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INVESTIGATION OF METHODS TO	§	
IMPROVE ELECTRIC AND TELECOM	§	PUBLIC UTILITY COMMISSION
INFRASTRUCTURE THAT WILL	§	
MINIMIZE LONG TERM OUTAGES	§	
AND RESTORATION COSTS	§	OF TEXAS
	§	
	§	

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Southwestern Public Service Company  
d/b/a Xcel Energy

**Report on Vegetation Management Program for Overhead Facilities and On-going  
Cyclical, Ground-based Inspection Program for Overhead Facilities**

(September 29, 2006)

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## **I. Vegetation Management Program for Overhead Facilities**

Southwestern Public Service Company (SPS) implemented a formal transmission and distribution vegetation management program in 1999. SPS' clearance and cycle guidelines are based on local tree growth rates, specific to individual trees on specific circuits. Specific clearances and cycles are determined based on species growth rates, as well as line voltage, construction of facilities, electric reliability performance and other factors.

The objective of SPS' vegetation management program is to keep conductors clear of all tall-growing trees, brush, and other vegetation that could compromise public safety and service reliability. Aside from inspections by non-vegetation management SPS personnel, this is accomplished by performing routine maintenance on a circuit basis. Maintenance activities include tree and brush removal, tree trimming, mowing, and herbicide applications. Maintenance objectives include:

- Public and worker safety
- Compliance with regulatory requirements
- Reliable electric service
- Integrated vegetation management practices
- Environmental stewardship and habitat enhancement

Professional vegetation managers are employed to oversee the program. Contractors perform most fieldwork. Each year, contractors are assigned a list of circuits to be worked. After the contractor completes a circuit, SPS inspects the work for compliance. For additional information on SPS' vegetation management program, refer to Xcel Energy's Vegetation Management Guidelines. Please refer to Exhibit A.

### **Transmission and Distribution Vegetation Management**

An independent contractor is assigned selected transmission lines and distribution circuits to work each year based on tree conditions and reliability performance. The contractor makes a reasonable attempt to notify landowners to make them aware of the necessary work. Types of work performed are tree trimming, tree removal, and herbicide applications. SPS also responds to landowner requests and trims trees as necessary.

### **Contractor Performance**

SPS has established and issued vegetation management guidelines to its contractors. SPS monitors contractor performance by conducting quarterly field audits, inspecting completed work, and tracking results indicators. SPS conducts quarterly and yearly reviews with its contractors to ensure performance and quality of work.

### **Customer Information**

SPS uses various customer information brochures, booklets, and door hangers to communicate tree and power line issues. The brochure "Tree Pruning Near Power Lines" describes the company's tree maintenance program. The booklet "Plant a Better Future"

promotes responsible tree planting around power lines by selecting low growing trees. Various door hangers are used to notify customers of inspections and scheduled work.

## **II. On-going Cyclical, Ground-based Inspection Program**

SPS conducts inspections of its overhead distribution system through several different programs. Main feeder lines are scanned with an infrared camera on a four-year cycle. The inspector, besides looking for hot connections, also looks for failing equipment on the circuit. The tree trimmers, while trimming the lines, also look for and report failing equipment. Meter Readers in route to meters also inspect the circuits. Betterment jobs are initiated as necessary to resolve any issues discovered. Unplanned ground patrols are performed after circuit breaker operations to evaluate the overall condition of the circuit. These ground patrols are not done on a schedule. Found problems are recorded and repairs scheduled.

Xcel Energy is considering a pilot program in 2007 to do an intrusive distribution pole inspection program.

Inspections on substation facilities are performed monthly and include a visual evaluation of the electrical equipment, fence security and public safety.

SPS patrols annually all transmission circuits not patrolled by the air. Over the past few years Xcel Energy's Transmission Department has been contracting all ground line pole inspections. Once lines have been evaluated from past records and recent ground patrols, a list is then generated by circuit and ones that have not been treated in the last 10 to 12 years are put into the pole testing budget for ground line inspection and treatment. This year Xcel Energy will be inspecting and treating, if needed, 10 to 12 thousands poles. In the past few years these numbers have been close to the same amounts as planned for 2006. Last year Xcel Energy used a new technology where a red radar x-rays the pole at ground level to determine decay. Xcel Energy is currently 75% complete with this year's inspection.

SPS also patrols all transmission circuits once a year from the air. Follow-up ground inspections are made for identified elements. Also, after relay operations, patrols are sent to circuits that experienced a sustained or momentary outage to determine if there is damage to transmission facilities.

## **Exhibit A**

### **Xcel Energy's Vegetation Management Guidelines**

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## ABOUT THIS INFORMATION & SAFETY POLICY

"A guide, not an  
absolute rule"

### Safety Statement

There is no job we  
do nor service we  
perform so urgent that  
we cannot take  
time and use the  
necessary equipment  
to do it safely.

### ABOUT THIS INFORMATION

The following information is intended as a guide for contractors performing vegetation management services. Vegetation management includes the services of distribution and transmission line clearance, overhead safety inspection program, landscape maintenance and bare-ground weed abatement. Regardless of the service performed, every work site has its own safety and work requirements.

Note: This information addresses reliability at Xcel Energy facilities and is not intended for use as personal safety guidelines. Contractors are responsible for developing and following their own safety procedures.

Contractors who are performing vegetation management services are required to have a copy of this information with them in the field. Those performing line clearance activity are also required to have the book *Pruning Trees Near Electric Utility Lines* by Dr. Alex Shigo on each truck/work location at all times.

\*\*This information supersedes all previous manuals and guidelines for line clearance and vegetation management work at Xcel Energy including Northern States Power Minnesota, Northern States Power Wisconsin, Public Service Company of Colorado, and Southwestern Public Service Company.

### SAFETY

All contractors performing vegetation management work on or near Xcel Energy facilities or rights of way shall follow approved safety guidelines and procedures. All contractors performing work for Xcel Energy shall comply with all applicable governmental safety and health regulations, and the safety and health provisions of their contracts.

There are two important standards for tree worker safety in the United States, OSHA 1910.269 and ANSI Z133.1-2000. Contract line clearance tree workers must meet the requirements of these standards as well as any other applicable federal, state or local laws, codes, or regulations.

#### *OSHA Requirements (1910.269)*

OSHA 1910.269 is the Occupational Safety and Health Administration's vertical standard pertaining to the generation, transmission and distribution of electricity. A specific section of OSHA 1910.269 requires that everyone performing tree work in proximity to electric hazards must be qualified and their training has to be documented.


### ***ANSI Requirements (Z-133.1-2000)***

ANSI Z-133 is the American National Standard for Arboricultural Operations- Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush- Safety Requirements. It has the force of law because it is the document an OSHA compliance officer would reference when identifying safety violations of employees engaged in tree work. Therefore, it is considered the definitive safety standard for arboricultural operations.

In short, ANSI Z-133 defines an electric hazard to exist anytime a tree worker, tool, tree or any other conductive object is closer than 10 feet from an energized conductor with a voltage of 50,000 volts or LESS. From this 10-foot baseline, 0.4 inches of required clearance is added for every 1,000 volts above the 50,000-volt baseline. **ANSI Z-133 provides tables that outline minimum approach distances for both qualified and non-qualified tree workers based on voltage and elevation.**

**Contractor managers are required to provide ANSI Z-133 minimum approach distance tables to their employees.**

### ***State Requirements***

**Colorado:** Colorado Revised Statutes Article 2.5- High Voltage Power lines- Safety Requirements. Only qualified employees of an electric utility can perform any activity that may bring an individual or equipment within 10 feet of high voltage (lines in excess of 600 volts) overhead lines. Contractors working directly for the utility are considered qualified. Non-qualified employees or individuals must contact the appropriate utility to make arrangements for safe activity.

**Texas:** Texas Statutes Chapter 752- High Voltage Power lines. Only qualified employees of an electric utility can perform any activity that may bring an individual or equipment within 6 feet of high voltage (lines in excess of 600 volts) overhead lines. Contractors working directly for the utility are considered qualified. Non-qualified individuals must contact the appropriate utility to make arrangements for actions to be taken to mitigate the hazard.

All contractors must be aware at all times of the nature and characteristics of the Xcel Energy electric and/or gas facilities to be worked before any work begins. Contractors need to understand that electric facilities must remain energized during the performance of work unless special arrangements are made with an authorized Xcel Energy representative.



*The following procedures pertain to contractors performing vegetation management work for Xcel Energy:*

- The contractor shall obtain full information as to the voltage of its circuits and minimum approach distances before starting the work.
- The contractor shall at all times conduct work in a manner to safeguard the public from injury and property from damage.
- The contractor must use all necessary protection for its employees and the public, and guard against interference with normal operation of the circuits. If, in the judgment of the contractor's general foreman/supervisor, it is too hazardous to prune or remove trees with the circuits energized, the contractor must contact an authorized Xcel Energy representative(s). If appropriate, Xcel Energy will provide the necessary protective materials or de-energize circuits to ensure the safe pruning or removal of the tree(s). Should the contractor knock down or come into contact with Xcel Energy conductors (power lines), the contractor must notify Xcel Energy immediately and take the necessary protective measures. All contractor-caused electric service interruptions are subject to repair at the contractor's expense.
- In the event a contractor becomes aware of any dangerous, broken, loose or faulty Xcel Energy line facilities in the normal course of its line clearance performance, the contractor shall promptly advise Xcel Energy as to the exact equipment location(s) and nature of the condition found in accordance with the Overhead Safety Inspection Program. (See section 5, OHSI program).
- Any contractor personnel entering substation equipment yards must be qualified employees (OSHA 1910.269) and must have attended Xcel Energy sponsored substation hazard awareness training. Contractor personnel must notify dispatch/area control prior to entering any substation, must lock the gate behind them while in the substation, notify dispatch/area control when leaving the substation, and must close and lock the gate behind them.

Colorado Substations: Either 303-273-4813 or 303-278-4703

Texas North Dispatch: 806-796-3255

Texas South & New Mexico Dispatch: 806-796-3250

Minnesota Metro East: 651-229-2575

Minnesota Metro West: 612-321-7435

Greater Minnesota, South Dakota, and North Dakota: 612-321-7434

Wisconsin: 715-839-2618

## Section 1

# GENERAL LINE CLEARANCE

### 1.1 – WHY ELECTRIC UTILITIES ARE REQUIRED TO PERFORM THE WORK

State regulatory entities such as Public Utility Commissions (PUC) and Public Service Commissions (PSC) require electric utilities to maintain its electrical systems in accordance with the National Electric Safety Code (NESC). The NESC generally requires the trimming or removal of interfering trees.

In addition, trees are a major contributor of electric service interruptions, nationwide. Trees cause outages in two ways, mechanical and electrical. Mechanical damage refers to entire trees or portions of trees failing and physically damaging facilities (knocking down wires, poles, etc.). Because trees can be conductive, electrical outages can also occur. These interruptions are caused when a portion of a tree becomes a short-circuit path for electricity to flow causing a protective device to operate and stop the flow of electricity. Therefore, trees must be maintained an adequate distance from the conductors in an attempt to prevent interruptions of electric service.

#### 1.1.1 National Electric Safety Code (NESC) Requirements

The National Electric Safety Code, Tree Trimming Section 218.A.1 states:

*Trees that may interfere with ungrounded supply conductors should be trimmed 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 trimming required.*

#### 1.1.2 Public Utilities Commission (PUC) and Public Service Commission (PSC) Tariffs

Tariffs and agreements with various state regulatory entities give utility companies and their contractors the ability to enter private property for maintenance purposes regardless of the existence of an easement or prescriptive rights.

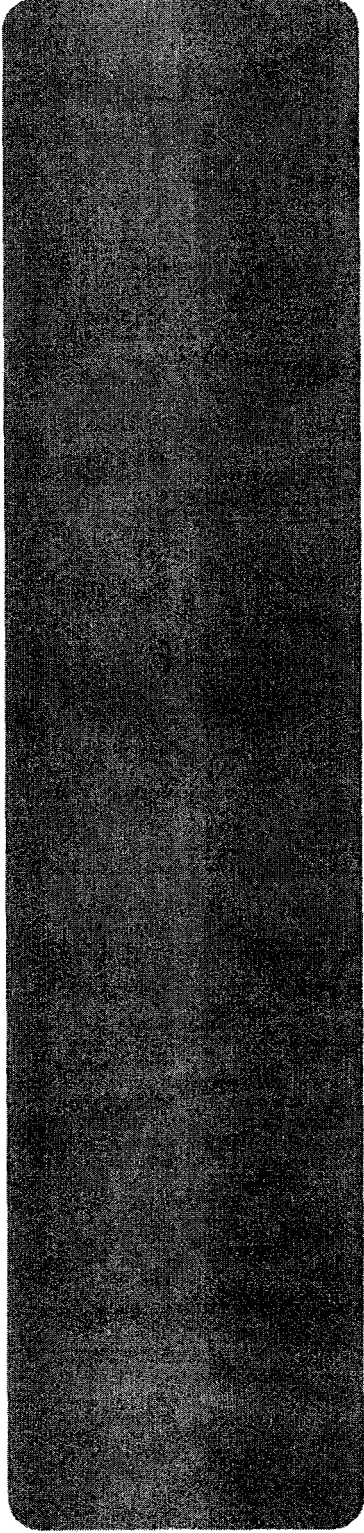
**Specific documents include:**

**Colorado:** Tariff R43, Access For Company's Employees

**Texas:** Section V, Sheet V-11, Access To Premises

**New Mexico:** Section 10, Access To Premises

## Section 1 (continued)



**Michigan:** Sheet 20, Access To Premises

**Minnesota:** No. 2, Section 1.3, Sheet 6-3, Access To Customer Premises

**North Dakota:** Section 1.3, Sheet E 78, Access To Customer Premises

**South Dakota:** Section 1.3, Sheet 6-3, Access To Customer Premises

**Wisconsin:** Sheet E 90, Schedule Ex-22, Access To Customer Premises

## Section 2

# INTEGRATED VEGETATION MANAGEMENT (IVM)

### 2.1- GENERAL PHILOSOPHY

IVM is a data-driven, progressive system of information gathering utilized to best plan and complete work, including follow-up auditing, to ensure the desired results are achieved. It involves the use of various types of vegetation management treatment including the removing, pruning and mowing of vegetation and the treatment of vegetation with chemicals. The overall goal of a utility IVM program is to develop site-specific, environmentally sensitive, cost-effective and socially responsible solutions to vegetation control near electric and natural gas facilities.

### 2.2 – HAZARD TREE MITIGATION

Trees that are located off the right-of-way that have an unacceptable risk of line interference before the next maintenance cycle are classified as hazard trees and should be removed.

Conditions could include but are not limited to the following:

- Dead or dying trees
- Leaning trees
- Weak branches
- Shallow root system
- Root failure
- Internal decay
- Canker or canker root

### 2.3 – WORK QUALITY GUIDELINES

#### 2.3.1 ANSI A-300 - 2001

The American National Standard Institute's A-300 standard presents performance standards for the care and maintenance of trees, shrubs, and other woody plants. The standard is intended as a guide for federal, state, municipal, and private authorities including property owners, property managers, and utilities.

Whenever possible and practical, contractor tree workers are expected to adhere to this standard when pruning trees near electric facilities.

Dr. Alex Shigo's yellow booklet titled *Pruning Trees Near Electric Utility Lines* provides a good working summary of the principals included in ANSI A-300. Contract tree workers are expected to have a copy of this booklet in the field for reference purposes.

## Section 2 (continued)

### *2.3.2 Pruning*

Tree pruning is the selective removal of branches that are not an adequate distance from the primary line, or that will grow too close to the power line before the next maintenance cycle. Secondary, street light and service wires are not routinely trimmed for clearance unless overbuilt primary exists. In addition, secondary or street light wires may be trimmed if major interference, such as broken limb, exists.

Tree pruning is done to provide adequate clearance from Xcel Energy facilities while making proper cuts. If practical, trimming methods will be based on procedures and examples set forth by ANSI A300. As a general rule, trees should be pruned to improve or re-establish the clearance provided from previous tree maintenance performed.

Remove or shorten dangerous limbs, such as those overhanging wires that have a high potential for breaking or bending into Xcel Energy conductors due to ice, snow or wind loading. Be aware of the possibility of included bark at the branch bark ridge.

Some factors to consider when pruning include:

- The growth rate of the tree species (how fast the branches grow back)
- The wood strength of the tree species (the chance of the branch breaking under the load of strong wind, snow, or ice)
- The voltage conducted by the line and the line's construction (the higher the voltage, the greater the clearance required).
- Number of customers exposed
- Critical customers (hospitals, etc)
- General public safety (existence of tree houses, public places, climbability etc.)

### **Vegetation Screens**

Where required by federal, state and/or local laws or regulations, screens of trees may be left on the right-of-way so the natural tree line is not interrupted.

## Section 2 (continued)

### ***2.3.3 Removal***

Tree removal is the selective clearing of entire trees and brush at ground level, where otherwise an unacceptable risk of interference with the electrical conductors would likely occur. Contractors will consult their Xcel Energy Vegetation Management representative for specific removal criteria for the area in which they are working.

Some factors to consider when determining if removal is appropriate include:

- Remove all tall-growing trees within the width of the right-of-way that fit the removal criteria for that geographic territory.
- Remove all tall-growing brush that has the potential to grow into the conductor.
- All trees and brush should be cut as close to the ground as practical.
- Whenever possible, stumps should be treated with herbicide to prevent re-sprouting.
- Remove all second growth from stumps cut on previous pruning cycles.
- Remove all trees that present an unacceptable risk to Xcel Energy facilities. (See Hazard Tree Section 2.2)
- Keep all poles, guy wires and switch grates clear of vegetation.

Trees are not removed from the vicinity of secondary, streetlight and service wires. Customers that want to have trees cleared from these conductors on their own may request that the conductor be de-energized by Xcel Energy for private removal by calling 1-800-895-4999.



## Section 3

# DISTRIBUTION LINE CLEARANCE

### 3.1 – CLEARANCE GUIDELINES

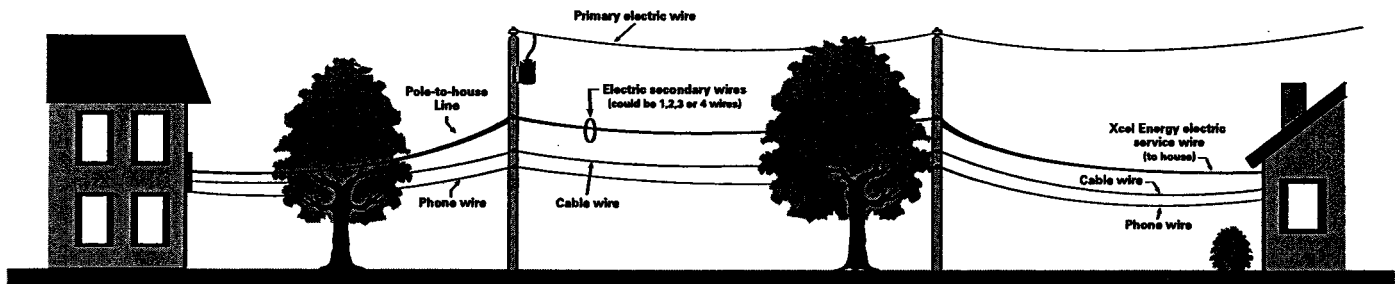
Xcel Energy's clearance guidelines are based on local tree growth rates, specific to individual trees on specific circuits. Specific clearances are determined based on species growth rates, as well as line voltage, construction of facilities, electric reliability performance and other factors listed below.

Therefore, each individual tree needs to be assessed to determine adequate clearance required from the conductor to prevent service interruption, damage to Xcel Energy facilities, and threats to public safety. Xcel Energy expects qualified line-clearance tree workers to use their professional judgment to determine what these clearances will be in each situation, based on the proposed maintenance cycle for the circuit on which they are working.

Contractors shall not rely on the accuracy of the line circuit or feeder maps. Contractors are responsible for obtaining the appropriate clearances on all facilities existing in the field.

#### 3.1.1 Definition of Conductor Types

An understanding of the basic distribution system is necessary to determine clearances. Xcel Energy does not purposely clear non-company conductor including cable and phone wires.



#### Notification

Xcel Energy expects that a reasonable attempt be made by contractors to notify property owners regarding work to be done. Contractors need to be aware that there are special conditions that may apply to each region (see section 1.1.2).

It is recommended that contractors obtain written acknowledgement from the landowner for all tree and brush removal, including the application of herbicide. (See the Herbicide section for further detail section 7.2)

## Section 3 (continued)

### **Refusal**

If clearing is necessary and the landowner refuses either access or to allow appropriate trimming and/or removal, the crew will notify their supervisor. If necessary, the supervisor will notify appropriate Xcel Energy Vegetation Management representative for resolution.

### ***3.1.2 Rights of Way/Easements***

Contractors need to be aware that transmission and distribution lines may be constructed where legal easements exist. Special conditions may apply regarding vegetation management activities. Refer to the Xcel Energy Siting and Land Rights Department for specific easement language.

### ***3.1.3 Fee-Owned Rights-of-Way***

Xcel Energy fee-owned rights-of-way or land is property owned by Xcel Energy. Xcel Energy may have total control of this property subject to conditions, reservations and encumbrances or lease agreements. Adjacent property owner acknowledgement may be required for access.

## **3.2 – WORK DESCRIPTIONS**

### ***3.2.1 Routine Maintenance /Scheduled Work***

Routine Maintenance is the proactive scheduled work performed by circuit/maintenance map. In general, all brush is removed, while logs are cut into manageable-sized pieces and left on the property for the customer.

### ***3.2.2 External and Safety Zone Requests***

Only qualified tree workers can work on trees that have grown closer than non-qualified tree worker minimum approach distances (See Safety section on page 2). Therefore, Xcel Energy is required to provide non-qualified personnel adequate clearance so that work by non-qualified workers can be performed safely. These clearance requests are known as “safety zone” requests.

It is important that contractor personnel respond to these requests in a timely manner and in accordance with any laws and regulations. Contractor personnel must also determine the most cost effective course of action to provide non-qualified personnel adequate clearance. Examples include:

- Pruning the portion of the tree back an adequate distance
- Dropping the tree on the ground
- Requesting that the conductor be de-energized



## Section 3 (continued)

- If the request pertains to a service line, street light wire or other secondary line, advise the requesting party to call Xcel Energy Customer Service at 1-800-895-4999 and request a “line drop” to temporarily remove the wire from the work zone.

Xcel Energy does not currently charge a fee for the trimming or dropping of trees related to safety zone requests, but it is important that the contractor clearly communicate to the requesting party that all debris will be left on site.

A service fee may apply to the de-energizing of conductors and for line drops. The requesting party should consult Xcel Energy Customer Service for more information at 1-800-895-4999.

If inspection by contractor personnel determines that the tree in question has adequate clearance, the requesting party has the option to have any necessary work performed on their own or wait until routine maintenance is performed.

### ***3.2.3 Internal Requests***

Various entities within Xcel Energy may request assistance from tree crews to mitigate tree issues. The majority of these requests are due to service reliability problems or to clear trees for the installation of new facilities and the upgrade of existing facilities.

#### **Service Reliability Related Requests**

It is important that contractors respond to these requests in a timely manner and in accordance with any instructions provided with the request. In many cases we expect contractors to make a judgment call as to the necessity of pruning. Contractors need to consider all factors including when the tree is due for routine maintenance when making this decision.

#### **Construction/Cross Charge**

These requests pertain to the installation of new facilities and the upgrade of existing facilities. In many cases contractor personnel will be asked to identify trees requiring clearance and to provide information that will be used to estimate the cost of tree clearing. It is important that contractor personnel respond to these requests in a timely manner and in accordance with any instructions provided with the request.

## Section 3 (continued)

### ***3.2.4 Emergency/Storm Response***

Contractor personnel are required to respond to storm situations in accordance with regional storm response process. Contact the Vegetation Management Representative to confirm regional applicable processes. Only work necessary for the restoration of power will be performed. A reasonable attempt should be made to notify customers. No debris disposal will be attempted for any tree work performed.

## Section 4

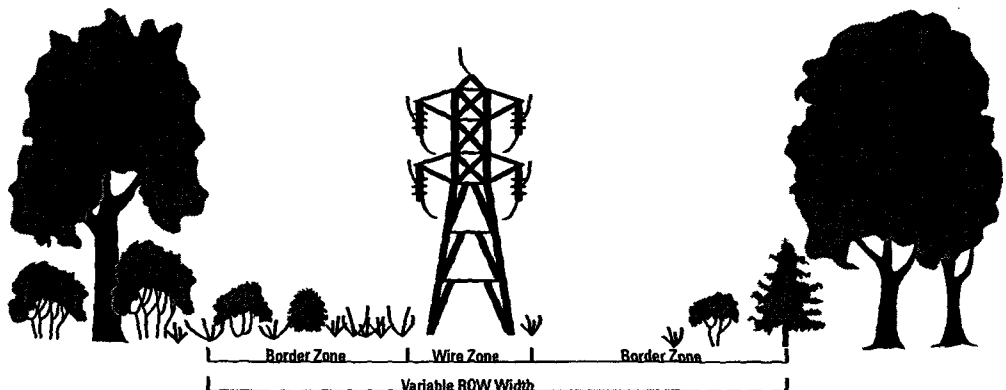
# TRANSMISSION LINE CLEARANCE

### 4.1 – GENERAL GUIDELINES AND PROGRAM PHILOSOPHY

The primary objective of the transmission line clearance program is to keep transmission facilities clear of all tall-growing trees, brush and other vegetation that could grow too close to conductors. This is accomplished by routine maintenance on each transmission circuit including tree removal, pruning, mowing and herbicide application. Each transmission right-of-way (ROW) has an established maintenance cycle depending on work required.

Maintenance objectives include:

- Public and worker safety
- Compliance with regulatory and legal requirements
- Reliable electric service that allows for operational flexibility
- Environmental stewardship and habitat enhancement



Wherever feasible, the wire zone/border zone concept (Bramble and Byrnes, 2000) shall be integrated into the vegetation management program to allow for different types and heights of vegetation in the ROW. This concept differentiates between the wire zone directly under the conductors and the remaining border zone.

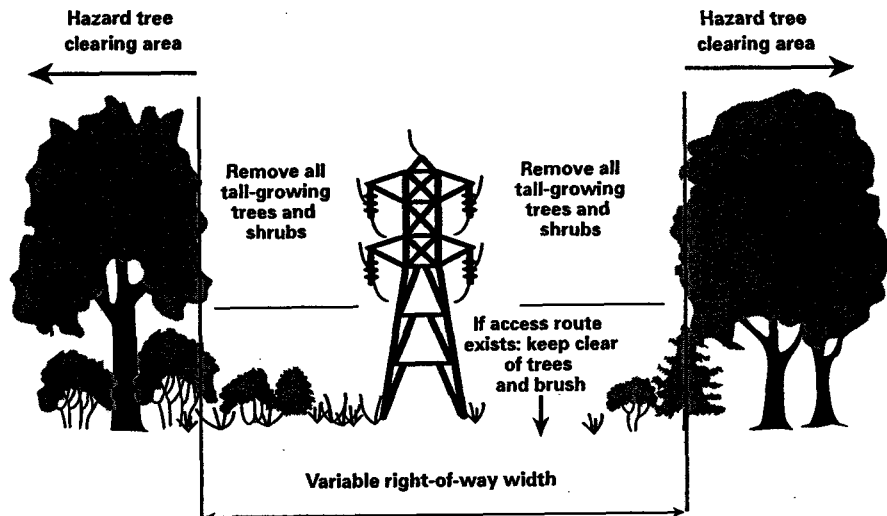
Generally, this concept allows for different, yet compatible, vegetation types in these separate zones.

- **Wire Zone:** Area directly underneath the conductor(s). Vegetation in the wire zone consists of low-growing forbs and grasses.
- **Border Zone:** Area that begins at the outside edge of the wire zone and extends to the edge of the easement. The border zone may contain additional short-growing woody plants and trees.

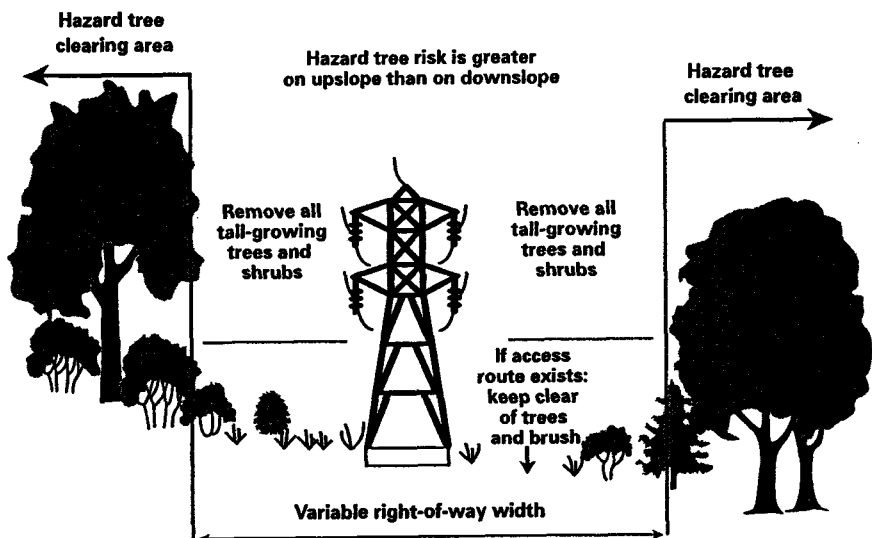
Areas outside the border zone must be patrolled for those trees that have an

## Section 4 (continued)

### Cross-Section of Typical Transmission Right of Way



### Special Considerations for Clearing Hazard Trees on Slopes of Right of Way



unacceptable risk of interfering with the line before the next maintenance cycle (see Hazard Tree Section 2.2).

## Section 4 (continued)

### 4.1.1 Minimum Clearance Guidelines

In some areas, property owners are very sensitive to ROW clearing. Specific agreements may exist that provide exceptions to the Wire Zone/Border Zone concept.

In any event, the following minimum clearance guidelines are to be maintained at all times.

#### Transmission: Maintained Clearances for Trees

All States, All Elevations

**Table A – Horizontal Maintained Tree Clearances at Lowest Sag Point**

Voltage(kV)	Up to 400 Ft Span	Up to 800 Ft Span	Up to 1200 Ft Span
69	11 ft	15 ft	30 ft
88	12 ft	16 ft	31 ft
115	12 ft	20 ft	32 ft
161	14 ft	20 ft	32 ft
230	17 ft	25 ft	38 ft
345	21 ft	29 ft	44 ft
500	27 ft	34 ft	45 ft

**Table B – Horizontal Maintained Tree Clearances at Structure**

Voltage(kV)	Up to 400 Ft Span	Up to 800 Ft Span	Up to 1200 Ft Span
69	11 ft	11 ft	11 ft
88	12 ft	12 ft	12 ft
115	12 ft	12 ft	12 ft
161	14 ft	14 ft	14 ft
230	17 ft	17 ft	17 ft
345	21 ft	21 ft	21 ft
500	27 ft	27 ft	27 ft

## Section 4 (continued)

**Table C – Vertical Maintained Tree Clearances at Lowest Sag Point**

Voltage(kV)	Up to 400 Ft Span	Up to 800 Ft Span	Up to 1200 Ft Span
69	14 ft	19 ft	23 ft
88	15 ft	20 ft	23 ft
115	16 ft	22 ft	26 ft
161	17 ft	23 ft	27 ft
230	19 ft	26 ft	29 ft
345	22 ft	29 ft	32 ft
500	27 ft	30 ft	34 ft

**Table D – Vertical Maintained Tree Clearances at Structure**

Voltage(kV)	Up to 400 Ft Span	Up to 800 Ft Span	Up to 1200 Ft Span
69	11 ft	11 ft	11 ft
88	12 ft	12 ft	12 ft
115	12 ft	12 ft	12 ft
161	14 ft	14 ft	14 ft
230	17 ft	17 ft	17 ft
345	21 ft	21 ft	21 ft
500	27 ft	27 ft	27 ft

In order to maintain these minimum clearances at all times, crews performing tree work must consider the tree species, growing environment, re-growth rate, maintenance cycle length, etc. in order to determine the amount of clearance required at the time of pruning. The following tables are provided as a guideline only. Each tree requires the evaluation of these factors in order to determine specific re-growth rates.

**Table 1 – Operating Area: NSP-MN, NSP-WI**

10 Most Common Tree Species	Average re-growth after trimming (ft)	
	4 Year Cycle	5 Year Cycle
Aspen	12	15
Linden	10	12
Box Elder	24	29
American Elm	20	24
Black Locust	27	32
Silver Maple	22	26
Sugar Maple	14	17
Red Oak	10	12
Weeping Willow	24	31
Cottonwood	24	32



## Section 4 (continued)

**Table 2 – Operating Area: PSC, Less than 6,000 ft**

10 Most Common Tree Species	Average re-growth after trimming (ft) 3 Year Cycle
Spruce/Douglas fir	5
Pine	5
Russian Olive	11
Silver Maple	12
Tree of Heaven	9
Aspen	5
Cottonwood	20
Siberian Elm	20
Willow	20
Poplar	20

**Table 3 – Operating Area: PSC, Greater than 6,000 ft**

10 Most Common Tree Species	Average re-growth after trimming (ft) 5 Year Cycle
Engelmann Spruce	5
Blue Spruce	5
Douglas fir	5
Lodgepole Pine	5
Ponderosa Pine	5
Aspen	5
Cottonwood	20
Siberian Elm	20
Willow	20
Poplar	20

**Table 4 – Operating Area: SPS**

10 Most Common Tree Species	Average re-growth after trimming (ft) 3 Year Cycle	4 Year Cycle
Siberian Elm	12	14
American Elm	10	12
Willow	10	12
Cottonwood	12	14
Poplar	12	14
Locust	10	12
Pecan	10	12
Mulberry	12	14
Sycamore	10	12
Silver Maple	10	12

## Section 4 (continued)

**The following calculations must be performed to determine clearances necessary at time of pruning:**

**Horizontal Clearance at time of pruning =**

(Value from table A/B\*) + (Value from table 1, 2, 3 or 4\*\*)

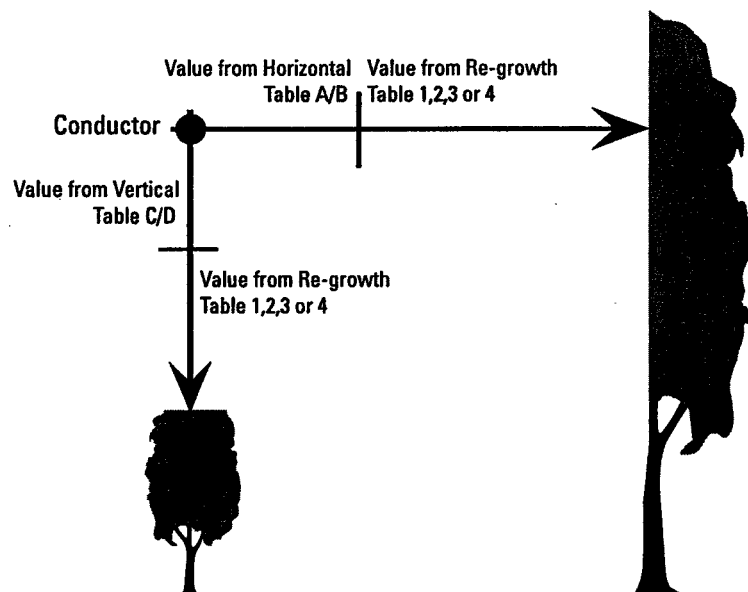
**Vertical Clearance at time of pruning =**

(Value from Table C/D\*) + (Value from Table 1, 2, 3 or 4\*\*)

\* Please note that clearances are provided at two points along the span for both horizontal and vertical clearance. There is one table for clearances at the low point of the conductor (belly of the line) and the second table for clearance at the structure. The difference between tables A & C, and B & D is the sag/sway factor. Depending on where the tree is located, determine best number to use utilizing these numbers as a guideline.

\*\*Choose table based on which operating area you are working in as well as species and established maintenance cycle. For species and maintenance cycles not listed, determine appropriate clearance from twig growth increment.

### Calculating Horizontal and Vertical Minimum Clearances





## Section 4 (continued)

### **Rights of Way/Easements**

Contractors need to be aware that transmission and distribution lines may be constructed where legal easements exist. Special conditions may apply regarding vegetation management activities. Refer to the Xcel Energy Siting and Land Rights Department for specific easement language.

### **Fee-Owned Rights-of-Way**

Xcel Energy fee-owned rights-of-way or land is property owned by Xcel Energy. Xcel Energy may have total control of this property subject to conditions, reservations and encumbrances or lease agreements. Adjacent property owner acknowledgement may be required for access.

## **4.2 – WORK DESCRIPTIONS**

### **4.2.1 Routine Maintenance /Scheduled Work**

Routine Maintenance is the proactive scheduled work performed by circuit/maintenance map.

### **Maintenance Work Within the Easement**

- Before entering any easement tract or private property for the purpose of right-of-way clearing, as a courtesy, an effort shall be made to contact the property owner.
- The property owner shall be informed of the work to be done, and an agreement reached on the disposal of debris. Be aware that landowner's easement may contain specific language pertaining to vegetation issues. Contractors are expected to determine most cost-effective method of completing all work performed.
- If the contractor is unable to contact/locate the owner of any property where work is required, report the situation to Xcel Energy Vegetation Management representative.
- If it is necessary to enter the property owner's land to gain access to the right-of-way, an agreement should be reached on the best route. If an agreement cannot be reached or in the case of an absentee owner, the contractor shall notify their Xcel Energy Vegetation Management representative.
- If any damage to property or crops results, the contractor is responsible for the related claims unless other provisions are made with Xcel Energy.
- If a property owner submits a claim, the responsible party should contact the owner immediately.

## Section 4 (continued)

### **Maintenance Work Outside the Easement:**

The contractor shall obtain a signed, written acknowledgement for any removal or herbicide work done beyond the bounds of Xcel Energy easement or rights of way.

#### ***4.2.2 External and Safety Zone Requests***

Only qualified tree workers can work on trees that have grown closer than non-qualified tree worker minimum approach distances (See Safety section). Therefore, Xcel Energy provides adequate clearance so that work by non-qualified workers can be performed safely. These clearance requests are known as "safety zone" requests.

It is important that contractor personnel respond to these requests in a timely manner and in accordance with any laws and regulations. Contractor personnel must also determine the most cost effective course of action to provide non-qualified personnel adequate clearance. Examples include:

- Prune the portion of the tree back an adequate distance
- Drop the tree on the ground

**Xcel Energy does not currently charge a fee for the trimming or dropping of trees related to safety zone requests, but it is important that the contractor clearly communicate to the requesting party that all debris will be left on site.**

If inspection of request by contractor personnel determines that the tree in question has adequate clearance, the requesting party has the option to perform any necessary work or wait until routine maintenance is performed.

#### ***4.2.3 Internal Requests***

Various entities within Xcel Energy may request assistance from tree crews to mitigate tree issues. The majority of these requests are due to service reliability problems (results of routine patrol process) or to clear trees for the installation of new facilities and the upgrade of existing facilities.

### **Service Reliability Related Requests**

It is important that contractors respond to these requests in a timely manner and in accordance with any instructions provided with the request. In many cases we expect contractors to make a judgment call as to the necessity of pruning. Contractors need to consider all factors including when the tree is due for routine maintenance when making this decision.

## Section 4 (continued)

### **Construction/Cross Charge**

These requests pertain to the installation of new facilities, the upgrade of existing facilities or work on facilities that are jointly owned. In many cases contractor personnel will be asked to identify trees requiring clearance and to provide information that will be used to estimate the cost of tree clearing. It is important that contractor personnel respond to these requests in a timely manner and in accordance with any instructions provided with the request.

#### ***4.2.4 Emergency/Storm Response***

Contractor personnel are required to respond to storm situations in accordance with regional storm response process. Only work necessary for the restoration of power will be performed. A reasonable attempt should be made to notify customers. No debris disposal will be attempted for any tree work performed.

# OVERHEAD SAFETY INSPECTION PROGRAM

Contractors shall report hazards found as part of the overhead safety inspection program, which is performed in concert with transmission and distribution line clearance operations.

## 5.1 – SCOPE

Contractors are expected to perform this inspection as part of their normal duties. During the course of routine line clearance operations, all spans of overhead primary conductor will be inspected, regardless of the presence of vegetation. While on each job site, contractors should also inspect secondary and service conductors.

Contractors are to identify obvious safety hazards on Xcel Energy's distribution and transmission overhead facilities that could pose a threat to the general public as well as our employees and contracted workers. Hazards that present an imminent threat to personal or public safety must be resolved immediately. Depending upon the urgency of the situation, it may be necessary for the inspector to stay on site until a utility representative arrives at the scene.

When a hazard is identified, complete the "Overhead Safety Inspection Form." The completed original document shall be given to the Xcel Energy Vegetation Management representative for distribution to the appropriate Field Operations manager.

### Sample List of Hazards

The following is a sample list of safety hazards that contractors should be able to recognize. Please note that all situations cannot be listed and good judgment must be used when inspecting.

#### Overhead Facilities

- Cracked or broken cross arms
- Missing cross arm braces
- Guy wires missing or damaged
- Tripping hazards, such as ground wire sticking out from pole
- Oil-filled equipment leaks
- Equipment ready to fall down
- Transmission right-of-way encroachment
- Clearances of conductors - from buildings, tree houses, ladders, transmission, etc.

## Section 5 (continued)

- Leaning pole, tower or footing
- Rotted or eroding pole, tower or footing
- Bird nest on a structure
- Significant woodpecker damage to a pole or tower
- Wires down or broken
- Severely frayed conductor or neutral/static wires
- Wires off insulator or pin
- Ground clearances
- Damage to insulator
- Damage to pole top pin
- Damage to pole steps
- Accessible objects hanging from lines

### Other Facilities

- Meter housing loose from structure
- Mast or riser pulling from housing
- Wires exposed
- Doors to underground equipment and vaults unlocked or open

## Section 6

# LANDSCAPE MAINTENANCE & WEED ABATEMENT

Xcel Energy's Vegetation Management group is also responsible for maintaining vegetation at electric substations and high- and low-pressure gas facilities. In some areas, Xcel Vegetation Management is also responsible to provide vegetation control services at power plants and at facilities such as offices and service centers, microwave sites, and other corporately owned property.

Facilities located on federal lands and some private properties require special notification and treatment types. Contractors are required to contact appropriate Xcel Energy Vegetation Management representative for site-specific information, whose contact information shall be obtained from the Vegetation Management System (VMS).



# MISCELLANEOUS VEGETATION MANAGEMENT

## 7.1 – VEGETATION MANAGEMENT SYSTEM (VMS)

The VMS application houses all the contractor activity, circuit and facility detail and work history, and customer request information.

### 7.1.1 Activity Reporting

Xcel Energy will provide contractors with crew activity booklets. Line clearance contractors are to record their time and activity daily, according to each type of activity performed on these sheets.

## 7.2 – HERBICIDE GUIDELINES

### 7.2.1 Applying Herbicide

All herbicide and treatment methods used by the contractor shall have prior approval by Xcel Energy Vegetation Management representative. Product labels and Material Safety Data Sheets (MSDS) must be provided to the appropriate Xcel Energy Vegetation Management representative.

#### Precautions

- Do not apply herbicides outside of easement right-of-way boundaries except in cases where landowner's written acknowledgement has been obtained.
- If a property owner should object to any of the herbicide treatments, the operation shall immediately be discontinued on that property until any issues are resolved.
- Bare-ground treatment should be applied to transmission switch gates.
- Herbicide may be applied to foliage to a height of 10 feet or less unless agreed to otherwise by an Xcel Energy Vegetation Management representative.

#### Spills or Accidents

Any spill, leak, fire or other accident involving herbicides *must be reported immediately* to Xcel Energy (see Special Conditions for North and South) and the appropriate state agency.

## Section 7 (continued)

### Xcel Energy Contacts

	Colorado	Oklahoma, Texas New Mexico Kansas	Minnesota South Dakota North Dakota	Wisconsin
Emergency Pager	303-556-1244	806-674-1890	612-534-5007	N/A
24 Hour Hotline	800-491-0818	If no answer, leave message with Name, Phone, Location and Nature of Emergency. You will be contacted as soon as possible.	800-393-3900 Across States 800-466-0466 24 hr. Energy Supply	715-577-0003
General Hotline	800-491-7522		Spill Hotline 612-330-3972	715-577-0003
PCB Hotline	800-491-3612		N/A	N/A
General Office	701-497-2107	806-378-2196	612-630-7875	715-839-1346 or 715-839-2691

### 7.3 – SPECIAL CONDITIONS DOCUMENTS

Specific operational work requirements apply to the company's different operating areas. A copy of the appropriate special conditions should be included with this guideline document. Please request current copies from an Xcel Energy Vegetation Management representative.

### 7.4 – AVIAN PROTECTION

Xcel Energy's long-term Avian Protection Plan details the company's efforts to improve facilities, primarily distribution lines, and to reduce risks to birds from interactions with company facilities. This plan is part of an agreement outlined in a Memorandum of Understanding with the U.S. Fish and Wildlife Service. The following items in the Avian Protection Plan relate to tree trimming:

- An inactive bird nest is defined as not having eggs or young. If birds are building a nest that doesn't have eggs or young, it is also inactive.
- If tree crews encounter an inactive nest, in part of a tree we need to trim, they can remove the nest. The only exception is an eagle nest. An inactive eagle nest cannot be removed.



## Section 7 (continued)

- If tree crews encounter an active nest (eggs or young present), in part of a tree we need to trim, the nest cannot be removed until it becomes inactive. We can still trim the tree to clear the wire as long as the nest and birds are not disturbed. We may need to return after the nest becomes inactive to finish trimming the tree. These situations must be reported to the Xcel Energy Vegetation Management representative who will contact the appropriate Environmental Services representative.
- If tree crews find a dead or injured bird that had come into contact with a line, they must contact their general foreman. The general foreman will then contact their Xcel Energy Vegetation Management representative who will contact the appropriate Siting & Land Rights Environmental Services representative.
- Contract General Foremen are responsible for keeping the avian protection glove box kit including the US Fish & Wildlife Service Special Purpose Permit on their trucks at all times.

### 7.5 – RESPONSIBLE TREE PLANTING

Xcel Energy's Right Tree book provides customers detailed information regarding power line compatible tree planting. Copies may be requested by calling Xcel Energy Customer Service at 1-800-895-4999.