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ABBREVIATIONS

ACA	-	Ammoniacal copper arsenate
ACZA	-	Ammoniacal copper zinc arsenate
ANSI	-	American National Standards Institute
AWPA	-	American Wood Preservers' Association
CCA	-	Chromated copper arsenate
EPA	-	Environmental Protection Agency
EPRI	-	Electric Power Research Institute
NaMDC	-	N-Methyldithiocarbamate
NESC	-	National Electrical Safety Code
MITC	-	Methylisothiocyanate
OCF	-	Overload Capacity Factor
pcf	-	pounds per cubic foot
REA	-	Rural Electrification Administration
RUS	-	Rural Utilities Service

DEFINITIONS

Accelerometer – A device used to measure acceleration.
Fumigants – Preservatives delivered into a pole in a liquid or solid form that vaporize over time sending fumes throughout a given pole section.
Fungi – Lower life plant form which uses wood for food to sustain life.
Incipient decay – The early stage of decay that has not proceeded far enough to soften or otherwise perceptibly impair the hardness of wood. It is usually accompanied by a slight discoloration or bleaching of the wood.

1. PURPOSE: The purpose of this guide bulletin is to furnish information and guidance to Rural Utilities Service (RUS) electric borrowers in establishing or sustaining a continuing program of effective, ongoing pole maintenance. Discussed are methods and procedures for inspecting and maintenance of standing poles and for determining the minimum required groundline circumferences for distribution and transmission poles.

2. GENERAL DISCUSSION OF POLE DECAY: Decay of a treated pole is usually a gradual deterioration caused by fungi and other low forms of plant life. Damage by insect attack (termites, ants and wood borers) is usually considered jointly with decay because preservative treatment of wood protects against both fungi and insects. In most cases, the decay of creosote and pentachlorophenol treated poles occurs just below the groundline where conditions of moisture, temperature and air are most favorable for growth of fungi. Decay factors affecting pole life are discussed below.

2.1 Pole Species: Of the millions of poles installed on RUS borrowers' systems, about 85 percent are deep sapwood southern pines. Untreated, southern pine sapwood is especially vulnerable to attack by wood destroying fungi, termites, and carpenter ants. In the Gulf States, where temperature and moisture are most favorable for fungi growth and environmentally favored by termites and carpenter ants, pole replacement time of an untreated southern pine pole would be 2 to 3 years. In areas of lower rainfall and average lower temperatures, the time to pole failure for untreated pine would increase to 5 to 10 years.

The bulk of the remaining pole population is classified as the western species, comprised of Douglas fir, western red cedar, lodgepole pine, and ponderosa pine. The northern pine species, red and jack, are used in relatively small amounts.

Adequate preservative treatment (pole conditioning and preservative penetration and retention) provides relatively good protection of pole sapwood and the underlying heartwood. Heartwood of most species varies widely in decay resistance, and is almost impossible to treat with preservatives. Species resistance to decay are classified as follows:

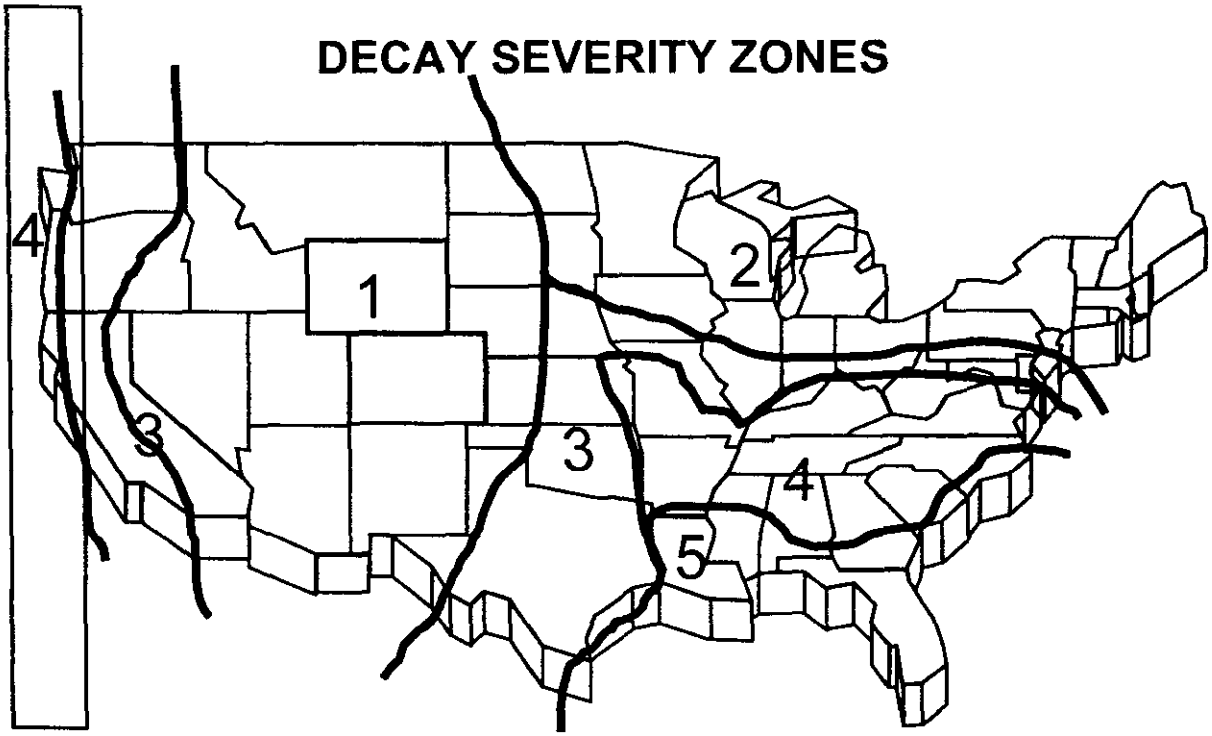
Durable – Western red cedar.
Moderately Durable – Douglas fir and most of the pines.
Least Durable – Lodgepole pine. (The use of this species has been limited primarily to the Mountain States areas.)

2.2 Preservative Treatments: There are two general classes of preservative treatment, oil-borne (creosote), pentachlorophenol (penta) in petroleum, and Copper Naphthenate) and water-borne (arsenates of copper). Creosote was the only preservative used on rural system poles until 1947, when post-war chemical shortages prompted the introduction of penta and Copper Napthenate. Both of these preservatives were dissolved in fuel oils from petroleum or mixed with creosote. Today, these preservatives are blended with petroleum distillates.

Penta is now the most widely used pole preservative. Where decay problems have occurred, they have not been attributed to any deficiencies of the preservative, but to one or more of the following: (1) loss of solvent carrier due to gravitation and bleeding, (2) poor conditioning of the poles, and (3) loss of dissolved penta to retentions below the effective threshold. To overcome these deficiencies, treatments and quality control have been improved.

Wood preservatives used in water-borne solutions include ammoniacal copper zinc arsenate (ACZA), and chromated copper arsenate (CCA) (types A, B, and C). These preservatives are often employed when cleanliness and paintability of the treated wood are required. Several formulations involving combinations of copper, chromium, and arsenic have shown high resistance to leaching and very good performance in service. Both ACZA and CCA are included in many product specifications for wood building foundations, building poles, utility poles, marine piles, and piles for land and fresh water use. Treatment usually takes place at ambient temperature. During treatment of Douglas fir, experience has shown that care needs to be taken to ensure that the pole is sterilized.

2.3 Decay Zones: The map on the following page details the five Decay Severity Zones of the United States. These zones were originally based on summer humidity and temperature information and later on a pole performance study conducted by the Rural Electrification Administration (REA). Decay severity ranges from least severe in Zone 1 to most severe in Zone 5. Service life records, individual experience, and/or a planned sample inspection should indicate if the decay hazard for a particular system is typical of the zone in which the system is located.



2.4 Types of Decay: After installation, decay organisms may invade the heartwood of poles through the poorly treated sapwood zones, checks, or woodpecker holes. Internal decay may occur in pole tops cut after treatment and in holes bored in the field where supplementary treatment has been neglected. Insufficient amount of preservative or migration of oil-type preservatives are the principal causes of external decay in southern pine poles. Poles in storage can decay because being stacked horizontally can encourage migration of the oil to the low side, depleting oil and preservative from the top side. For this reason, it is recommended that poles in storage are rolled annually to eliminate depletion of preservative from the top side.

Internal decay may be found in southern pine poles that were not properly conditioned or in which penetration or the amount (retention) of preservative is lacking entirely or insufficient. Internal decay of the western species usually involves the heartwood which has been improperly seasoned prior to treatment.

External decay above ground, more commonly known as "shell rot", occurs frequently in butt-treated western red cedars after 12-15 years of service.

3. PLANNED INSPECTION AND MAINTENANCE PROGRAM: The purpose of a planned inspection program is to reveal and remove danger poles and to identify poles which are in early stages of decay so that corrective action can be taken. The end result of the inspection program is the establishment of a continuing maintenance program for extending the average service life of all poles on the system. The steps in developing a planned pole inspection and maintenance program are outlined below:

3.1 Spot Checking: Spot checking is the initial step in developing a planned pole inspection and maintenance program. Spot checking is a method of sampling representative groups of poles on a system to determine the extent of pole decay and to establish priority candidates for the pole maintenance measures of the program. A general recommendation is to inspect a 1,000-pole sample, made up of continuous pole line groupings of 50 to 100 poles in several areas of the system. The sample should be representative of the poles in place. For instance, all the poles on a line circuit or a map section should be inspected as a unit and not just the poles of a certain age group. The inspection of the sample should be complete, consisting of hammer sounding, boring, and excavation as described in Section 4. Field data should be collected on the sample as to age, supplier, extent of decay, etc.

The data should be analyzed to determine the areas having the most severe decay conditions and to establish priorities for a pole-by-pole inspection of the entire system. It may be desirable to take additional samples on other portions or areas of the system to determine if the severity of decay is significantly different to warrant the establishment of an accelerated pole inspection and maintenance program for that portion of the system. The results of the spot check will aid in scheduling a continuous pole inspection and maintenance program at a rate commensurate with the incidence of decay.

3.2 Scheduling the Inspection and Maintenance Program: If an ongoing maintenance program is not in place, the suggested timing for initial pole-to-pole inspection and subsequent re-inspection is shown in Table 3-1. Supplementary treatment is performed where necessary after the initial inspection.

Decay Zone	Initial Inspection	Subsequent Re-inspection	Percent of Total Poles Inspected Each Year
1	12 – 15 Yrs	12 Yrs	8.3%
2 & 3	10 – 12 Yrs	10 Yrs	10.0%
4 & 5	8 – 10 Yrs	8 Yrs	12.5%

TABLE 3-1 – Recommended Pole Inspection Schedules

The vulnerability of poles to decay is generally proportionate to the decay zone in which they are installed. As a general recommendation, the initial pole-by-pole inspection program should be inaugurated at a yearly rate of 10 percent of the poles on the entire system when the average age of the poles reaches 10 years. If a spot check indicated that decay is advanced in 1 percent of the pole sample, the inspection and maintenance program should be accelerated so that a higher percentage of poles are inspected and treated sooner than the figures shown in Table 3-1. If the decay rate is low for a particular decay zone or area of the system, the pole-by-pole inspection can be adjusted accordingly. Historical inspection data indicates that the ratio between the decaying/serviceable poles to reject poles in the 10-15 year age group is about six or more to one. In a 30-year age group, the ratio was down to about one to one or less. In the latter group, the survivors have more than sufficient residual preservative to protect them indefinitely. The poorly treated poles in the 30-year old group usually have already decayed and been replaced.

The greatest economic benefit from regular inspection is in locating the decaying/ serviceable group. Treatment of poles in this group can extend pole life, thereby avoiding the cost of emergency replacement. Inspection and proper maintenance can more than pay dividends by extending the serviceable life of the poles. With the costs of replacing poles rising, the economics of extending the service life become more favorable.

3.3 Setting Up the Program: The pole-by-pole inspection and maintenance work may be done by system employees or by contracting with an organization specializing in this type of work. The choice should be made on the basis of the amount of work to be done, availability, depth of trained people on staff, and a comparison of the costs. Developing the necessary skills in the system's own crews may require considerable time and be contingent upon the availability of an experienced inspector to train system employees. Therefore, qualified contract crews may be preferable for this work in many instances. To be considered qualified, the individual should have inspected, at a minimum, 5,000 poles under a qualified inspector and another 5,000 poles independently, but under close supervision. When the inspection program is underway, the work of the person chosen to inspect should be checked every week or two by the system's representative and the inspector's supervisor. The best way to check on inspector's work is to select at random about 10 poles inspected in the last few weeks, and perform a complete re-inspection of the 10 poles. The re-inspection should include: re-excavating, removal of paper and treatment, testing for hollow sounds, taking a boring, checking soft surface wood, re-measuring the pole, rechecking the calculations, then retreating and backfilling. If any serious first inspection errors are discovered, all work performed by the inspection between these spot checks should be re-inspected.

The pole inspection and maintenance program may result in a large number of replacements. If the reject rate is high, the system's crews may not be able to replace rejected poles in a reasonable time because of other work. The temporary addition of skilled personnel for inspection or pole replacement may be required. It is generally necessary to use at least one crew full time to keep up with the pole inspector. An average pole inspector can check 150-200 poles per week or 800 poles per month. It is desirable to have one person responsible for supervision and coordination.

3.4 Re-inspections: Information obtained during the first pole-y-pole inspection can serve as the basis for scheduling subsequent inspections. It is recommended that a re-inspection be made ever 8 to 12 years as mentioned in paragraph 3.2, according to the decay zone and severity of decay. These recommendations should be modified by personal experience, but the intervals should not be extended by more than 3 years. It is advisable to recheck some poles which have been groundline treated at intervals sooner than recommended in paragraph 3.2 to assure field applied treatment is working properly and recommended time intervals for re-inspection can be trusted.

4. INSPECTION METHODS: There are varying types of inspection, each with a different level of accuracy and cost. Inspection methods with low accuracy require more frequent re-inspection than methods which are detailed and more accurate.

4.1 Visual Inspection: Visual inspection is the easiest and lowest cost method for inspecting poles and has the lowest accuracy. Since most decay is underground or internal, this method will not detect the majority of any existing decay. Obvious data can be collected on each specific structure, such as the above ground relative condition of the pole, crossarm, and hardware. However, because this method misses the most crucial part of a true pole inspection and maintenance program, this method is not recommended.

4.2 Sound and Bore: This method involves striking a pole with a hammer from groundline to as high as the inspector can reach and detecting voids by a hollow sound. An experienced inspector can tell a great deal about a pole by listening to the sounds and noticing the feel of the hammer. The hammer rebounds more from a solid pole than when hitting a section that has an internal decay pocket. The internal pocket also causes a sound that is dull compared to the crisp sound of a solid pole section.

Some inspection methods require all poles to be bored, while others require boring only when decay is suspected. Boring is usually done with either an incremental borer or power drill with a 3/8" bit. An experienced inspector will notice a change in resistance against the drill when it contacts decayed wood. The shaving or the

borings can be examined to determine the condition of the wood, and the borings can be analyzed for penetration and retention.

When voids are discovered, a shell thickness indicator can be used to measure the extent of the voids. This information can be used to estimate the reduction in strength caused by the void, as discussed in Section 8.

The effectiveness of the sound and bore method varies with different species. For southern yellow pine poles, which represent a majority of the poles in North America, decay normally is established first on the outside shell below ground. The decay moves inward and then upward to sections above ground. By the time sound and bore inspection methods can detect internal decay pockets above ground, the pole is likely to have extensive deterioration below ground.

The sound and bore method is more effective with Douglas fir and western red cedar poles. Decay on these poles is likely to begin internally near the groundline, or in the case of Douglas fir, above the groundline. Therefore, sounding and boring can identify at least some decay at a stage before the groundline section is severely damaged.

All borings should be plugged with a treated wood plug which is properly sized for the respective hole.

Sound and bore method is recommended for the inspection of Douglas fir and western red cedar poles but should be used in combination with excavation for southern pine poles.

4.3 Excavation: The effectiveness of the sound and bore inspection is greatly increased when excavation is added to the process. Excavation exposes the most susceptible section of the pole for inspection. For southern yellow pine, this is particularly true since decay begins externally and below ground.

Poles should be excavated to a depth of 18 inches in most locations. Deep excavation may be required in dry climates. After excavation, the exposed pole surface should be scraped clean to detect early surface decay. The best results can be obtained by using a triangular scraper.

Shell rot and external decay pockets should be removed from the pole using a specially designed chipper tool. Axes or hatchets should never be used for this application. The remaining pole section should be measured to determine if the pole has sufficient strength with the reduced circumference. Tables 2, 3, and 4 on page 19, assist in determining the effectiveness.

After complete inspection and application of preservative treatment, the pole is backfilled by tamping every 6 to 8 inches of dirt at a time until the hole is filled. The backfill should mound up around the pole to allow for future settling and drainage away from the pole.

5. ADDITIONAL INSPECTION TOOLS AND METHODS: Additional equipment and methods are available which can be incorporated into the inspection process.

5.1 Shigometer: The Shigometer uses electrical resistance to detect incipient decay before it can be detected with the human eye or sensed with a drill. During the decay process, negative ions form in the infected wood and cause the electrical resistant to lower. The Shigometer measures electrical resistance and detects incipient decay when there are sudden drops in resistance readings.

The Shigometer employees test leads consisting of a twisted pair of insulated wires with bare metal tips. Both metal tips are slowly inserted into a 7/64" diameter hole bored into the pole. The instrument delivers an electric current pulse through the probes each second. The resistance of the wood tissue is measured between the contact points of the two tips.

By detecting incipient decay, the inspector can decide what further steps of inspection and preservative treatments to take.

5.2 Poletest: Poletest is a sonic instrument developed through research funded by the Electric Power Research Institute. During the development of this instrument, spectral analyses of sound waves that traveled through cross sections at various locations were compared to the actual breaking strength of poles. The end result of the research is a field test device that provides a statistically reliable direct readout of the strength of a pole at a specific cross section.

The intent of the Poletest instrument is to provide a strength assessment for individual poles as opposed to assuming pole designated fiber stresses of the American National Standards Institute (NASI) 05.1. However, Poletest is not a substitute for traditional inspection because it does not detect decay, especially below ground. Measured strength values can be used to assist in determining when pole replacement is necessary.

5.3 De-K-Tector: The De-K-Tector and other waveform analysis instruments analyze sound wave patterns as they travel through a cross section of a pole. A calibrated mechanical striker impacts the pole and the sound wave or vibration wave caused by the impact is sensed by an accelerometer on the opposite side of the poles.

The waveform that is detected by the accelerometer is electronically divided into high and low frequency components. Research has shown high frequencies are absorbed more by decayed wood. Therefore, a reading with a low magnitude, high frequency component would indicate a "questionable" pole because decay absorbed some of the high frequency component before the waveform reaches the opposite side of the pole. That pole would need further inspection by traditional methods.

6. RESULTS OF WOOD POLE INSPECTION

6.1 Inspection Results: Inspection results should be used to update pole plant records, evaluate pole conditions, plan future inspection and maintenance actions, and provide information for system map revisions. The inspection process will result in identifying the condition of each individual distribution and transmission pole.

In general, ANSI C2, "National Electric Safety Code (NESC)," requires that if structure strength deteriorates to the level of the overload factors required at replacement, the structure shall be replaced or rehabilitated. The inspection results should be replaced or rehabilitated. The inspection results should indicate if a pole is "serviceable" or a "reject".

6.1.1 A pole is considered "serviceable" under any of the following conditions:

a. Large portion of completely sound wood exists.
b. Early stages of decay which have not reduced the pole strength below NESC requirements.
c. Pole condition is as stated in (1) or (2) but a defect in equipment may exist, such as a broken ground or loose guy wire. Equipment defects should be subsequently repaired.

6.1.2 Any pole that does not meet the above conditions should be classified as a "reject". Any of the following conditions are characteristics of rejects:

a. Decay, insect or mechanical damage has reduced pole strength at the groundline below NESC requirements.
b. Severe woodpecker hole damage has weakened the pole such that it is considered below NESC requirements.
c. Hazardous conditions exist above ground, such as split top.

6.1.3 Rejected poles may be classified further depending on the severity of the deterioration and whether they are reinforceable:

a. A "reinforceable reject" is any reject which is suitable for restoration of the groundline bending capacity with an industry acceptable method of reinforcement.

b. A "replacement" candidate is a rejected pole which is not suitable for necessary rehabilitation.

c. A "priority reject" is a reject pole that has such severe decay deterioration, it should be removed as soon as possible.

7. REMEDIAL TREATMENT

7.1 The purpose of remedial treatment of a standing pole is to interrupt the degradation by the addition of chemicals, such as pesticides, insecticides and fungicides, thereby extending the useful life of the structure. Treatment may be external groundline treatment or internal treatment.

7.2 Regulations and Licensing: Most states require applicators or job supervisors to obtain a pesticide applicator license. Testing for this license includes a "basic skills test" to show knowledge of the rules and regulations governing pesticides. Some states also give a "category test" which is specific to wood poles and wood preservation.

The uses of pesticides are classified by the United States Environmental Protection Agency (EPA) as either "general" or "restricted". A "general use" pesticide is not likely to harm humans or the environment when used a directed on the label. These pesticides may be purchased as applied without a pesticide applicator license. However, a manufacturer may choose not to make a product available for purchase by the general public.

A "restricted use" pesticide could cause human injury or environmental damage unless it is applied by competent personnel (certified applicators) who have shown their ability to use these pesticides safety and effectively. These wood preservatives can only be purchased and applied by someone who has a pesticide applicator license or whose immediate supervisor has a pesticide applicator license.

7.3 Groundline Treatment: All treated poles eventually lose resistance to decay, and groundline treatment provides an economical extension of their useful life. Experience has shown that groundline decay can be postponed almost indefinitely in cases where periodic inspection and maintenance programs are in effect. Groundline treatment is recommended under the following conditions:

a. Whenever a pole is excavated during an inspection, and the pole is sound or decay is not so far advanced that the pole has to be replaced or repaired.

b. Whenever a pole over 5 years old is reset, or

c. Whenever a used pole is installed as a replacement.

The two general types of external preservatives used for groundline treatment are either waterborne or oilborne. The fungi-toxic components of waterborne preservatives are water soluble while the oilborne preservatives carry oil soluble fungicides. There are formulations that contain both waterborne and oilborne solutions.

Sodium fluoride is the most commonly used water soluble active ingredient in remedial treatments. Historically, oilborne preservatives have included creosote and pentachlorophenol. However, use of penta in supplemental preservatives appears to be declining. In recent years, Copper Naphthenate has been used in external preservative pastes. Boron has also been introduced as an ingredient in a groundline paste.

Before application of external preservatives, decayed wood should be stripped from the pole and removed from the excavation. The preservative paste or grease is most commonly brushed onto the pole. A polyethylene backed paper is then wrapped around the treatment and stapled to the pole. The paper helps to facilitate the migration of the preservative into the critical outer shell.

7.4 Internal Treatment: The three basic types of preservatives used for internal treatment are liquids, fumigants, and solids.

7.4.1 Liquid Internal Preservative: Liquid internal preservatives should be applied by pressurized injection through a series of borings that lead to internal decay pockets or voids. Adequately saturating the pocket and surrounding wood should arrest existing decay or insect attack and prevent further degradation for an extended time.

Liquid internal preservatives contain water soluble or oil soluble active ingredients. Sodium fluoride is the principle active ingredient in the water based formulations. Moisture that is present in the pole will help facilitate diffusion of the active ingredients into the wood beyond a decay pocket.

Oil based internal preservatives most often incorporate Copper Naphthenate as an active ingredient with fuel oil or mineral spirits as the solvents. Since Copper Naphthenate is not soluble in water, it is likely to migrate into the surrounding wood only as far as the oil will travel.

7.4.2 Fumigants: Most of the fumigants in use for wood poles today were originally developed for agricultural purposes. Applying fumigants to soil will effectively sterilize the ground. Due to high levels of microorganisms and chemical activity in soil, the fumigants will degrade fairly rapidly and dissipate so that new crops can be planted in a short time.

These same fumigants do not degrade rapidly in wood and will remain affixed to sound wood cell structure for many years. Fumigants have also been found to migrate longitudinally in wood, several feet away from the point of application. This helps control decay in a large section of the pole. When the vapors migrate into a decay void, however, they may dissipate through associated checks and cracks. This reduces the long term effectiveness and requires more frequent application.

Registered pole fumigants include Sodium N-methyldithiocarbamate (NaMDC), Methylisothiocyanate (MITC), Chloropicrin and Vorlex. Vorlex has not yet been commercially used for utility poles, since it requires a closed application system. Chloropicrin is a very effective wood fumigant. However, the liquid has to be applied from pressurized cylinders, and the applicator has to wear a full-face air respirator.

NaMDC and MITC are the most widely used wood pole fumigants. NaMDC is soluble in water to a maximum amount of 32.7 percent. Treatment holes drilled in a wood pole are filled with the aqueous solution so the appropriate dosage is applied. Recommended dosages vary according to pole size. The NaMDC solution decomposes and generates MITC as the main fungi-toxic ingredient. The maximum theoretical amount of resultant MITC at ideal conditions is 18.5 percent by weight. The MITC vapors then migrate up and down the pole to help control decay.

Pure MITC is a solid below 94°F and contains 97 percent active ingredient. Solid MITC sublimes directly into fumigant vapors. Avoiding the liquid stage helps to minimize loss of fumigant during application through checks and cracks. MITC is packaged in vials to facilitate installation. Just before placing the vial into a treatment hole, the cap is removed. As with any fumigant, application holes should be plugged with pressure treated plugs.

7.4.3 Solids: Currently, one solid preservative, a boron rod, is available in North America as a supplemental preservative treatment for wood poles. However, the American Wood Preservers' Association (AWPA) Standards do not include borates for ground contact applications like utility poles. Research and development continues in evaluating formulations of borates with other compounds.

7.5 Woodpecker Damage: Woodpecker damage is another problem that requires attention. Many methods have been used in attempts to prevent such damage, but nothing has been entirely successful.

It appears that a woodpecker selects a pole only by chance, and that the first hole invites further attack by other woodpeckers. For these reasons, it is good maintenance practice to seal up the smaller holes. Various materials are available for plugging the holes, and a wire mesh can be used to cover the plugged hole as well as large areas of a pole.

8. DETERMINING THE SERVICEABILITY OF DECAYED POLES

8.1 The decision to treat or replace a decayed pole depends upon the remaining strength or serviceability of the pole. The permissible reduced circumference of a pole is a good measure of serviceability. The following procedure may be used to assist in determining if a pole should be replaced or reinforced.

8.2 Decay Classifications: Decay at the groundline should be classified as:

a. General external decay.
b. External pocket.
c. Hollow heart or
d. Enclosed pocket.

8.3 Permissible Reduced Circumference Safety Factors: Wood pole lines are designed using designated fiber strengths and loads multiplied by an overload capacity factor (OCF). For tangent structures the NESC prescribes on OCF "when installed" (new) for Grade B construction (transmission lines) of 4.0 and requires replacement or rehabilitation if the OCF reaches below 2.67. For Grade C construction (usual distribution line grade of construction) the "when installed" OCF is 2.67 and replacement or rehabilitated OCF is 1.33.

Using Tables 1 through 4, on pages 17 and 19 of this bulletin, will give assistance in determining when replacement or rehabilitation is necessary. If the reduced circumference indicates a pole at or below the "at replacement" OCF, the pole should be replaced, splinted, stubbed immediately, or otherwise rehabilitated. Appendix A, of this bulletin, shows the typical pole stubbing detail for distribution poles. Poles are successfully rehabilitated using steel channels, fiberglass reinforcing and epoxy.

8.4 General Procedures for Using Tables 1, 2, 3, and 4:

8.4.1 General External Decay. After removing all decayed wood, measure the circumference above and below the decayed section to determine the original circumference. Then measure the reduced circumference at the decayed section. If the line is built to Grade B construction (transmission), enter the original circumference in the OCF 4.0 column of Table 1. Move right across from the original circumference column of Table 1 until you find the reduced circumference. Once you find the reduced circumference, read the OCF at the top of the column in which your reduced circumference ended. If this OCF meets or exceeds the 2.67 OCF column, replacement is not necessary. However, poles with values close to the minimum should be monitored frequently to ensure that the poles OCF does not fall below the minimum.

For Grade C construction (usually distribution) enter Table 1 using the original circumference in column 4, OCF 2.67. These poles have to stay above the values of the OCF 1.33 column.

8.4.2 External Pockets. Remove decayed wood and make measurements of the depth and width of the pocket. Measure the pole for the original circumference. Refer to Table 2 to determine the circumference reduction. Enter Table 1 with the original circumference and the reduced circumference to determine the current OCF.

8.4.3 Hollow Heart (Heart Rot). If hollow heart is found, determine the shell thickness and measure the original circumference of the pole. Refer to Table 3 to determine the circumference reduction. Enter Table 1 with the original circumference and the reduced circumference to determine the current OCF.

To determine the shell thickness, bore three holes (preferably of 1/4 -3/8-inch diameter), 120° apart; measure the shell thickness at each hole, and average the measurements. After shell thickness is determined, treat and plug holes with tightly fitting cylindrical wood plugs that have been treated with preservative. No transmission pole should remain in service with a shell thickness less than 3 inches.

8.4.4 Enclosed Pocket. An enclosed pocket is an off-center void as shown in Table 4, and its diameter should be measured by boring holes as described in section 8.4.3. Using the minimum thickness of the shell, refer to Table 4 for the reduction in circumference. Measure the original circumference. Enter Table 1 with the original circumference and the reduced circumference and determine the current OCF.

Table 1
Pole Circumference Overload Capacity Factors (OCF)

Original Circumference (Inches)	Reduced Circumference (Inches)						
OCF 4.0	OCF 3.5	OCF 3.0	OCF 2.67	OCF 2.5	OCF 2.0	OCF 1.5	OCF 1.33
30.0	28.7	27.3	26.1	25.6	23.8	21.6	20.7
31.0	29.7	28.2	27.0	26.5	24.6	22.3	21.4
32.0	30.6	29.1	27.8	27.4	25.4	23.0	22.1
33.0	31.6	30.0	28.7	28.3	26.2	23.8	22.8
34.0	32.5	30.9	29.6	29.1	27.0	24.5	23.5
35.0	33.5	31.8	30.5	29.9	27.8	25.2	24.2
36.0	34.4	32.7	31.4	30.8	28.6	25.9	24.9
37.0	35.4	33.6	32.3	31.6	29.4	26.6	25.6
38.0	36.3	34.5	33.1	32.5	30.2	27.4	26.3
39.0	37.3	35.4	34.0	33.3	31.0	28.1	27.0
40.0	38.3	36.3	34.9	34.2	31.8	28.8	27.7
41.0	39.2	37.3	35.8	35.1	32.5	29.5	28.4
42.0	40.2	38.2	36.7	35.9	33.3	30.2	29.0
43.0	41.1	39.1	37.5	36.8	34.1	31.0	29.7
44.0	42.1	40.0	38.4	37.6	34.9	31.7	30.4
45.0	43.0	40.9	39.3	38.5	35.7	32.4	31.1
46.0	44.0	41.8	40.2	39.3	36.5	33.1	31.8
47.0	45.0	42.7	41.0	40.2	37.3	33.8	32.5
48.0	45.9	43.6	41.9	41.0	38.1	34.6	33.2
49.0	46.9	44.5	42.8	41.9	38.9	35.3	33.9
50.0	47.8	45.4	43.6	42.7	39.7	36.0	34.6
51.0	48.8	46.3	44.5	43.6	40.5	36.7	35.3
52.0	49.7	47.2	45.4	44.5	41.3	37.4	36.0
53.0	50.7	48.2	46.3	45.3	42.1	38.2	36.7
54.0	51.6	49.1	47.1	46.2	42.9	38.9	37.4
55.0	52.6	50.0	48.0	47.0	43.7	39.6	38.1
56.0	53.6	50.9	48.9	47.9	44.4	40.3	38.7
57.0	54.5	51.8	49.8	48.7	45.2	41.0	39.4
58.0	55.5	52.7	50.6	49.6	46.0	41.8	40.1
59.0	56.4	53.6	51.5	50.4	46.8	42.5	40.8
60.0	57.4	54.5	52.4	51.3	47.6	43.2	41.5

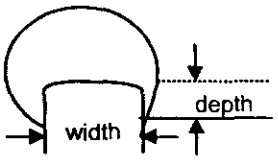


Table 2
Reduction in Measured Circumferences to Compensate for External Pockets

Pocket Width (ins)	1					2					3					4					5					6				
Pocket Depth (ins)	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Measured Circumference Of Pole (ins)	Reduction in Circumferences (ins)																													
20 to 30	1	1	2	-	-	2	2	3	-	-	2	3	4	-	-	3	4	5	-	-	4	6	8	-	-	6	8	-	-	-
30 to 40	1	1	1	2	-	1	2	2	3	3	2	3	4	4	4	2	4	5	5	6	3	5	6	7	8	5	7	8	9	-
40 to 50	1	1	1	2	2	1	2	2	3	3	2	3	3	4	4	2	3	4	5	6	3	4	5	6	7	3	5	6	7	8
50 to 60	1	1	1	2	2	1	2	2	3	3	2	3	3	4	4	2	3	3	4	5	3	4	4	5	6	3	4	5	6	7

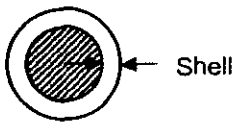


Table 3
Reduction in Measured Circumferences to Compensate For Hollow Heart

Measured Circumference Of Pole (ins)	Minimum Thickness of Shell (ins)					
	2	2.5	3	3.5	4	4.5
20 to 25	1	-	-	-	-	-
25 to 30	2	1	-	-	-	-
30 to 35	3	2	1	-	-	-
35 to 40	4	3	2	1	-	-
40 to 35	5	4	3	2	1	-
40 to 45	7	5	4	3	2	1

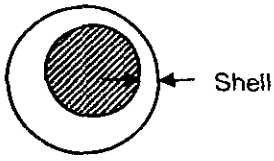
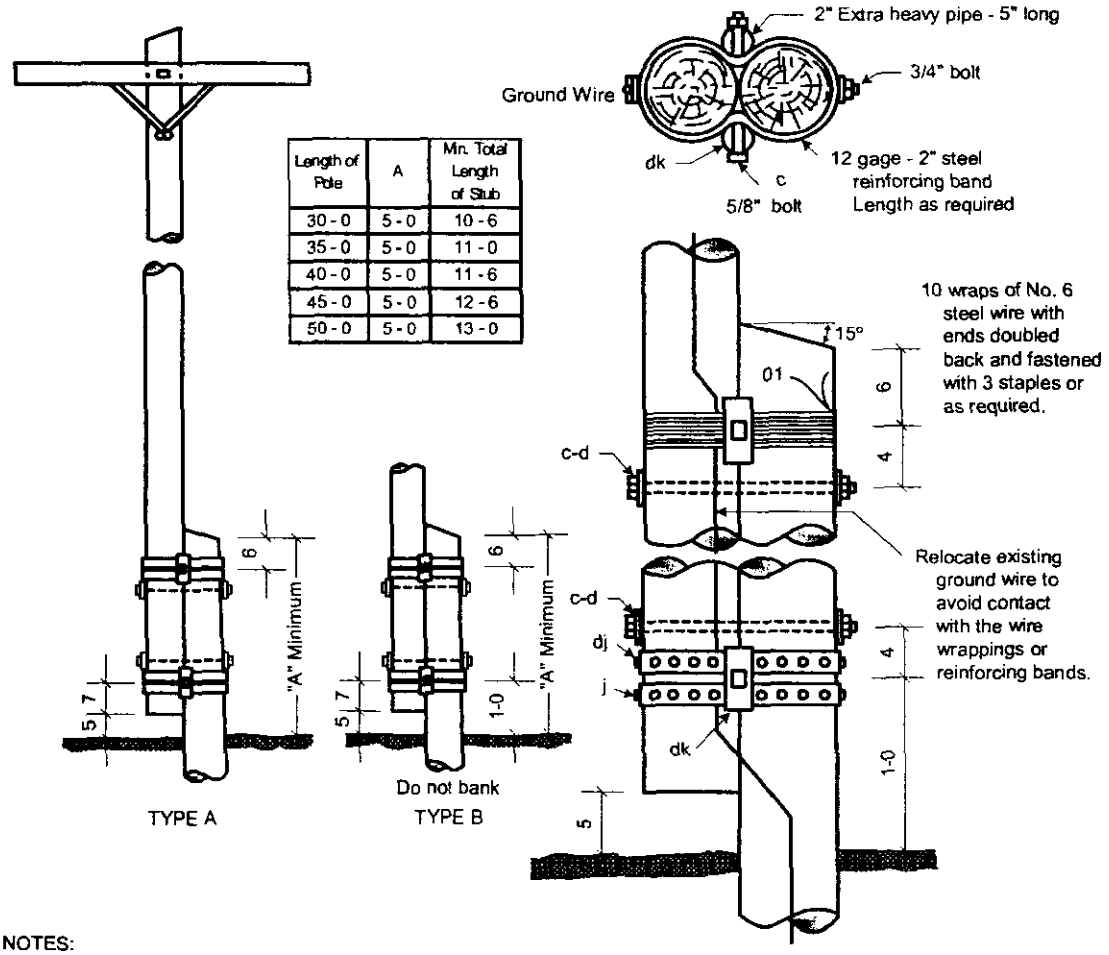


Table 4
Reduction in Measured Circumferences to Compensate For Enclosed Pockets

Diameter of Pocket (ins)	3			4			5		
Shell Thickness (ins)	1	2	3	1	2	3	1	2	3
Measured Circumferences Of Poles (ins)	Reduction in Circumferences (ins)								
20 to 30	2	1	-	3	1	-	4	2	-
30 to 40	2	1	1	3	1	1	4	2	1
40 to 50	2	1	1	3	2	1	4	3	1



Length of Pole	A	Min. Total Length of Stub
30 - 0	5 - 0	10 - 6
35 - 0	5 - 0	11 - 0
40 - 0	5 - 0	11 - 6
45 - 0	5 - 0	12 - 6
50 - 0	5 - 0	13 - 0

NOTES:
Use either wire wrapping or reinforcing band for stubbing material as required.
Position stub at side of pole (At right angle to direction of line and outisde of angle.)

ITEM	NO REQ'D	MATERIAL		ITEM	NO REQ'D	MATERIAL	
c	2	Bolt, machine. 3/4" x required length				Wire. No. 6 galvanized. as required.	
c	2	Bolt, machine. 5/8" x required length		01		Staples. as required.	
d	4	Washer. 2 1/4" x 2 1/4" x 3/16". 13/16" hole					
j	4	Screw, lag. 1/2" x 4"					
dj	4	Band, reinforcing. 12 gage x 2" x req'd length					
dk	4	Pipe spacer. 2" extra heavy x 5" long					

STUB REINFORCING OF DISTRIBUTION LINE POLES

SCALE : NTS

DATE : 02/20/95

M15

Metric Conversion Factors

To Convert From	To	Multiply By
Foot (ft)	Meter (m)	0.3048
Inch (in)	Centimeter (cm)	2.54
Degrees Fahrenheit (x°F)	Degrees Celsius (°C)	5/9 (x° - 32)

Appendix C

Electric Utility Third-Party Attachment Programs

Associated with this investigation, Staff reviewed AmerenUE's programs for assessing the impacts of third-party attachments to its utility poles. AmerenUE's formalized audit of third-party attachments began in 2001 and is operating on a five year cycle.

This program involves visual audits of third-party attachments on all AmerenUE poles to identify attachments AmerenUE was not aware of and may be non-compliant. All attachments are followed up on and either confirmed to be acceptable without modification or modified to be compliant. Compliance issues are assessed against NESC requirements and can be either clearance or pole strength related. Most attachments are assessed and found to be compliant; those that are not are typically in violation of clearance requirements not pole strength requirements. AmerenUE uses a contractor to assess third-party pole attachments.

AmerenUE completed the first cycle of its third-party attachment audits in January of this year. As a result of these audits, AmerenUE identified approximately 47,000 violations. Of these violations, 92% were at the pole versus midspan line clearance violations. Of the identified pole violations, approximately 98 to 99% were clearance violations. The small remaining percentage of violations was typically hardware related, and some of these required structural analyses due to a large bundle being attached to the pole.

AmerenUE's third-party attachment audits are structured to identify attachments to AmerenUE's utility poles that may not have been considered in existing calculations that confirmed the pole's acceptability for the loads it was intended to carry. Most third-party attachments are compliant and their approval by AmerenUE is completed before they are attached to the utility pole.

Any third-party that wishes to attach infrastructure to AmerenUE's poles must first determine what type of equipment and loads they plan to attach to AmerenUE's poles. The calculations to confirm that the loads on the pole do not exceed the pole's allowable stresses are certified by a professional engineer. They are then submitted to AmerenUE. Only attachments approved through this process are permissible on AmerenUE's poles.

Attached to the end of this appendix is an example pole attachment calculation package provided by AmerenUE. The first page of this attachment explains the six labeled attachments that follow the first page.

Post Attachment Audits

Ameren utilizes an independent contractor, Utilimap, to perform audits on 3rd party attachments on Ameren poles. Utilimap reports the results of the audits to Ameren via email notification. Data is reviewed through Utilimap's web-based portal.

Attachment 1 is a screen shot of the web portal showing poles audited relating to permit no. 2410.

Attachment 2 is a copy of the location detail of the pole audited.

Attachment 3 is a copy of the violation detail associated with the attachment on the pole.

Attachment 4 is an actual field photo of the pole audited.

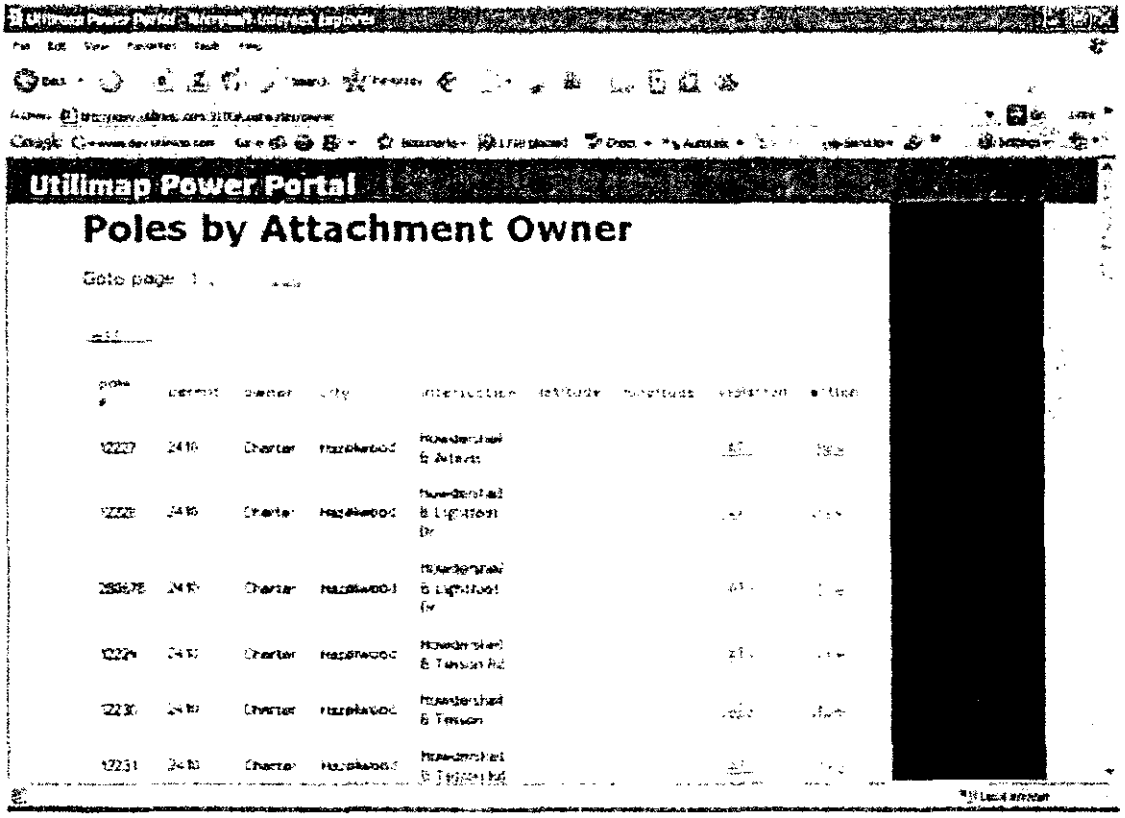
Attachment Pole Loading

Ameren also utilizes Utilimap to perform field inspection, structural analysis, and recommended make-ready for all 3rd party attachment applications. Each pole attachment is field measured and loaded into a pole loading program called O-Calc. The program calculates the pole's structural loading with the proposed attachment added. In addition, clearances are measured to verify compliance with the NESC. Any make-ready required either due to loading or clearances is shown as a recommendation.

Attachment 5 is a copy of the analysis result summary reported back Ameren.

Attachment 6 is a copy of the O-Calc output for a particular pole on a permit application showing the loading calculations, 3D image of pole with attachments and an actual field photo of the pole.

ATTACHMENT 1



ATTACHMENT 2

Utilimap Power Portal

Date: Mon Jul 26 00:00:00 CDT 2004

Pole num seq: 1509-1504-19

Pole num: 12227

Permit num: 2410

Company: Charter

City: Hazelwood

Street: Howdershell

Cross street: Altavia

Loc add:

Lat: 0.000000000

Long: 0.000000000

Violation: CATV

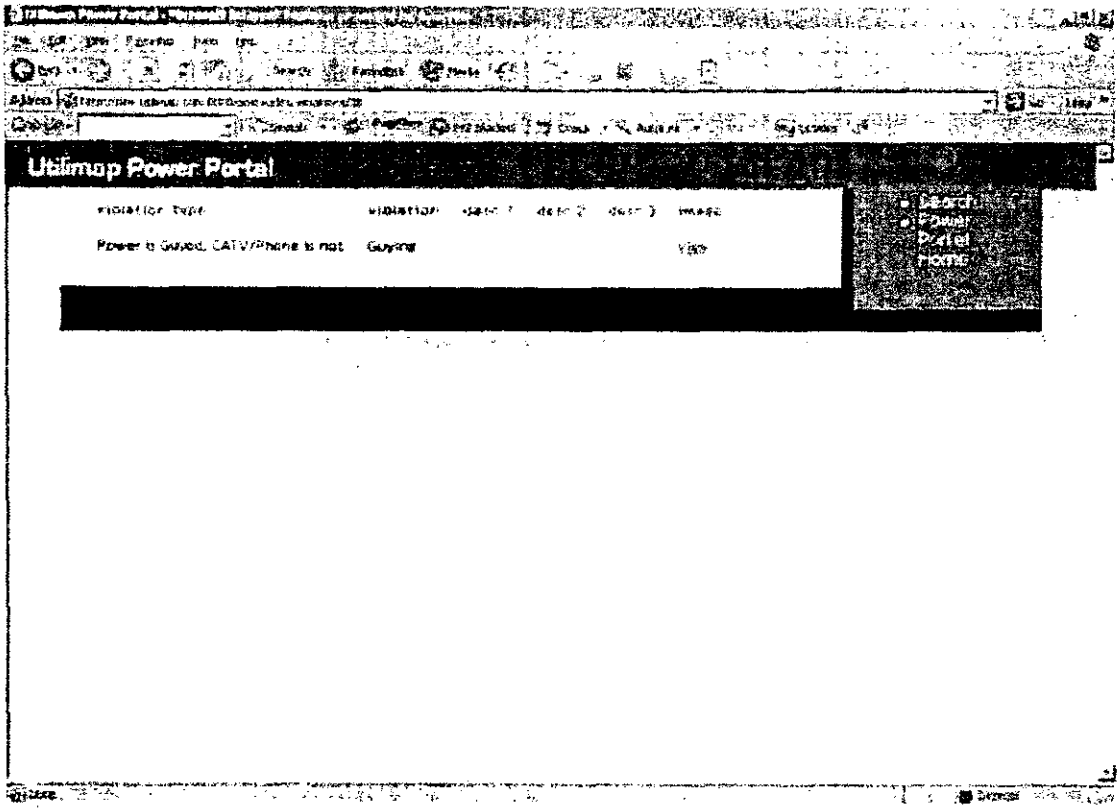
Violation other:

Viol category:

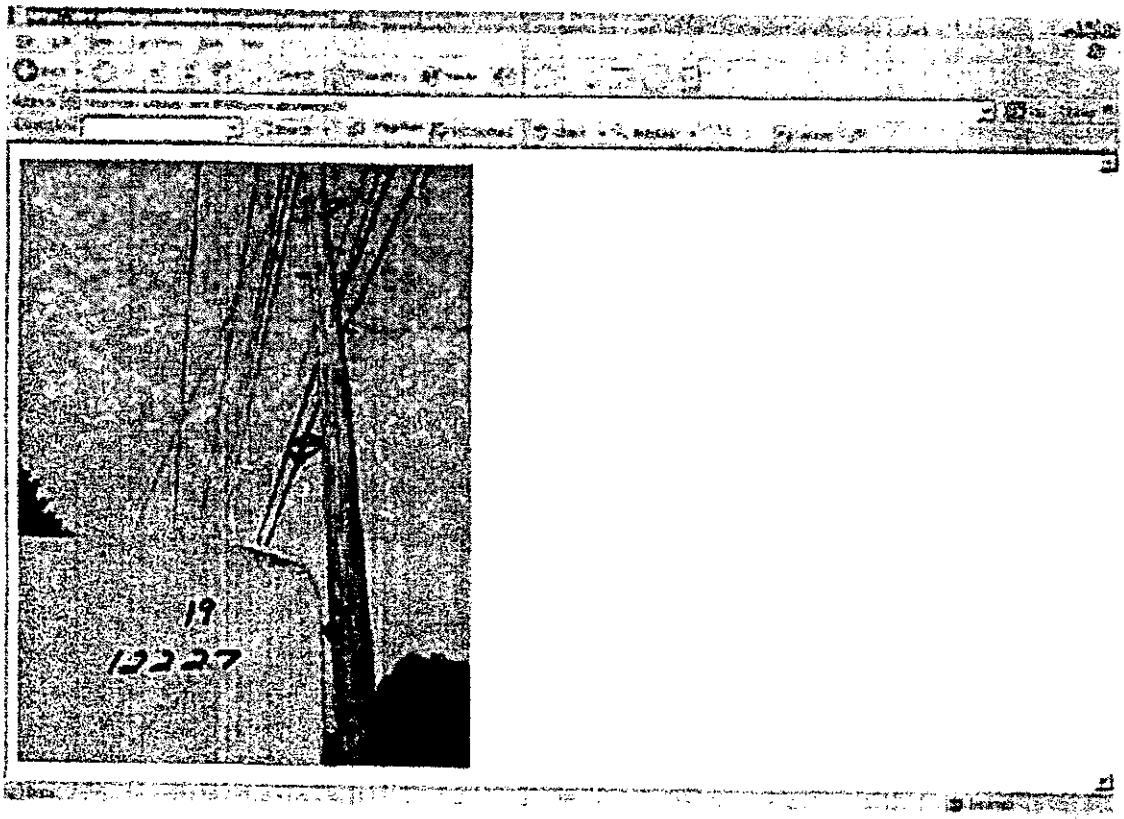
Back

- Search
- Power Portal Home

ATTACHMENT 3



ATTACHMENT 4



[illegible] Corporation
[illegible]

Field Date [illegible]

12

Application # [illegible]	Tel Pole: [illegible]	Proposed Attachment: [illegible]
City/Township: Marlboro Heights	STATE: MO	Attaching Client Company: Cable America

Client Map Number	#	Pole Owner	Pole Number	Pole Location	Owner	Existing Attachment Height	Proposed Attachment Height	Lowest Power	Telephone	Neutral	Extreme %	% Loaded Capacity	Dry Rated	Guy Lead & Position	Violation of Clearance Issue	Make Ready Recommendation Power	Make Ready Recommendation CATV
[illegible]	1	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	N		YES		[illegible]
[illegible]	2	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	N		NO		N/A
[illegible]	3	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	N		YES		[illegible]
[illegible]	4	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	N		NO		N/A
[illegible]	5	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	N		YES		[illegible]
[illegible]	6	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	N/A	[illegible]		[illegible]	N		YES		[illegible]
[illegible]	7	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	N/A	[illegible]		[illegible]	N		NO		OVERLASH TO EXISTING STRAND [illegible]
[illegible]	8	AEP	[illegible]	[illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	[illegible]		[illegible]	N		YES		[illegible]
[illegible]	9	AEP	[illegible]	[illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	N/A		[illegible]	Y	11 @ [illegible]	YES		[illegible]
[illegible]	10	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	N/A	[illegible]		[illegible]	N		NO		OVERLASH TO EXISTING STRAND [illegible]
[illegible]	11	AEP	[illegible]	[illegible]	CL	[illegible]	[illegible]	[illegible]	N/A	[illegible]		[illegible]	N		YES		[illegible]
[illegible]	12	AEP	[illegible]	[illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	N/A		[illegible]	N		NO		ATTACH CATV AT [illegible]

STATE OF MISSOURI
PE [redacted]
PROFESSIONAL ENGINEER

ATTACHMENT 5

[illegible]

Application # [illegible]	Total Poles 21	Proposed Attachment: .625 Coax [illegible]	[illegible]
City/Township: Maryland Heights	State MO	Attaching Client Company: Cable America	

Map	#	Pole Owner	Pole Owner #	Pole Structure	[redacted]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	Violation of Clearance Issues	Make Ready Recommendations Power	Make Ready Recommendations Comm
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[redacted]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	AUE	[illegible]	[illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	[illegible]		[illegible]	[illegible]	[illegible]	YES		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[redacted]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]		ATTACH CATV AT [illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[redacted]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[redacted]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]	[illegible]		[illegible]		[illegible]
[illegible]	[illegible]	AUE	[illegible]	[illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	[illegible]		[illegible]	[illegible]		YES		[illegible] RE-SAG
[illegible]	[illegible]	AUE	[illegible]	[illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	[illegible]		[illegible]	[illegible]		NO		ATTACH CATV AT [illegible] & SAG
[illegible]	[illegible]	AUE	[illegible]	[illegible] TANGENT; [illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	[illegible]		[illegible]	[illegible]	[illegible]	YES		[illegible] AT [illegible] WITH [illegible] LEAD AT [illegible] ATTACH CATV AT [illegible] & SAG
[illegible]	[illegible]	AUE	[illegible]	[illegible] TANGENT, [illegible]	[redacted]	N/A	[illegible]	[illegible]	N/A	[illegible]		[illegible]	[illegible]	[illegible]	YES		PROPOSE [illegible] AT [illegible] WITH [illegible] LEAD AT [illegible] ATTACH CATV AT [illegible] & SAG [illegible] RE-SAG [illegible]

Osmose O-Cale™ Pole Loading Analysis Report

Licensed To: Utilimap

Group ID:	[illegible]	Pole Length / Class:	45 / 3	Code:	NESC Standard	Extreme Wind:	[illegible]
Pole ID:	[illegible]	Pole Species:	SOUTHERN PINE	Construction Grade:	""	Extreme Wind Speed (mph):	
Related To:	[illegible]	Guy/Anchor Effect Strength:	0.00	Loading District:	Heavy	Strength Factor:	0.85
DAGER:	[illegible]	Class Strength Weight Reduction:	No	Ice Radial Thickness (in):	0.50	Transverse Wind OLF:	[illegible]
JOB #:	[illegible]	Structure Type:	ANGLE	Wind Speed Applied (mph):	39.53	Transverse Wire Tension GLF:	1.65
CLIENT:	[illegible]	Setting Depth (ft):	7.25	Wind Pressure (psf):	4.00	Longitudinal Wire Tension GLF:	1.60
EMPL #:	[illegible]	Allowable Moment at GL (ft-lb):	91,143	Wind Angle (deg):	-103.25	Vertical Load GLF:	1.90

Maximum Capacity Utilization:	52.7%	with wind at -103.2°	at 23.3 ft
Groundline Capacity Utilization:	52.7%	with wind at -103.2°	at 23.3 ft
Vertical Buckling Capacity Utilization:	11.9%	with wind at -103.2°	at 23.3 ft

Wind at -103.2° | **Moment 47,620 lb-ft at -109.5°**

GROUNDLINE LOAD SUMMARY:** | 0.50" Ice + 39.53 mph Wind at -103.2° Applied Moment 47,620 lb-ft at -109.5° | Allowable Moment 91,143 lb-ft

	Shear Load (lbs)**	Percent Applied Load	Bending Moment (lb-ft)	Percent of Applied Moment**	Percent of Pole Capacity	Bending Stress (psi)	Vertical Load (lbs)	Vertical Stress (psi)	Total Stress (psi)	Percent of Pole Capacity
Power Conductors:	784	21.6	26,473	55.6	25.0	820	-417	-4	-1,116	20.5
Comm. Cables:	334	9.2	18,113	38.0	19.9	561	-364	-4	-1,155	15.5
Pole:	2669	73.7	3,631	7.6	4.0	372	-2,112	-23	-2,092	4.3
Crossarms:	1	0.0	268	0.6	0.3	29	-150	-2	-22	1.3
Insulators:	6	0.2	235	0.5	0.2	16	-130	-1	-98	1.3
Transformers:	0	0.0	7	0.0	0.0	0	0	0	0	0.0
Equipment:	3	0.1	969	2.0	1.1	65	-171	-2	-69	1.1
Guy Wire Loads:	0	0.0	2	0.0	0.0	0	0	0	0	0.0
Guy Wire Reactions:	0	0.0	3	0.0	0.0	0	0	0	0	0.0
Pole Residual Load:	1,045	100.0	47,623	100.0	52.2	3,557	-3,482	-32	-3,585	52.7
Pole Reserve Capacity:			43,523		47.8	3,287			3,215	47.3

Vertical Load Summary:

Buckling Constant:	[illegible]
Buckling Critical Height (ft):	21.31
Buckling Setting Depth (% Coll. Hgt.):	33.91
Buckling Setting Depth (inches):	30.50
Min. Buckling Diameter at GL (in):	[illegible]
Diameter at Tip (in):	[illegible]
Diameter at GL (in):	[illegible]
Modulus of Elasticity (psi):	[illegible]
Buckling Load Capacity at Hinge (lbs):	[illegible]
Buckling Load Applied at Hinge (lbs):	[illegible]
Buckling Load Margin of Safety:	[illegible]

Power Conductors:	Phase	Wire Height (ft)	Left Sag (ft)	Right Sag (ft)	Wind Offset (in)	Cable Dia. (in)	Cable Weight (lb/ft)	Left Span (ft)	Left Angle (deg)	Left Tension (lb)	Right Span (ft)	Right Angle (deg)	Right Tension (lb)	Tension Moment (lb-ft)**	Offset Moment (lb-ft)**	Wind Moment (lb-ft)**	Moment at GL (lb-ft)**
[illegible]		[illegible]															
[illegible]		[illegible]															
[illegible]		[illegible]															
[illegible]		[illegible]															
[illegible]		[illegible]															
[illegible]		[illegible]															
[illegible]		[illegible]															
[illegible]		[illegible]															
Totals: 6 Wires														15,973	228	8,273	24,473

Communicating Cables:	Owner	Wire Height (ft)	Left Sag (ft)	Right Sag (ft)	Wind Offset (in)	Cable Dia. (in)	Cable Weight (lb/ft)	Left Span (ft)	Left Angle (deg)	Left Tension (lb)	Right Span (ft)	Right Angle (deg)	Right Tension (lb)	Tension Moment (lb-ft)**	Offset Moment (lb-ft)**	Wind Moment (lb-ft)**	Moment at GL (lb-ft)**
PEDESTAL		34.25	3.28	0.56	5.58	1.65	0.515	66.0	0.0	775	36.0	-25.0	775	10,672	101	2,395	13,269
GUY/EG - 3/4 MESSENGER		23.75	0.91	0.79	4.66	0.81	0.218	66.0	0.0	237	36.0	-25.0	237	3,164	53	1,450	4,845
Totals: 2 Wires														13,836	154	4,845	18,114

* not including Guy Wire Tension ** incl Cable Overload Factors

Attachment G

Osmose O-Calc ™ Pole Loading Analysis Report

Licensed To: Utilimap

Group ID:	62,547	Pole Length / Class	45 / 3	Code:	NESC Standard	Extreme Wind	No
Pole ID:	15_10535	Pole Species:	SOUTHERN PINE	Construction Grade	C	Extreme Wind Speed (mph)	
Related To	PARENT	Groundline Fiber Stress (psi)	8,000	Loading District	Heavy	Strength Factor	0.65
OWNER:	AR 15735	Fiber Stress Height Reduction	No	Ice Radial Thickness (in)	0.50	Transverse Wind OLF	2.50
JOB #:	5567	Structure Type	ANGLE	Wind Speed Applied (mph)	39.53	Transverse Wire Tension OLF	1.65
CLIENT:	CABLE AMERICA	Setting Depth (ft):	7.25	Wind Pressure (psf)	4.00	Longitudinal Wire Tension OLF	1.00
ENP. #:	137	Allowable Moment at 0.0 ft:	91,143	Wind Angle (deg):	-103.25	Vertical Load OLF:	1.90

Crossarms:	Owner	Attach Height (ft)	Horiz. Offset (in)	Gap to Pole (in)	Offset Angle (deg)	Rotate Angle (deg)	Incline Angle (deg)	Unit Weight (lb)	Unit Height (in)	Unit Width (in)	Unit Diameter (in)	Unit Length (in)	Shape Factor	Offset Moment (lb-ft)**	Wind Moment (lb-ft)**	Moment at GL (lb-ft)**
[illegible]		36.3	1.50	1.00	179.0	180.0	0.0	50.0	4.50	3.50	-	96.00	1.6	17	113	85
[illegible]		36.2	1.50	1.00	0.0	0.0	0.6	50.0	4.50	3.50	-	96.00	1.6	-17	114	137
Totals: 2 Crossarms								100.0						0	268	253

Insulators:	Owner	Attach Height (ft)	Horiz. Offset (in)	Gap to Pole (in)	Offset Angle (deg)	Rotate Angle (deg)	Incline Angle (deg)	Unit Weight (lb)	Unit Height (in)	Unit Diameter (in)	Shape Factor	Offset Moment (lb-ft)**	Wind Moment (lb-ft)**	Moment at GL (lb-ft)**
Dead End Insulator 6"		36.3	8.22	4.00	180.0	[illegible]	90.0	6.5	11.50	3.00	1.0	4	25	30
Dead End Insulator 6"		36.3	8.22	4.00	0.0	55.0	90.0	6.5	11.50	3.00	1.0	-5	24	20
Dead End Insulator 6"		36.2	44.16	12.98	103	270.0	90.0	6.5	11.50	3.00	1.0	-18	25	[illegible]
Dead End Insulator 6"		36.24	44.19	12.91	-50.1	[illegible]	90.0	6.5	11.50	3.00	1.0	53	27	63
Dead End Insulator 6"		36.2	44.15	14.44	[illegible]	55.0	90.0	6.5	11.50	3.03	1.0	48	24	65
Dead End Insulator 6"		36.4	44.10	14.64	71.4	55.0	90.0	6.5	11.50	3.00	1.0	-33	21	-28
Post Insulator		32.17	8.83	3.00	-90.0	0.0	60.0	0.0	9.50	3.75	1.0	15	3	12
Totals: 7 Insulators								52.0				15	207	226

Equipment:	Owner	Attach Height (ft)	Horiz. Offset (in)	Gap to Pole (in)	Offset Angle (deg)	Rotate Angle (deg)	Incline Angle (deg)	Unit Weight (lb)	Unit Height (in)	Unit Width (in)	Unit Diameter (in)	Unit Length (in)	Shape Factor	Offset Moment (lb-ft)**	Wind Moment (lb-ft)**	Moment at GL (lb-ft)**
[illegible]		30.5	19.19	29.91	-20.0	165.0	0.0	40.0	-		4.00	72.00	1.0	227	17	255
[illegible]		30.5	52.16	64.43	-30.5	0.0	0.0	50.0	-	-	9.00	6.00	1.0	548	97	667
Totals: 2 Equipment								90.0						756	115	925

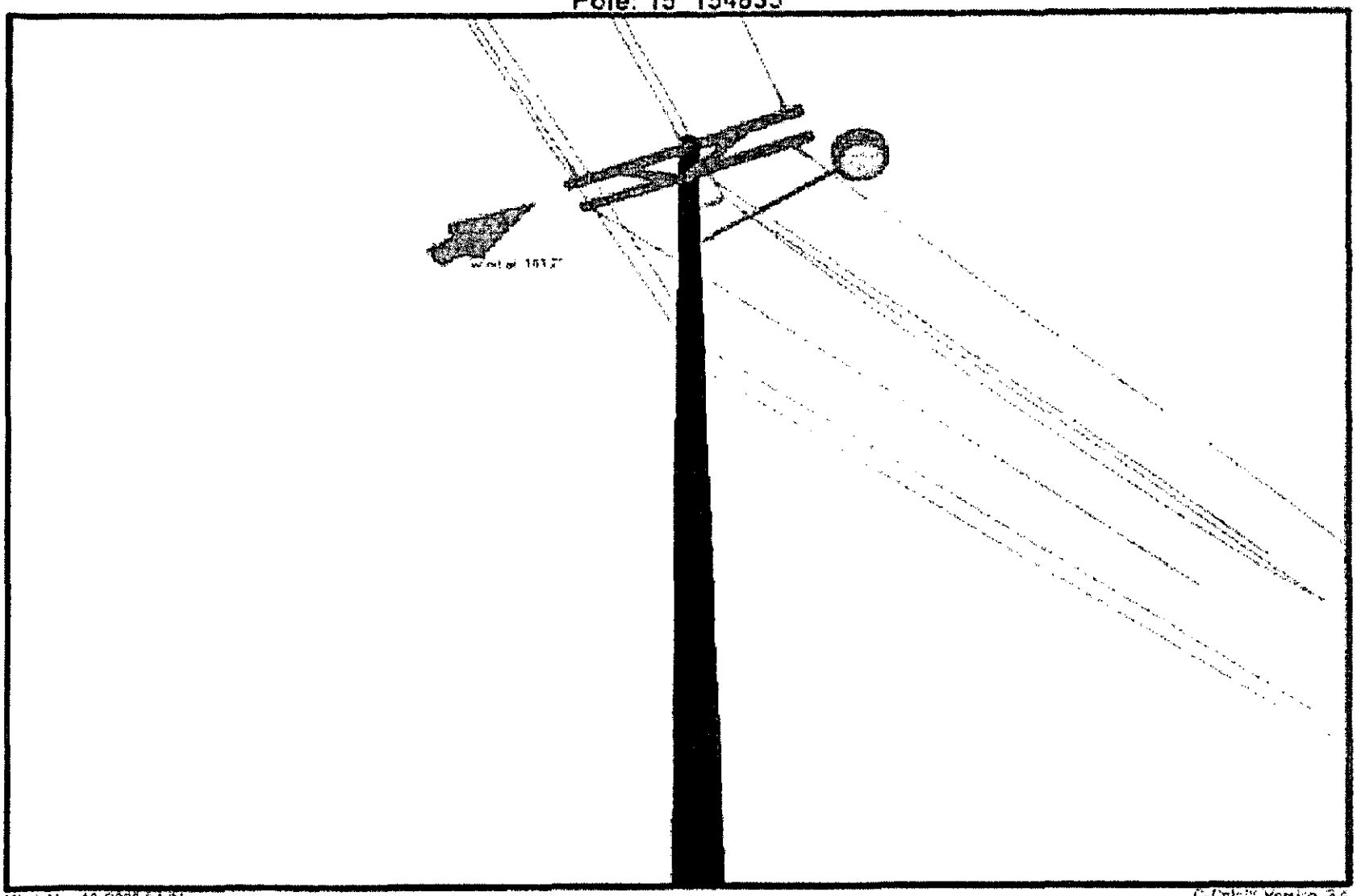
Pole Notes:

[illegible]

[illegible]

* not including Guy Wire Tension ** includes Overload Factor(s)

Group: K6_6542
Pole: 15_154835



Wed, May 10 2026 04:21 pm

C-Dale™ Version 3.4

Appendix D

Draft Vegetation Management Reporting Rule

Title 4 – DEPARTMENT OF ECONOMIC DEVELOPMENT
Division 240 – Public Service commission
Chapter 3 – Filing and Reporting Requirements

PROPOSED RULE

4 CSR 240-3.191 Electric Utility Vegetation Management Reporting and Plan Submission Requirements

(1) *Annual submission of performance report.* Commencing on January 1, 200X, each electric utility shall accumulate the following information for each calendar year and annually transmit it to the manager of the Energy Department of the commission, or his/her designee, no later than the last business day of February in the following calendar year.

(A) *Contents of report.* A summary report detailing all activities conducted during the calendar year related to vegetation management.

1. The report shall segregate the activities based on circuit voltage groupings. These groupings shall be used to differentiate between transmission and distribution.

2. The report shall include circuit-miles affected by vegetation management activities during the calendar year for each grouping. [The circuit-miles reported should be expressed as the physical length of the affected circuits within the grouping and also as a percentage of the total length of circuits for that grouping.]

3. The report shall include expenses incurred and techniques utilized (e.g., chemical, mechanical, or other methods) for overall vegetation management activities.

4. The information for section 1.(A).1,1(A),2, and 1(A).5 shall be reported for the entire electric utility system (Missouri jurisdiction) and also reported by regional/district/division operating areas, if the utility is divided into regions/districts/divisions.

5. The report shall provide detailed information regarding the extent of vegetation management and tree removals on both the utility system right-of-way and off the utility system right-of-way (adjacent to the utility system right-of-way).

(B) A summary report detailing the electric utility's criteria for assessing the effectiveness of the vegetation management plan and the results of those assessments.

(C) The summary report required by Section (1)(A) shall include a comparison of vegetation management activities scheduled for the calendar year and the actual vegetation management activities completed.

(D) A summary report detailing total customer outages during the calendar year that are attributable to vegetation interference, excluding major storm events. The information shall be reported for the entire electric utility system (Missouri jurisdiction) and also reported by regional/district/division operating areas, if the utility is divided into regions/districts/divisions.

(2) *Annual submission of plan.* Commencing on January 1, 200X, each electric utility shall prepare the following information for each calendar year and annually transmit it to the manager of the Energy Department of the commission, or his/her designee, no later than the last business day of December in the preceding calendar year.

(A) *Contents of plan.* A summary report detailing all scheduled vegetation management activities for the following calendar year including affected circuit-miles, budgeted expenses, and methods to be utilized for vegetation management. The report information shall be limited to distribution facilities. The information shall be reported for the entire electric utility system (Missouri jurisdiction) and also reported by regional/district/division operating areas, if the utility is divided into regions/districts/divisions. Transmission system information shall be reported by each utility submitting a copy of FERC report FAC-003-1.

(3) *Field inspections.* All electric utilities shall participate in joint field inspections of vegetation management activities, as requested by the staff of the commission. These field inspections may include vegetation management activities in progress and locations of completed vegetation management activities.

Appendix E

Draft Infrastructure Inspection Reporting Rule

Title 4 – DEPARTMENT OF ECONOMIC DEVELOPMENT
Division 240 – Public Service Commission
Chapter 3 – Filing and Reporting Requirements

PROPOSED RULE

4 CSR 240-3.192 Electric Utility Infrastructure Inspection and Maintenance Plan Submission Requirements

(1) *Submission of plan.* Each electric utility shall adopt and annually transmit to the manager of the Energy Department of the commission, or his/her designee, no later than the last business day of February a written program for inspecting and maintaining its electric supply lines and substations (excluding generating stations), for the current year, in order to determine the necessity for replacement, maintenance and repair. If the plan is amended or altered, revised copies of the appropriate plan pages shall be submitted.

(2) *Annual report.* Each utility shall include as part of its annual report to the commission staff an analysis and certification of compliance with each area of the inspection plan for the previous year's plan or a detailed statement on areas of noncompliance to the previous year's plan

(3) *Contents of plan.* The inspection plan shall include the following elements:

(A) *General.* A listing of all counties or parts of counties in which the utility has electric supply lines in Missouri. If the utility has district or regional offices responsible for implementation of a portion of the plan, the addresses of those offices and a description of the territory for which they are responsible shall also be included.

(B) *Inspection of lines, poles, and substations.*

1. Inspection schedules. The plan shall contain a schedule for the periodic inspection of the various units of the utility's electric plant. The period between inspections shall be based on accepted good practice in the industry, but shall not exceed twelve years for any given line or piece of equipment.

2. Inspection coverage. The plan shall provide for the inspection of all supply line and substation units, of primary voltage, within the adopted inspection periods and shall include a complete listing of all categories of items to be checked during an inspection.

3. Instructions to inspectors. Copies of instructions or guide materials used by utility inspectors in determining whether a facility is in acceptable condition or in need of corrective action or further investigation.

(4) *Records.* Each utility shall keep sufficient records to demonstrate compliance with its inspection programs. For each inspection unit, the records of line, pole, and substation inspections shall include the inspection date(s), the findings of the inspection, and the disposition or scheduling of repairs or maintenance found necessary during the inspection. The record shall be kept until two years after the next periodic inspection is completed or until all necessary repairs or maintenance are completed, whichever is longer.

(5) *Conduct of inspections.* Inspections shall be conducted in a manner conducive to the identification of safety, maintenance, and reliability concerns or needs.

(6) *Correction of problems found during inspections.* Corrective action shall be taken within a reasonable period of time on all potentially hazardous conditions, instances of safety code noncompliance, maintenance needs, potential threats to safety and reliability, or other concerns identified during inspections. Hazardous conditions shall be corrected promptly.

Appendix F

Draft Reliability Reporting Rule

Title 4 – DEPARTMENT OF ECONOMIC DEVELOPMENT
Division 240 – Public Service commission
Chapter 3 – Filing and Reporting Requirements

PROPOSED RULE

4 CSR 240-3.193 Electric Utility System Reliability Monitoring and Reporting Submission Requirements

(1) *Annual submission of report.* Commencing on January 1, 200X, each electric utility shall accumulate the following information (on a monthly basis) for each calendar year and annually transmit it to the manager of the Energy Department of the commission, or his/her designee, no later than the last business day of April in the following calendar year.

(A) *Contents of report.* System Average Interruption Frequency Index (SAIFI) which reflects the average frequency of service interruptions in number of occurrences per customer and is defined as the total number of customer interruptions for the period covered divided by the total number of customers served.

(B) Customer Average Interruption Frequency Index (CAIFI) which reflects the average number of interruptions per customer interrupted and is defined as the total number of customer interruptions for the period covered divided by the total number of customers affected.

(C) System Average Interruption Duration Index (SAIDI) which reflects the average interruption in hours or minutes per customer served for the period covered and is defined as the sum of all customer interruption durations divided by the total number of customers served.

(D) Customer Average Interruption Duration Index (CAIDI) which reflects the average interruption duration and is defined as the sum of all customer interruption durations divided by the total number of customers interrupted.

(2) The information required by Section (1) shall be submitted electronically in tabular and graphical formats.

(3) The information required by Section (1) shall be submitted unadjusted and adjusted to exclude major storm events per IEEE Standard 1366, IEEE Guide for Electric Power Distribution Reliability Indices.

(4) The information required by Section (1) shall be reported for the entire electric utility system (Missouri jurisdiction).

(5) *Interruptions not to be reported.* The following interruption causes shall not be included in the calculation of the reliability indices required by Section (1):

(A) Interruptions initiated pursuant to the provisions of an interruptible service tariff or contract and affecting only those customers taking electric service under such tariff or contract;

(B) Interruptions due to nonpayment of a bill;

(C) Interruptions due to tampering with service equipment;

(D) Interruptions due to denied access to service equipment located on the affected customer's private property;

(E) Interruptions due to hazardous conditions located on the affected customer's private property;

(F) Interruptions due to a request by the affected customer;

(G) Interruptions due to a request by a law enforcement agency, fire department, other governmental agency responsible for public welfare, or any agency or authority responsible for bulk power system security or reliability; or

(H) Interruptions caused by the failure of a customer's equipment; the operation of a customer's equipment in a manner inconsistent with law, an approved tariff, rule, regulation, or an agreement between the customer and the electric utility; or the failure of a customer to take a required action that would have avoided the interruption, such as failing to notify the company of an increase in load when required to do so by a tariff or contract.

(6) *Worst performing circuits.* Each electric utility shall establish and maintain a program for identifying and analyzing its worst performing circuits during the course of each calendar year. The program shall include, but should not be limited to, an analysis of the top 5% worst performing circuits for the entire electric utility system (Missouri jurisdiction). The worst performing circuits shall be identified and ranked using SAIFI values computed for each circuit, adjusted to exclude major storm events per IEEE Standard 1366, IEEE Guide for Electric Power Distribution Reliability Indices and in any other manner chosen by the utility. The SAIDI value for each circuit shall also be listed.

(7) The information developed in accordance with Section (6) shall be reported for each calendar year to the manager of the Energy Department of the commission, or his/her designee, no later than the last business day of April in the following calendar year. This report shall also include actions taken (or planned) to improve the performance of the circuits identified in Section (6).

(8) *Multi-year worst performing circuit reporting*. For subsequent years, following calendar year 200X, the performance of the circuits reported in accordance with Section (7) for the three (3) previous calendar years (as developed) will be reported to the manager of the Energy Department of the commission, or his/her designee, no later than the last business day of April in the following calendar year. If a circuit is on the worst performing circuit list, submitted in accordance with Section (7), for three (3) consecutive calendar years; the electric utility shall include detailed plans and schedules for improving the performance of that circuit in the annual report required by Section (7). Such plans and schedules may vary from circuit to circuit based on differences in geography or other local conditions, customer density and cost considerations.

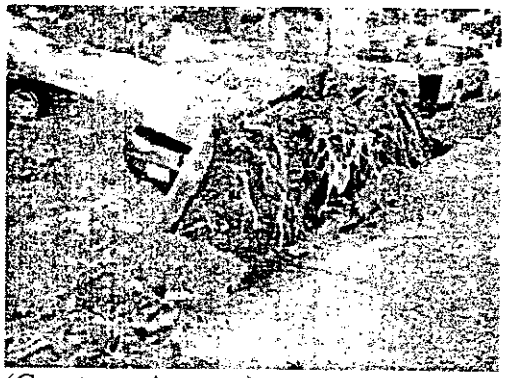
(9) *Reliability improvement programs*. Commencing on January 1, 200X, each electric utility shall prepare the following information for each calendar year and annually transmit it to the manager of the Energy Department of the commission, or his/her designee, no later than the last business day of December in the preceding calendar year.

(A) *Contents of plan*. A summary report detailing all programs scheduled for the following calendar year designed to maintain or improve service reliability. The information shall be reported by regional/district/division operating areas, if the utility is divided into regions/districts/divisions. This report shall include funding levels and the status of each of these programs.

Appendix G

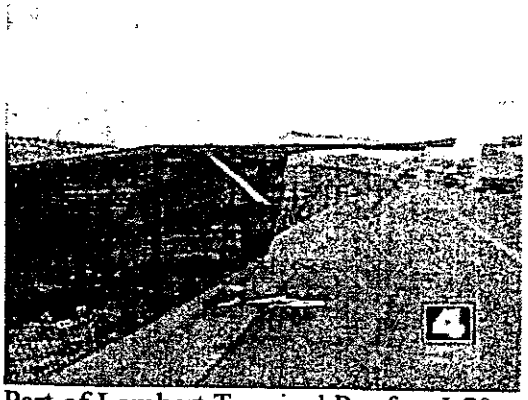
Pictures


(Courtesy: Ameren)

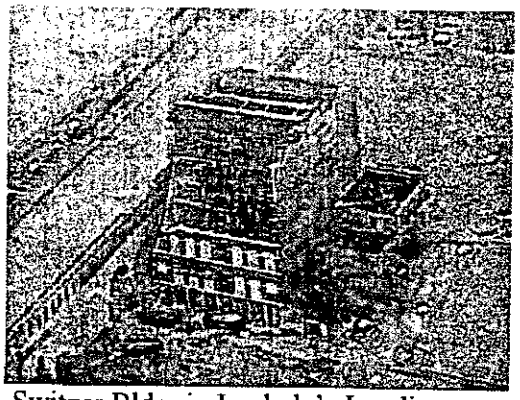

(Courtesy: Ameren)


(Courtesy: Ameren)


(Courtesy: Channel 4, St. Louis)



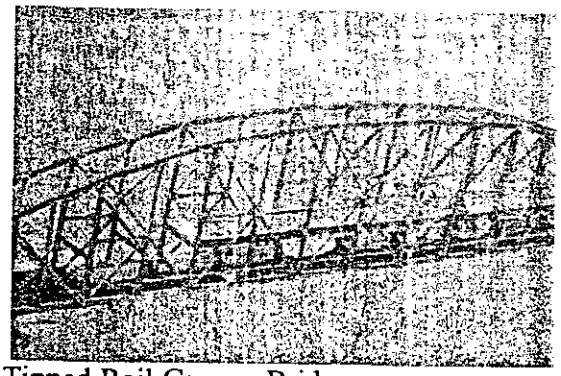
Part of Lambert Terminal Roof on I-70
(Courtesy: Channel 4, St. Louis)



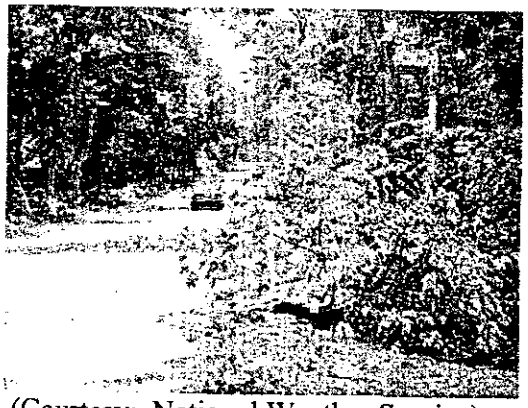
Switzer Bldg. in Laclede's Landing
(Courtesy: Ameren)

(Courtesy: Ameren)

(Courtesy: Ameren)



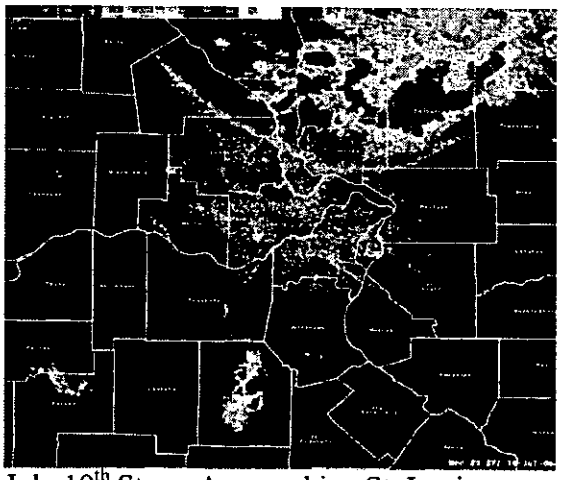
Tipped Rail Cars on Bridge
(Courtesy: Ameren)



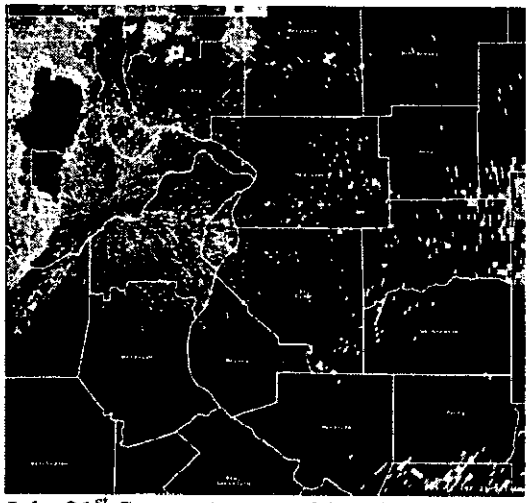
(Courtesy: National Weather Service)

(Courtesy: National Weather Service)

(Courtesy: Mr. Daniel Schesch)

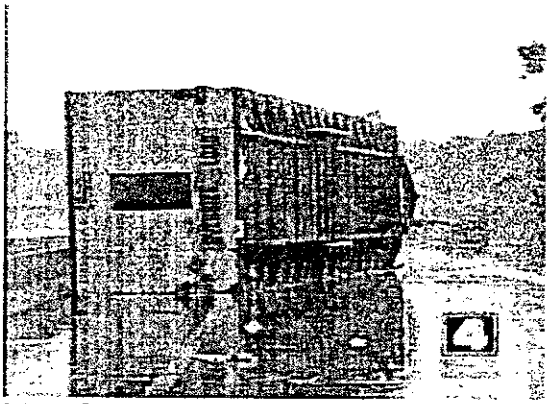


July 19th Storm Approaching St. Louis
(Courtesy: National Weather Service)



July 21st Storm Approaching St. Louis
(Courtesy: National Weather Service)

(Courtesy: Ameren)



Manufactured Home on Highway
(Courtesy: Channel 4, St. Louis)

APPENDIX H

NEWSPAPER ARTICLES

Unexpected fury

The storm's aftermath | Hundreds of thousands face a steamy day without electricity after a swift-moving storm knocks down buildings, trees and power lines.

Neighbors Hugh Wheeler (left) and Terry Penberthy stand amid damage on Louisville Avenue in St. Louis' Dogtown neighborhood. Jerry Naunheim Jr. | Post-Dispatch

FROM STAFF REPORTS

A powerful summer storm slammed into the St. Louis area Wednesday evening, toppling buildings, street lights, tractor trailers and hundreds of trees.

At least 476,000 customers lost power, Metrolink was shut down and just one-third of flights were getting in and out of Lambert Field.

"This is one of the worst storms we can all remember to hit the city of St. Louis in recent years," St. Louis Mayor Francis Slay said at a hurriedly called news conference.

The power outages will present a challenge to utility crews trying to get the power back on in temperatures expected to exceed 100 degrees today.

Until Wednesday, the two biggest storms to hit the area in the last few years were in July 2004, when about 225,000 lost power, and in August 2005, which affected about 250,000. It took AmerenUE crews four days to restore power to all customers in 2004 and five days in 2005.

The storm brewed quickly in central Illinois and swept southwest toward the St. Louis area shortly after 7 p.m. Meteorologists said the storm was unusual, not because of its path, but because a powerful "gust front" preceded the rain and thunder, causing damage from St. Charles County in the west to Madison County in the east, but hitting St. Louis and St. Louis County hardest.

PLEASE SEE **STORM** | **A2**

Thursday, July 20, 2006
St. Louis Post-Dispatch

Lives and limbs

HISTORIC POWER OUTAGE • NATIONAL GUARD ARRIVES • TWO DEAD

A state of emergency

Residents on both sides of the Mississippi River began on Thursday the long, tedious job of piecing together their communities, starting just hours after a devastating storm caused widespread damage. Two deaths and 30 injuries were blamed on the storm. Missouri's National Guard was scheduled to begin assisting cleanup efforts. AmerenUE customers without power could only wait; it might take a few days before their power is restored.

FULL STORM COVERAGE
PAGES A10-12 • METRO • BUSINESS • SPORTS

THE KANSAS CITY STAR.
Saturday, July 22, 2006
WWW.KANSASCITY.COM

Outages the worst ever in St. Louis

New storms have undone efforts to restore electricity as residents seek refuge.

By JEFF DOUGLAS
The Associated Press

ST. LOUIS A fresh round of storms brought new power outages to St. Louis on Friday as about 570,000 homes and businesses braced for a weekend without electricity.

Crews worked feverishly to restore power after storms toppled trees and tore the roofs off homes Wednesday, but a second wave of storms Friday erased utility workers' progress.

Ameren Corp. officials said it could be early next week before all power is restored. Ameren called the outage the *worst in the city's history.*

"It definitely represents some more challenges for us. The storm that blew through here left a lot of damage," Ameren spokesman Tim Fox said. "It essentially has affected power for another 200,000 customers."

Three people have died as result of the storms and heat.

The heat subsided Friday with highs in the 70s and low 80s, and highs in the 70s were forecast for the weekend.

Residents turned their attention to the mess left by the storms and the loss of power.

In northwest St. Louis County, winds from the latest storm tore the roof off an office building, causing concerns about a natural-gas leak and displacing about 100 workers.

"I saw the roof flying, and I was thinking, 'Please, don't hit my car,' " said Jeff Winkler, 26, an analytical chemist at Severn Trent Labs, who was pulling into the parking lot. "I thought I saw the worst of it earlier this week — but this was worse."

HUY RICHARD MACH | THE ASSOCIATED PRESS

Members of the Missouri National Guard removed a fallen limb off Kingshighway on Friday as they helped check on residents in the neighborhoods of north St. Louis. Missouri Gov. Matt Blunt mobilized the troops to help the area recover from Wednesday's storms.

More than 500 people spent Thursday night in two Red Cross shelters. A third opened Friday afternoon, said Jeff Rainford, chief of staff for Mayor Francis Slay. Besides the overnight centers, municipal officials set up 52 cooling centers in the city and St. Louis County.

"There are a lot of people who are hungry because all of their food has spoiled," said Agnes Reese, 48, who spent Friday at one of the shelters.

Many fast-food restaurants and groceries remained closed and without power. Schnuck Markets Inc., which operates 65 groceries in the St. Louis area, said 26 of its stores lost power. Eight were still without electricity Friday.

Reese relaxed in a tub of cool water Thursday night and had not decided whether to stay in the shelter, where 300 people slept Thursday night even though there were cots for 200.

Among those taking shelter at the community center were about 200 residents of nursing homes, some of them using wheelchairs.

Debra Raymond, 50, hoped to avoid staying overnight at the shelter. She slept Thursday with a dozen relatives and friends on the floor of her daughter's air-conditioned home.

"We came to the shelter to cool off and get some warm food," Raymond said. "We are hoping and praying we'll have electricity tonight."

In De Soto, about 40 miles south of St. Louis, the death of a 93-year-old man appeared to be heat-related. Jefferson County Sheriff's Capt. Ralph Brown said. The man and his 82-year-old wife had refused to leave their home despite Thursday's heat and power outage. Brown said the temperature inside the home was 85 degrees.

Virtually every hotel room in the region was booked for the weekend, mostly by residents fleeing homes without power.

Gov. Matt Blunt on Thursday declared a state of emergency in the city. The state has asked President Bush for federal disaster assistance.

Jim Salter of The Associated Press contributed to this report.

Gauging economic impact of storms can be guesswork

Early reports of costs should be viewed with skepticism, experts say.

By Repps Hudson
ST. LOUIS POST-DISPATCH

Measuring the economic impact of a natural disaster such as the storms that struck the St. Louis area Wednesday and Friday is at best guesswork by careful analysts — and even those numbers won't be available for weeks or even months.

So economists and government leaders advise skepticism over economic loss estimates likely to arise over the next few days.

The best estimates are derived from a careful analysis of affected neighborhoods, the level of income of residents in those neighborhoods and the loss of business when restaurants and stores are forced to close because they have no electricity, said Don Phares, professor emeritus of economic and public policy at the University of Missouri at St. Louis.

"It would be an educated guess, with some qualifications," Phares said.

He cautioned that until all electrical power is restored and the emergency for residents and businesses is ended, there is no way to plausibly gauge economic losses.

Still, such a calamity is a net loss to the economy, said Glenn MacDonald, associate dean of Washington University's Olin School of Business. It's not even offset by the many people working overtime to put things back in order and by stores selling generators, plywood, batteries and other necessities.

"We look at all the work some people do, but then look at the capital losses," he said. "This is bad, on net. If it were good (for the local economy), we'd want to create more storms."

Charley Williams fills his tank Friday at a QuickTrip in north St. Louis County. The station operated on a generator. Many stations that lost power were closed. Jerry Naunheim Jr. | Post-Dispatch

MacDonald noted that there are two things to consider when studying the economic impact of a disaster such as the storms. "What kind of economic activity has been delayed? If I was going to wash my car and the storm hit, I'll probably still go wash my car in a few days," he said. "What kind of economic activity has been lost forever? If a tree or a car or a house is damaged, broken or gone, that's destroyed capital. The net is bad."

A natural disaster can hit different segments of society very differently, Phares said.

For example, some businesses that have had to close because they have no electricity have employees who are paid minimum wage or slightly more.

"Those people are at the low end of the spectrum," he said. "They are just creeping by. If the place they work is closed three, four or five days or more, that's one less paycheck, and that can put them into a tailspin. If you or I lose a week's paycheck, we can survive. They may not be able to."

Another factor to consider is the business and commercial areas disabled by the storm or the outage. That would lead to losses in sales taxes, which makes up 50 percent to 60 percent of the operating budgets for some cities.

"The sales tax has become a primary source of income for cities," said Stuart Haynes, staff associate of the Missouri Municipal League. "If you're talking about a week (of not collecting sales taxes), boy, that's a lot."

Cities also count on receipts from utility taxes. If a customer's electricity is cut off, then his or her city may not receive as much revenue from that tax, which Haynes said typically makes up about 15 percent of city budgets.

But that seemingly clear picture is muddied by other factors.

For instance, said Willie Norfleet, director of finance of University City, which has been damaged by winds and has residential and business power outages, the loss of utility taxes may differ little from a typical summer.

"We may have cool days in July when people don't use their air conditioning," Norfleet said. "The storm could hurt individual businesses, but not so much the city."

rhudson@post-dispatch.com
314-340-8208

POWER STILL OUT IN BALLWIN. Huge 60-plus-year-old tree on the deck. It took out the deck/shade cover and a corner of the house. Also took another smaller tree with it. Had the wind come from the west like normal, it would have taken the cars and half the house. Numerous limbs and trees down in the neighboorhood (Kehrs Mill/Skyline area). **Christy**

POWER STILL OUT AT MY HOUSE IN BEVO (at my parents' house now). Watched the storm from my porch as it tore siding parts of the neighbors' houses, snapped many trees and shorted out the power lines. My house was strangely unscathed. Saw a piece of aluminum soffit twisted and woven between wires up in the power lines on the telephone pole (that's going to have to be taken down before the power can come back on, I'm sure). Lots of damage and power out in that part of south city though. Saw a storefront collapsed inward on Morganford near Tower Grove Park. Quite a few overhead traffic signals lying on the ground. Traffic signals at Hampton and Chippewa were partially down as well as flashing green and flashing red both in the same direction. That was a bit amusing. **Mike H**

I WAS ALSO AT THE STADIUM. I have never been so fearful for my life. It was truly terrifying, since there is really no place for shelter for 40,000 people. The crowd was pretty orderly, all things considered. The road in front of the Arch was completely trashed. It was littered with debris from stuff that was alongside the road for the Live On The Levee festival this weekend. Heading east, the first town we came to that had power was O'Fallon, Ill. For once, it was actually a good thing to live so far away from civilization, as the small town that I live in did have power. **TC**

FOURTEEN HOURS LATER, POWER IS STILL OUT on Ridgeview Drive (unincorporated St. Louis County, near Carman & Doughtery Ferry roads). This is completely understandable given the scope and power of (Wednesday) night's storm. What is NOT understandable is that this is the fourth time this year alone that power to this neighborhood has been lost for a significant amount of time. That's correct, four times in seven months. In addition, power outages took place here at least four times in 2005. In my 20s, I lived for two years in a Third World country and didn't lose electrical power this often. **Dan Layton**

MY HUSBAND WAS SUPPOSED TO LEAVE ST. LOUIS (Wednesday) night at 6. As he waited, it got very dark. He said that when they were about to board the plane, an announcement was made that boarding would be delayed because of a storm. He sat back down and a fellow passenger asked him to watch her bags as she went to the restroom. While she was gone, they announced that everyone needed to evacuate the terminal. My husband said that the windows started to bend and flex! As soon as the lady returned, they left. He tried calling relatives to find out what was going on and when he got a hold of one cousin she couldn't tell him anything since they had lost power. He finally got to LAX at 11:20 p.m., or 1:20 a.m. your time. We got home at 1:10 our time and he was up at 5 a.m. to go to work. Can we have less drama when we come in September for his high school reunion?
Roberta Fleishman

I WAS AT THE CARDS GAME (Wednesday) night. It was one of the scariest moments of my life. I thought the scoreboard was going to come down at one point. **Scott**

KEEPING FAITH

Allyson Heil, 9, of Hamel, stands Sunday amid the rubble of Landmark Pentecostal Church in Bethalto, which was shattered in Wednesday's storm. "I took a few mementos of our church," she said, with tears in her eyes. The congregation worshipped Sunday at First Baptist Church of Bethalto. Gabriel B. Tait | Post-Dispatch

Congregation that lost church counts its blessings

By Jake Wagman
ST. LOUIS POST-DISPATCH
7-24-06

BETHALTO • Every week, Pastor Mark Burk's congregation sings about praise and sacrifice. This week, they had special reason to pray.

While they worshipped as the guests of another church on Sunday, less than a mile away stood the rubble of their former home, the roof ripped off and the sanctuary destroyed by the tempest that tore through the region on Wednesday.

Last week's storms hit Bethalto and parts of the Metro East area like a buzz saw. Gov. Rod Blagojevich declared Clinton, Jefferson, Madison and St. Clair counties disaster areas. As of Sunday, there was still a boil-water order for Caseyville.

Burk's church, the Landmark United Pentecostal Church on Central Avenue, is one of the oldest buildings in Bethalto. The brick and wood structure was built around 1860 and was a place where residents of this town of about 10,00 have gathered for generations.

"So it's seen a lot of storms in its time," Burk said.

Yet none, it appears, had been so fierce as to deposit the church's ceiling beams on the ground below, creating a pile of warped boards and rusting nails.

But the loss for the church could have been more than wood and metal

PLEASE SEE **CHURCH** | A4

had three young adults at Bible study not heeded the tornado warning sirens Wednesday evening. Just moments before the wind whipped through the church, the three went down to the basement. Though the church crumbled, they came through unscathed.

"They heard the sirens. They went down to the basement, and everything collapsed around them," Burk said.

Ryan Harris, 20, was one of the three. He said the group had prayed in the basement, using the glare from their cell phones for light. Harris briefly re-emerged when the storm began, watching it through the crack in the front door.

"I started hearing noises and stuff and thought, 'All right, God, I can take a hint,'" Harris said.

It's a good thing he did: After he went back to the basement, the church caved in, destroying the pews, the altar and even the baby grand piano.

Burk's pastoral assistant, the Rev. John Heil, was the one who discovered the three who fled to the basement. They have more than that to be thankful for, Heil said — the church was scheduled to have an evening worship later that night.

"If this would have happened 30 minutes later, the church would have been full," Heil said.

On Sunday, Heil's young daughter took a brick from the pile of debris as a memento. Later, Heil met the rest of the congregation at the First Baptist Church of Bethalto, which opened the building to Landmark's members to hold an afternoon service.

Burk said the church's board soon will begin discussions about where to relocate. In the meantime, they were asking for volunteers to haul what could be salvaged from the destroyed building.

"I realize we lost a church, but the church is right here," Burk said. "The church is wherever we gather."

Many people in the area were still without power, making church a welcome respite. The Bethalto Church of God held its service under a tent in the parking lot, where worshippers traded traditional Sunday best for open collars and open-toed shoes.

"I'm a preacher in flip-flops. Good grief," said Pastor Jeremy Robinson.

Storm damage to the church was relatively minor, but it has been without power since Wednesday. Robinson encouraged the congregation to pray for the community, pray for their neighbors and pray — please pray — for the Ameren workers.

jwagman@post-dispatch.com | 314-622-3580

Insurers call storms 'catastrophe'

This tree fell on this home in Troy, Ill., during last week's storms. Claims for property damage from [illegible] and lightning throughout the area have been filed with insurance companies [illegible]

State Farm reports 3,900 claims as of Monday, Allstate has 1,344

By Rebecca Roussell
ST. LOUIS POST-DISPATCH

Two large insurers are using the term "catastrophe" to describe the extent of damage from last week's storms, and are providing extra adjusters to handle the demand in claims.

State Farm Insurance Co. reported 3,900 claims as of Monday, said Tia Lindell, spokeswoman for the company. A team of 60 adjusters was sent to the area, in addition to local claims officers reacting to the storm.

State Farm is the No. 1 auto and homeowner insurer in Missouri and Illinois.

Allstate Insurance Co., a top-10 insurer in both states, reported 1,344 claims and sent 42 additional adjusters to the area, said spokeswoman Emily Pasala.

For Allstate, a catastrophe includes events where losses from customers exceed $1 million. State Farm doesn't place a dollar value on the term, but Lindell said it's based on the number of customers affected and the severity of the damage.

The number of homeowner and property claims surpassed auto claims for both companies.

Most of the property damage was from rain, wind, fallen trees and limbs, and lightning, which caused fires.

"This storm [was] really catastrophic with wind damage," Lindell

PLEASE SEE INSURANCE | C6

MEDICAL CARE

Storms, heat put area hospitals and their staffs to the test

Mary Jo Feldstein
ST. LOUIS POST-DISPATCH

As its neighborhood battled falling trees and widespread power outages, St. Louis University Hospital opened a closed unit to house residents of area nursing homes that are without power. Nurses volunteered for extra shifts. Meanwhile, tired, hungry hospital workers nibbled on granola bars and other snacks wheeled through the floors on a cart.

"We're trying really hard to make it as easy on our staff as possible," said Susan Hakes, a spokeswoman.

Across the region, hospitals scrambled into action during the storms and throughout the clean-up, but the effort has stressed emergency rooms and staff.

SLU Hospital has used two nurses from an outside staffing agency since the storms hit. That's actually less than it typically would bring in during busy times. The hospital wanted to hire more, but Hakes said they weren't available.

On Monday, airmen from Scott Air Force base helped SLU move nursing home residents back to their homes, but its emergency room was still seeing about 10 to 15 percent more patients than usual.

At first SLU's emergency room filled up with people who injured themselves stumbling in the dark or picking up debris, Hakes said. Now, the hospital is seeing more patients with heat-related illnesses.

PLEASE SEE HOSPITALS | C6

Robert Tackett of St. Charles

AFTER THE STORM | A DANGEROUS JOB

Ameren worker electrocuted

Another lineman is shocked and burned atop a pole in Spanish Lake.

By Heather Ratcliffe and Jessica Bock
ST. LOUIS POST-DISPATCH

As up to 4,000 repair workers hung from truck booms and power poles in a race to restore electricity to desperate Ameren customers, it was the simple mistake of stepping on a hidden downed wire that killed one of them Tuesday.

Robert Tackett, 56, of St. Charles, touched an energized power line partially hidden in brush behind a Ladue mansion while surveying damage about 7:45 a.m.

Not an hour later, a contract

PLEASE SEE DEATH | A11

Wednesday, July 26, 2006
St. Louis Post-Dispatch

WHY ARE SOME OF US

Still in the dark?

The pace of power restoration

A Post-Dispatch analysis of power outages by ZIP code shows that many communities in the northern tier of the St. Louis area have been the slowest to regain electricity. Ameren says its efforts have been hampered because of large-scale damage and because many homes in those areas are built back-to-back, restricting access.

Customers with restored power

80-100% restored | 40-59% restored
60-79% restored | 20-39% restored

Ten ZIP codes with highest number of power outages

ZIP code, city	Without power during peak outage times	Without power Tuesday	Percent with power restored
63129, Oakville	21,268	43	99.8%
63136, Jennings	**21,006**	**15,138**	**27.9%**
63301, St. Charles	20,595	66	99.7%
63033, Black Jack	19,178	11,150	41.9%
62040, Granite City	18,199	7,624	58.1%
63031, Florissant	17,954	7,147	60.2%
63123, Affton	16,118	505	96.9%
63125, Lemay	14,231	227	98.4%
62234, Collinsville	12,892	1,405	89.1%

Thankful or angry: Storm drew out emotions

On the radio

One of the most annoying aspects of this storm was the lack of reliable information. I was frustrated listening to the radio stations advertising that the latest storm information would be available on the 5 or 6 or 10 o'clock news or by checking Web sites. With the storm devastation in such a concentrated area, my neighbors, friends and family were powerless, too. In many emergency situations, electric power is lost, so television's "emergency broadcast system" is useless. This was a severe wind storm, but, with determination, most people could find gas, water, ice, food, batteries, cooling stations etc. What would happen in case of a massive tornado touch-down, earthquake, etc, making roads impassable, collapsing bridges, causing casualties, flooding, evacuations, gas fires, etc.?

Radio has to be the answer for communicating. All St. Louis-based radio stations should be required to broadcast official information at designated hourly intervals when an emergency is declared. We should establish a centralized emergency communication source based on information from a trustworthy source for broadcasting to the masses. If this type is in existence, it failed.

Sue Morton | Florissant

Lest we not forget ...

Thanks to the trash collectors. They have the back-breaking job of lifting all those trash cans full of decomposed, spoiled foods. The smell alone is enough to turn a stomach. The collectors have worked very hard at each stop where cans and plastic bags are swollen with this filthy organic matter.

Jackie Hasty Woodson Terrace

What do you say?

I am so sick of people complaining about AmerenUE not doing its job fast enough. We need to thank Ameren's workers for working so hard to get power back on around the city as fast as they could. Every morning I see out-of-state electrical trucks. This morning I was a little embarrassed for the city. I saw a whole fleet of electrical trucks from Alabama and tree cutters from Ohio. These people came to help us, and all we can do is complain. Have we even thanked them?

Carol Barrett | St. Louis County

Afterthought

AmerenUE is doing a poor job to restore the power in North St. Louis County. I have been without power since July 19. As of July 26, I have not seen nor heard of any effort to restore power to our neighborhood. I am disgusted that North County is an afterthought. What happened to any emergency contingency plan?

Tina Kennett | Hazelwood

Challenging time

To AmerenUE: Thanks for a job well done after the two storms that devastated the area. I am grateful for the hard work and long hours put in by Ameren's service people and those who came from other areas to help out in order to restore power to homes and businesses. The inconvenience we experienced was small compared to other natural disasters. This is one customer who is grateful for your response at a challenging time.

Jean Mechura | Overland

Proud St. Lousian

I am sick of the Rev. Al Sharpton racing to St. Louis to protest. I'm tremendously happy that the largest utility in the area responded better and faster than any large business entity or organization in a calamity involving hundreds of thousands of people.

I heard AmerenUE explain how power would be restored. There has never been an ethnic influence on a power grid. Ameren immediately called for thousands of electricians from all over the Midwest, and everybody was gallantly working double shifts, only to have the bulk of their work undone when another storm hit July 21.

The irreverent Mr. Sharpton already is complaining about rate hikes. Maybe people missed it, but we were told that after the stations and main lines were restored, it would be a yard-by-yard effort. Let's worry about the money when every needy person has been taken care of.

When I'm paused at a four-way stop, and my turn to cross is granted with a nod or a wave, I feel enormously proud to be a St Louisan.

P.J. Link | Maplewood

Amazing response

As one of the more than 500,000 customers who lost power for several days, let me say that it was a struggle to do without so much that we take for granted. Lights, air-conditioning, fresh and safe food, cold water and comfortable sleeping conditions.

I have heard much negative talk about AmerenUE's response. I would like to see any business respond better to 500,000 customers who all expected to be served quickly and then to be served again two days later.

I'm amazed at Ameren's quick response to the area's most destructive, massive storm in the last 50 years. No one could have foreseen such a large area being hit with such force, and hit again two days later.

To have your life interrupted for four or five days is not the end of life as we know it. It is only a hot, expensive, dark interruption. Most people have taken this experience well, with humor and grace. For those who demand instant gratification, I advise patience. We should thank God that we and our loved ones are alive and well enough to grumble about being hot and tired of the dark. For a lot of the people in this world, life is like that every day.

Kenn Avenevoli | Florissant

In the dark

The public's frustration at being kept in the dark — literally and figuratively — as to where and when the repairs were being made is unacceptable.

If AmerenUE had issued daily statements as to which area was undergoing repair and what subsequent repair was scheduled, the anxiety of those of us vainly flipping switches and futilely searching for repair trucks would have been alleviated to a large degree.

Surely someone was directing the repair crews in some kind of order. Why was this kept secret?

Mary Beth Baruto | St. Louis County

Plan? What plan?

After four nights and five days without electricity, I cannot help but feel frustration at the lack of leadership. I have to believe that the federal and state departments of homeland security contemplated scenarios in which major metropolitan areas have an electrical power crisis. After the hurricanes in the South, I have to believe that federal and state leadership considered emergency power plans, gas distribution and plans for residential care facilities. Yet I do not see such obvious hallmarks of emergency management.

Brian Stokes | St. Louis

Saturday, July 29, 2006
St. Louis Post-Dispatch
YOUR VIEWS: Letters from Readers

Sunday, July 30, 2006
St. Louis Post-Dispatch

Measuring the response

Assessing officials | One week later, bistate divide comes clear

By Jake Wagman, Clay Barbour and Adam Jadhav
ST. LOUIS POST-DISPATCH

One week after a pair of monster storms ripped through the area, St. Louis County Executive Charlie A. Dooley held a news conference in far north county, practicing a little damage control.

The area was ground zero for the twin tempests. A rumor had circulated in the minority-heavy north county area that race was the reason many people were still without power. Dooley, an African-American, assured the community that nature was the only culprit.

Such second-guessing by residents was part of the aftermath of one of the worst blackouts ever in St. Louis. More than 700,000 homes and businesses lost power. Food went bad. Homes were destroyed. People died.

The question now is: Did our leaders do their job? The answer, it seems, is split along the Mississippi River.

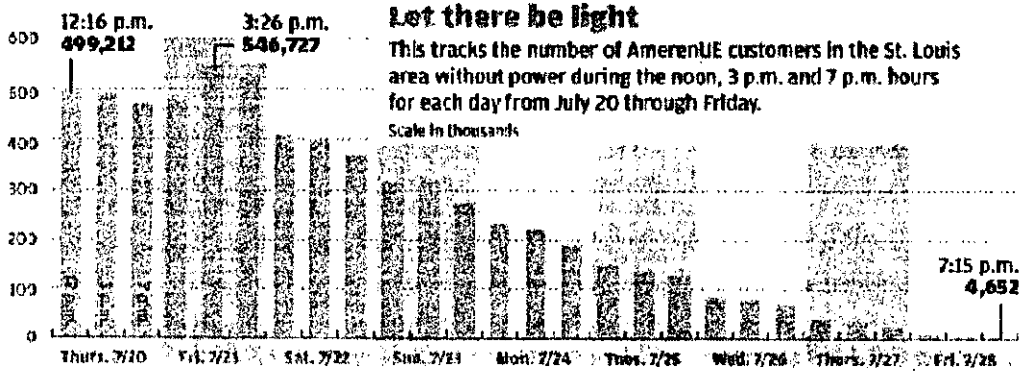
In Missouri, officials have been praised for a fluid response. Leaders recognized early on the severity of the damage, set up cooling stations and evacuated the elderly and vulnerable.

In Illinois, officials have been

PLEASE SEE **RESPONSE** | C5

MISSOURI Officials saw severity of damage early, established cooling stations and conducted evacuations.

ILLINOIS Cities appeared unprepared, officials weren't communicating and aid wasn't sought for a week.



Let there be light
This tracks the number of AmerenUE customers in the St. Louis area without power during the noon, 3 p.m. and 7 p.m. hours for each day from July 20 through Friday.

Scale in thousands

SOURCE: AmerenUE | Post-Dispatch

Assessing Ameren | Company must take the heat

By Jeffrey Tomich and Joe Mahr
ST. LOUIS POST-DISPATCH

In Ameren's emergency operations center, a flat-screen TV displays hundreds of trouble spots. A dozen employees work the phones and computers, and one of the company's top executives glances at a digital clock timing the outage.

They never want that clock to top 72 hours.

By now — 1 p.m. on Thursday — it's approaching Hour 186.

"Obviously we didn't make our goal (on) this one," said Thomas Voss, Ameren's chief operating officer. "But Mother Nature sometimes does some things you don't expect."

As the region recovers from its worst outage ever, some local leaders, customers and regulators wonder if Mother Nature isn't the

PLEASE SEE **OUTAGES** | C4

AMEREN SAYS
Company doesn't believe anything in its system increased the likelihood or severity of outages.

CUSTOMERS SAY
Many community leaders find the company's claims suspicious.

More storms arrive | C8


BEFORE
SCHEDULE WW-2


AFTER
SCHEDULE WW-2