree and brush disposal, mowing, notification of herbicide and TGR application. It provides a space for the property owner's signature. Property owner signatures are required for tree removal, but not brush disbursal or herbicide application.

PacifiCorp also has a *Refusal /Complaint Form.* This form should be completed by contract utility foresters, supervisors/GFs, tree crews or foresters whenever a customer has concerns about upcoming or recently completed work. It identifies the property owner, the type of project and the nature of the refusal or complaint. These documents should be kept in a permanent file.

8.2.3 Crew Arrival on Site

When crews arrive for work at a residential site, they should make a courtesy knock on the door and let the homeowner or tenant know they are about to begin work. If no one is home, the crew should proceed with the planned tree work.

8.3 Customer and Property Owner Refusal Procedure

The customer refusal process is presented in Figure 8.3. Detailed records must be kept of every conversation, including the date and time it occurred, and summary of the matters discussed. If a vegetation management representative makes a failed attempt to contact a refusal by phone, the date and time of the call should also be noted.

8.3.1 Contract Utility Forester Refusal Procedure

When a property owner refuses to allow the work necessary to satisfy PacifiCorp specifications, the contract utility forester shall complete a *Property Owner Refusal/Complaint Report* and notify their supervisor/GF, and area forester within two working days and before any work is performed on the property. Contract utility foresters shall not compromise clearances.

8.3.1.1 Easements

After documenting the refusal, the contract utility forester should research the right-of-way to determine PacifiCorp's property rights for that location. PacifiCorp often owns easements, copies of which are available from PacifiCorp right-of-way services. In addition, states grant prescriptive rights if the line has existed for specified length of time. This time period varies depending on the state (Table 8.1). This information should be provided to the appropriate GF/supervisor.

8.3.2 Crew Leader Refusal Procedure

When a property owner refuses to allow the crew leader to obtain specification clearances, the crew leader shall complete a *Property Owner*

Refusal/Complaint Report and notify their GF/supervisor, contract utility forester, or area forester within two working days and before any work is performed on the property. Crew leader notification initiates the refusal procedure from the beginning.

8.3.3 General Foreman/Supervisor Procedure

The supervisor/GF should contact the property owner within two weeks of being informed of a refusal to try to resolve the situation. The GF/Supervisor should review the documentation surrounding the refusal before contacting the customer. GF/supervisors should not compromise work below the specification without written authorization from the responsible area forester. If a prescriptive or written easement exists, the supervisor/GF should inform the customer of our rights under those easements. Notwithstanding, the general foreman/supervisor should not have the trees worked without customer consent.

If the general foreman/supervisor cannot resolve the refusal to full specification, he or she shall refer it to their area forester by turning in the *Property Owner Refusal/Complaint Report.*, along with any associated easement information.

8.3.4 Regional Forester Procedure

When aregional forester receives a refusal that the contract utility forester and general foreman/supervisor have been unable to resolve, within two weeks he or she shall contact the property owner to attempt to resolve the refusal. The forester may compromise work below the specifications, provided that trees have not grown within work thresholds in Tables 5.1 or 6.1 and the agreement will not present unreasonable safety or electric service risks. This section is not intended to defer judgment to property owners on how much clearance to allow. Neither is it intended to justify clearances outside of specification in order to avoid dealing with an escalated complaint.

If the forester cannot resolve the refusal, the customer shall be sent two letters by the same certified post. One is a description of the legal authority under which the Company is acting and the other letter summarizing the circumstances of the refusal and setting date and time that the tree will be worked. The date shall be at least five business days from the time the letter is postmarked. The refusal letter should reference the applicable written or prescriptive easement if they exist. The forester shall alert the director of vegetation management, transmission and distribution support managing director, as well as the appropriate operations manager, customer and community manager, wires director, and regulatory analyst about the letters. The regulatory analyst will inform the proper regulatory agency about the action. If it appears the media could become involved, the Media Hotline should be notified.

Once the letter is sent, tree crews shall be dispatched to work the site to specifications at the assigned date and time, regardless of whether or not a right-of-way or prescriptive easement exists. The forester or GF/supervisor should be on site during work. Records shall be kept for use in potential litigation. Before and after photos of the site should be taken.

TABLE 8.1. Prescriptive easement time requirements by state

State	Time
California	5 years
Idaho	20 years
Oregon	10 years
Utah	20 years
Washington	10 years
Wyoming	10 years

Figure 8.3. Refusal process.

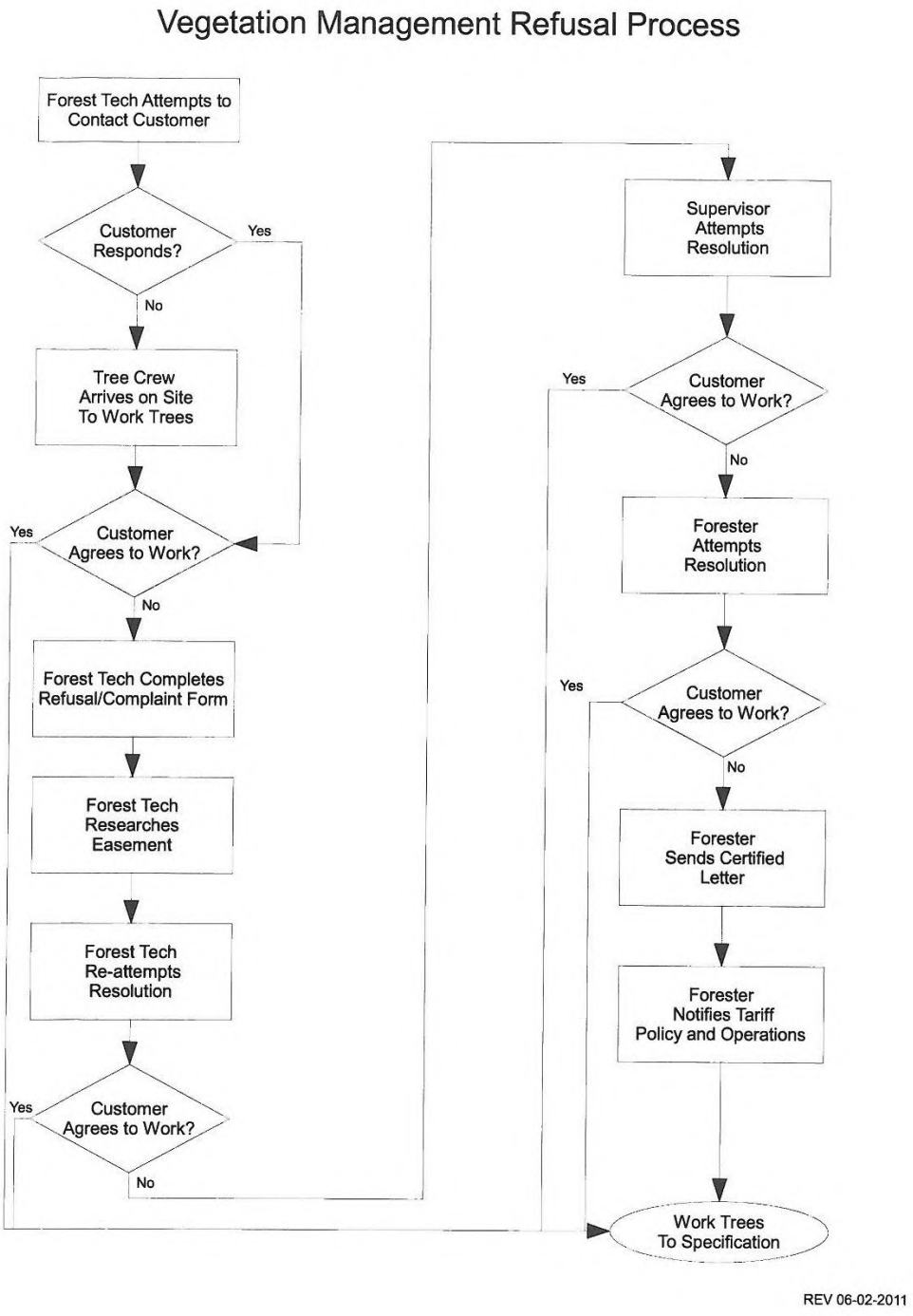

Figure 8.4. Information surrounding refusals should be documented and electronically filed with the appropriate project.

8.4 Customer and Property Owner Complaints

Customer and property owner complaints regarding any aspect of the vegetation management program shall be addressed promptly, fairly and professionally. PacifiCorp should be notified of complaints using a *Property Owner Refusal/ Complaint Report.* Customers will be contacted within 48 hours of receipt of the complaint. Documentation surrounding the refusal should be digitally filed to be accessed with other information from the specific project for use the next time through.

8.5 Commission Complaints

Response to commission complaints should take the highest priority. Commission responses should be made the same day and go through tariff policy with assistance from the vegetation management service coordinator. It is important to provide timelines with appropriate summaries of vegetation management's interaction with the subject party. Response for data request should be provided by the next business day if at all possible, but no later than three business days. Foresters should take the lead in Commission responses.

8.6 Customer Survey

PacifiCorp has Pacific Power and Rocky Mountain Power customer surveys. Surveys are vitally important for quality control, and for giving customer's a voice regarding vegetation management's performance.

The survey asks customers to rate from 1 (lowest) to 5 (highest) Vegetation Management's performance relative to five questions:

- Our notification clearly explained the work we would be doing.
- The workers were friendly and courteous.
- The work was completed as you understood it would be.
- The property was left neat and orderly.
- Overall, I am satisfied with how the work was handled.
- It also allows space for comments and for the customer to identify him/herself.

Tree crews should leave customer surveys on each property on which utility tree work is performed. For work on municipal or other government agency trees, a survey should be provided to the appropriate management authority. The area forester should also see that surveys are left on properties where they conduct crew audits. The survey is self-addressed and postage paid for the respondent's convenience.

9. DEFINITIONS

Allelopathy. Production of a chemical by one plant to suppress competing plants of other species.

BMP. Best management practice

Border zone. The Region A right-of-way portion that extends from the right-of-way edge to 10 feet from the outside phases.

Branch bark ridge. Area of raised bark between two stems. The ridge is formed as the two stems grow together, pushing the bark outward. A raised branch bark ridge is often a sign of a strong branch attachment.

Branch collar. Wood formed around a branch attachment. It contains wood from both the branch and parent stem.

Branch core. Area in the trunk of a tree that traces the branch back to its origins as a bud on a twig.

Branch protection zone. Area in the branch core that undergoes chemical change in response to wounding or disease in the branch. The chemicals protect the tree by inhibiting or preventing diseases from passing from the branch to the parent stem.

Caliper. The diameter of a tree six inches off the ground.

Cambium. Area of cell division responsible for stem diameter growth.

Clearance. Line de-energizing for safety purposes. Clearances require 48 hour notices to all customers that will be effected by the outage.

Company. PacifiCorp.

Crown reduction. Reduction of the top or sides of the tree by thinning cuts (lateral or branch collar cuts).

Crown Restoration. Restoring a previously headed stem's natural structure by thinning sprouts emanating from the old wound. Crown restoration should be done incrementally over the course of several cycles. The crowns of many third order trees may be so damaged they may never be restored.

Cycle buster. Fast-growing tree species that will not hold for a complete cycle.

Cycle work. Cycle work is described in section 5.2. It involves systematic work, addressing trees that have grown within work thresholds outlined in Tabe 5.1, and includes removals, herbicide and TGR treatments as outlined in the *Work Release.*

DBH. Diameter at breast height.

Danger tree. A tree on or off the right-of-way that may contact electric facilities either through growth or if it should fall.

Decurrent form. Trees lacking a strong central leader, resulting in a spreading crown (for example, American elm [*Ulmus americana]*).

Distribution line. Lines energized between 600 and 45,000 volts.

Drip line. The horizontal extent of the crown out to the branch tips.

Drop-crotch. Archaic term for lateral cut.

Excurrent form. Tree with a strong central leader (for example, Ponderosa pine [*Pinus ponderosa]*).

Fast -growing species. Tree species that vertically grows more than three feet per year.

Flush cut. A final pruning cut flush with the parent stem (the trunk, for example) that cuts into or removes the branch collar. Flush cuts are damaging and inappropriate.

GF. General foreman.

Hazard tree. Dead, dying, diseased, deformed, or unstable trees which have a high probability of falling and contacting a substation, distribution or transmission conductors, structure, guys or other Company electric facility.

Heading cut. Internodal cut on a stem, or a cut made to an inappropriate lateral.

Hold. Deactivating the automatic re-closers and the line. Holds are issued to a Journeyman lineman who, in the event of an outage, is responsible for ensuring that it is save to re-energize the line.

Included bark. Bark included in the juncture between two stems. It is a structural defect that can lead to stem failure.

Integrated Vegetation Management (IVM). Integrated vegetation management is a system of managing vegetation in which undesirable vegetation is identified, action thresholds are considered, all possible control options are evaluated, and selected control(s) are implemented (ANSI 2012a).

Interim Work. Scheduled work in the interim half way between cycles. For example, most of Oregon is on a four years cycle. Two years after completing cycle work, feeders will be scheduled for a systematic pass to work trees that will interfere with primary conductors before the end of the current cycle. Work should be limited to trees that grow six feet or more a year or hazard trees.

ISA. International Society of Arboriculture.

kV. One thousand volts.

Lateral cut. A cut that shortens a branch to a lateral no less than one-third the diameter of the original stem and removing no more than one-half the lead's foliage.

Lead. An upright trunk or major limb with a dominant role in the tree crown, and a lateral is a branch off a parent stem

Low-growing tree species. Trees with a potential mature height under 25 feet.

Merchantable timber. Trees with a DBH of 6 inches or more, which are

recoverable and have a market in the area.

Moderate-growing species. Tree species that can be expected to vertically grow between one and three feet per year under normal conditions.

MVCD. Minimum vegetation clearance distance. Maximum flash distance established by FAC-003.

Natural target. Proper final pruning cut location at a strong point in a tree's disease defense system. They are branch collars and proper laterals.

Pruning. Scientifically-based arboricultural practice of removing tree parts.

Readily climbable tree. Readily climbable trees have low limbs that are accessible from the ground and sufficiently close together so that the tree can be climbed by a child or average person without using a ladder or special equipment. Vehicles do not render trees climbable. Climbable trees should have a main stem or major branch that would support a child or average person either within arm's reach of an uninsulated energized electric line or within such proximity to the electric line that the climber could be injured by direct or indirect contact. They are located near homes, schools, parks, businesses or other locations where people (particularly children) frequent.

Refusal. A case where a property owner does not allow trees to be cleared from PacifiCorp facilities to specification.

Region A. The area in transmission rights-of-way where the wire is less than 50 feet off the ground.

Region B. The area in transmission rights-of-way where the wire is between 50 feet and 100 feet off the ground.

Region C. The area in transmission rights-of-way where the wire is more than 100 feet off the ground.

Round over. A traditional line clearing technique that lowers a tree to a specified clearance distance and sculpts it into a ball. Round overs are a damaging practice that expressly violate PacifiCorp specifications.

Sapling. Tree under four inches in diameter at breast height.

Secondary line. Wire energized to less than 600 volts.

Service line. A secondary line that runs between the electric supply and the customer.

Shall. A mandatory requirement.

Short-growing tree. A tree with a potential mature height of 25 feet or less.

Should. A strongly advisory recommendation. It shall be followed unless there is a compelling reason not to.

Slash. Brush and stems under 6 inches in diameter removed from trees during vegetation management operations.

Slow-growing species. Tree species that can be expected to vertically grow less than one foot per year.

Subordination. Removing the terminal, typically upright or end portion of a parent branch or stem to slow the growth rate so other portions of the tree grow faster (Gilman 2002).

Tall-growing species. Tree species that grow to 25 feet or more at maturity.

TGR. Tree Growth Regulator. In the context of these specifications, TGR refers to chemicals that slow growth of some tree species.

Transmission lines. Wire energized over 45 kV

Trimming. Reducing the length of toenails, hair, the amount of budgets and other things, Christmas tree decoration and unskilled removal of tree parts.

Volunteer. A naturally seeded, non-landscape tree.

Wetland. Wetlands are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface (EPA 2004) http://www.epa.gov/owow/wetlands/vital/what.html.

Whorl. A node in a pine tree where three or more limbs commonly originate.

Wire zone. Right-of-way portion that is directly under the wires and within 10 feet to the field side of the outside phases (Bramble et al. 2001).

Work threshold. Distance from conductors inside of which trees should be pruned or removed during cycle work.

10. REFERENCES

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