Section 1: Introduction

KAMO Electric Cooperative, Inc. (KAMO) was established in 1941 to provide its member cooperatives with safe, low-cost, reliable power. KAMO Power, with headquarters in Vinita, Oklahoma, is a Generation and Transmission (G&T) cooperative serving 17 member distribution cooperatives in northeast Oklahoma and southwest Missouri (8 being in Missouri). KAMO is one of six G&T utilities that own Associated Electric Cooperative, Inc. (AECI). AECI provides the capacity and energy needs for KAMO and the other five G&T's. This cooperative, as all cooperatives in Missouri, is run by a board of 17 Directors which approve the company's mission and internally developed Policy:

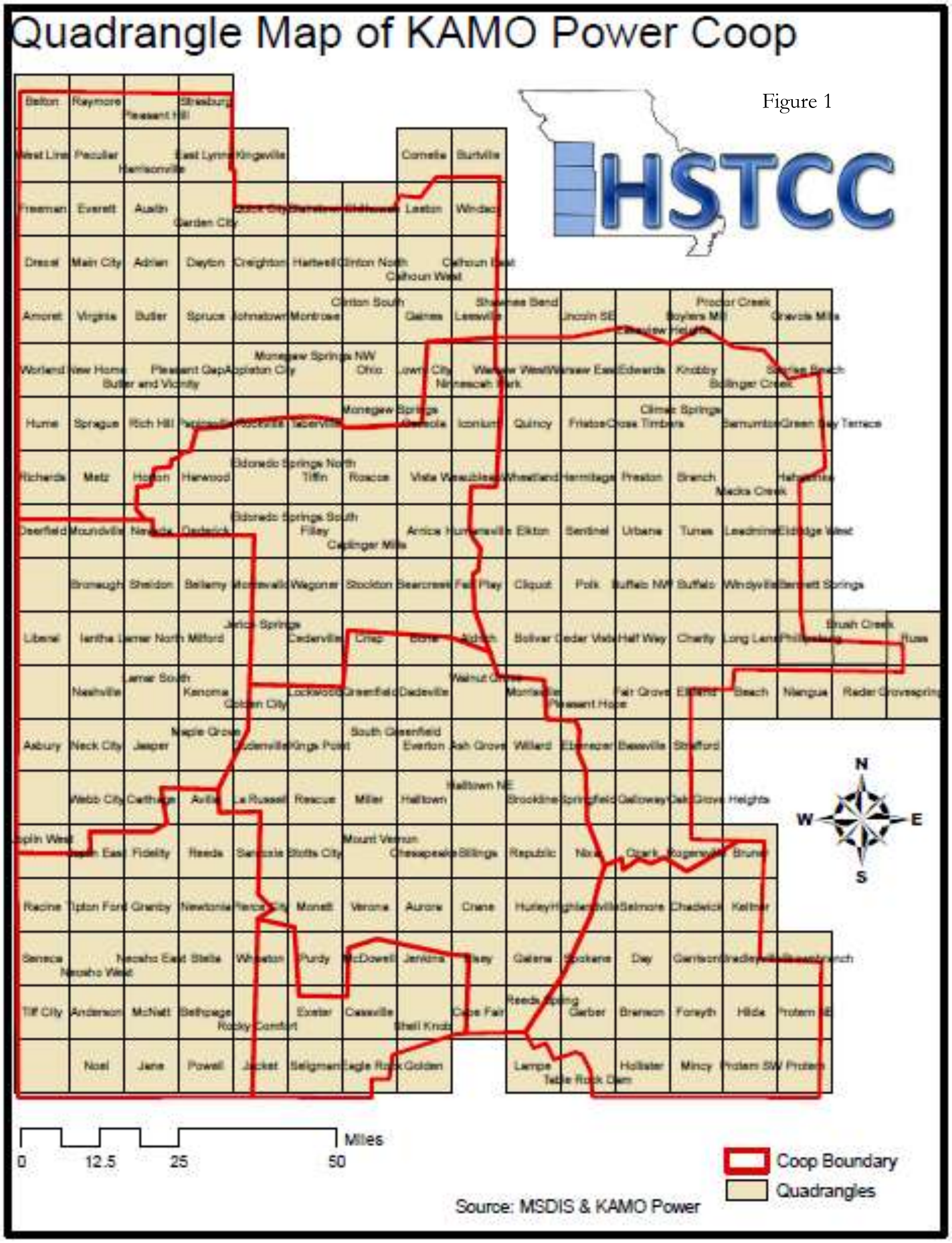
> *"KAMO Power exists to serve the needs of its member cooperatives by providing safe, low-cost, reliable power. KAMO accomplishes this through its high voltage transmission network, qualified and dedicated personnel, effective system operations, maintenance and planning and long term rate stability."*

KAMO's service boundaries within the state of Missouri include 17 counties almost in their entirety (those being McDonald, Barry, Newton, Lawrence, Jasper Dade, Greene, Dallas, Polk, Cedar, Barton, Vernon, St. Clair, Hickory, Henry, Bates, and Cass), as well as the western portions of Stone, Christian, Webster and Camden County. The southern portion of Benton County and a small portion in Taney around the generation corridor are also a part of KAMO area. The cooperative owns 1,269.25 miles of transmission lines within these counties. Figure 1 depicts the geographic boundaries of the cooperative in relation to USGS local quadrangles within the state of Missouri. *(Map sources: www.usgs.gov, KAMO, MSDIS.)*

The customer base of KAMO is 8 distribution member cooperatives in Missouri; these 8 distribution cooperatives are served by 136 substations owned by KAMO. These 8 cooperatives, in turn serve 159,933 customer/members. Table 1.1 shows these 8 customers of KAMO.

Table 1.1 Missouri KAMO Distribution Cooperative Customers

Cooperative	Customers
Barry Electric Cooperative	9,669
Barton County Electric Coop	6,399
New-Mac Electric Coop	16,765
Osage Valley Electric Coop	15,627
Ozark Electric Cooperative	31,067
Sac Osage Electric Coop	10,757
Southwest Electric Coop	35,334
White River Valley Electric	34,315
Totals	159,933



Annual total sales to member cooperatives for 2010 was 3,034,694 megawatt-hours. Population density for the cooperative service area is depicted in Figure 2 (*Map source: U.S. Census 2010 and MSDIS*).

Population Density for KAMO Coop

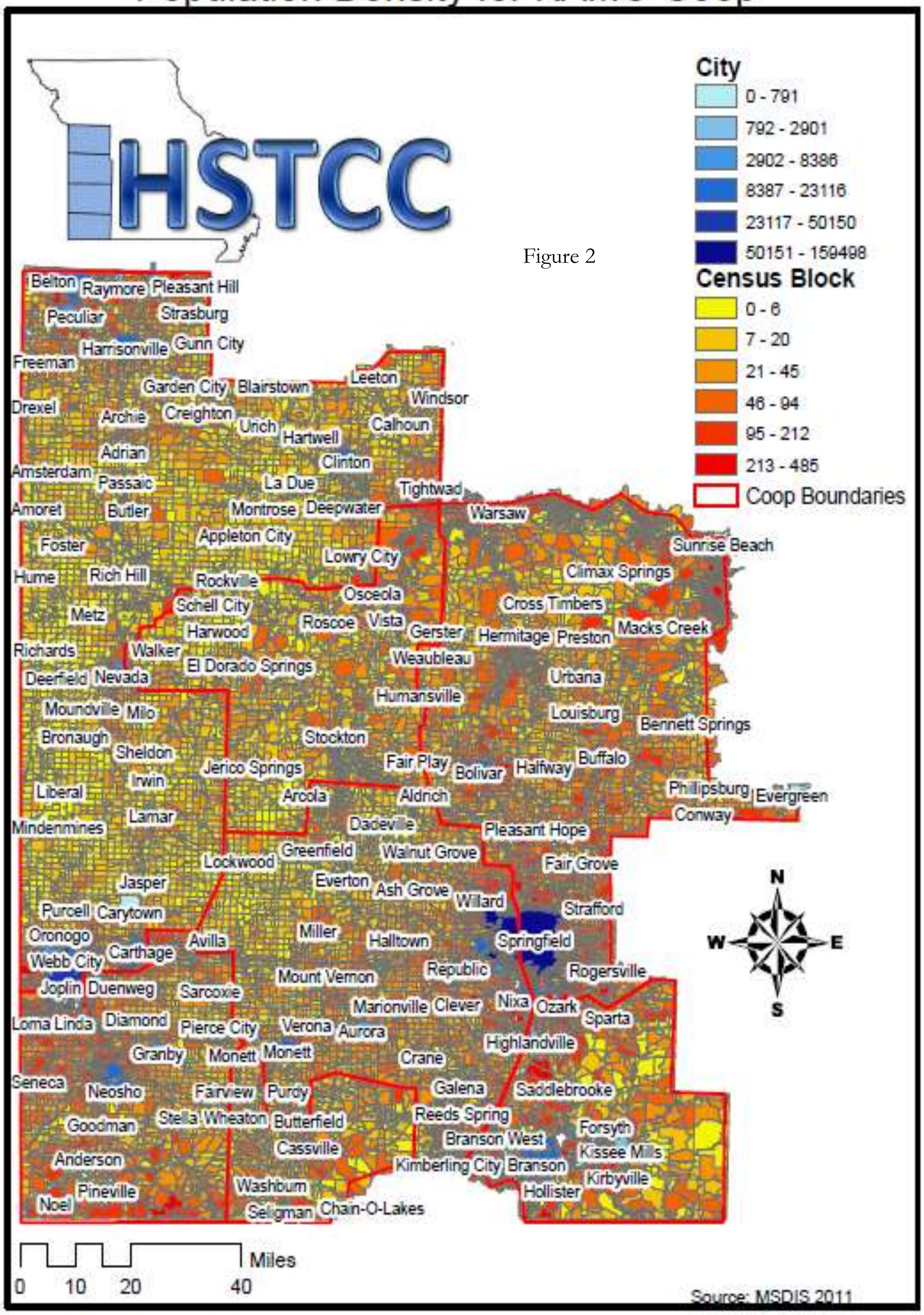


Figure 2

Section 2: Planning process:

Through a partnership between the Association of Missouri Electric Cooperatives and the Missouri Association of Councils of Government, the Harry S Truman Coordinating Council was contracted to facilitate a hazard mitigation planning process for KAMO. The initial meeting between the two entities was held on January 25, 2011 as part of a regional kick-off meeting for southwest Missouri. This informational meeting provided the basic responsibilities for each agency and allowed for initial discussion concerning the project timelines, data collection and other pertinent topics. Additional information was provided by KAMO staff via email, such as business structure, customer information, critical facilities information, and asset inventory by type and location.

One formal meeting was held at the KAMO offices in Vinita, Oklahoma on November 2, 2011. Table 1.2 summarizes the attendees and topics of this meeting. Meeting highlights are available in the chapter appendix.

Table 1.2	**KAMO Planning Meeting Synopsis**	
Meeting Date	**Attendees, Title, Organization**	**Topics of discussion**
Ongoing communication via email	Keith Harrison, Dir. Of Operations, KAMO Gloria Bottom, HSTCC Staff	KAMO business structure Customer information Critical facilities information Asset inventory by type and location
November 2, 2011	Keith Harrison, Dir. Of Operations, KAMO Ted Hilmes, Chief Operating Officer Daryl Lawrence, GIS Analyst Ann Hartness, Chief Financial Officer	Data collection review Current mitigation strategies Establishment of goals, actions, and objectives Method of prioritization Prioritization of goals, actions, and objectives

Public Involvement

As with all public hazard mitigation plans, public involvement was encouraged through a variety of methods. KAMO's local chapter was posted on the Harry S Truman website inviting both cooperative members and the general public to provide comment. Print copies of the chapter were also made available upon request through the local office. Comments from neighboring jurisdictions were also solicited using the standardized AMEC letter which was mailed to the appropriate contacts, including:

- County Commissioners in the following counties
    - Barry
    - Barton
    - Bates
    - Benton
    - Camden
    - Cass

  - Cedar
  - Christian
  - Dade
  - Dallas
  - Greene
  - Henry
  - Hickory
  - Jasper
  - Lawrence
  - McDonald
  - Newton
  - Polk
  - St. Clair
  - Stone
  - Taney
  - Vernon
  - Webster
- local emergency management directors, and
- The local Red Cross chapter.

KAMO provides generation and transmission services to eight transmission cooperatives and thus does not provide service directly to any critical facilities (hospitals, emergency services, etc.), higher education institutions, or large industrial centers. Additionally, KAMO's mitigation plan was included in the public comment period for the combined AMEC plan.

Section 3: Asset inventory

KAMO Electric Cooperative has a wide variety of assets by type. Real estate owned by the company includes office buildings, warehouses, garages, and other outbuildings throughout the service area in Missouri. 40 vehicles provide access to customers and infrastructure. KAMO owns and maintains 1,269.25 miles of transmission lines and 136 substations to provide generation and transmission services to its eight Missouri distribution cooperatives. As a generation or transmission coop, KAMO does not own any distribution lines or infrastructure. Table 1.3 provides information concerning total asset valuation.

Ensuring quality distribution to its customers, KAMO maintains transmission lines and substations scattered throughout its service territory. Table 1.4 includes a list and quantity of transmission lines and substations by county.

Both tables are as follows:

Table 1.3	KAMO Asset Inventory Valuation Summary in Missouri	
Asset	**Total Replacement Cost**	**Cost breakdown**
Total KAMO Assets	$1,062,580,722	
Transmission Lines	$737,080,722	69kV – $679,782,017 161kV - $57,298,705
Substations	$311,000,000	69kV - $246,000,000 161kV – 65,000,000
Office Buildings	$5,000,000	
Vehicles & Equipment	$7,000,000	
Mobile Substations	$2,000,000	
Microwave Towers	$500,000	
Source: Internal KAMO Accounting and Insurance records, 2011		

Table 1.4	KAMO Asset Inventory by Service County			
County	**Number of Substations**	**Replacement Cost of Substations**	**Miles of Transmission Line**	**Replacement Cost of Lines**
Barry	9	21,000,000	85.15	48,243,436
Barton	4	8,000,000	47.27	26,781,764
Bates	3	9,000,000	53.91	30,543,789
Benton	4	8,000,000	35.24	19,965,927
Camden	5	13,000,000	28.17	16,472,509
Cass	7	17,000,000	50.37	28,538,131
Cedar	5	13,000,000	69.8	46,521,219
Christian	10	26,000,000	69.5	42,571,597
Dade	5	13,000,000	57.5	32,577,775
Dallas	3	6,000,000	24.06	13,631,674
Greene	8	16,000,000	46.28	28,476,750
Henry	7	17,000,000	91.01	51,563,536
Hickory	3	6,000,000	27.79	15,744,980
Jasper	4	11,000,000	47.8	27,082,046
Lawrence	4	8,000,000	55.43	31,404,975
McDonald	7	14,000,000	51.13	28,968,724
Newton	8	19,000,000	83.39	47,246,272
Polk	5	10,000,000	86.35	50,817,025
St. Clair	7	17,000,000	62.75	35,552,268
Stone	13	26,000,000	61.62	34,912,043
Taney	9	18,000,000	56.81	32,186,842
Vernon	6	15,000,000	75.87	46,115,972
Webster	0	0	2.05	1,161,469
Total	**136**	311,000,000	**1,269.25**	737,080,722
Source: Internal KAMO Accounting and Insurance records, 2011				

Section 4: Identified Hazards and Risk Assessment Methodology

Natural hazards in southwest Missouri vary dramatically with regard to intensity, frequency, and the scope of impact. Some hazards, like earthquakes, happen without warning and do not provide any opportunity to prepare for the threat. Other hazards, such as tornadoes, flooding, or severe winter storms, provide a period of warning which allows for public preparation prior to their occurrence. Regardless, hazard mitigation planning can lessen the negative of any natural disaster regardless of onset time. The following natural hazards have been identified as potential threats for the service region of the KAMO Electric Cooperative:

- Tornadoes
- Severe Thunderstorms, Hail, and High Winds
- Flood and Levee Failure
- Severe Winter Weather
- Earthquakes
- Dam Failure
- Wildfire
- Sinkholes

Likewise, a number of hazards may be eliminated from consideration in their local plan due to the state's geographic location including tsunamis, hurricanes, coastal storms, volcanic activity, avalanche, and tropical storms. Additionally, a number of hazards may be eliminated specifically for KAMO because of asset types and geographic location in the state of Missouri. Those hazards eliminated for the KAMO service region include:

- Drought
- Heat Wave
- Severe land subsidence
- Landslides

Although drought can potentially impact southwest Missouri, water availability does not directly impact the delivery of electric service to KAMO customers. Similarly, heat wave has been eliminated. Though it may result in additional usage and potentially tax the system, heat waves do not usually cause infrastructure damage to cooperative assets. The results of a heat wave in the KAMO service area may be considered cascading events rather than damage caused directly by the hazard itself. Land subsidence and landslides have also been eliminated based upon local soil structure categorization by the USGS. Limestone, carbonate rock, salt beds, and other naturally dissolving rock which are most susceptible to the formation of sinkholes are in karst areas. The KAMO area includes the Springfield and Salem Plateau sub-province of the Ozarks Plateau (as well as being in the Central lowlands which is not karst). Few sinkholes have occurred in this area of KAMO except in the small portion of the Salem Plateau. Only 18 substations and 164 miles of line are within this area, and no sinkhole has impacted KAMO. Sinkholes will be addressed but only precursory, as KAMO does not consider sinkholes as a threat.

For the purpose of this risk assessment, the identified hazards for the KAMO service area have been divided into two categories: **historical and non-historical hazards**.

> **Historical Hazards** are those hazards with a measurable previous impact upon the service area. Damage costs per event and a chronology of occurrences are available. The associated vulnerability assessments utilize the number of events and cost of each event to establish an average cost per incident. For KAMO, hazards with historical data include tornadoes, severe thunderstorms/high wind/hail, flood and levee failure, severe winter weather, sinkholes and wildfire.
>
> **Non-historical Hazards** are hazards with no previous record of impact upon the local service area. As such, the associated vulnerability assessments for each of these hazards will have an occurrence probability of less than 1% in any given year, but the extent of damage will vary considerably. For KAMO, hazards without historical data include earthquakes and dam failure.

Probability of Occurrence

In determining the potential frequency of occurrences, a simple formula was used. For historical events, the number of recorded events for the service area was divided by the number of years of record. This number was then multiplied by 100 to provide a percentage. This formula was used to determine future probability for each hazard. For events that have not occurred, a probability of less than 1% was automatically assigned as the hazard cannot be excluded from the possibility of occurrence. Likewise, when discussing the probable risk of each hazard based upon historical occurrences, the following scale was utilized:

- Less than 1% chance of an event occurrence in any given year.
- 1-10% chance of an event occurrence in any given year
- 10-99% chance of an event occurrence in any given year
- Near 100% chance of an event occurrence in any given year

The number of occurrences was further refined to focus on damage-causing events. Those occasions which had reported damages were divided by the total number of recorded events to obtain a percentage of total storms which result in infrastructure damage. (Formula: Number of damage-causing events / total number of events = Percentage of occurrences which cause damage.)

Potential Extent of Damage

Vulnerability Assessment matrices for each hazard are included on the following pages. These worksheets detail loss estimates for each hazard affecting the cooperative's service area. Loss estimates were calculated using the asset summary created by internal KAMO accounting records. Each hazard has a unique impact upon the service area, requiring each hazard to utilize a different valuation amount depending upon the level of impact.

Non-historical hazards assume damage to all general assets. For Historical Hazards, assets were divided into two groups based upon historical impact which were utilized in the hazard damage analysis:

- Generation and transmission infrastructure assets and buildings
    - Used for Tornado damage assessments
    - Valued at $1,053,080,722
- Generation and transmission infrastructure assets only
    - Used for:
        - Severe Thunderstorm / High Wind / Hail
        - Flood
        - Severe Winter Weather
    - Valued at $1,048,080,722

In addition, historical hazards with recorded damages were used to identify an average cost per event. (Formula: Total cost of damages / total number of events = Average damage cost per event.) When discussing the extent of potential damages for all hazards, the following scale was utilized:

- Less than 10% potential damages to total cooperative infrastructure
- 10-25% potential damages to total cooperative infrastructure
- 25-50% potential damages to total cooperative infrastructure
- More than 50% potential damages to total cooperative infrastructure

Regardless of hazard categorization, the following matrix (Table 1.5) will be utilized to identify the potential damage extent and likelihood of occurrence for each natural hazard type.

Table 1.5 **Sample KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix Hazard: ____________**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Damage Extent of	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

In many instances, natural hazard events occur without causing significant damage to the cooperative's infrastructure. The more significant impact of natural hazard episodes comes in the form of reported customer outages. The infrastructure may not be significantly harmed by an ice storm, but may result in prolonged and widespread outages in the cooperative's service area. In considering the potential impact of a hazard, loss of function provides a more concise picture for comparison of events and geographic regions of the state. In addition to system damage, each hazard will be evaluated on the average number of reported or estimated outages per event occurrence. (Formula: Average number of outages reported / Total number of customers = Average percentage of outages reported per event)

<table>
<tr><td colspan="2" rowspan="2">Table 1.6

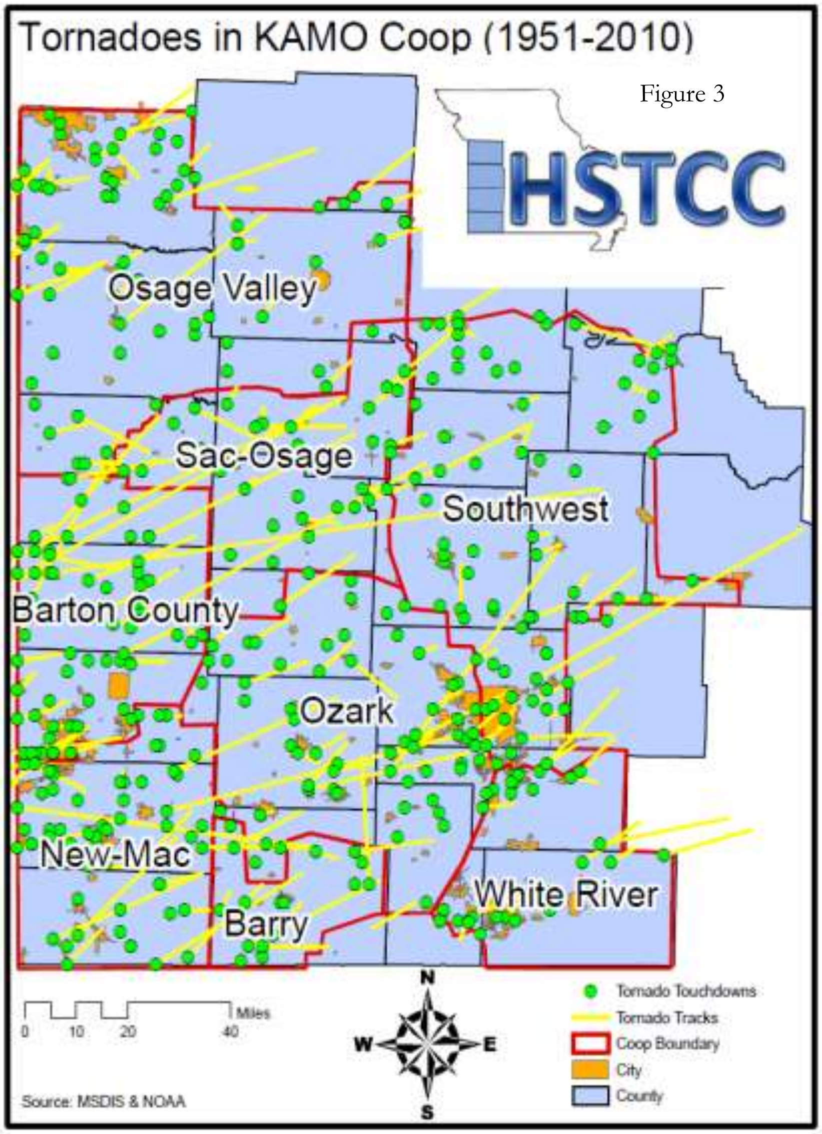
Sample KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix
Hazard: ____________</td><td colspan="4">Probability of Damage-causing Hazard Occurrence</td></tr>
<tr><td>Less than 1% in any given year</td><td>1-10% chance in any given year</td><td>10- 99% chance in any given year</td><td>> Near 100% probability in any given year</td></tr>
<tr><td rowspan="4">Potential Extent of Impact</td><td>Less than 10% of customers report outages</td><td></td><td></td><td></td><td></td></tr>
<tr><td>10-25% of customers report outages</td><td></td><td></td><td></td><td></td></tr>
<tr><td>26-50% of customers report outages</td><td></td><td></td><td></td><td></td></tr>
<tr><td>More than 50% of customers report outages</td><td></td><td></td><td></td><td></td></tr>
</table>

Section 5: Risk Assessment

A) Historical Hazards:

Tornadoes

In the last 60 years, 434 tornadoes have been reported within the KAMO cooperative boundaries. Figure 3 provides a pictorial representation of all recorded tornado touchdown sites and recorded path. *(Data for map collected from NOAA and MSDIS.)*



A data insufficiency exists, however, between 1968 and 2005 in both historical hazard records and cooperative records concerning damage estimates. For the purpose of this assessment, the years for which records exist for both data sets have been used. From 2006-2010, KAMO's service area within the state of Missouri has experienced a total of 91 tornadic events. Using the previously described methodology, the probability of a tornadic event in the KAMO service area in any given year is near 100% (91 events / 5 years = 1820%). Estimated cooperative material damages associated with each of these events were compiled by KAMO staff. 12 of the 91 occurrences caused damage to cooperative assets, resulting in a 13.2% probability that any given tornadic occurrence will produce damage. Table 1.7 provides a summary of event dates, EF-scale ratings, damage cost estimates and outages reported.

Table 1.7	KAMO Tornadic Event Summary						
Date of event	**EF Scale rating**	**Damage estimates**	**Outages Reported**	**Date of event**	**EF Scale rating**	**Damage estimates**	**Outages Reported**
3/12/2006	F2	$8,771	13,114	5/10/2008	F4	$262,426	See other 5/10 event
3/12/2006	F2	$26,140	See above	5/8/2009	F1	$2,069	12,922
3/12/2006	F3	102,529	See above	5/8/2009	F2	$27,898	See above
3/12/2006	F3	$17,531	See above	5/8/2009	F1	$5,320	See above
3/12/2006	F1	$44,627	See above	5/8/2009	F1	$9,236	See above
5/10/2008	F1	$4,522	8,174	5/8/2009	F0	$199	See above
Data provided based on internal KAMO records which reflect cost from the referenced event year.							

Based upon the last five years of historical event records, the average tornado to affect the cooperative will include an EF1-EF2 rating, causing an average damage cost of $42,606 per event ($511,268/12 events = $42,606). This averaged amount accounts for less than 1% of KAMO's total overhead assets and building valuation ($42,606 /$ 1,053,080,722 = 0.00405%). Table 1.8 demonstrates the probability of occurrence in conjunction with the potential extent of damage.

<table>
<tr><td colspan="2" rowspan="2">Table 1.8

KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix
Hazard: <u>Tornado</u></td><td colspan="4">Probability of Hazard Occurrence</td></tr>
<tr><td>Less than 1% in any given year</td><td>1-10% chance in any given year</td><td>10- 99% chance in any given year</td><td>Near 100% probability in any given year</td></tr>
<tr><td rowspan="4">Potential Extent of Damage</td><td>Less than 10% of damage to system</td><td></td><td></td><td></td><td>[shaded]</td></tr>
<tr><td>10-25% damage of system</td><td></td><td></td><td></td><td></td></tr>
<tr><td>26-50% damage of system</td><td></td><td></td><td></td><td></td></tr>
<tr><td>More than 50% damage of system</td><td></td><td></td><td></td><td></td></tr>
</table>

The only direct customers of KAMO are the eight distribution cooperatives served by KAMO. Those coops serve an average 2851 customers who have been affected by an outage due to a tornado. When compared with the total number of customers served by KAMO (159,933), it can be projected that 1.8% of all customers may report outages during any given tornadic event. Table 1.9 demonstrates the probability of occurrence in conjunction with the potential extent of impact upon local customers.

Table 1.9 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: <u>Tornado</u>**		Probability of Damage-causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages			■	
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Severe Thunderstorms, High Wind, and Hail

From 2006-2010, KAMO's service area within the state of Missouri has experienced a total 922 hail events and 212 thunderstorm/high wind events. Therefore, the probability of a hail event in the KAMO service area in any given year is near to 100% (922 events / 5 years = 18440%) while the probability of a thunderstorm/high wind event in any given year is near to 100% (750 events / 5 years = 15000%). None of the hail occurrences caused damage to cooperative assets, resulting in a less than 1% probability that any given hail occurrence will produce damages. With no damages reported it can be projected that it would cause less than 1 percent damages in the future to assets.

None of the thunderstorm wind occurrences caused damage to cooperative assets, resulting in a less than 1% probability that any given thunderstorm/high wind occurrence will produce damage. With no damages reported it can be projected that it would cause less than 1 percent damages in the future to assets. Table 1.10 demonstrates the probability of occurrence in conjunction with the potential extent of damage for both hail and thunderstorm/high wind events.

Table 1.10 **KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Hail/<u>Thunderstorm/High Wind</u>**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				■
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

Again, the only direct customers of KAMO are the eight distribution cooperatives served by KAMO. Those coops serve 159,933customers, none who have been affected by these hail and thunderstorm winds. It therefore can be projected that less than 1% of all customers may report outages during any given such event. Table 1.11 demonstrates the probability of occurrence in conjunction with the potential extent of impact upon local customers.

Table 1.11 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard:**		Probability of Damaging-Causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Flood and Levee Failure

Large portions of the KAMO area are located in the 100 year floodplain. Most are small rivers and streams, unlike the eastern side of the state having the Missouri and Mississippi Rivers to deal with. Levees within the area include the very small Carthage Levee which protects a small portion of Carthage industrial park. Carthage is privately powered and does not get electric from KAMO so KAMO is not affected by this one. Another levee is the Warsaw Levee which is associated with the Harry S Truman Dam and Reservoir. It protects a small portion of Warsaw. Warsaw electric is provided by KCP&L not any cooperative. Affects from this levee are probably limited but without an inundation map, affects are not clear for damages from a failure. Currently, inundation data for levee failure is lacking due to issues surrounding mapping, appropriate models, and its close association with flooding events. Accurate data is unavailable to provide maps of the area's levees. Levees have been constructed across the state and the region by a variety of public and private entities with varying levels of protection, oversight and maintenance. Figure 4 below depicts the 100 year floodplain in relation to the cooperative's boundaries. *(Map sources: FEMA HAZUS-MH; DFIRMS; Missouri Office of Administration, and Association of Missouri Electric Cooperatives.)*

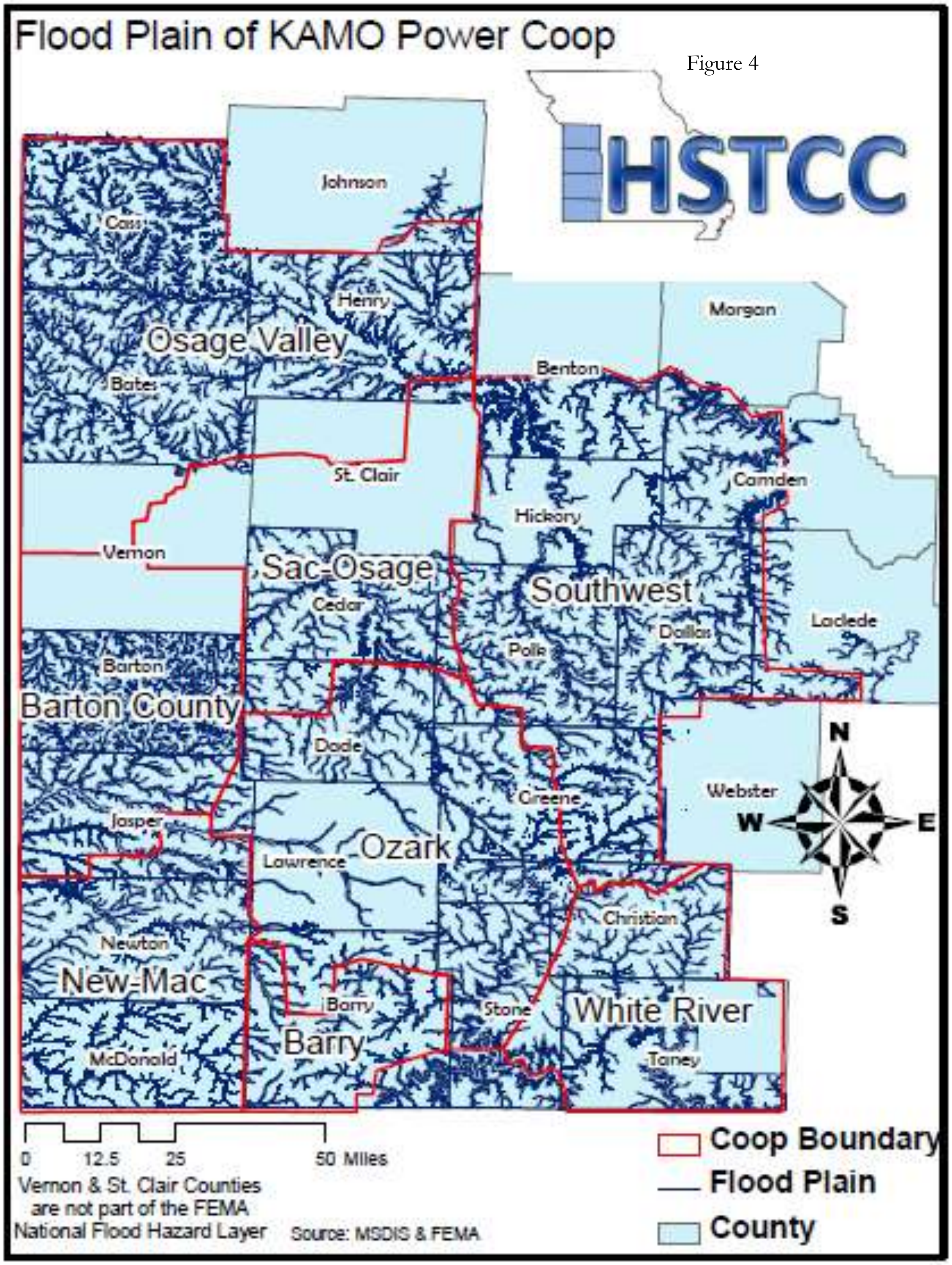

Flood Plain of KAMO Power Coop
HSTCC
Johnson
Cass
Henry
Osage Valley
Bates
Morgan
Benton
St. Clair
Camden
Hickory
Vernon
Sac-Osage
Cedar
Southwest
Laclede
Dallas
Polk
Barton
Barton County
Dade
Greene
Webster
Jasper
Ozark
Lawrence
Christian
Newton
New-Mac
Barry
Stone
White River
Barry
McDonald
Taney
N
W
E
S
0 12.5 25 50 Miles
Vernon & St. Clair Counties are not part of the FEMA National Flood Hazard Layer
Source: MSDIS & FEMA
Coop Boundary
Flood Plain
County

Figure 4

From 2006-2010, KAMO's service area has experienced 184 flooding events. Therefore, the probability of a flood event affecting the cooperative assets in any given year is near 100% (184 events / 5 years = 3680%). Again, none of the 184 occurrences caused damage to cooperative assets, resulting in a less than 1% probability that any given flood occurrence will produce damage.

Flood events vary widely based upon numerous factors including, of course, annual precipitation. There were no damages due to flooding within the KAMO area to KAMO assets. Therefore the damages to the system would be estimated to be less than 1 percent of all assets. Table 1.12 demonstrates the probability of occurrence in conjunction with the potential extent of damage.

Table 1.12 **KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Flood**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	≥100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

No outage reports coincided with flood events. Therefore the estimate for outages due to flooding would be less than 1 percent. Table 1.13 demonstrates the probability of occurrence in conjunction with the potential extent of impact upon local customers.

Table 1.13 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Flood**		Probability of Damage-Causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Severe Winter Weather

From 2006-2010, KAMO's service area has experienced a total of twenty-four winter weather events, including significant snowfall and ice storms. Therefore, the probability of a severe winter weather event in the KAMO service area in any given year is near 100% (24 events / 5 years = 480%). Estimated material damages associated with each of these events were compiled by KAMO staff. Table 1.14 provides a summary of event dates, types, associated damage estimates, and reported outages. Three of the twenty-four occurrences caused damage to cooperative assets, resulting in a 12.5% probability that any given severe winter weather occurrence will produce damage. (3 / 24 = 12.5%). This is the greatest threat to KAMO assets with one event causing about $1.6 Million damages.

Table 1.14	**KAMO Severe Winter Weather Event Summary**			
Event date	**Event type**	**Damage estimates**	**Outages reported**	**FEMA declarations**
1/12/2007	Ice Storm	$1,582,333	96,060	DR-1676
12/9/2007	Ice Storm	$30,308 for 12/9-12/10 event	19,208	DR-1736
12/10/2007	Ice Storm	See above	See above	DR-1736
Data provided based on internal KAMO records which reflect cost from the referenced event year.				

Based upon these historical records, the average severe winter weather event to affect the cooperative will cause an average damage cost of $322,528 ($1,612,641 / 3 events = $322,528). This averaged amount accounts for less than 1% of KAMO's total overhead asset valuation ($322,528 / $1,048,080,722 = 0.031%). Table 1.15 demonstrates the probability of occurrence in conjunction with the potential extent of damage.

Table 1.15 **KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: <u>Severe Winter Weather</u>**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

The only direct customers of KAMO are the eight distribution cooperatives served by KAMO. During the January 2007 ice storm, most if not all, of these cooperatives reported significant outages. Certainly some of these outages were due to damage of KAMO transmission lines. At one time there were over 120,000 members in the dark although not all were KAMO. One of KAMO distributors had over 66% outages. (Information of the January and December storms from the AMEC website http://www.amec.org/2007Ice/2007IceStorm.html) The December 2007 winter storm event resulted in less damage and number of outages reported. Several of the cooperatives served by KAMO reported outages resulting from the December 2007 event. The historical data for the five damaging winter weather events resulted in an average of 38,423 customers reporting outages per damaging event. When compared with the total number of customers served by KAMO, it can be projected that 24% of all customers may report outages during any given severe winter weather event. Table 1.16 demonstrates the probability of occurrence in conjunction with the potential extent of impact upon local customers.

Table 1.16 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: <u>Severe Winter Weather</u>**		Probability of Damage-Causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Wildfire

The incidence of wildfire in the KAMO service area presents a unique risk assessment. Wildfire events have occurred in each of the twenty-three counties. According to the Missouri Department of Conservation, all of KAMO counties have experienced wildfires between 2004 and 2008. Table 1.17 summarizes the incidences of wildfire for these counties. The probability of a wildfire event in the KAMO service area in any given year is near 100% (351 events / 4 years = 8,775%). Therefore, for the purposes of this assessment, wildfire and its associated impacts cannot be eliminated from the realm of possibility.

Table 1.17 Wildfire summary by county

County	# of Wildfires, 2004-08	Average Annual # of Wildfires	Likelihood (1-5)	Acres Burned	Average Annual Acres Burned	Total Buildings Damaged	Vulnerability
Barry	148	29.6	2	1850.25	370	1	Medium
Barton	9	1.8	1	343.5	69	0	Low
Bates	98	19.6	1	1611.75	322	0	Medium
Benton	352	70.4	3	8333.11	1667	20	High
Camden	739	147.8	5	18464.31	3691	19	High
Cass	98	19.6	1	449	90	0	Low
Cedar	132	26.4	1	1358.5	272	2	Medium
Christian	45	9	1	319	64	2	Low
Dade	165	33	2	1617.8	324	3	Medium
Dallas	178	35.6	2	10055	2011	0	High
Greene	211	42.2	2	920.31	184	8	Medium-low
Henry	320	64	3	8990.091	1798	8	High
Hickory	86	17.2	1	1842.5	369	0	Medium
Jasper	211	42.2	2	1207	241	1	Medium
Lawrence	206	41.2	2	1159.5	232	0	Medium
McDonald	78	15.6	1	832	166	0	Medium-low
Newton	528	105.6	4	1966.58	393	31	Medium
Polk	145	29	1	882.75	177	3	Medium-low
St. Clair	217	43.4	2	6634.7	1327	4	High
Stone	139	27.8	1	1372.1	274	3	Medium
Taney	90	18	1	2988.3	598	0	Medium-high
Vernon	56	11.2	1	2386.6	477	4	Medium
Webster	203	40.6	2	2238.07	448	3	Medium
Totals	4454	890.8	1-2	77822.721	15564.544	112	Medium-High

Source: Missouri State Hazard Mitigation Plan, 2010

The potential extent of damage caused by wildfire is difficult to determine. Like earthquakes and dam failure, wildfires have had no measurable impact upon the KAMO facilities. To date, 4,454 fires have burned a total of 77,822.721 acres, for an average of 17.47 acres affected per event. KAMO sustained no damage related to wildfires in its service area during this time period. Cooperative assets are located throughout the service area rather than being located at a single central site. With an average of 17 acres per fire in the service area, it is unlikely that infrastructure damage would exceed 1% based upon asset location and un-likeliness of an uncontrollable wildfire. This initial assessment assumes a limited impact upon electric distribution infrastructure of less than 10% (Table 1.18). Further study will be required to create a model for damage assessments related to wildfire.

Table 1.18 **KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Wildfire**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				■
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

To date, no damages were reported during recorded wildfires for KAMO. It, therefore, can be projected that less than 10% of all customers may report outages during any given wildfire event. Table 1.19 demonstrates the probability of occurrence in conjunction with the potential extent of impact upon local customers.

Table 1.19 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Wildfire**		Probability of Damage-Causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages	■			
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Sinkholes

The incident of sinkholes varies widely when comparing the historical occurrences. The northwestern section of the service area is immune to sinkholes, while Greene County has 1431 sinkholes reported in the Missouri State Hazard Mitigation Plan, 2010. Most are concentrated near Greene County with the further north or south, the fewer sinks. There are several along a line to Jasper County area where there are 146. The total number of reported sinkholes reported in the Plan for the twenty-three county service area of KAMO is 2834. Table 1.20 details the number of sinkholes by county according to the 2010 Missouri State Hazard Mitigation Plan.

Table 1.20 Sinkholes in KAMO Service Area

County	Number of Sinkholes
Barry	88
Barton	1
Bates	0
Benton	1
Camden	10
Cass	0
Cedar	10
Christian	629
Dade	96
Dallas	8
Greene	1431
Henry	2
Hickory	25
Jasper	146
Lawrence	92
McDonald	7
Newton	42
Polk	88
St. Clair	9
Stone	31
Taney	65
Vernon	0
Webster	53
Total	2834

Source: 2010 Missouri State Hazard Mitigation Plan

Although there are a significant number of sinkholes in several of the counties, damages are rarely associated with these events. KAMO has no reported damages as a result of sinkholes. Although KAMO has not recorded any damages as a result of sinkholes, for the purposes of this assessment, sinkholes and their associated impacts cannot be eliminated from the realm of possible damages. Due to the number of sinkholes reported in the area, there is a high probability that they will occur in the future. When considering the historical data available, the probability of damage to KAMO facilities is low. This initial assessment assumes a limited impact upon electric transmission infrastructure of less than 1% (Table 1.21). Further study will be required to create a model for damage assessments related to sinkholes.

Table 1.21 **KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: <u>Sinkholes</u>**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

No customers have reported outages as a result of sinkholes. It can be projected that less than 10% of all customers may report outages due to any given sinkhole event. Table 1.22 demonstrates the probability of occurrence in conjunction with the potential extent of impact upon local customers.

Table 1.22 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: <u>Sinkholes</u>**		Probability of Damage-Causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

B. Non-historical Hazards

Earthquakes

The closest source of earthquake risk in northwest Missouri is the NeMaha Fault, which runs roughly from Oklahoma City, Oklahoma north to Lincoln, Nebraska. In 1993, the NeMaha fault produced a discernable earthquake that was felt in the region, rating a 2.9 on the Richter Scale of Earthquake Intensity. Additional quakes took place February 11, 1995 (3.1 rating); July 16, 2004 (3.5 rating); March 23, 2003 (3.1 rating). More recently, an earthquake rating 3.6 was recorded on December 17, 2009. Although a relatively quiet fault system, the NeMaha fault has the potential to produce a damaging earthquake, profoundly impacting the KAMO Electric Cooperative.

The region is also subject to effects of the New Madrid Fault located in extreme southeast Missouri, which has, according to many experts, the potential to produce the largest earthquakes in North America. Undoubtedly, this fault has the potential to affect the KAMO service area in its entirety. In addition, there have been several small, virtually undetectable earth movements in the region in recent history, which may or may not be attributed to the aforementioned fault lines or other, very small faults located nearby.

While the NeMaha fault is geographically closer and geologically active, C.E.R.I. records demonstrate the limited impact of said earthquakes, with no quakes to date exceeding a 5.5 on the Modified Mercalli Scale. Its cascading effects have been largely restricted to more localized regions, but even then the damage caused has been minimal. By contrast, the New Madrid fault has the potential to cause damage throughout the state of Missouri, including the KAMO service area. Scientists from the U.S. Geological Survey (USGS) and the Center for Earthquake Research and Information (CERI) at the University of Memphis have estimated the probability of a magnitude 6.0 or greater earthquake from the New Madrid Fault is 25-40 percent through the year 2053. The probability of an earthquake increases with each passing day.

The projected earthquake intensity ratings for the cooperative region changes based upon the Modified Mercalli Scale. Given a New Madrid earthquake with a 6.7 rating, the region would experience Level V intensity characteristics. In the event of an earthquake with a 7.6 rating, the region would experiences Level VI intensity characteristic while an earthquake with an 8.6 rating would most likely cause Level VII intensity characteristics.

In the event of an earthquake with a 7.6 rating, the KAMO service area would most likely experience minor building damage as well as damage to the electrical distribution system. The HAZUS-MH loss estimation per the State Hazard Plan 2010, gives a 2% chance of exceedance in the next 50 years. Counties within KAMO have a loss ratio of 1% in Bates County to 9.8% in Cass. This damage, however, would most likely be relatively minimal and localized when compared with the southeast corner of the state. Distribution lines overhead and underground could become disconnected or severed, and transformers could be damaged. Though the probability of occurrence is very small, the potential extent of damage could significantly impact both the cooperative and its customers as demonstrated in Table 1.23.

Table 1.23 **KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Earthquake**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system		(shaded)		
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

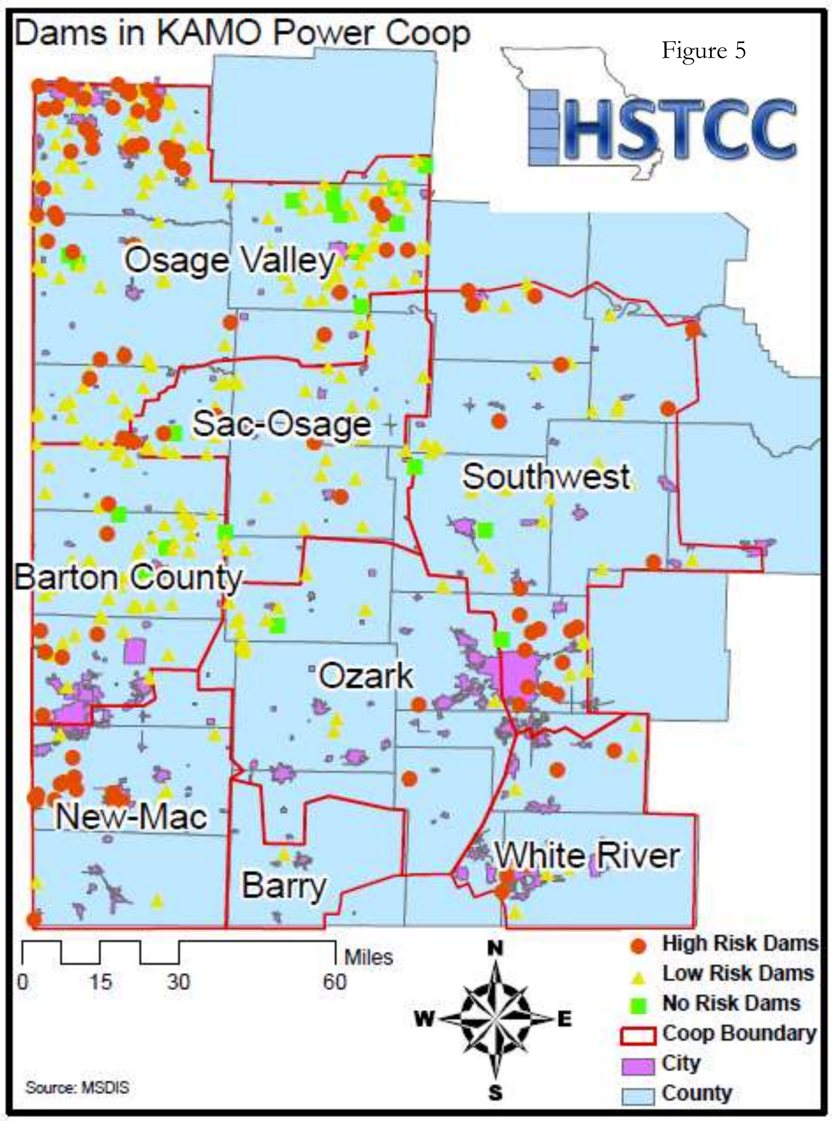
Based upon information outages related to damages from other events, it may be estimated that 10% of customers could report outages related to an earthquake event. This is based upon the areas of higher damage projection areas that could affect the overall system and cascading effects. Table 1.24 demonstrates the probability of occurrence in conjunction with the potential extent of impact upon local customers.

Table 1.24 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Earthquake**		Probability of Damage-Causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages		(shaded)		
	26-50% of customers report outages				
	More than 50% of customers report outages				

Dam Failure

Like earthquakes, dam failures have had no measurable impact upon the KAMO service area to date. According to Missouri DNR's Dam Safety Division, 385 dams currently exist within the cooperative boundaries: 21 are no risk, 261 low risk and 103 high risk. 30 are regulated by the state due to the fact that they are non-agricultural, non-federal dams which exceed 35 feet in height. Figure 6 shows the locations of all known dams located within KAMO's service area. *(Map sources: www.msdis.missouri.edu; www.dnr.mo.gov/env/wrc.)*

26 dam failures have occurred within the state of Missouri over the past 100 years. However, no such event has occurred within or near the cooperative's boundaries. However, for the purposes of this assessment, dam failure and its associated impacts cannot be eliminated from the realm of possibility. In order to allow for a risk assessment, the probability of this event has been included as less than 1%.



Determining the potential extent of dam failure is currently impossible due to a lack of data concerning inundation zones. Further study concerning existing dams and their impact is required to make a more comprehensive assessment of potential damages. This initial assessment assumes a limited impact upon downstream electric distribution infrastructure of less than 10% for both infrastructure damage and service interruption. (Tables 1.25 and 1.26).

Table 1.25 **KAMO Electric Cooperative Infrastructure Vulnerability Assessment Matrix** **Hazard: Dam Failure**		Probability of Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	Near 100% probability in any given year
Potential Extent of Damage	Less than 10% of damage to system				
	10-25% damage of system				
	26-50% damage of system				
	More than 50% damage of system				

Table 1.26 **KAMO Electric Cooperative Service Interruption Vulnerability Assessment Matrix** **Hazard: Dam Failure**		Probability of Damage-Causing Hazard Occurrence			
		Less than 1% in any given year	1-10% chance in any given year	10- 99% chance in any given year	> Near 100% probability in any given year
Potential Extent of Impact	Less than 10% of customers report outages				
	10-25% of customers report outages				
	26-50% of customers report outages				
	More than 50% of customers report outages				

Section 6: Mitigation strategies -

Previous efforts at mitigation

For organizations like KAMO, mitigation is considered to be part of prudent business operations. In order to ensure the delivery of a continuous power supply and minimize service interruptions, a number of mitigation strategies are continually utilized. Routine maintenance and upgrades to existing equipment are completed as part of daily tasks. Vegetation management is utilized to limit the cascading effects of natural hazards. Safety and reporting information are disseminated to the public through various types of media. Mutual aid agreements and partnerships create relationships which provide for future support in the event of a natural disaster.

Additionally, mitigation is considered prior to any expansion of service into special hazard areas. Before any service is build, it is first "staked out" in coordination with local builders and property owners. This process, completed by the Line Superintendent and contracted engineers, identifies and addresses foreseeable hazards and safety issues before any new service lines area constructed. USDA-RUS specifications regarding operation and safety are utilized in every step of the process. Steps are taken to practically minimize the exposure of equipment to loss due to foreseeable hazards, such as flooding.

Existing and potential resources

As stated above, mitigation is a key component of good business practices. KAMO Electric Cooperative includes mitigation strategies as part of regular work activities to ensure service with minimal interruptions. Funding for these activities is provided through the cooperative's normal budgetary process for maintenance.

In order to expand mitigation efforts beyond normal maintenance, it is likely that KAMO will need to seek outside funding sources. These may include private, state, or federal programs which provide grant and loan funding. Upon passage of this plan, KAMO will be eligible for funding through FEMA in the following categories:

- Hazard Mitigation Grant Program
- Flood Mitigation Assistance Program
- Pre-Disaster Mitigation Program
- 406 Stafford Act

Development of goals, objectives, and actions

Establishing mitigation goals, objectives, and actions for a business entity requires a slightly different approach than public agencies. Certainly, a number of similarities exist; both entities must consider which hazards most commonly occur and have the greatest potential for causing disruption to members or residents. They must also consider which types of actions will maximize benefits and minimize costs, how mitigation strategies will be implemented, who will enforce implementation, and how the overall plan will be maintained and updated.

The KAMO mitigation planning committee, with assistance from HSTCC staff, worked to identify goals, actions, and objectives which addressed hazard mitigation issues. The committee first identified ongoing mitigation strategies as well as potential strategies which seek to improve service and limit disruptions resulting from natural hazards. Action items were then analyzed for common characteristics and summarized to see if they aligned with the objectives. Goal and objectives were then developed to fulfill the needs of KAMO. Table 1.27 provides a simple synopsis of the goals and objectives before prioritization.

Table 1.27	KAMO goals and objectives
Identified Goals	**Identified Objectives**
Goal 1: Protect the health and safety of the community.	**Objective 1:** Prevent injury, loss of life, and damage to property.
	Objective 2: Reduce outage time to critical facilities.
Goal 2: Reduce future losses due to natural hazard events.	**Objective 1**: Protect and maintain existing infrastructure.
	Objective 2: Research and develop plans for future infrastructure improvements, seeking implementation where feasible.
	Objective 3: Research and develop plans for future communication and data collection improvements where feasible.
Goal 3: Improve emergency management capabilities and enhance local partnerships.	**Objective 1:** Improve assessment of outages and reduce response time.
	Objective 2: Create or maintain partnerships with outside agencies.
Goal 4: Continue to promote public awareness and education.	**Objective 1:** Utilize media resources to promote public education.
	Objective 2: Continue interaction with local schools and civic groups.
Goal 5: Reduce losses due to sabotage and terrorism.	**Objective 1**: Protect and maintain existing infrastructure.
	Objective 2: Reduce outage time to critical facilities.

Traditionally, the STAPLEE (Social, Technical, Administrative, Political, Legal, Environmental, and Economic) method is used to prioritize mitigation actions. These categories, however, do not necessarily align with the private sector in the same way they are applicable to governmental agencies. A number of action items could be included with multiple goals and objectives, for example. As a result, the committee chose to use a different method to prioritize their mitigation strategy.

After identifying ongoing and potential action items, the committee created three priority tiers:

- **First tier** actions focus on physical infrastructure protection and improvements which ensure continued, quality service and seek to reduce power outages. These types of actions are the highest priority of KAMO.
- **Second tier** actions create and maintain working relationships to reduce and prevent the impact of power outages. These include improvements to safety and reporting information, mutual aid agreements, and other efforts which seek to expand and improve both customer service and disaster planning.
- **Third tier** actions identify potential projects for other system improvements. These include mapping efforts, technological improvements, and research related to the expansion of mitigation efforts.

Actions within each tier may be funded through regular budgetary methods or identified outside sources. Tables 1.28, 1.29, and 1.30 provide lists of action items by tier as well as the goals and objectives identified with each.

Table 1.28 Prioritized Mitigation Actions for KAMO Electric Cooperative – Tier 1			
Tier 1			
Action item:	*Goal/Objective*	*Timeframe for completion*	*Cost-benefit score*
Perform routine maintenance and utilize upgraded equipment where possible to ensure quality of system. Tasks may include part replacement and/or upgrades. Identified work includes, but is not limited to: (a) Replacement or repair of poles, cross-arms, lines, (b) Installation of communication equipment in all substations, (c) Installation/replacement of digital relaying equipment.	Goal 1 / Objective 1 Goal 2 / Objective 1 Goal 2/ Objective 2	Ongoing effort	Medium Cost / High Benefit: Score 8
Upgrade to concrete or steel poles where possible.	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2	Ongoing effort; completed as funding allows.	Medium cost High benefit Score: 8
Install storm structures to reduce amount of damage.	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2	Ongoing effort; completed as funding allows.	Medium cost High benefit Score: 8
Install tie lines to eliminate radial lines to substations.	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2	Ongoing effort; completed as funding allows.	High cost Medium benefit Score: 4
Relocation and Stabilization of Transmission Structures at Risk	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3	Ongoing effort; Completed as funding allows.	Medium cost High benefit Score: 8
Install elevated berms around substations susceptible to flooding.	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3	Dependent upon additional funding.	Medium cost High benefit Score: 8
Install motor operated devices (MOD) on switches to improve sectionalizing	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 3 / Objective 1	Dependent upon additional funding.	Low cost Medium benefit Score: 6
Create a back-up Control Center.	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3 Goal 3 / Objective 1	Ongoing effort; Completed as funding allows.	High cost Medium benefit Score: 4
Use vegetation management to prevent interference with delivery of power.	Goal 1 / Objective 1 Goal 2 / Objective 1	Ongoing effort	Low cost Medium benefit Score: 6

Table 1.29 Prioritized Mitigation Actions for KAMO Electric Cooperative – Tier 2

Tier 2			
Action item:	*Goal/Objective*	*Timeframe for completion*	*Cost-benefit Score*
Provide safety and reporting information to the general public through varying methods: • Company website • Local newspapers • Publications • Communication with member cooperatives	Goal 1 / Objective 1 Goal 4 / Objective 1 Goal 4 / Objective 2	Ongoing effort	Low cost Medium benefit Score: 6
Increase number of generators owned for use in critical asset outages	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2	Dependent upon additional funding.	Medium cost High benefit Score: 8
Maintain mutual aid agreements	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 3 / Objective 2	Ongoing effort.	Low cost High benefit Score: 9
Cooperate with local, regional and state government organizations to reduce the impact of power outages.	Goal 1 / Objective 1 Goal 3 / Objective 2	Ongoing effort.	Low cost High benefit Score: 9
Intrusion Detection and Asset Hardening	Goal 5 / Objective 1 Goal 5 / Objective 2	Ongoing effort; Completed as funding allows.	Medium cost High benefit Score: 8

Table 1.30 Prioritized Mitigation Actions for KAMO Electric Cooperative – Tier 3

Tier 3			
Action item:	*Goal/Objective*	*Timeframe for completion*	*Cost-benefit*
Research flood maps to determine substations susceptible to flooding.	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3	Ongoing effort.	Low cost High benefit Score: 9
Research requirements for back-up control center.	Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3 Goal 3 / Objective 1	Ongoing effort.	Low cost Low benefit Score: 3
Research key lines to determine areas where concrete or steel poles will improve reliability.	Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3 Goal 3 / Objective 1	Dependent upon additional funding.	Low cost High benefit Score: 9
Research key lines to determine areas where MOD's will improve sectionalizing.	Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3 Goal 3 / Objective 1	Dependent upon additional funding.	Low cost Medium benefit Score: 6

Monitor developments in data availability concerning the expected impact of ice, tornado, wind and wildfire upon the KAMO service area through local, state, and federal agencies, including NOAA updates on weather (such as IceDamageIndex site).	Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2 Goal 2 / Objective 3 Goal 3 / Objective 1	Ongoing effort.	Low cost Medium benefit Score: 5
Have LIDIS analysis done on bulk electric system lines	Goal 1 / Objective 1 Goal 1 / Objective 2 Goal 2 / Objective 1 Goal 2 / Objective 2	Ongoing effort; Completed as funding allows.	High cost High benefit Score: 7

Section 7 – Plan Implementation and Maintenance

Plan incorporation

The goals, objectives, and actions of the previous section identify both ongoing efforts at mitigation and potential methods for expanding efforts. The plan has been reviewed and adopted by the Board of Directors as part of the company's operations policy. This mitigation plan necessitates involvement from every KAMO employment level as the organization strives to ensure quality service to their customers.

Other Local Planning Mechanisms

Beyond the KAMO plan, few planning mechanisms exist at the local level. The 23 Missouri counties of KAMO's service area each have a FEMA-approved Natural Hazard Mitigation Plan in place or are in the process an update. County emergency management directors have Local Emergency Operations Plans which seek to mitigate the same hazards for residents. These same counties are also included in their respective Regional Transportation Plan (RTP) as well as a Comprehensive Economic Development Strategy (CEDS). KAMO's plan can be easily incorporated into these local plans and allow for coordination across agencies in the event of an emergency.

KAMO is located within the rural portions of mostly third-class counties which are prohibited from enforcing building codes and zoning by the state of Missouri. Jasper County is a first-class county but does not have an approved comprehensive plan. Only Greene County has a comprehensive plan that it could be included into. They do not provide service direct to any municipality within these counties. Comprehensive plans and Capital Improvement plans do not exist inside of the KAMO serviced areas.

Plan Maintenance

KAMO will conform to the requirements established by the Association of Missouri Electric Cooperatives (AMEC) for monitoring, evaluating, and updating the plan.

Continued Public Involvement Opportunities

KAMO will conform to the requirements established by the Association of Missouri Electric Cooperatives (AMEC) for continued public involvement. Opportunities for public comment will continue to be offered through various media outlets, the cooperative's website, and the physical office of KAMO.