14. Supply Chain

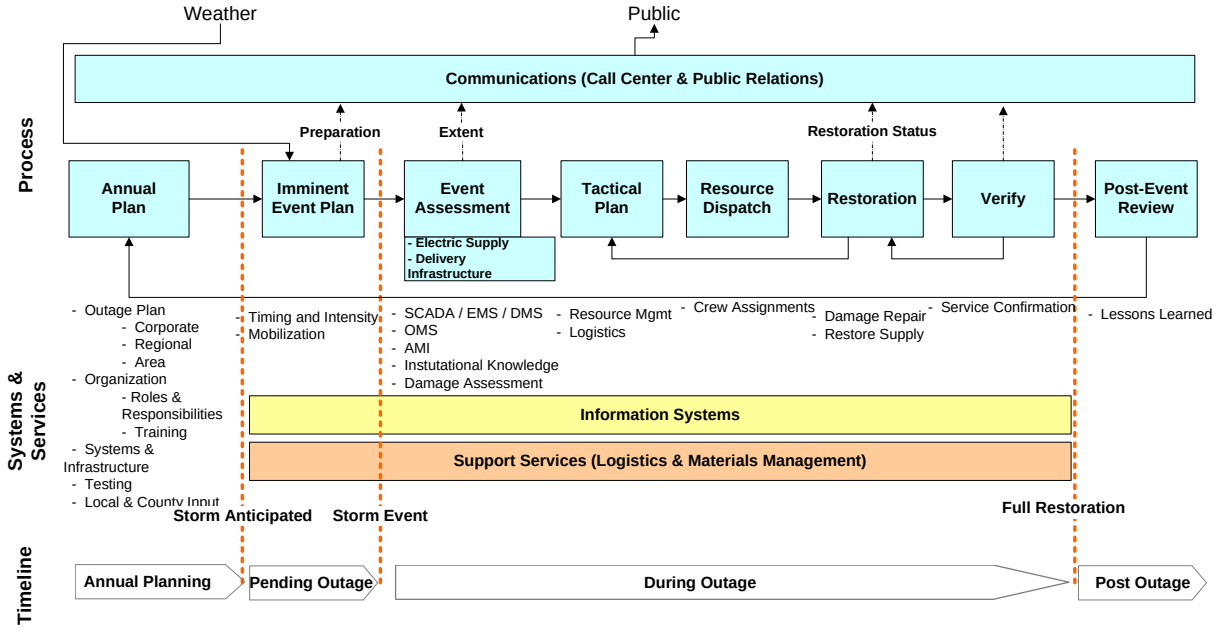

Exhibit 14-1: Outage Management Process – Supply Chain

14.1 Industry Practices

At all utilities, an outage event requires the availability of materials needed to repair or replace damaged infrastructure. These materials must be delivered to the right location in a timely fashion to maintain crew productivity. Supply Chain Operations must receive specific requests for materials from operating centers and must communicate delivery times and locations to field operations. The effectiveness of the Supply Chain directly affects the planning and execution of any storm event.

Due to long lead times for certain materials, Supply Chain Operations (purchasing, inventory control, storerooms, and distribution functions) requires planning to respond to an outage event. Pre-stocking of outage reserves within operating center storerooms or at other locations is needed to ensure rapid response and reduce transportation requirements during outage events. Further, major restorations consume materials at rates well above any reasonable level of outage reserves. The establishment of dedicated storm reserve stock is a small cost to ensure timely restoration from a major outage. Supply Chain Operations must have plans in place to manage rapidly changing inventories, restock storerooms and crews effectively and order, track and expedite materials from suppliers.

14.2 AmerenUE Practices

Purchasing and inventory control operate from AmerenUE's headquarters. AmerenUE supports its Missouri restoration operations from its central Dorsett storeroom, other storerooms and a fleet of dedicated "storm trailers."

Based on previous experience, AmerenUE has detailed lists of required storm materials and begins the ordering process as the storm begins, in advance of the formal damage assessment.

AmerenUE has a materials management information system and application that operated in a mainframe environment for the three storms, but now a replacement system operates in a client server environment. These systems provide the needed functionality to source, request, procure, and issue materials. To overcome some inherent time lags within the materials management information system, AmerenUE uses spreadsheets and on-site material management coordination ("eyeballs") at the storerooms.

14.3 Conclusions

14.3.1 Supply Chain Operations performed very well before, during, and after each of the three storms.

At the beginning of each storm, inventory control placed large orders for the expected storm restoration materials usage. AmerenUE drew upon its documented storm requirements in previous storms to improve the accuracy in defining these initial orders for each of the three major storms.[123] One inventory control supervisor shifted from the corporate offices to the Dorsett storeroom to ensure that inventory levels were observed and confirmed first hand.[124] Key Supply Chain Operations personnel also shifted to other locations as needed. To insure clarity of roles, the responsibility for ordering was delegated to senior buyers, while the junior buyers assumed the expediting role.[125]

AmerenUE's Supply Chain Operations implemented procedures to supply materials, in needed and appropriate quantities and lengths and to meter out supplies to crews during the early days of the storms.[126] This attention to detail avoids material shortfalls. As a result of experience from the July 2006 storm,

[123] KEMA Interviews HS02, HS14, HS15
[124] KEMA Interviews HS14, HS15
[125] KEMA Interview HS15
[126] KEMA Interviews HS05, HS06, HS08

AmerenUE's stores department developed methods to cost effectively retrieve excess materials from departing contractors.[127]

AmerenUE's management worked collaboratively with the union and the bargaining unit employees supported the restoration effort well.[128]

14.3.2 AmerenUE's manned "Storm Trailer" concept provides a well-managed, specific, and reserved inventory of commonly used restoration materials that can be staged close to affected area(s).

AmerenUE has innovatively implemented the "storm trailer" utility leading practice. The AmerenUE storm trailers contain specific restoration material neatly organized in specially designed 53-foot over-the-road trailers. There are inventory levels determined for the storm trailers[129] and a "crew" is designated to manage "a storm trailer. The "crew" is staffed by experienced storeroom employees augmented by employees from AmerenUE's power plants,[130] thus expanding the capabilities of Supply Chain Operations. These crews were trained to recognize distribution materials through an Overhead Line Familiarization Program. To support the reordering of materials each Storm Trailer is equipped with laptops that can access AmerenUE's materials management system over a wireless network.[131] Together the storm trailers, dedicated inventory levels, specifically trained and designated staffing and access to the materials management system forms a very innovative package. Exhibit 14-2 and Exhibit 14-3 shows these Storm Trailers. As shown in Exhibit 14-2 the cross arms are conveniently stored in a special rack under the trailer, leaving valuable interior space for small stock items.

[127] KEMA Interviews HS06, HS08, MK09
[128] KEMA Interviews HS02, HS06, HS08, HS15
[129] KEMA Interview HS06
[130] KEMA Interviews HS06, HS08
[131] KEMA Interview HS06

Exhibit 14-2: Storm Trailer

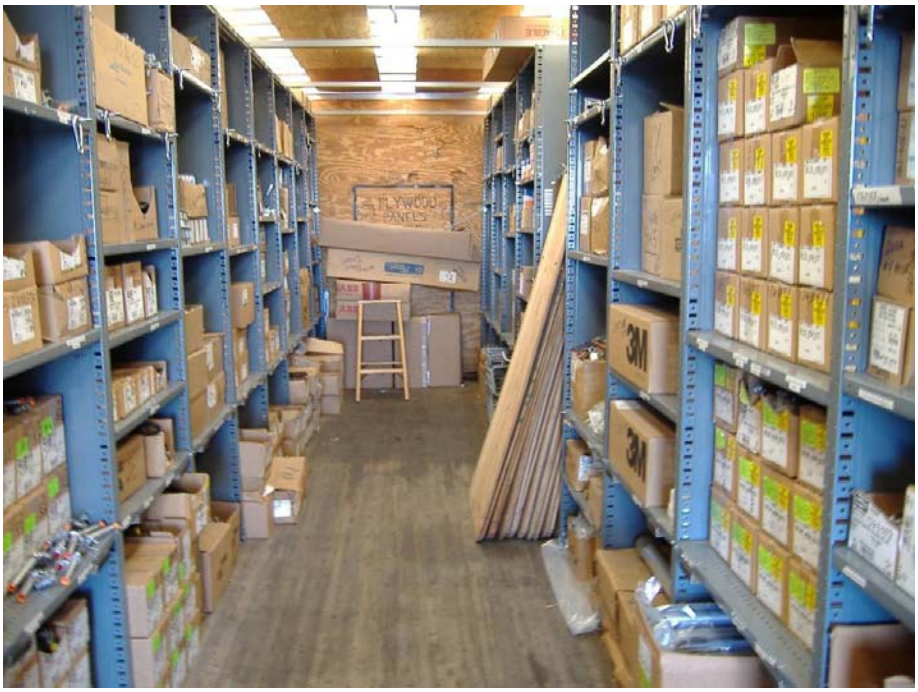

Exhibit 14-3: Inside of a Storm Trailer

14.3.3 "EMPRV", the Materials Management Information System (MMIS) replacement, is a concern for Supply Chain Operations because it is slower than MMIS, which already requires the use of paper to support materials selection and order status.

This conclusion regarding the MMIS is supported by the following two findings.

14.3.3.1 MMIS has now been replaced by a new materials system (EMPRV), which concerns Supply Chain Operations because it is slower than MMIS. AmerenUE has not investigated the limitations of EMPRV under storm restoration conditions, to determine the impact on timely receipt and delivery of materials.

Supply Chain Operations has expressed their concerns over EMPRV's slow response time to the IT organization, which has achieved some changes. EMPRV is still considered slower than MMIS by many within Supply Chain Operations.[132] An example includes long delays to assemble material status reports.

If EMPRV is significantly slower than MMIS during storm conditions, AmerenUE's Supply Chain Operations performance could affect restoration efficiency. Because the paper methodology is used to provide rapid service, it is a critical link to the EMPRV system. AmerenUE should develop a program to investigate the EMPRV performance concerns.

14.3.3.2 The MMIS was augmented by paper forms/reports to minimize the process time for both material selection and order status.

Because of concerns over the response time between MMIS and Oracle and handheld devices used for the pick function, a paper based methodology was developed and used in both inventory control and the storeroom.[133] The paper methodology allowed more rapid supply and then the information was entered into the MMIS. This accommodation was viewed positively by Supply Chain Operations.

[132] KEMA Interviews HS08, HS14, HS15
[133] KEMA Interviews HS06, HS08, HS14, HS15, response to KEMA Data Request

14.3.4 During the first two storms, Standards Department employees were used as field checkers, which had an impact on information needed for substitutions when approved materials were not available. However, for the third storm Standards ensured that adequate support was available.

Standards personnel, who have strong knowledge about the distribution system, were wisely designated to perform the field checker role.[134] However, when pre-qualified materials and/or suppliers are unavailable during a storm, Purchasing must obtain approvals for substitute materials from the Standards Department to maintain system integrity. While no clear examples were cited of materials delays, Supply Chain Operations expressed concerns and Standards provided support as needed during the first two storms. In response to Supply Chain Operations' needs, Standards ensured coverage was provided during the third storm.[135]

14.4 Recommendations

14.4.1 Develop and perform a realistic test for EMPRV.

EMPRV needs to work well during a restoration effort. Further, the tool should minimize the need for the use of paper except in the most extreme conditions where communications has been interrupted. Consider the following recommended actions:

- Determine the needs of supply chain stakeholders within and external to AmerenUE,
- Develop a series of realistic test scenarios for EMPRV, including unrelated loading on the client server and a backcast of the three storms,
- Run the test scenarios under realistic conditions,
- Evaluate the test results, and
- Determine if changes are required and make changes.

[134] KEMA Interviews HS14, HS15
[135] KEMA Interviews HS14, HS15

15. Support Logistics

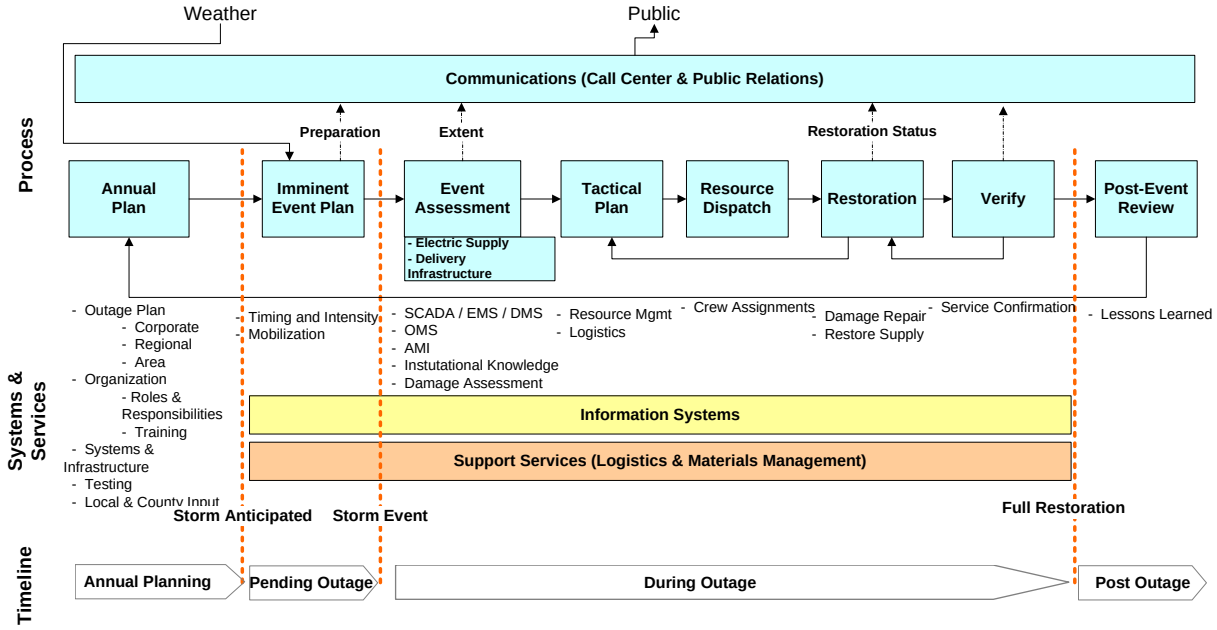

Exhibit 15-1: Outage Management Process – Support Logistics

15.1 Industry Practices

The typical utility must be prepared to provide support such as food and lodging for both its own employees while working long outage shifts and outside restoration crews. This requirement is complicated by the typical 16-18 hour shifts used during the early phases of restoration, which leave little time for needed rest and travel to accommodations.

For efficiency, many utilities arrange catering services that deliver lunches to crews at their work locations and provide breakfast and dinner at the beginning and end of the workday. This alleviates the need for crews to travel from the work site two or three times per day. The hotel/motel accommodations also require creativity, as the parking lots must be able to accommodate a large line trucks and other vehicles. In some circumstances, local hotel/motels cannot be used if they are still without power. A well-designed support logistics program avoids undue use of facilities that the utility's customers may also need such as hotel/motel rooms and restaurants.

15.2 AmerenUE Practices

AmerenUE provided the expected food and lodging, but also provided shuttle vans to move crews from their lodging to staging areas, security for Company facilities and vehicles parked overnight, and contracted for staging areas for foreign crews and vehicles. Notably, AmerenUE contracted for a mobile laundry facility and employees volunteered to process line workers' clothing to maintain the pace of the restoration.

15.3 Conclusions

15.3.1 To meet the unexpected needs to effectively lodge, provision, and support foreign contractors and mutual aid crews, AmerenUE developed cost effective support logistics methods. While a number of employees have experience during storms, AmerenUE has not documented its support logistics process for Level III storms.

In August 2005 AmerenUE centralized storm support logistics.[136] For the July 2006 storm AmerenUE used two college dormitories to provide lodging for over 700 foreign crew members.[137] This innovative concept reduced costs and eliminated competition for lodging with AmerenUE's customers. AmerenUE arranged for buffet breakfasts and dinners to be catered at the lodging sites to manage costs and eliminate transit time to restaurants. Box lunches were distributed before daily dispatch to eliminate crew time lost by traveling to and waiting to be served in restaurants.

During the winter storms, the dormitories were not available and AmerenUE shifted its focus to geographically select accommodations that reduced transit and meal time.[138] As necessary, AmerenUE provided buses to transfer crews from staging areas if the lodging did not have adequate parking space for work vehicles and provided security at the staging areas and lodging to protect line crews' work vehicles.

Over 200 AmerenUE employees volunteered to assist with support logistics and provide local knowledge for foreign crews. AmerenUE contracted for a mobile

[136] KEMA Interview MK12
[137] KEMA Interview MK12
[138] KEMA Interview MK12

laundry facility and AmerenUE employees volunteered to process line workers' clothing to maintain the pace of the restoration.[139]

However, AmerenUE has not documented the process it used during Level III storms. This leaves AmerenUE vulnerable to a lower level of performance if the designated employee is unavailable.

15.3.2 To ensure safety and maximize its available work force, AmerenUE provided lodging to its own linemen if their home was without power.

Upon request, AmerenUE provided each lineman and his/her family one room if their home was without power.[140] This accommodation was provided to ensure adequate rest for the employee and to eliminate their concerns about their family's safety.

15.3.3 AmerenUE has not developed a rapid method to transfer the crew information available at the EOC to the support logistics function. Although AmerenUE has long term plans to use the capabilities of Resources on Demand it has not yet developed a plan to implement or test the software's ability to manage the support logistics function under storm restoration conditions.

Information was transferred by conferences among the relevant AmerenUE employees. The status of support logistics was maintained on spreadsheets with data manually entered. Minor problems including specific lodging requirements by crew and foreman and the timeliness of this information transfer occurred. At present AmerenUE will continue to use spreadsheets for those functions.[141]

AmerenUE will begin the implementation of version 3.0 of the software program "Resources on Demand", which is designed to track the resources available to the EOC and manage the support logistics function, however at this time implementation has not begun to extend the capabilities to support logistics.[142] AmerenUE participated in the development of the changes to the software program for versions 2.5 and 3.0 and has plans to implement the tie between crew management and the support logistics capabilities of the program at some undetermined point in the future.

[139] KEMA Interview HS12, KEMA Data Request MK12-0X
[140] KEMA Interview MK12
[141] KEMA Interviews MK12, HS12
[142] KEMA Interview HS12

15.4 Recommendations

15.4.1 Develop an implementation plan for Resources on Demand (3.0) to support the support logistics function and all contractors and mutual aid crews.

Document all the work that has gone into managing the logistics processes supporting the restoration process. Specifically, AmerenUE should:

- Document the current support logistics process,
- Determine the needs of support logistics stakeholders within and external to AmerenUE,
- Determine the capabilities of Resources on Demand,
- Map the needs compared to the capabilities,
- Implement the support logistics function on Resources on Demand,
- Develop a series of realistic test scenarios, including unrelated loading on the client server and a backcast of the three storms,
- Run the test scenarios under realistic conditions,
- Evaluate the test results,
- Make appropriate adjustments to the support logistics Resources on Demand implementation,
- Retest and evaluate, and
- Document the support logistics function under Resources on Demand.

16. Appendices

16.1 List of Exhibits

16.2 Comparative Data of Line Design and Pole Loading

COMPANY CODE	A	B	C	D	E	F	G
No. of customers	4,700,000	310,000	520,000	2,202,625	650,000	5,271,365	4,400,000
Customer class distribution							
Residential	34%	60%	60%	91%	60%	88%	88%
Commercial	46%	35%	20%	8%	20%	9%	11%
Industrial	20%	15%	20%	1%	20%	1%	1%
Percent OH/UG	64/36	60/40	70/30	71/29	67.5/32.5	80/20	83/17
Pole loading/design criteria	CA GO 95	NESC	NESC Gr B	NESC	NESC	CA GO 95	NESC Hvy Ldg
Max wind speed for design	100 mph	85 mph over 60 '	-	-	60 mph	56 mph	NESC
(wood, steel, concrete, composite)	w, s, composite	w,c,s,comp	w,s,comp	w	w,c	w	w, com
Setting depths of poles	Generally 10%+2 feet w/ 6' min.						
Typical span length (in feet)							
Feeders	200	250	200-300	200	200	150-300	138
Laterals	200	200	200-300	200-300	100	150-300	155
Software used for pole calcs	In-house	IDF-PRO	In-house,PLS	Unknown	O-CALC	In-house	In-house
Size of OH wire							
Feeders	336 ACSR	336 & 795	477	636 Al	336 Al	715 AA	336 AAC
Laterals	1/0 ACSR	#2	#2	1/0 ACSR	#2 AAAC	#4 ACSR	#4 & 1/0 ACSR
Use tree wire or spacer cable	Yes 1/0 ACSR	No	No	Yes,336&636	336/ 2/0 /#2	4/0 1/0	Yes
Type of insulators for storm prone areas	Porc & poly-clamp	Porc & poly	-	-	Porc-tie type	porc&poly/tie/clamp	n/a
Use different hardware to mount insulators	No	No	No	No	No	No	No
Framing used in storm areas	c-arm, delta	c-arm, vert	-	c-arm	c-arm,vert, delta	c-arm, delta	n/a
Any extra structural design for storm areas	Storm guys, washers	side guys	no	no	storm guys	no	no
Special UG design for storm areas	No	Bog shoes	No	No	No	Submersible	No
Special design for environ. Sensitive areas	No	Yes	No	No	Ye	Yes	Yes
Use any break away devices	No	No	No	No	No	No	s/l pole bases
Use special wire to reduce wind load	No	No	T2-2 (4/0) dplx	No	No	No	No
Any other special products for storm loading	No	No	No	No	No	No	PLP dampers
Equip used to install heavy poles (>5K lbs)							
Investigating new construction/materials	No	No	No	No	Trng on pole calcs	No	No

Recommendations Specific to Outage Planning & Restoration:

1) Staff should conduct a roundtable with all the electric utilities in Missouri to discuss best practices in restoration planning and execution.. Ameren agrees with this recommendation and will wait for Staff to schedule a meeting.

2) AmerenUE should continue to enhance its safety programs to identify and make downed lines safe after a major outage event. AmerenUE utilizes Public Safety Advisors and Cut-In-Clear crews to make downed lines safe during major outage events. AmerenUE continues to assess the need to expand this role. AmerenUE also communicated with customers through the media and other avenues regarding the dangers of downed power lines.

3) AmerenUE should continue to maintain its mutual assistance agreements, and in each major restoration effort evaluate the necessity of utilizing these agreements so that it will have access to such resources when needed. 3. AmerenUE is affiliated with the Midwest Mutual Assistance Group and EEI Mutual Assistance. AmerenUE maintains a good working relationship with member utilities of both groups.

4) AmerenUE should explore the structure of a mutual assistance agreement with the Association of Missouri Electric Cooperatives (AMEC) for future emergencies where either AmerenUE or one or more of the electric cooperatives needs assistance following major storms like those experienced on July 19th and 21st. AmerenUE is in the process of setting up meetings with the Association of Missouri Electric Cooperatives to discuss a mutual assistance agreement.

5) AmerenUE should either maintain or have the ability to produce up-to-date maps of its infrastructure and roads to supply to crews during major outage events. AmerenUE utilizes Utilimap to produce large quantities of maps during major outage events. Individual Divisions are also building stockpiles of feeder maps for use during major outage events.

6) AmerenUE should continue to work toward elimination of its trimming backlog per its prior agreement with the Staff in Case No. EW-2004-0583. AmerenUE has complied fully with Case No. EW-20040583. As of December 31, 2007 11, 594 of the 13,347 rural miles have been completed and 5691 of the 7783 urban miles. The City of St. Louis as of December 27, 2007 is on the desired 4 year trim cycle, with rest of Missouri on track to obtained desired cycle, based on classification of urban or rural, on or before December 31, 2008.

7) Adopt and implement a Commission rule to require each electric utility to annually submit a report on its vegetation management program's structure, objectives, status, and funding. AmerenUE has already begun adoption of the proposed vegetation management rules. AmerenUE will provide a copy of its vegetation standards, guidelines, and procedures no later than July 1, 2008. AmerenUE will file a report no later than August 15, 2008, documenting the expenditure of $45 million on vegetation management

between July 1, 2007 and June 30, 2008. After the initial report, AmerenUE will file its annual report on April 1ST of each year, as contemplated by the proposed rules.

8) AmerenUE should implement vegetation management programs that:
a) Target more substantial removal of vegetation along power lines throughout its system, including side clearances and overhangs, along feeders and subtransmission systems. AmerenUE has already implemented, on certain problematic feeders, an increase in both removals and overhang. In 2007, twenty one feeders were identified and work completed. In addition, AmerenUE has increase tree clearances, especially on overhanging branches above three phase backbone sections on lines.

b) Target removal of problem trees within the utility's easement and possible replacement with ornamental trees or other low-growing vegetation. See item a)

c) Target communications with landowners, who have trees off the right-of-way that represent a significant risk to sub-transmission and feeder lines, to find reasonable means to reduce the outage risk from these trees. On January 18th, 2008 AmerenUE began pre-notifying property owners per proposed rule. An educational brochure discussing utility tree trimming practices, information on planting the right tree in the right place, and a reference to Ameren's web site for further information is included. AmerenUE will continue to work with landowners with identified tree issues on or off easements as needed.

d) Trim trees in areas with particularly high densities of vegetation on a more frequent basis. Currently urban areas are targeted for a four-year cycle; it may be appropriate to go to a three-year cycle in some areas. Once desired cycle lengths are obtained in 2008, AmerenUE will be evaluating the trimming of certain circuits on a shorter time interval.

9) AmerenUE should include a clear message within the Voice Response Unit (VRU) script to address non-pay disconnections during the course of major storm outage restorations. This has been done in a coupe of recent storms since the Staff made this recommendation. It was not added in the December 2007 storm for a couple of reasons. First, there were significantly fewer total outages during this storm and the call center was able to manage the call volume. Second, the cold weather rule was in affect so most delinquent customers would know we were not doing non-pay disconnects.

10) AmerenUE should continue discussions with AT&T regarding notification whenever call gapping is to be implemented on switches that affect the provision of critical AmerenUE services. AmerenUE has an agreement with AT&T where they will provide notification to AmerenUE in any situation that warrants their use of call gapping.

11) AmerenUE should promote customer registration on its website to ensure that customers can access customer-specific information on service restoration in the event of a storm related outage. AmerenUE customers have the ability to go online at Ameren.com and sign up for My Electric Outage. This will tell them if their power is on

or off. If their power is off they will get information about the outage including outage start date/time, outage status, cause of outage, estimated restoration time, and number of customers out. My Electric Outage had 98,796 hits during the December 2007 storm. Reference document: Website Usage

12) City and county agencies, in conjunction with AmerenUE, should facilitate the development of neighborhood watch groups, or assess the ability of the current Operation Weather Survival (OWS) network system, to check on special needs customers during an extended outage. AmerenUE is limited in what effect we can have toward this goal. AmerenUE will wait for government agencies to address the situation.

13) AmerenUE should continue to make efforts to improve participation in the Storm Schools it offers for the media, fire, police, city and county officials. AmerenUE is looking for ways to continue this effort.

14) AmerenUE should further enhance its communications with field crews performing restoration work regarding AmerenUE's authority to cut trees outside of its right-of-way for the purpose of accessing its right-of-way for storm restoration work. Tree trimming, during restoration work, is a balance between clearing the lines sufficiently for safety and reliability and performing the work in a timely manner in order to restore the customers. AmerenUE consistently performs works both on and off right-of ways during restoration and post restoration on trees damaged during major events.

15) While centralization of AmerenUE's storm restoration process has brought about a number of coordination efficiencies, Staff believes that district managers should be available to local officials to deal with emergency situations and be provided with authority to request priority treatment of projects in their areas that require special attention. In all three affected Divisions, the managers assigned someone from their staff to maintain informal, open communications with local officials as well as critical customers such as nursing homes, schools, and other important public facilities. They adjusted restoration efforts as needed to deal with critical customers.

16) AmerenUE's participation in the SEMA/EOC coordination phone calls during this restoration effort was extremely helpful to all the agencies involved. Staff recommends that SEMA request that each electric utility with damaged infrastructure attend and actively participate in all future storm restoration efforts where the level of damage prompts SEMA/EOC activation. AmerenUE was receptive to SEMA phone calls during the December 2007 Storm. AmerenUE participated in the daily SEMA Conference calls.

17) AmerenUE provided its storm center direct number to several city, county and state officials. Several officials reported that having this number available was extremely helpful to them. AmerenUE also reported that the calls received on this number did help it prioritize work on several critical projects. Unfortunately, AmerenUE also reported that too many individuals distributed this number to a broader group than it was intended to be provided to and at times issues that were not of a critical nature were being called in on this number, reducing the efficiency of personnel tracking outage repairs and

dispatching crews. Staff recommends that AmerenUE continue to provide this number to key officials but caution these officials to be very careful in their distribution of this number, and that it be used only for emergency purposes. The Storm Center direct number is still available to city, county and state officials.

18) (Telecommunications) The Commission may want to give consideration to expanding its current back-up power requirement to include battery reserves and/or generators for Digital Line Carrier and node locations as well as the customer's location.
19) (Water) Missouri American Water Company (MAWC) should assess additional methods to get information to customers regarding boil orders, if any, during major outage events when customers do not have access to the normal media they use to receive information. These additional means may include the OWS network system, the Post Office, flyers posted at shopping centers, super markets, gas stations, and other locations where people are likely to read a notice.
20) (Water) MAWC should assess whether it needs to have on-site back-up generators installed, or have access to portable generators, at its major production facilities in order to provide reliable water service in the future given the outage history they have experienced at these facilities.

Recommendations Specific to Reliability & Infrastructure Maintenance:

1) Adopt and implement a Commission rule that requires electric utilities to annually report certain standard reliability metrics, their programs for attaining or improving these metrics, the status of these programs, and program funding levels.
2) Adopt and implement a Commission rule that requires electric utilities to annually submit a report on the structure, objectives, status, and funding of their transmission and distribution infrastructure inspection and maintenance programs.
3) AmerenUE should assess its current non-feeder distribution pole inspection programs and report to Staff within 180 days on which of the following approaches it believes is appropriate regarding maintenance and inspection of these distribution poles:
a) Enhance its existing distribution pole audit programs (overhead circuit inspection program and pole attachment audits) to increase the likelihood that these audits will identify distribution poles that should be rejected or receive additional treatment to extend their useful life;
b) Implement a new program specifically for inspection of distribution poles that is structured to have a high likelihood of identifying poles that should be rejected or receive additional treatment to extend their useful life;
c) Demonstrate that the current rate of replacement of distribution poles is consistent with the anticipated average age of currently installed distribution poles and their expected useful life, and therefore, no distribution pole audit program changes are appropriate at this time; or
d) Propose an alternate approach to those programs noted above.

In 2007 AmerenUE implemented an enhanced distribution pole inspection program aimed at inspecting ALL distribution poles on a 12 year cycle. A circuit inspection program was also implemented that requires that all reclosers, sectionalizers, and regulators be inspected twice annually and capacitor banks be inspected annually.

Storm Start	Storm End	Extent	Description
	December, 1848	An article in the Columbia Daily Tribune, December 19, 1924: "In December, 1848, sleet occurred which had no parallel in the history of the county. Trees, even of the largest class, were almost literally stripped of branches, rendering the roads in many places impassable. Trees without number were borne to the ground and broken off by insupportable mass of ice upon them. Shade and ornamental trees were greatly damaged and many orchards were ruined."	
12/16/1924	12/19/1924	One of the worst ice storms to affect Missouri in terms of severity, duration, damage and loss occurred. Central and east central portions of the state were hit hardest and after the storm had subsided. Ice ruts, 6 inches deep, were in the roads and made driving next to impossible. There were also reports of livestock frozen in the fields. To this date, the 1924 ice storm is one of the most significant winter weather events to strike Missouri.	Three-fourths of Missouri was covered by a layer of ice that varied from one to six inches thick.
01/08/1930	01/11/1930	Ozark Plateau; Quotes extracted from Climatological Data, January 1930 report: In most of the Ozark Plateau there was considerable damage to trees and utility properties by ice, from rain freezing as it fell, for three to four days beginning about January 8.	
01/07/1937	01/08/1937	The ice glaze was the heaviest in many years in Missouri. About one half of the state was affected, and the effects were severe in a belt extending in a southwest direction from Clark, Lewis, and Marion Counties on the northeast border to the southwest border. A strip about 50 to 75 miles wide in this belt suffered the maximum damages, with ice 1 to 2 inches thick on wires and considerably thicker on ground surfaces.	Mixed with the ice sheet was a heavy fall of sleet, varying in amount from 1 to 6 inches and averaging about 3 inches in most of northern Missouri and the west-central counties.
1/9/1949	1/12/1949	West Texas and southeastern New Mexico through the panhandle and north Texas, northeast across central Oklahoma and the southeastern corner of Kansas into south-central Missouri	Ice storm of unusual proportions; worst in Midland's history; long distance phone circuits out across region; 2 to 3inch of ice

Storm Start	Storm End	Extent	Description
1/22/1949	2/4/1949	North Texas north across central and eastern Oklahoma, northwest Arkansas and southeast Kansas and northeast into central Missouri	Worst ice storm in company history for Dallas P+L; steel towers crumpled; winds to 35 mph on 1/30 slowed repairs; 2inch of ice on wires; some phone lines had not been repaired from previous storm
1/3/1950	1/6/1950	Eastern Arkansas, western Tennessee, into Missouri	2inch of ice and sleet; worst ice storm in 17 years in Memphis area; one of worst in history in eastern AR
2/13/1951	2/15/1951	Southcentral Texas northeast across eastern Oklahoma and western Arkansas, into Missouri	Communication almost paralyzed in AR; ice on wires 1.5inch in diameter in San Antonio area; worst ice storm in Palestine TX history; timber damage in MO and AR
1/1/1952	1/7/1952	Northeast South Plains, northeast across central Oklahoma and east across north Arkansas and south Missouri	Ice on wires 2inch in diameter with 6inch long icicles in MO
4/17/1953	4/19/1953	Northcentral Oklahoma, east into Missouri	Ice, wind and lightning damaged phone and power lines
12/7/1956	12/10/1956	Northeastern Oklahoma northeast into Missouri and on	Power and communication lines damaged
1/26/1957	1/28/1957	Central Arkansas northeast through southeast Missouri	Most severe ice storm in northeast AR in 20 years; both water and power out in some towns; one of worst in memory in southeast MO;
12/2/1973	12/7/1973	Southwest Kansas, northeast across southeast Nebraska and northwest Missouri, and into central Iowa	Power outages lasted up to 6 days; one of most severe ice storms of record in KS; worst ice in this century in southwest IA; communication towers damaged

Storm Start	Storm End	Extent	Description
12/6/1978	12/10/1978	Central to northeast Arkansas into extreme southeast Missouri	Trees and power and phone lines damaged in AR; worst ice storm in extreme southeast MO since the 1950s; outages lasted up to 1 week
12/29/1978	1/4/1979	Central Texas northeast across southeast Oklahoma, northwest Arkansas and into Missouri	Worst ice storm in 30 years in TX and AR--10 day long outages in some places; gusty winds following ice storm in MO
12/12/1979	12/14/1979	Central north Texas into southcentral Oklahoma; southeast Missouri	Trees and power lines damaged; galloping; gusty winds
3/18/1984	3/20/1984	Southwest Kansas northeast to northwest Missouri and southeast Nebraska	Up to 2inch thick ice--communication towers fell-- one of most damaging and widespread ice storms ever in KS; outages lasted up to 1 week; no water in rural districts
12/13/1987	12/17/1987	Northwest Arkansas and southwest Missouri	Higher elevations in Ozarks affected
12/24/1987	12/30/1987	West North Texas northeast across central Oklahoma, northwest Arkansas, and southeast Kansas, and northeast through Missouri	Up to 1inch thick ice in KS; in MO up to 2inch thick ice, outages lasted up to 6 days, worst winter storm since early 70s, and ice remained longer at higher elevations; up to 3inch thick ice in OK, communication tower down in Tulsa, worst ice storm in the experience of many
12/29/1990	1/2/1991	Arkansas, except south and east, into southwest Missouri	Most severe ice storm since Dec 1983 with outages lasting up to 8 days in AR

Storm Start	Storm End	Extent	Description
10/28/1991	11/11/1991	West North Texas across west central Oklahoma and east central Kansas, and southeast Nebraska and northwest Missouri and into Iowa and MN; south central South Dakota into south central North Dakota	In OK, extensive tree pruning limited damage to power lines; up to 2inch ice and windy in KS, TV tower down; up to 2inch ice in NE; 1.5inch ice and windy in ND, galloping; most costly ice storm in history in IA; up to 3inch of ice in MN
12/1/1991	12/4/1991	West North Texas northeast across central Oklahoma into southeast Missouri	Trees and power lines damaged
1/16/1994	1/22/1994	North Arkansas into southeast Missouri	Power outages lasted more than 1 day in some areas
11/13/1996	11/27/1996	Northwest Arkansas, northeast Oklahoma into south central Missouri and north; northeastern Nebraska, southeast South Dakota and into western Iowa; in cloud icing in western Montana.	Up to 3inch thick ice in SD, outages lasted up to 4 days
1/12/1997	1/15/1997	Eastern Gulf coast of Texas into western Gulf coast of Louisiana; Extreme southeast Missouri	Record ice storm in LA; up to 1inch thick ice in MO, windy, communication tower down
1/1/1999	1/6/1999	Northwest and northcentral Arkansas across southwest Missouri	More than 1inch thick ice in AR; in MO up to 2inch thick ice, outages lasted up to 6 days
01/29/2002	01/31/2002	A long-lived major ice and snow storm blasted much of northwest, northern and central Missouri. Ice accumulations of over an inch were observed from the Kansas City metropolitan area, east and north through Moberly Missouri. For the Kansas City area, the ice storm was ranked as the worst ever.	At one point 409,504 total customers were without electrical power in the CWA, with some residents without power up to two weeks.

Storm Start	Storm End	Extent	Description
01/12/2007	01/14/2007	Southwestern, south central and east central Missouri; mostly along I-44 corridor from Springfield to St. Louis. The January 12-14 Ice Storm had not been experienced since the December 1987 Ice Storm, in terms of power outages. Fourteen other counties along the I-44 corridor also reported at least an inch of ice. The ice accumulations resulted in widespread downed trees and power lines. Approximately 200,000 residences were without power.	Ice Storm left over 200,000 southwest Missourians without power and a landscape resembling a war zone. Officially at the National Weather Service office in Springfield, one and a half inches of ice accumulation was received. Communities across southeast Kansas into western Missouri also received 1 to 5 inches of a snow and sleet mixture.
12/08/2007	12/11/2007	Southwestern and portions of central and east central Missouri as well as northwestern Missouri	The storm reached historical proportions over parts of northwestern Missouri, where some communities in Buchanan, Andrew, Holt, Atchison and Nodaway counties reported ice as thick as 1 inch.

Source:

Data from 1848-1937: Dr. Guinan(Missouri State Climatologist) provided this information and he references it to a clipping from *Columbia Daily Tribune, December 19, 1924: Colonel William F. Switzler tells in his History of Boone County of a sleet storm* and an article that he wrote for Missouri Ruralist for which he extracted quotes from *Climatological Data, December 1924 report.*

Data from 1949-1999: American Life Alliance has gathered data on past ice storms from Storm Data(NOAA) and Climatological Data National Summary (US Weather Bureau) and news articles from cities in the affected region. The American Lifelines Alliance (ALA) is a public-private partnership project funded by the Federal Emergency Management Agency (FEMA) and managed by the National Institute of Building Sciences (NIBS), with the goal of reducing risks to lifelines from hazards.

Data for 2000- 2007: Event Archives and Significant weather records of NOAA's National Weather Service Weather Forecast Office.

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Ameren Electric Emergency Restoration Plan

Dave Wakeman

Ameren Energy Delivery

Plan Content

- Overview
- Emergency Operations Center
- Individual Job Duties/Responsibilities
- Damage Assessment
- Restoration Update Conference Calls
- Extensive Damage Recovery
- Division Electric Emergency Restoration Plans
- Division Supply List
- Logistics
- Sending/Receiving Crews with Ameren System
- Handling Outside Crews
- Mutual Assistance to Other Utilities
- Technology
- Contingency Planning for Loss of Critical Systems and Facilities

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Emergency Operations Center

- EOC Activation
- Storm Levels
- EOC/Division Responsibilities
- EOC Operations
- Resource Procurement/Release
- Restoration Update Conference Call
- Storm Critique

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Individual Job Duties/Responsibilities

- EOC Personnel
- Distribution Dispatch Offices
- Division Storm Center
- Construction Field Jobs
- Service Crew Work
- Damage Assessment Roles
- Division Support

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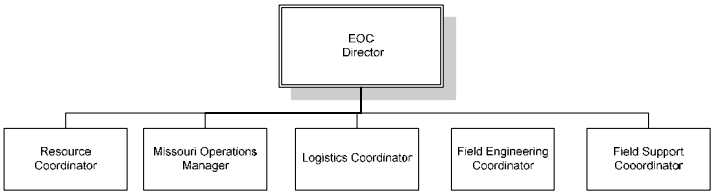

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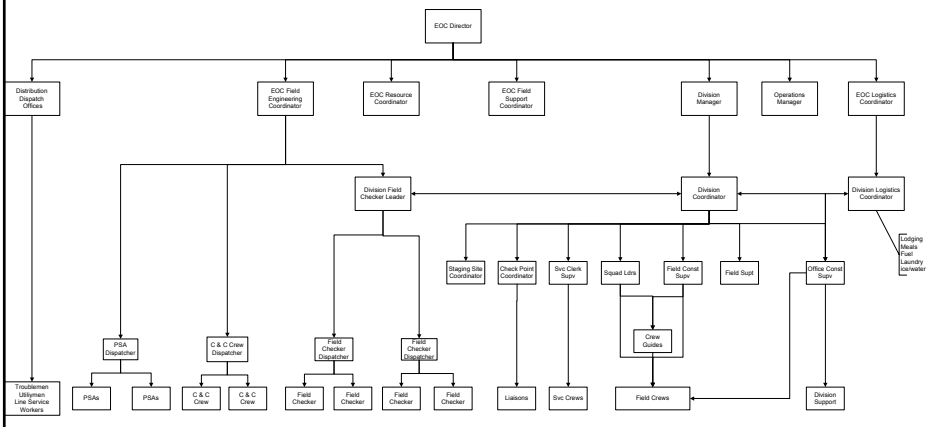

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Damage Assessment

- Information Review
- Initial Field Damage Assessment (High Level)
- Detailed Damage Assessment
- Heavy Localized Damage Assessment

Springfield IL 3/11/06 taken from St. John's hospital window
(night of 3/11/06 - lots of damage to Springfield)

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Restoration Update Conference Calls

- Call timing
- Call set up
- Call content
- Call documentation

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Division Electric Emergency Restoration Plans

- Template SharePoint site
- Critical logistics information
- Annual Review is necessary

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Division Supply List

- Items that may benefit a Division during a restoration
- Can be updated with new items
- Must have contingency plan for local offices

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Logistics

- Major component of a successful plan/ restoration effort
- Must prepare for a variety of situations
- Power outages can affect your vendors
- Must build relationships/criteria before the need

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Logistics

A Key to Success

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Logistics - Lodging

- Lodging
  - Hotels
  - Dorms
  - Gyms/ Large Facilities
  - Tents
- Number of facilities can be large
- Contracts are a huge benefit

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Logistics – Meals

- Breakfast
- Lunch
  - Box Lunches
  - Snacks
  - Supplemental deliveries
- Dinner
  - Buffet
  - Restaurants

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Logistics - Miscellaneous

- Parking
- Busing
- Laundry
- Ice
- Water/Sports drinks
- Security
- ... (the thing you haven't thought of yet)

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Staging Sites

- Selected sites and Contracts upfront
- Sample layouts for sites
- Must staff sites
- Storm Trailers and Mobile Command Center

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Handling Resources

- Sending Internal Resources
- Receiving Internal Resources
- Receiving Outside Resources
- Sending resources off property

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Sending/Receiving Crews within Ameren System

- Sending Crews to Assist
  - Supervisors, Superintendents, Crew Dispatchers, Equipment
- Receiving Crews to Assist
  - Staging Sites, Material Trailers

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Handling Outside Crews

- Checkpoints
- Checkpoint Coordinator
- Ameren Liaison
- Safety Coordinator
- Squad Leaders
- Crew Guides

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Mutual Assistance to other Utilities

- Handled By Operations Managers
- Discussions with EOC
- Typically not supported by EOC

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Technology

- Dispatch/EOC phones
- Cell phones
- Voice Radios
- Consoles/Truck/ Portables
- Mapping
- SCADA
- Weather tools
- Web pages

•Contingency planning for loss of critical systems and facilities

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Resources on Demand

- System to track personnel and equipment
- Used to manage resources during storm restoration
- Information is kept to the individual level
- Web based for view throughout the company
- Tracks history and documents movements

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Storm Plans

- Questions or comments