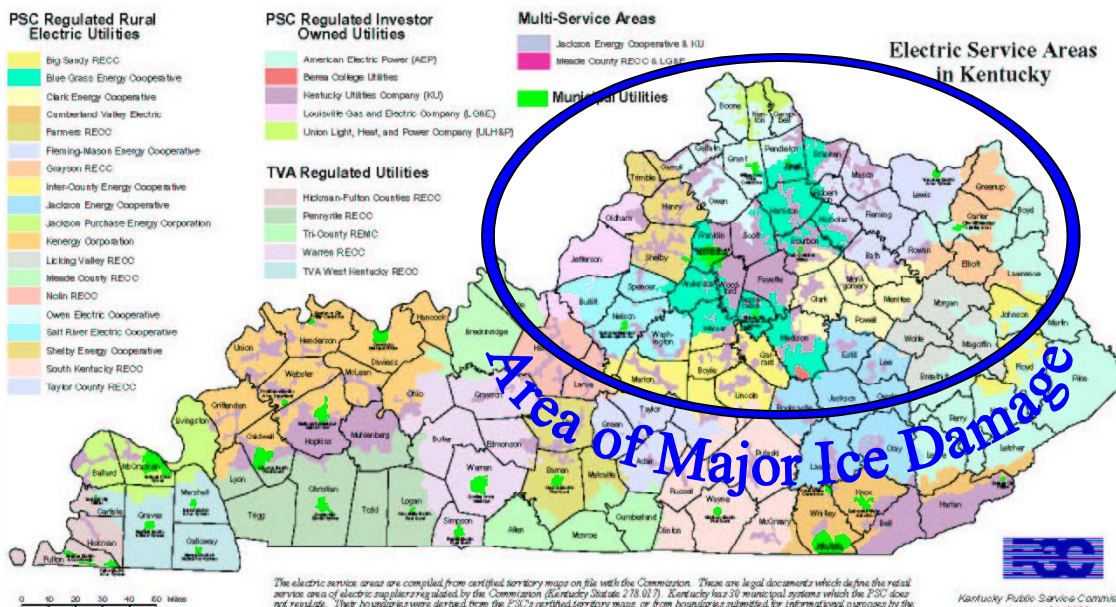


**ASSESSMENT OF
ELECTRIC UTILITIES RESPONSE
TO THE
FEBRUARY 2003 ICE STORM**

**BY
THE KENTUCKY PUBLIC SERVICE COMMISSION
FEBRUARY 6, 2004**



The Kentucky Public Service Commission (“KPSC”) staff charged with compiling this report would like to extend a well-deserved “**Thank You**” to all that were part of the storm restoration process. You showed professionalism and dedication to safety for yourself, your fellow workers and the general public.



The electric service areas are compiled from certified territory maps on file with the Commission. These are legal documents which define the retail service area of electric regulators established by the Commission (Kentucky Statute 238.017). Kentucky local municipal systems which the PSC does not regulate. Their boundaries were derived from the PSC's certified territory maps, or from boundaries submitted for informational purposes by the

February 2003 Ice Storm Assessment

Table Of Contents

Topic / Section	Page
PREFACE	
EXECUTIVE SUMMARY	ES1
ASSESSMENT (REPORT)	1
A. THE STORM IMPACT	1
B. THE IMPACT OF ICE ON OVERHEAD DISTRIBUTION FACILITIES	5
1) Ice Storm Formation	5
C. UTILITY RESPONSE	8
1) Planning	8
2) Monitoring and Mobilization	9
3) Damage Assessment	10
4) Prioritization of Repairs	11
5) Contract Labor	13
6) Materials and Supplies	13
D. UTILITY RESTORATION SUMMARIES	14
1) Kentucky Utilities (KU)	16
2) Kentucky Power Company (KPC)	19
3) Blue Grass Energy	20
4) Clark Energy	21
5) Grayson RECC	22
6) Fleming-Mason Energy	23
7) Utilities With Less Severe Damage	24

E.	TYPICAL RESTORATION WORK PROCESS	25
1)	Post Storm Inspection and Clean-Up	28
F.	PREVENTATIVE MEASURES AND PROCEDURES	31
1)	Joint-Use Attachments	31
2)	Vegetation Management (VM)	32
(a)	Overhead Transmission VM	33
(b)	Overhead Distribution VM	34
(c)	R/W Trim Cycles	34
(d)	R/W Widths	35
(e)	VM Equipment and Methods	36
(f)	Customer Issues of VM	38
(g)	Customer Relation of VM	38
(h)	Forestry Analysis	39
(i)	Continuing Problems With VM	40
(j)	VM Summary	40
3)	Line Maintenance and Inspection	42
(a)	Distribution Line inspection	43
(b)	Pole Inspection	44
(c)	Conductor Inspection	44
(d)	Hardware and Equipment	45
(e)	Past and Present Inspection / Maintenance Trends	46
4)	Recommendations From the 1994 Ice Storm Report	47
5)	Preventive Measures Summary	48
G.	COMMUNICATIONS	49
1)	Public / Customer Communication	49
2)	Public Official Communication	53
3)	Division of Emergency Management (DEM) Communication	54
(a)	Local and Regional Emergency Response Coordinators	55

H.	FINDINGS, RECOMMENDATIONS AND CONCLUSIONS	56
1)	Key Findings	56
2)	Recommendations	59
3)	Conclusions	61

DUE TO THE SIZE OF THE APPENDIX, IT WILL BE PROVIDED ON CD UPON REQUEST

I.	APPENDIX INDEX	0
A.	APPENDIX A ~ NESC Ice and Wind Loading Information	0
B.	APPENDIX B ~ Ice Storm Damage to Trees	0
C.	APPENDIX C ~ Map of Extreme Ice For ASCE Manual 7 Design	0
D.	APPENDIX D ~ February 1994 Ice Storm in the Southeastern US	0
E.	APPENDIX E ~ Icing Events During Past 10 Years in KY	0
F.	APPENDIX F ~ Ice Storm Resources	0
G.	APPENDIX G ~ KPSC News Releases	0
H.	APPENDIX H ~ Kentucky Power (AEP) Forestry Plan (sample)	0
I.	APPENDIX I ~ Back-Up Generator Information	0
J.	APPENDIX J ~ Outage / Call Management Software (sample)	0
K.	APPENDIX K ~ Blue Grass Energy EOP (sample)	0
L.	APPENDIX L ~ FEMA Disaster Reference Manual	0
M.	APPENDIX M ~ 1994 Kentucky Ice Storm Outage Investigation Report	0
N.	APPENDIX N ~ Utility Self-Assessments	0
O.	APPENDIX O ~ Utility Responses to 2 nd Data Request	0
P.	APPENDIX P ~ Public Official's Comments to the KPSC	0

PREFACE

This Ice Storm Assessment Report reviews the impact of the February 2003 ice storm on electric transmission and distribution systems (the “Utilities”) along the storm’s path as it moved through Kentucky. Differing approaches used by the various utilities in dealing with the storm are reviewed and suggestions are made for improvements and “best practices” in system design and operation.

The team made use of studies conducted by other utilities and regulatory bodies in their attempt to lessen the damaging consequences of reoccurring ice storms of this magnitude. Findings and recommendations presented in this assessment utilize the knowledge and experience of Kentucky Public Service Commission (KPSC) staff. Ideas and suggestions offered in this assessment are not at this time binding on utilities.

This assessment will be read and reviewed by a diverse audience of regulators, legislators and staff, news media, utility personnel and consumers. Therefore, it attempts to provide background and resource information in a usable format that everyone can understand and use.

Above all, the KPSC staff wishes to acknowledge the tremendous sacrifices made by the men and women who provided the numerous days and weeks of unselfish work to see that power was quickly and safely restored. We also thank affected consumers for their many acts of kindness, assistance and understanding and for their patience.

The most welcome and rewarding statement that can be made about this disastrous storm is that all affected utilities adhered to professional and safe work ethics and practices throughout the storm restoration process, with the result that no workers or customers suffered severe injuries as a result of damaged utilities or during restoration work.

Kentucky Public Service Commission Staff

EXECUTIVE SUMMARY

Following the February 2003 ice storm, the Kentucky Public Service Commission (“KPSC”) Staff reviewed storm responses and recovery efforts of the regulated utilities¹ that were most severely affected. This review assessed all aspects of utility response, from disaster planning and preparedness through the final stages of restoring service to customers. The utilities responded to requests for information from Commission staff concerning their forecasting, response planning, damage assessment, mobilization, repair activity, and customer service before and during the ice storm, as well as their general operation and maintenance practices and overall emergency preparedness. Staff reviewed the data, and where necessary, reviewed supplementary documentation requested during the review process. This assessment relies upon and draws from the provided documentation, utility inspections, site visits, and interviews with utility personnel, and upon the knowledge and experience of the KPSC staff. The report contains the results of this review. It includes lessons learned, changes made by the utilities as a result of the ice storm, and additional recommendations made by the KPSC staff.

The storm’s path crossed central Kentucky during the late night hours of February 15, 2003. Utility damage was experienced along a line beginning in Hardin County running through Lexington to Ashland and Greenup County. At approximately 10:30 PM the ice started layering onto all exposed surfaces in the Lexington area. Radial ice approximately 2 inches thick was deposited along much of the storm track. The storm was one of the most severe to occur in Kentucky in the last century.

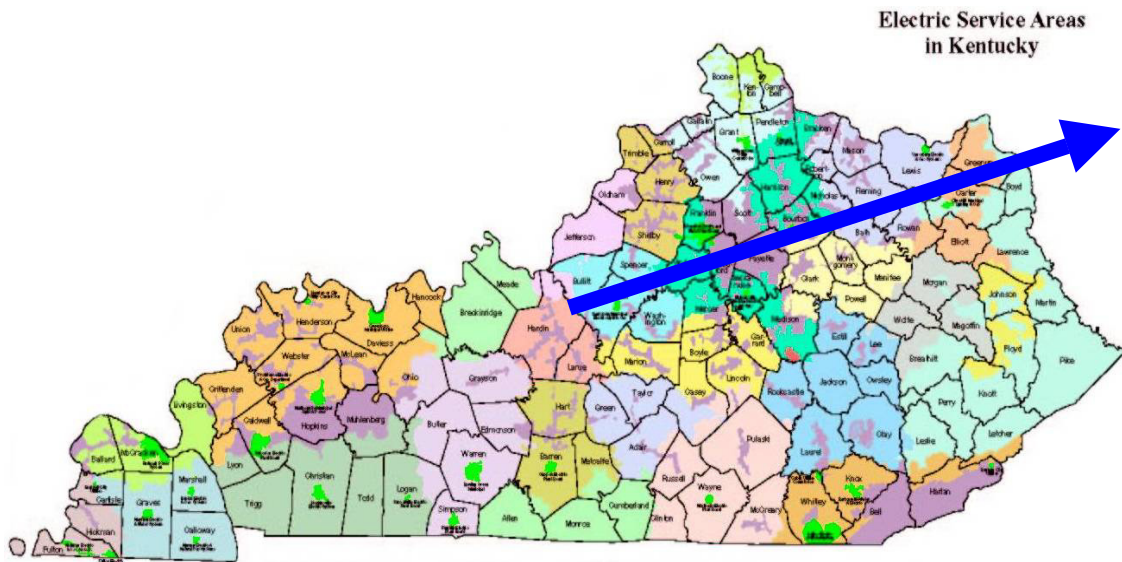


FIGURE 1: February 15 & 16 Ice Storm Track Across Kentucky

¹ Alltel, BELLSOUTH, Blue Grass Energy, CInergy (UHL&P), Clark Energy, Fleming-Mason Energy, Grayson RECC, Inter-County Energy, Kentucky Power, LGE/KU, Licking Valley RECC, Nolin RECC, Owen Energy and Salt River Electric.

The table below indicates the extent of damage the storm caused on Kentucky's regulated utilities.

<u>UTILITY</u>	<u>CONSUMERS OUT</u>	<u>PERCENTAGE OUT</u>	<u>POLES REPLACED</u>	<u>TRANSFORMERS REPLACED</u>
Alltel	24,436	9 %	701	N/A
BELLSOUTH	2,103	0.1 %	32	N/A
Blue Grass	15,000	31 %	165	53
CINergy	8,000	6 %	0	0
Clark	16,860	70 %	74	75
Fleming-Mason	17,348	80 %	397	151
Grayson	16,000	100 %	850	180
Inter-County	3,259	14 %	1	0
Kentucky Power	17,000	10 %	275	93
Kentucky Utilities ²	146,000	30 %	547	236
Licking Valley	5,300	32 %	40	5
Nolin	1,658	6 %	2	1
Owen	3,190	7 %	2	0
Salt River	5,000	13 %	23	5
<u>TOTALS</u>	281,154	8 %	3,109	799

CONCLUSIONS, FINDINGS AND RECOMMENDATIONS

The KPSC staff concludes that the utilities were adequately prepared for the February 2003 ice storm, given its extreme severity, and that the utilities' restoration efforts were diligent, effective, and well managed on the whole. The utilities' performance, though not flawless, was commendable. The utilities have made changes in their outage prevention and restoration programs, which the Commission staff endorses. Additional changes recommended by the Commission staff that should improve these practices are detailed on the following pages.

Finally, the assessment concludes that the utilities' line workers and field personnel deserve special recognition for their part in the restoration effort. These men and women spent long hours performing dangerous tasks under difficult conditions in order to restore power to hundreds of thousands of Kentuckians. They can be proud of their achievements and assured of the public's gratitude.

¹ Alltel, BELLSOUTH, Blue Grass Energy, CINergy (UHL&P), Clark Energy, Fleming-Mason Energy, Grayson RECC, Inter-County Energy, Kentucky Power, LGE/KU, Licking Valley RECC, Nolin RECC, Owen Energy and Salt River Electric.

² The total includes 5,000 customers of LG&E, KU's sister company.

KEY FINDINGS

The assessment by the Commission staff resulted in the following key findings:

1. The severity of the ice storm, as measured by the number of customer outages and damage to distribution facilities, was unprecedented on a statewide basis.
2. Trees or limbs falling onto distribution lines caused the majority of outages during the ice storm. There is a direct correlation between the proximity of trees to utility lines and the integrity of the lines. Adequate right-of-way maintenance and tree trimming are essential in order to minimize the number and severity of outages due to storms. However, even more aggressive trimming would have had little effect in lessening the devastation of this major storm.
3. The cost of the restoration estimated by the utilities was approximately \$22.5 million for KU and approximately \$24.7 million for the other utilities combined. The majority of the electric cooperatives expenses are eligible for Federal Emergency Management Administration (“FEMA”) reimbursement.
4. A major point of frustration among some local officials was the difficulty in obtaining information about the progress of restoration in specific areas. There were no means available of conveying real-time information about restoration efforts. Utility internet sites were of limited use to customers and news media reports during the restoration process, but potential exists for this medium. Communication problems with local officials were particularly evident in portions of the KU service territory outside Fayette County. Some local officials reported difficulty in reaching KU management during the first 24 to 36 hours of the storm event.
5. The regional utility equipment and supply providers seemingly did an excellent job obtaining and delivering all needed supplies (poles, wire, transformers & hardware).
6. KPSC staff had difficulty at times making contact with utility management in a timely manner.
7. The utilities have appropriate procedures in place for making advance plans for severe weather events and obtaining restoration assistance from other utilities (i.e. Mutual-Aid Agreements). Their plans were disrupted to some extent in this case because the storm unexpectedly increased in intensity and breadth as it moved through the state. Also, most neighboring utilities were hesitant to release their force and contract crews until they were certain that the ice would not be damaging to their own system.
8. Some of the affected utilities had not reviewed and updated their Emergency Operation Plan (“EOP”) recently.
9. Some of the affected utilities did not have access to information concerning available contractors and equipment rental services.

10. The utilities' efforts to deal with the high volume of telephone calls they received were commendable, but additional resources should be allocated to this purpose by the utilities in general.
11. As a result of the ice storm, a need for improved communications with Spanish-speaking customers was identified.
12. Assertions have been made that improvement in the design, inspection and maintenance of the utilities' electric distribution systems would make them less vulnerable to major storms. While there may be isolated areas that need improvement, the assessment did not indicate that significant outages during the ice storm were attributable to the design or age of the distribution systems or to pre-existing conditions on the systems. Similarly, areas of underground utilities were not locally affected but possibly experienced outages due to damage of overhead facilities that provided incoming power or phone service. The conversion from overhead to underground utilities, while being a possible tool to reduce future storm damages, is very difficult to economically and operationally justify except in specific instances. This subject is much too complex to be included in this assessment to any greater extent.
13. Increasing the use of alternate feeds, as proposed by some customers, would not be of significant benefit in reducing outages during storms of this magnitude. Similarly, greater use of distributed generation would be of limited benefit in reducing weather-related outages.
14. Assertions have been made that some of the utilities assigned fewer restoration workers to certain areas than to other parts of their service territory that incurred similar damage from the ice storm. The assessment indicates that the ice buildup in some areas peaked later than in other areas and was greater than anticipated.
15. This assessment found no discrimination among geographical areas by any of the utilities in their storm restoration efforts. There were fewer restoration workers per outage in some parts of the utilities' systems during the first day of storm restoration due to several factors, including the fact that the ice storm began on one side of the area and passed across the utilities territory. Consequently, the first available off-system resources were deployed in population centers where initial damages were defined. The utility assessment teams must ensure that all population centers are included in the initial assessment. KU initially focused nearly all of its resources in Fayette County delaying restoration of power in the communities of Anderson and Woodford counties. The restoration efforts were also controlled by the limited access due to road closings and travel restrictions.
16. The utilities' restoration priorities of addressing safety-related situations, emergency services, and critical infrastructure needs, and then to restore service to the largest numbers of customers in the shortest period of time were deemed appropriate by KPSC staff.

17. Predicting restoration times for customers is a very difficult and unreliable process. Customers tend to be very frustrated when they find themselves still without power at the predicted restoration time. Their anxiety can be alleviated somewhat by the utilities' ability to provide accurate status updates of the existing outages to the extent practical and to educational preparedness/training of the customer prior to such conditions.
18. At the time their power lines were damaged by the storm, or at the time their power was restored, a small percentage of customers suffered property damage because of open neutral conditions or other related service abnormalities. Prudent inspections prior to re-energizing lines, good communications with local electrical inspectors and public awareness can reduce or prevent such instances in the future.
19. Kentucky's electric utilities have emphasized safety precautions that should be taken around downed power lines. The message, which was emphasized from the outset during the ice storm, clearly has taken hold in the public consciousness, as evidenced by the absence of any injuries caused by downed lines.
20. There was some delay by utilities in communicating the fact that property owners are responsible for repairs to property connections. It was learned that customers generally do not understand where the utility's responsibility ends and theirs begins.
21. Tree trimming or removal of trees near power lines by property owners themselves or their contractors resulted in two fatalities shortly after the restoration was completed.
22. The utilities' line workers and field personnel deserve special recognition for their extraordinary work during the restoration effort. The safety record of all line workers, tree crews, and other personnel is to be commended. Despite the long duration of the ice storm restoration process, and work being conducted in very hazardous conditions, there were no serious injuries or accidents reported to the KPSC. Commission staff congratulates the utilities in their attention to safety during the restoration process.

RECOMMENDATIONS

The Commission staff makes the following recommendations based upon their findings and experience that should improve the utilities' prevention and restoration practices. In addition, the utilities have identified lessons learned from the storm and are implementing changes as well. The Commission staff has reviewed these changes and endorses them.

1. In planning for future storms utilities should make every effort to ensure that an adequate number, based on the individual utilities' need, of telephone lines are available to customers for incoming calls to the call centers, as well as having sufficient queue size for efficient management of the call volume imposed by major storms. The number of customers is steadily increasing; thus, the utilities cannot appropriately assume that the February 2003 Ice Storm is the worst storm they will ever face. Telephone systems and call center personnel adequate to meet the requirements of the February 2003 Ice Storm may not be sufficient for future planning purposes.
2. The addition of Spanish-speaking employees to customer service and public communication staffs should be considered.
3. The utilities should give additional attention to right-of-way maintenance and system inspections to maintain and improve system reliability. Consideration should be given to the clearing of rights-of-way versus merely trimming. A proper balance must be attained between aesthetic benefits to the community and the risk of substantial societal costs associated with the types of major storms to which Kentucky is vulnerable. All utilities should carefully examine their tree-trimming practices and their interpretation, as well as enforcement of those practices to determine whether improvements can be made to minimize the risk of damage to utility distribution systems during storms.
4. A below-ground-line pole inspection and treatment program should be ongoing at the industry recommended interval.
5. A program to replace all excessively aged and/or damaged conductors is highly recommended.
6. It is noted that the use and installation of "bundled conductor" for primary feeders has been on the increase for several years. KPSC staff recommends that the engineering design criteria for this construction be reviewed to ascertain that adequate safety/overload factors are being used in light of the increased ice loading that Kentucky has experienced in recent years. The increased ice loading subjects the mounting bracket on each pole to extreme stress. Failure of a single bracket can initiate a cascading mechanical failure of adjoining structures such as the one occurring near Fayette Mall in Lexington during the 2003 ice storm.

7. A high degree of emphasis should be placed on R/W clearing and inspection / maintenance for three-phase feeder circuits. In general, if these circuits remain intact and energized the remainder of the distribution system can be repaired/re-energized much sooner.
8. The utilities should develop, continually maintain, update and review their Emergency Operations Plans (EOP).
9. The utilities should continue their policy of providing increased assistance to customers with medical needs. As storms approach, the utilities should contact medical alert customers, or their caretakers, at the earliest time the impact and extent of a major storm becomes known to the utilities and encourage them to make alternative shelter arrangements. The utilities should continue to evaluate each storm, seek customer feedback, and determine the most effective means of contacting medical alert customers.
10. The Commission staff recommends that the utilities ensure that elected officials in all areas of their service territory have a means of access to information regarding storm restoration progress.
11. A storm preparedness position or contact employee should be established at each utility. This person should be responsible and accountable for establishing, reviewing and maintaining the utility's disaster preparedness and restoration procedures. This person should also make regular contact with the Kentucky Emergency Management offices in their territory. They could also serve collectively with their peers on a statewide disaster planning/restoration task force.
12. The utilities should make an effort to detect and eliminate improper or damaged neutral and/or grounding connections during the power restoration process. In particular, utilities should inspect their distribution tap lines for connections that may have the neutral disconnected from the utility's main line neutral (this is known as an "open neutral" condition) or other similar circumstances. Prudent inspections prior to re-energizing lines, good communications with local electrical inspectors, and public awareness can reduce the number of incidents resulting from damaged customer service lines.
13. An inspection and all necessary follow-up work should be conducted for aerial crossings of limited access highways. It should be ascertained that all such crossings are in accordance with the National Electrical Safety Code (NESC) requirements that they be constructed to meet Grade B standards.
14. Each utility should at least have a limited working relationship with two or more construction contractors providing services in the state. This allows for much quicker and smoother emergency assistance when needed. It would also be

- beneficial to have a working agreement or Storm Work contract in place with all details such as billing, crew size, safety rules, etc. agreed upon in advanced.
15. Information about the customer's responsibility for repairs to property connections, and proper inspection of those repairs, should be a point of emphasis in initial communication efforts in future events that damage significant numbers of property connections. Improving customer education about their responsibility will help utilities restore power safely and decrease customer frustration.
 16. Utilities should consider establishing "Restoration Information" Web sites that could convey the information about the status of restoration efforts in specific areas.
 17. Safety during extended storm cleanup should be a public information point of emphasis.
 18. Utilities should monitor local media and respond as quickly as possible to misinformation. In the initial stages of a disaster, it may be worthwhile to make company officials available to as many as possible of the media outlets conducting call-in shows in order to insure that correct information reaches the public. Because this likely would overwhelm the regular media relation's staff, it may be worthwhile to provide media training to a number of other personnel who could fulfill this function in case of emergency.
 19. Utilities should consider conducting briefings and facility tours for members of the media in order to familiarize them with disaster response. This could be an event linked to the onset either of winter or the spring severe storm season. Topics covered could be mutual aid agreements, pre-positioning of material, disaster plans and safety issues.
 20. In major disasters affecting utilities, the KPSC, working in close cooperation with the affected utilities, should quickly take an active role in informing the public about safety issues, restoration efforts and other areas within its purview. KPSC staff should be available as needed to reinforce and supplement communication efforts by utilities. The KPSC also should make a spokesperson available as needed at media briefings in the affected area.
 21. The communications from the utilities through the KPSC to the Kentucky Emergency Operations Center in Frankfort were efficient particularly after an email reporting method was established. It is recommended that the KPSC staff review the update forms annually and the contact lists to ensure their accuracy.
 22. Commission Staff should amend its periodic utility inspection program to include ascertaining that the utilities' Emergency Operations Plans have been adequately reviewed.
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