STATE OF IOWA

Natural Hazards Mitigation Plan

Iowa's Rural Electric Cooperatives' Annex to the State of Iowa Hazard Mitigation Plan

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SECTION ONE. IOWA'S COOPERATIVES

Introduction

Iowa's rural electric cooperatives serve more than 650,000 Iowans in more than 200,000 rural homes, farms and businesses in all 99 counties. The cooperatives provide electricity to approximately a quarter of a million meters. Iowa's electric cooperatives are committed to delivering power that is safe, reliable, environmentally responsible and affordable. In addition, electric cooperatives are:

- Private, non-profit, independent electric utility businesses
- Established to provide at-cost electric service
- Owned by the consumers they serve
- Governed by a board of directors elected from the membership

The Iowa Association of Electric Cooperatives (IAEC) provides services to the state's electric cooperatives in the areas of legislation, regulation, safety, communications, education and training, and employee benefits.

Currently, the IAEC is made up of thirty four (34) distribution and seven (7) generation and transmission (G & Ts) rural electric cooperatives (RECs).[1] The cooperatives, as employers, range in size from a high of eighty nine (89) employees to six (6) employees while most employ more than fifteen (15) but fewer than twenty five (25).

The Iowa Electric Cooperative Community

Iowa's electric cooperatives are private, non-profit, independent electric utilities, owned by the members they serve. Democratically governed businesses, electric cooperatives are organized under the Cooperative or Rochdale Principles[2], anchoring them firmly in the communities they serve and ensuring that they are closely regulated by their consumer/members.

Electric cooperatives began to spread across rural America after President Franklin D. Roosevelt created the Rural

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[1] 2013 IAEC Member-Cooperatives:

Distribution Cooperatives:
Access Energy Cooperative, Allamakee-Clayton Electric Cooperative, Boone Valley Electric Cooperative, Butler County REC, Calhoun County REC, Chariton Valley Electric Cooperative, Clarke Electric Cooperative, Consumers Energy, East-Central Iowa REC, Eastern Iowa REC, Farmers Electric Cooperative - Greenfield, Farmers Electric Cooperative - Kalona, Franklin REC, Grundy County REC, Guthrie County REC, Harrison County REC, Hawkeye REC, Heartland Power Cooperative, Iowa Lakes Electric Cooperative, Linn County REC, Lyon REC, Midland Power Cooperative, Nishnabotna Valley REC, North West REC, Osceola Electric Cooperative, Pella Cooperative Electric Association, Pleasant Hill Community Line, Prairie Energy Cooperative, Raccoon Valley Electric Cooperative, Southern Iowa Electric Cooperative, Southwest Iowa Rural Electric Cooperative, T.I.P. REC, Western Iowa Power Cooperative, Woodbury County REC

Generation & Transmission Cooperatives:
Basin Electric Power Cooperative, Central Iowa Power Cooperative, Corn Belt Power Cooperative, Dairyland Power Cooperative, L and O Power Cooperative, Northeast Missouri Electric Power Cooperative, Northwest Iowa Power Cooperative

[2] 1. Open, Voluntary Membership; 2. Democratic Control; 3. Limited Return, If Any, On Equity Capital; 4. Net Surplus Belongs To User-Owners; 5. Honest Business Practices; 6. Ultimate Aim Is To Advance Common Good; 7. Education, and 8. Cooperation Among Cooperatives.

Electrification Administration (REA) in 1935. The Executive Order establishing the REA and the passage of the REA Act a year later marked the first steps in a public-private partnership that has, over the last 70 years, bridged the vast expanse of rural America to bring electric power to businesses and communities willing to organize cooperatively and accept responsibility for the provision of safe, affordable and reliable electric power.

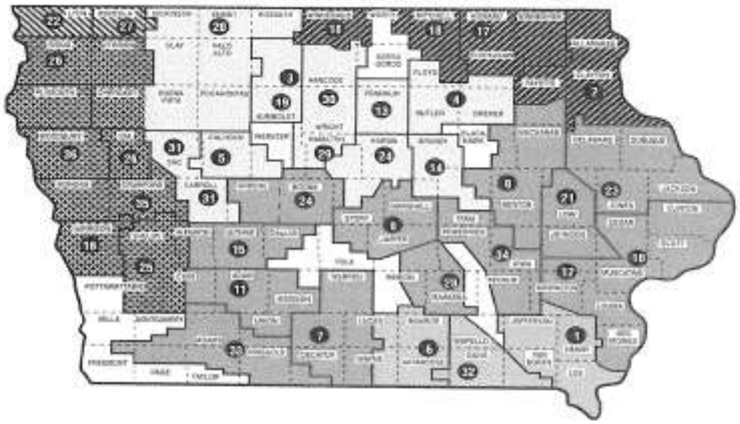
Today there are more than 900 electric cooperatives nationwide. They provide reliable and technologically advanced service to 40 million Americans while maintaining a unique consumer-focused approach to business.

Electric cooperatives typically serve sparsely populated areas: In Iowa they have an average of less than five (5) meters per mile compared to thirty five (35) for Investor Owned Utilities (IOUs) and forty seven (47) for municipally owned utilities. The sparsity of Iowa's cooperatives' population served accounts for the phenomenal number of miles of overhead line built in the State which is enough to circle the globe, at the equator, 2.5 times.

Cooperative System Vulnerabilities

Due to the fact that Iowa's electric cooperatives typically serve sparsely populated areas, the cooperative distribution systems are dominated by long stretches of overhead electric lines. Most of this line is constructed in public right of ways in open areas and is highly susceptible to ice and wind. The overhead electric lines that are located in wooded or tree lined areas are also susceptible to damage from falling trees and branches. The threat of this type of damage is mitigated by aggressive tree trimming and vegetation management practices.

AREAS SERVED BY RURAL ELECTRIC COOPERATIVE IN IOWA



GENERATION AND TRANSMISSION COOPERATIVES

The distribution electric cooperatives represented in the above map and listed on the next page purchase wholesale power through the generation and transmission cooperatives listed below.

Member Cooperative	Headquarters	Key No. of Member Co-ops
Central Iowa Power Cooperative	Cedar Rapids	7, 8, 9, 10, 11, 15, 21, 23, 24, 28, 33, 34
Corn Belt Power Cooperative	Humboldt	3, 4, 5, 13, 14, 19, 20, 24, 30, 31
L and O Power Cooperative	Rock Rapids	22, 27
Northwest Iowa Power Cooperative	Le Mars	16, 20, 25, 26, 35, 36
Dairyland Power Cooperative	La Crosse, Wis.	2, 17, 18
Northeast Missouri Electric Power Cooperative	Palmyra, Mo.	16, 32
Independents		12, 29
Basin Electric Power Cooperative	Bismarck, N.D.	Corn Belt, L and O, NIPCO

MAP DIRECTORY KEY

No.	Distribution Cooperative	Location	Page No.
1	Access Energy Cooperative	Mount Pleasant	22
2	Allamakee-Clayton Electric Cooperative, Inc.	Postville	24
3	Boone Valley Electric Cooperative	Renwick	27
4	Butler County Rural Electric Cooperative	Allison	28
5	Calhoun County Rural Electric Cooperative	Rockwell City	30
6	Chariton Valley Electric Cooperative, Inc	Albia	32
7	Clarke Electric Cooperative, Inc.	Osceola	34
8	Consumers Energy	Marshalltown	36
9	East-Central Iowa Rural Electric Cooperative	Urbana	38
10	Eastern Iowa Light and Power Cooperative	Wilton	40
11	Farmers Electric Cooperative, Inc.	Greenfield	44
12	Farmers Electric Cooperative	Kalona	46
13	Franklin Rural Electric Cooperative	Hampton	48
14	Grundy County Rural Electric Cooperative	Grundy Center	50
15	Guthrie County Rural Electric Cooperative	Guthrie Center	52
16	Harrison County Rural Electric Cooperative	Woodbine	54
17	Hawkeye Rural Electric Cooperative	Cresco	56
18	Heartland Power Cooperative	Thompson, St. Ansgar	58
19	Humboldt County Rural Electric Cooperative	Humboldt	60
20	Iowa Lakes Electric Cooperative	Estherville	62
21	Linn County Rural Electric Cooperative	Marion	66
22	Lyon Rural Electric Cooperative	Rock Rapids	70
23	Maquoketa Valley Electric Cooperative	Anamosa	72
24	Midland Power Cooperative	Jefferson	74
25	Nishnabotna Valley Rural Electric Cooperative	Harlan	76
26	North West Rural Electric Cooperative	Orange City, Ida Grove, Le Mars	78
27	Osceola Electric Cooperative, Inc.	Sibley	80
28	Pella Cooperative Electric Association	Pella	82
29	Pleasant Hill Community Line	Webster City	85
30	Prairie Energy Cooperative	Clarion, Garner	86
31	Raccoon Valley Electric Cooperative	Glidden, Sac City	88
32	Southern Iowa Electric Cooperative, Inc.	Bloomfield	90
33	Southwest Iowa Rural Electric Cooperative	Corning, Mount Ayr, Stanton	92
34	T.I.P. Rural Electric Cooperative	Brooklyn	94
35	Western Iowa Power Cooperative	Denison	96
36	Woodbury County Rural Electric Cooperative	Moville	98

SECTION TWO: PLAN DEVELOPMENT

IAEC Electric Cooperative Member Planning Process

The initial phase of the planning process was to identify a Hazard Mitigation Project team leader and to establish a project team comprising of Iowa Association of Electric Cooperative Department heads and member managers of the IAEC. Mark Landa, Iowa Regulatory Compliance Group, served as the project team leader and as the primary contact person for the team. The project team was formed as an advisory group and as a task group to develop the plan.

The project team members included:

Name	Position/Title	Organization/Company
Brian Kading	Executive Vice President/General Manager	IAEC
Regi Goodale	Director of Regulatory Affairs	IAEC
Dennis Corcoran	Director of Safety and Loss Control	IAEC
Mark Landa	Attorney/Iowa Regulatory Compliance Group	Sullivan & Ward, P.C.

Meeting dates were set on a monthly basis. The project team sought input from interested parties not on the project team during member cooperative annual meetings, meetings of the IAEC Safety and Loss Control Committee, and during cooperative Manager's and Superintendants' and Foremens' Meetings.

The initial plan was developed primarily during a six-month period from January 2007 through June 2007. The project team met from March 2007 through April 2007 until the draft plan was circulated for review. The project team, together with input from each of the member cooperatives, identified characteristics and potential consequences of natural and non-natural hazards affecting the IAEC member cooperatives. With the understanding of the risks posed by the identified hazards, the team determined priorities and assessed various methods to avoid or minimize any undesired effects. As a result, mitigation strategy and goals were developed.

The team then went on to develop an implementation and monitoring plan in which the plan will be implemented through various hazard mitigation projects, changes in day-to-day operations, and through continued hazard mitigation development.

In May, 2008 the team initiated a critical facilities evaluation as part of its continuing review and update of the Plan. Each member cooperative was asked to complete a survey identifying its local critical facilities which information was collated and evaluated to determine if the scope of the Plan warranted revision. The required revisions identified during this process were incorporated into the Plan which was adopted by the IAEC Board of Directors during its July 9, 2008 meeting.

Hazard Mitigation Plan Review Committee

In March 2013 a volunteer standing committee was formed for the purpose of reviewing the Plan. A list of the Committee members, the cooperatives they represent and their positions is attached to this Plan as Attachment C.

The Committee members include cooperative general managers; managers of facility, engineering and finance operations; line superintendents and corporate relations/customer service representatives.

The Committee met on March 29, 2013 for the purpose of reviewing the State of Iowa hazard mitigation planning process and the State of Iowa and Iowa Cooperative mitigation plans. As a result of the thorough review of this Plan performed by the Committee, a number of parts of this Plan have been modified or included. The diversity of the knowledge and expertise of the Committee's members throughout this process has resulted in a greatly enhanced, multifaceted planning document.

Local Participation

Electric cooperatives have been an integral part of Iowa's rural communities for more than 50 years. Its customers are its members and are its owners and as such have a direct line of communication with those persons that manage and operate the cooperative systems. Likewise, electric cooperatives have a direct line of communication with the surrounding rural communities and local governments. As such, the cooperatives, their members and the local communities and governments have had an ongoing dialogue regarding the operation of the cooperatives' systems and that input during the development of the mitigation plan assisted in shaping plan goals and mitigations. Meetings with cooperative management and cooperative operations personnel whereby local, regional and system-wide vulnerabilities and strengths were communicated helped identify priorities in developing goals for reducing risk and preventing loss from natural and non-natural hazards throughout the member cooperative's service territories.

Information and a request for input regarding the process of preparation of the initial plan was communicated to cooperative managers on three occasions in 2007, the operations supervisors on two occasions in 2007 and more than 150 cooperative directors and officers on February 5, 2008. Copies of the plan were made available at each member cooperative's headquarters and the office of the IAEC. A draft of the plan was also posted on the IAEC's website.

A subsequent Plan review was conducted by the Safety and Loss Control Committee in October 2009 and a status report on the evaluation process of the Plan was presented to the managers of the IAEC member cooperatives during the manager's 2009 summer and fall meetings.

Following the ice storms of 2010, the IAEC's Safety and Loss Control Department conducted a survey entitled *"2010 Ice Storm Survey"* and reviewed the survey results with the Safety and Loss Control Committee in March, 2010. The survey focused on the practices of the member cooperatives during the December, 2009 and January, 2010 ice storms pertaining to disaster recovery efforts, safety procedures and disaster assistance coordination efforts. Recommendations for better assistance coordination and recovery efforts were discussed.

Local Hazard Mitigation Planning Benefits

During the process of developing the plan, benefits were realized. The following is a list of the benefits that were generated during the development of the plan.

1. Allowed for an in-depth analysis of current electric generation and distribution system emergency response practices of the IAEC member electric cooperatives and the potential response capabilities of those members in the event of a natural disaster.

2. Provided the IAEC and its members with a re-evaluation of the location of critical facilities and what hazards to which they may be subject.

3. Provided for the sharing of information and team building between the IAEC, its members and the local hazard mitigation response teams.

4. Heightened the IAEC members' awareness level as to the nature of disasters throughout Iowa.

5. Provided an evaluation tool on IAEC members' current resources and how to best utilize them in an emergency.

6. Allowed cooperative's to practice the plan for scenario responses and mitigation measures on the most likely to occur disasters. These response planning sessions are in the form of annual tabletop exercises which are conducted by each cooperative locally.

7. Provided more up to date informational maps on specific hazards and facility locations. Cooperatives maintain facility maps which describe, in exacting detail, facility location, type, and physical status. The following maps, data, and information are gathered, updated, analyzed, tabulated, and documented in exacting detail to describe:

   - System, key, circuit and area maps;
   - Results of circuit analysis, and economic analysis of the system;
   - Installed costs of existing lines and equipment;
   - Historic and projected numbers, distances, and costs associated with installing new overhead and underground lines, services, transformers, and meters; and,

   This information is used to identify and document system vulnerabilities, construction items or projects.

8. By identifying the responsible personnel and tasks associated with the process the planning has resulted in more accurate and readily available information relating to property loss,

number of affected structures and population.

9. Enhanced the member cooperatives' Emergency Restoration and Business Continuity Plans and planning activities through the coordination of existing local planning, and system design, construction and restoration efforts with this local and statewide hazard mitigation planning initiative.

SECTION THREE: PUBLIC AND PRIVATE COOPERATIVE CONSTRUCTION AND RESTORATION FINANCING

Introduction

Historically, the ongoing construction, maintenance and restoration activities of Iowa's electric cooperatives are funded primarily through a loan and grant program of the federal government, administered by the U.S. Department of Agricultures' Rural Utilities Services, CoBank and by the National Rural Utilities Cooperative Finance Corporation (CFC).
These loan and grant programs are not designed for and are not ideally suited to be a financing mechanism for the actions required of cooperatives to recover from natural and man-made disasters.

RUS Grant and Loan Programs

Under the authority of the Rural Electrification Act of 1936, Rural Utilities Services (formerly REA) (RUS) of the U.S. Department of Agriculture makes direct loans and loan guarantees to electric utilities to serve customers in rural areas.

The loans and loan guarantees finance the construction of electric distribution, transmission, and generation facilities, including system improvements and replacement required to furnish and improve electric service in rural areas, as well as demand side management, energy conservation programs, and on-grid and off-grid renewable energy systems. Loans are made to corporations, states, territories and subdivisions and agencies such as municipalities, people's utility districts; and cooperative, nonprofit, limited-dividend, or mutual associations that provide retail electric service needs to rural areas or supply the power needs of distribution borrowers in rural areas.

Through the RUS Electric Programs, the Federal government is the majority note holder for approximately 700 electric systems borrowers in 46 states. Currently there are twenty four (24) Iowa electric distribution and generation and transmission RUS borrowers.

The National Rural Utilities Cooperative Finance Corporation (CFC)

The National Rural Utilities Cooperative Finance Corporation (CFC) was formed in 1969 by rural electric cooperatives to provide them with a source of funds to supplement the financing provided by RUS. CFC was organized as a cooperative and has been granted tax-exempt status under Section 501(c)(4) of the Internal Revenue Code. CFC is the primary private market lender to rural electric systems, which serve more than 32 million end-users of electricity.

CFC's owners consist of electric cooperative distribution systems, power supply systems, statewide associations and service organizations. It serves as the sole source of financing for more than 200 electric cooperatives and supplements the credit programs of the USDA Rural Development's utilities programs.

CoBank

CoBank is a national cooperative bank which provides loans, leases, export financing and other financial services to agribusinesses and rural electric power, water and communications providers in all 50 states.

CoBank is part of the Farm Credit System, which Congress formed in 1916 to fill a need for long-term agricultural credit. The System is a national network of lending institutions that provides production agriculture with more than 30 percent of its credit and financial needs. CoBank was created in 1989 through the merger of 11 Banks for Cooperatives. The bank began operations with $12 billion in assets, $9 billion in loans outstanding and $807 million in capital. On Jan. 1, 2012, CoBank merged with U.S. AgBank.

SECTION FOUR. INTERRUPTIONS AND SYSTEM FAILURES

Utility interruptions and failures that involve electrical power exist throughout the state. Each of Iowa's cooperatives serve a regional area and have facilities located throughout their service area. Cooperative electric distribution systems exist everywhere and are subject to damage from digging, fire, traffic accidents, and severe weather, including ice and snow storms, wind, flooding and other day-to-day events.

Nearly 80% of the IAEC's member cooperatives members are classified to be located in farm or rural areas. Planned mitigation measures have a proportionately greater beneficial impact on the cooperative member population due to its age (65% are older than 50 years old), income (mostly under $50,000) and age of member homes (60% live in houses built before 1980). In addition, 82% of the members live in single family detached homes. Nearly 60% of these homes are less than 2,000 square feet, 65% are occupied by 2 or fewer people and 40% of the homeowners have lived in their homes for more than 20 years (24% have lived in their homes for more than 30 years). As such, system failures, which are primarily due to overhead electric line damage or loss, when they do occur, will have a more detrimental impact due to remote location of member homes and age of structure and member population.

The following storms typify the nature and extent of electric cooperative facility damage and the impacts that the loss of electric service has on personal, commercial and industrial properties and the health and well-being of individuals and communities.

Halloween Ice Storm: 1991

On Halloween morning, a low pressure system developed over southeast Texas and moved rapidly north northeast, reaching its maximum intensity (984 mb) just east of La Crosse, WI on the afternoon of November 1st. This storm became known as the Halloween Blizzard in most of Minnesota and the Halloween Ice Storm in Iowa and portions of southeast Minnesota.

Snow moved into southern Iowa during the afternoon of October 30th and then spread into northern Iowa and Minnesota early on October 31st. Warm air aloft wrapping around this low pressure area caused the snow to change into a mixture of snow, sleet, and freezing rain by mid morning on Halloween across southeast Minnesota and much of eastern Iowa, and this mixture continued until the late afternoon of November 1st. 1-2" of ice accumulated from southwest Iowa into north central Iowa, and from 2-3" of ice accumulated across south central and southeast Minnesota.

In Iowa, Interstate 35 was closed down by fallen power lines. 80,000 homes were without power and there was $63 million in utility damage. Ten to fifteen percent of the corn crop was still in the fields and the combination of ice, snow, and wind from this storm flattened some fields. Crop damage was estimated up to $5 million. Wind speeds of 30 to 50 mph, and gusts to 60 mph on November 1st and 2nd, created blizzard conditions across eastern South Dakota, Minnesota, western Iowa, and extreme western Wisconsin. This storm closed schools, businesses, bridges, and public transportation systems for several days. Clean up was hindered by numerous accidents and abandoned vehicles. At the time, this storm was considered the most costly ice storm in Iowa history. It took over a week to restore power in some rural areas. Governor Terry Branstad declared 52 of 99 counties as disaster areas.

Winter Storm: February 24 – March 6, 2007

A severe prolonged winter storm moved through Iowa, February 23, 2007 to March 2, 2007. The storm affected nearly the entire State of Iowa, leaving devastation and darkened homes and businesses with the hardest hit areas being in the central and south east counties. Many news articles referred to this ice storm as one of the worst in Iowa's history. During the ice storm, ice accumulated on any object that was at or below freezing, and the weight of the ice broke utility poles, conductors, tree limbs and other objects that could not withstand the weight of the ice.

Ice accumulations of over an inch were reported in many areas. Many tree branches could not withstand the added weight of the ice and fell to the ground, striking electric lines and whatever else was in their path. When the ice began to melt, the falling ice caused additional outages. Some electric customers experienced outages more than once during that period, as power was restored but interrupted again by falling limbs. Thirty five cooperatives experienced a total of 107,895 outages across 46 counties during the storm. Within five days, most of these customers were returned to service, but many customers in more heavily damaged areas were without power for over a week.

Electric cooperatives affected by the ice storm quickly mobilized all of their available crews and sought outside assistance. Work crews from 6 different states came to Iowa in an effort to rapidly restore power to as many customers as possible. Approximately $60 million dollars of damage was caused to Iowa cooperatives overhead electric lines as a result of this storm.

Winter Ice Storm: December 10 – 11, 2007

A strong upper level weather feature moved into the southwest U.S. as upper level ridge took place over the southeast U.S. This placed Iowa in a strong southwest flow of air aloft. At the surface, a shallow layer of Arctic air was in place with surface high pressure located over the north central U.S. Deep moisture was drawn north into Iowa over the top of the Arctic Air at the surface with a deep layer of above freezing air flowing the top of the cold low level air. Precipitatable water values rose to more than 2 times the normal for mid December. A large area of freezing rain developed by the late evening hours over southern Iowa.

The rain spread northeast rather rapidly over much of the southeast half of the state during the early morning hours. One quarter of an inch or more of ice accrual took place southeast of a Waterloo, Boone, to Atlantic line. Ice accumulated to at least one half inch southeast of a Tama, Dallas Center to the southeast corner of Cass County. The heaviest ice accumulations took place over south central Iowa from just south of Des Moines, southwest to Taylor County and east toward into Wapello and Davis Counties. Snow fell along the north edge of the freezing rain area. A band of 2 to 4 inch snow occurred over a large part of northern Iowa. A significant number of trees and power lines were downed from about Interstate 80 south. Power outages were very numerous as well with Alliant Energy reporting 40,000 to 45,000 customers without power at one point, and MidAmerica Energy reporting nearly 30,000 out at one point. On December 12, 2007, due to the storm, more than 11,000 cooperative members were without power. Tree damage was described as incredible by one observer in Monroe County at Albia. Damage was quite extensive over southern Iowa, especially from U.S. Highway 34 south, and up into Warren County. The ice caused over $20 million damage to Iowa's cooperatives' facilities. Due to the severity of the storm, Governor Chet Culver declared 23 southeast Iowa counties disaster areas.

<u>Severe Winter Storms: December 23 – 27, 2009</u>

A potent winter system struck portions of the northern Plains and Upper Mississippi River Valley starting on December 23rd, continuing through the Christmas holiday. The storm moved north out of the southern Plains, tracking into Iowa on Christmas Day. This storm brought considerable snowfall, strong winds and blizzard conditions to parts of the region. Most of the heavy snow piled up across western and central Minnesota, western Iowa, and west into the northern Plains. The presence of warm air led to a variety of winter precipitation types, along with a moderate amount of rainfall.

From the morning of December 23rd through the mid-afternoon hours the precipitation was freezing rain, sleet, or snow. Gusty winds led to some drifting of snow across some roadways, and additional slick spots. Just south of this scattered activity, a larger mass of precipitation advanced northward through Iowa and Illinois, and moved north to around I-90 by late afternoon. The warmer air was brought northward which resulted in a changeover to freezing rain or freezing drizzle overnight. By the morning of the 24th, a crust of ice had formed on the snow, along with icing up to 3/8 inches on exposed surfaces in many areas - especially northeast Iowa and southwest Wisconsin.

Waves of precipitation moved northward across the region. Most of the accumulations on Christmas Eve came in the form of rain, with over an inch falling at many locales. That night, the warm temperature regime held across much of the local area (surface temperatures were above freezing all night long), and rain continued to be the dominant precipitation type. On Christmas morning the rain continued for most of the region and mixed with some snow across parts of southeast Minnesota and northern Wisconsin. The main mass of precipitation shifted west by the afternoon, affecting mostly parts of Minnesota and Iowa. Cold air would finally wrap far enough around the area of low pressure to start changing the rain over to snow from south to north in the early evening. Periods of light snow would fall across the region through the night, but accumulations were mostly in the form of a trace to a few tenths of the inch.

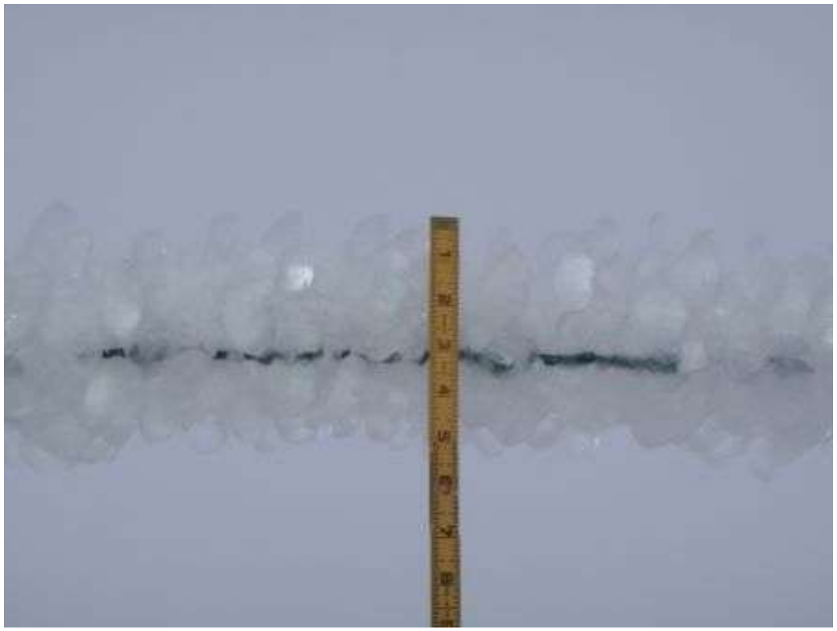
The preliminary estimate of damage caused by this storm exceeded $7.6 million, primarily the result of damage to Iowa's electric cooperative electric line facilities.

Severe Winter Storms: January 19 – 26, 2010

A strong weather system from the southwest U.S. moved east across the southern half of the country during the night of the January 19, 2010 into the daytime hours of January 20th. The low passed south of Iowa, however a strong push of warm and moist air moved into Iowa during the morning of the 20th resulting in a large area of freezing rain which developed with embedded thunderstorms across southern Iowa. Thunderstorms produced moderate to heavy freezing rain and some small hail as they overspread the southern third of the state. The area of freezing rain lifted north across Iowa through the morning hours and produced significant amounts of ice.

The heaviest accumulation of ice occurred over the west central counties with Ida, Carroll, and Crawford Counties reporting 3/4 to one (1) inch of ice accrual. The ice of up to 1 inch thick extended as far east as Guthrie County and into a part of Adair County. The ice toppled large trees and knocked power out for thousands of customers. Wapello County also received ¾ of an inch of freezing rain as heavier thunderstorms moved through that area. Roads were ice covered and numerous schools and businesses closed due to the ice.

Power outages numbered in the 50,000 to 60,000 customer range at the peak during the evening of January 20th. Thirty six hours after the event, over 40,000 customers remained without service. Some of the rural areas were without power for several days to a week after the ice storm. There were still over 700 customers without power nine (9) days after the ice storm occurred. Most of the outages were in Sac and Carroll Counties.



Freezing drizzle followed the main ice event. Though only very light additional accrual of ice took place, trees that were close to breaking continued to fall during the evening and resulted in the continued rise of power outages. On January 22nd, winds began to increase, resulting in additional damage. By mid afternoon, 60,000 customers were without power, and the counties of Sac, Carroll, Audubon, Calhoun, Cass, and Crawford had received a state disaster declaration. The ice storm broke approximately 2250 utility poles and knocked down nearly 1000 miles of power lines. Total damage to the Iowa Rural Electric Cooperatives alone was initially estimated at more than $35,000,000 and has topped $________________.

Severe Storms/Tornadoes/Straight–line Winds: April 9 – 10, 2011

During the period April 9 – 10, 2011, portions of Iowa were struck by severe storms, tornadoes and straight–line winds. The National Weather Service reported 28 tornadoes touched down in Iowa on April 9, 2011. At about 10 pm CDT that day, five (5) tornadoes were on the ground simultaneously in Pocahontas County, Iowa, all of which were from one supercell thunderstorm. The most severe tornado of this storm event , an EF4, touched down south of Pocahontas, Iowa.

Mapleton in Monona County in western Iowa was struck around 7:20 p.m. Authorities say the tornado destroyed or damaged more than 100 homes and injured more than a dozen people, but there were no fatalities.

Throughout Iowa, damage from the storms was estimated at $78.6 million, much of which likely took place in and around Mapleton. Damage to utilities was estimated to be approximately $5.3 million.

Other Storms or Events

By FEMA's own estimate, the number of disasters each year is increasing, but only 50% of events trigger Federal assistance.[3] The storm descriptions that appear above are about storms that have caused an amount of damage sufficient to exceed the thresholds established by FEMA. During the course of the year, Iowan's are beset by severe weather of every type all year long. Due to the fact that Iowa's cooperatives' facilities are located in every corner of every county of the state and are primarily located above ground, those facilities are susceptible to damage by flooding, ice, wind, snow, tornadoes, high winds, terrorism, vandalism, accidents, and animals. Although not eligible to receive federal and state financing to assist in their rebuilding efforts, Iowa's cooperatives must nevertheless restore service to their members as quickly and safely as conditions will allow and to take any subsequent actions to ensure that its electric distribution system remains able to provide reliable service.

[3] FEMA Website at: http://www.fema.gov/what-mitigation

SECTION FIVE. FEDERAL AND STATE SYSTEM RELIABILITY REQUIREMENTS

Introduction

Three years prior to the terrorist attack of the World Trade Center electric power systems were identified in Presidential Decision Directive 63 (PDD-63), (May 1998), as one of the critical infrastructures of the United States. Damage to or loss of critical or significant parts of the U.S. electric power system can cause enormous damage to the environment, loss of life and economic loss and can affect the national security of the United States. Such damage or loss can be caused by acts of nature or human acts, ranging from the weather, an accident and to an act of terrorism. Protecting America's critical infrastructure is the shared responsibility of Federal, State, and local government in active partnership with the private sector.

Homeland Security Presidential Directive 7 (HSPD-7), December 2003, established a national policy for Federal departments and agencies to identify and prioritize United States critical infrastructure and key resources and to protect them from terrorist attacks. These critical infrastructures and key resources are both physical and cyber-based and span all sectors of the economy. A substantial portion of the electric infrastructure of the United States resides in, and is maintained by, rural America. To ensure that the electric infrastructure in rural America is adequately protected, RUS instituted the requirement that all current and future electric borrowers enhance or develop an Emergency Restoration Plan (ERP) based upon a Vulnerability and Risk Assessment (VRA) and to provide RUS with a written certification of the completion of the VRA process and the written ERP.[4]

These regulatory obligations are in addition to other similar State of Iowa regulatory requirements imposed by the Iowa Utilities Board, which are described more fully below. These IUB requirements, together with the RUS regulations, ensure the continued maintenance and reliable daily operation of Iowa's cooperative's systems and provide for prompt and effective restoration of electric generation and distribution systems in the event of natural or man-made disasters.

Iowa's State Electric Utility Reliability Requirements

Reliability is the degree of performance of the elements of the electric system that results in electricity being delivered to customers within accepted standards and in the amount desired at a reasonable price. A planning goal for reliability used extensively in many areas throughout the country has been an outage rate of no more than one day in 10 years. An occasional short duration disruption of electric connectivity for small numbers of Iowa cooperatives' members is all but inevitable due to the effects of weather, incursions by animals, human-related activities and age of the distribution system.

[4] The regulation applies to RUS “borrowers”, that is, any electric distribution, transmission and generation organization that has an outstanding loan made or guaranteed by RUS for rural electrification or that is seeking such financing. In addition, the regulation expands the definition of the term “borrower” to include recipients of RUS electric program grants, and “applicant” to include applicants for such grants. Currently, these RUS regulations apply to twenty four (24) of the thirty four (34) distribution cooperatives and Corn Belt Power, Central Iowa Power Cooperative, and Northwest Iowa Power Cooperative, the three (3) principal Iowa G & Ts.

The degree of reliability is measured by the frequency, duration, and magnitude of adverse effects on the electric supply. There are many indices for measuring reliability; the three most common are referred to as SAIFI (System average interrupting frequency index), SAIDI (System average interruption duration index), and CAIDI Customer average interruption duration index).[5] Another frequently used index is the Average Service Availability Index or ASAI which is a measure of the percent of time power is available when it is demanded.[6]

Each of Iowa's cooperatives is subject to the regulatory authority of the Iowa Utilities Board (IUB). IUB rule 199 IAC 20.18(476,478), *Service reliability requirements for electric utilities,* provides that reliable electric service is of high importance to the health, safety, and welfare of the citizens of Iowa. Pursuant to the IUB rules, Iowa's cooperatives are required to assess the reliability of their transmission and distribution systems and facilities that are under the board's jurisdiction and report the methodology they utilize for monitoring reliability and ensuring quality of electric service within an electric utility's operating area.

[5] SAIFI is the average frequency of sustained interruptions per customer over a predefined area. It is the total number of customer interruptions divided by the total number of customers served. SAIDI is commonly referred to as customer minutes of interruption or customer hours, and is designed to provide information as to the average time the customers are interrupted. It is the sum of the restoration time for each interruption event times the number of interrupted customers for each interruption event divided by the total number of customers. CAIDI is the average time needed to restore service to the average customer per sustained interruption. It is the sum of customer interruption durations divided by the total number of customer interruptions.

[6] Average Service Availability Index – ASAI is a measure of the average availability of the sub transmission and distribution systems to serve customers. It is the ratio of the total customer minutes that

Each cooperative is also subject to the following general obligations:

a. Each electric utility shall make reasonable efforts to avoid and prevent interruptions of service. However, when interruptions occur, service shall be reestablished within the shortest time practicable, consistent with safety.

b. The electric utility's electrical transmission and distribution facilities shall be designed, constructed, maintained, and electrically reinforced and supplemented as required to reliably perform the power delivery burden placed upon them in the storm and traffic hazard environment in which they are located.

c. Each electric utility shall carry on an effective preventive maintenance program and shall be capable of emergency repair work on a scale which its storm and traffic damage record indicates as appropriate to its scope of operations and to the physical condition of its transmission and distribution facilities.

d. In appraising the reliability of the electric utility's transmission and distribution system, the board will consider the condition of the physical property and the size, training, supervision, availability, equipment, and mobility of the maintenance forces, all as demonstrated in actual cases of storm and traffic damage to the facilities.

e. Each electric utility shall keep records of interruptions of service on its primary distribution system and shall make an analysis of the records for the purpose of determining steps to be taken to prevent recurrence of such interruptions.

f. Each electric utility shall make reasonable efforts to reduce the risk of future interruptions by taking into account the age, condition, design, and performance of transmission and distribution facilities and providing adequate investment in the maintenance, repair, replacement, and upgrade of facilities and equipment.[7]

In addition, each Iowa cooperative has adopted and filed with the IUB a reliability plan.[8] The plan must be updated not less than annually and is to describe the following:

(1) The utility's current reliability programs, including:
   i. Tree trimming cycle, including descriptions and explanations of any changes to schedules and procedures;
   ii. Animal contact reduction programs, if applicable;
   iii. Lightning outage mitigation programs, if applicable; and
   iv. Other programs the electric utility may identify as reliability–related.

(2) Current ability to track and monitor interruptions.

(3) How the electric utility plans to communicate its plan with consumer owners.

As of April 1, 2004, and each April 1 thereafter, each Iowa cooperative is required to prepare for its board of directors a reliability report. A copy of the annual report is filed with the IUB for informational purposes, and is to be made publicly available in its entirety to each cooperative's consumer owners. The annual report, reports on at least the following:

(1) Measures of reliability for each of the five previous calendar years, including reliability indices. These measures start with data from the year covered by the first Annual Reliability Report so that by the fifth Annual Reliability Report submittal reliability measures will be based upon five years of data.

[7] 199 IAC 20.18(3)"a" – "f"

[8] 199 IAC 20.18(8)"a", *Annual report for all electric utilities not reporting pursuant to 20.18(7).* By July 1, 2003, each electric utility shall adopt and have approved by its board of directors or other governing authority a reliability plan and shall file an informational copy of the plan with the board.

(2) Progress on any reliability programs identified in its plan, but not less than the applicable programs listed above.[9]

The IUB has established a comprehensive framework for recording and reporting information to be maintained by Iowa's cooperatives and filed with the Board to demonstrate that all reasonable actions are being taken to ensure reliability of the cooperatives' electric service.

The electric utility industry does not have a common definition of what constitutes an interruption or outage. While there is general consensus that an interruption or outage is the loss of electric service to one or more customers as a result of component failure, mis-operation, or human error, there is no common definition of how long a customer must be out of service before the loss of service is considered an outage or interruption.

Each electric utility must make reasonable efforts to avoid and prevent interruptions of service. However, when interruptions occur, service is to be reestablished within the shortest time practicable, consistent with safety.
The Iowa Utilities Board (IUB) defines an interruption as a loss of service to one or more customers or other facilities and is the result of one or more component outages. The types of interruption include momentary event, sustained, and scheduled.

Each Iowa cooperative must record and maintain sufficient records and reports that will enable it to calculate for the most recent seven–year period the average annual hours of interruption per customer due to causes in each of the following four major categories: power supplier, major storm[10], scheduled[11], and all other.[12]
When recording interruptions, Iowa's cooperatives must use detailed standard codes for interruption analysis recommended by the United States Department of Agriculture, Rural Utilities Service (RUS) Bulletin 161–1, Tables 1 and 2, including the major cause categories of equipment or installation, age or deterioration, weather, birds or animals, member (or public), and unknown. Iowa's cooperatives are also required to maintain and record data sufficient to enable it to compute system-wide calculated indices for SAIFI–, SAIDI–, and CAIDI–type measurements, with the data associated with “major storms” and without.[13]

The cooperatives are also required to make their records of customer interruptions available to the board as needed.

As a result of these efforts, Iowa's cooperatives historically have realized an ASAI of more than 99.975%.

Every electric cooperative follows a basic principle when it comes to restoring power; priority goes to the lines that will get the most people back in service the quickest. This usually means that the main lines to the substations that can affect 200 – 600 members are fixed first and continues

[9] 199 IAC 20.18(8)

[10] The category “major storm” represents service interruptions from conditions that cause many concurrent outages because of snow, ice, or wind loads that exceed design assumptions for the lines.
[11] The category “scheduled” refers to interruptions resulting when a distribution transformer, line, or owned substation is deliberately taken out of service at a selected time for maintenance or other reasons.
[12] 199 IAC 20.18(5)"b" The “all other” category includes outages primarily resulting from emergency conditions due to equipment breakdown, malfunction, or human error.
[13] 199 IAC 20.18(5)"b"(2)

out to tap lines which may affect 30 – 200 members and then to individual service lines affecting just 1 to 5 members. Individual repairs are taken care of last for the reason that, in most cases, when a crew can restore power to dozens of homes in the same amount of time that it would take to restore power to one it will make the choice to restore power to as many people as quickly as possible.

RUS Operation and Maintenance Reliability Requirements

RUS has also imposed operation and maintenance reliability requirements on its borrowers[14]. Under its regulations, the twenty four (24) Iowa cooperatives that borrow from RUS have the following obligations[15]:

1. Duty To Operate and Maintain System. Each RUS borrower is required to operate and maintain its system in compliance with prudent utility practice, in compliance with its loan documents and with all applicable laws, regulations and orders, and is to maintain its systems in good repair, working order and condition, and is to make all needed repairs, renewals, replacements, alterations, additions, betterments and improvements, in accordance with applicable provisions of the borrower's security instrument.

2. Duty to Perform System Security VRA and Prepare ERP. Each RUS borrower is responsible for on-going operations and maintenance programs, individually or regionally performing a system security VRA, establishing and maintaining an ERP, maintaining records of the physical, cyber and electrical condition and security of its electric system and for the quality of services provided to its customers.

3. Duty To Inspect and Test System**.** The borrower is also responsible for all necessary inspections and tests of the component parts of its system, and for maintaining records of such inspections and tests. Each borrower is to budget sufficient resources to operate and maintain its system and annually exercise its ERP. An actual manmade or natural event on the

[14] All of the electric cooperatives were originally financed by the Rural Electrification Administration, now RUS. From its inception in 1936, RUS electric distribution line systems have been characterized by simplicity of design and standardization of materials, with the resulting reduction in costs of service to cooperatives members. RUS staff engineers designed system-wide engineering specifications utilizing simplified (and more economical) single-phase and 3-phase construction which hastened the spread of electric lines to the principal beneficiaries of the cooperatives then and now, farmers. These engineering specifications were not merely recommended standards of design and construction then or today. These were the standards by which electric cooperatives were to be originally constructed and by which their systems are to be maintained and constructed today as a condition for obtaining federal and CFC financing. Consequently, all of Iowa's electric cooperatives, those financed by RUS now and those not, are bound together by unique and common design and construction of their electric distribution systems, many of which are physically interconnected

[15] 7 CFR §1730.20

borrowers system in which a borrower utilizes a significant portion of its ERP counts as an annual exercise for that calendar year, provided that after conclusion of the event, the borrower verifies accuracy of the emergency points-of-contact (POC) and the associated contact numbers as listed in their ERP. For portions of the borrower's system that are not operated by the borrower, the borrower is responsible for ensuring that the operator is operating and maintaining the system properly in accordance with the operating agreement.

RUS also requires its borrowers to conduct all necessary inspections and tests of the component parts of its electric system and to maintain records of such inspections and tests.[16] The frequency of inspection and testing is determined by the borrower in conformance with applicable laws, regulations, national standards, and Prudent Utility Practice. The frequency of inspection and testing is determined giving due consideration to the type of facilities or equipment, manufacturer's recommendations, age, operating environment and hazards to which the facilities are exposed, consequences of failure, and results of previous inspections and tests. The records of such inspections and tests are to be retained in accordance with applicable regulatory requirements and Prudent Utility Practice. The retention period must be of a sufficient time period to identify long-term trends and at least until the applicable inspections or tests are repeated.[17]

Inspections of facilities must also include a determination of whether the facility complies with the National Electrical Safety Code, National Electrical Code (as applicable), and applicable State or local regulations and whether additional security measures are considered necessary to reduce the vulnerability of those facilities which, if damaged or destroyed, would severely impact the reliability and security of the electric power grid, cause significant risk to the safety and health of the public and/or impact the ability to provide service to consumers over an extended period of time.[18]

Any serious or life-threatening deficiencies are to be promptly repaired, disconnected, or isolated in accordance with applicable codes or regulations. Any other deficiencies found as a result of such inspections and tests are to be recorded and those records are to be maintained until such deficiencies are corrected or for the retention period, whichever is longer.[19] The records of such inspections and tests are retained in accordance with applicable regulatory requirements and Prudent Utility Practice. The retention period must be long enough to identify long-term trends. Records must be retained at least until the inspections or tests are repeated.

Inspections of facilities must include a determination of whether the facility complies with the National Electrical Safety Code, National Electrical Code (as applicable), and applicable State or local regulations and whether additional

[16] 7 CFR §1730.21(a)

[17] 7 CFR §1730.21(b)
[18] 7 CFR §1730.21(c)
[19] Ibid.

security measures are considered necessary to reduce the vulnerability of those facilities which, if damaged or destroyed, would severely impact the reliability and security of the electric power grid, cause significant risk to the safety and health of the public and/or impact the ability to provide service to consumers over an extended period of time. The electric power grid, also known as the transmission grid, consists of a network of electrical lines and related facilities, including certain substations, used to connect distribution facilities to generation facilities, includes bulk transmission and sub-transmission facilities. Any serious or life-threatening deficiencies must be promptly repaired, disconnected, or isolated in accordance with applicable codes or regulations. Any other deficiencies found as a result of such inspections and tests are to be recorded and those records are to be maintained by the cooperative until the deficiencies are corrected or until the inspections or tests are repeated, whichever is longer.[20]

Summation

In part due to the information-driven age that we live in, now more than ever, electricity is the lifeblood of commerce. Business and industry have always suffered economic hardship when electric service is interrupted for extended periods of time, but today, interruptions of just minutes can cost thousands of dollars in lost product, production capacity, information and communications. As a result, today, reliable electric service is a necessity of life.

Iowa's cooperatives have been successful in producing and delivering electricity to their consumer/members for more than sixty (60) years and each cooperative continually satisfies its obligation to construct and maintain an electric generation and/or deliver system which meets or exceeds industry and regulatory standards, thereby reducing, to the greatest extent possible, interruptions of service. Historically, in the event of an outage, regardless of the reason, Iowa's cooperatives have committed the time, manpower and all other resources needed to restore power as quickly and safely as possible.

The term "mitigation" is broadly defined to mean "to cause to become less harsh or hostile; to make less severe or painful".[21] In answer to the question, "What is mitigation?" FEMA states:

> "Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. Mitigation is taking action *now*—before the next disaster—to reduce human and financial consequences later (analyzing risk, reducing risk, insuring against risk). Effective mitigation requires that we *all* understand local risks, address the hard choices, and invest in long-term community well-being. Without mitigation actions, we jeopardize our safety, financial security, and self-reliance."[22]

Under both the common dictionary and FEMA's definitions of "mitigation" Iowa's cooperatives are continually employing the planning, maintenance and construction practices that are intended to help eliminate or reduce the impact of natural and man–made events and its dependence on federal and state resources for disaster relief.

[20] Ibid.

[21] Merriam–Webster Dictionary

[22] FEMA Webpage: http://www.fema.gov/what-mitigation

Periodically, (typically every 2 to 4 years) electric cooperatives employ a process of preparation of construction work plans (CWPs) for their electric distribution systems. A CWP is the documented results of an engineering study which has determined all of the new construction required to maintain adequate and reliable electric service during the planning period. A CWP is used as an engineering support document for loan applications, as a component of ongoing integrated system planning, and as means for specifying and documenting plant requirements for the next 2 to 4 years.

As is discussed in Section Five, Iowa's electric cooperatives are obligated to abide by the IUB's requirements, one of which is to install and maintain overhead and underground electric supply lines in accordance with the National Electrical Safety Code (NESC), as of 2013, the 2007 edition. (Rule 199 IAC 25.2). Over time the NESC has evolved and has been revised to reflect the basic provisions that are considered necessary for the safety of employees and the public.

By following the current NESC, together with widely accepted construction design specifications, it has resulted in the construction of overhead line that will better withstand the adverse effects of snow, ice, wind and other causes of line damage, thereby mitigating the harmful effects of natural and manmade hazards.

SECTION SIX. SECURITY OPERATIONS PRACTICES AND EMERGENCY PLANNING

Iowa's Cooperatives' Duty to Analyze and Review Security, Operations and Maintenance Policies and Practices.

RUS requires each borrower to periodically analyze and document its security, operations and maintenance policies, practices, and procedures to determine if they are appropriate and if they are being followed.[23] The records of inspections and tests are also to be reviewed and analyzed to identify any trends which could indicate deterioration in the physical or cyber condition or the operational effectiveness of the system or suggest a need for changes in security, operations or maintenance policies, practices and procedures. For portions of the borrower's system that are not operated by the borrower, the borrower's written analysis will also include a review of the operator's performance under the operating agreement.

RUS also retains authority over the review and evaluation of borrowers' security, operations and maintenance policies, practices, and procedures. When requested, a borrower is to conduct a review of its existing policies, practices and procedures and to document and rate them individually.[24] Records related to the operations and maintenance of the borrower's system must also be provided.

Emergency Planning

In 2005, Iowa's Cooperatives performed Vulnerability and Risk Assessments (VRA) of their electric systems.[25] The VRA is for the purpose of identifying critical assets, that is, facilities considered necessary for the reliability and security of the electric power grid, those facilities which, if damaged or destroyed, would severely impact the reliability and security of the electric power grid, or would cause significant risk to the safety and health of the public and/or impact the ability to provide service to consumers over an extended period of time.[26] Also deemed to be critical are facilities that are critical assets or infrastructure owned or served by the borrower's electric system or that are determined, identified and communicated as elements of national security by the consumer, State or Federal government.[27]

Iowa's cooperatives established a framework for completing the VRA consisting of the following six steps[28]:

1. Identification of critical facilities and loss impact,[29]
2. Identification of what protects and supports each critical asset,
3. Characterization of the threat to each,

[23] 7 CFR §1730.22(a)
[24] 7 CFR §1730.22(b)
[25] 7 CFR §1730.27(a) – (d)
[26] 7 CFR §1730.27(e)
[27] 7 CFR §1730.27(e)(3)
[28] RUS advises that a VRA should identify and quantify the utilities facilities, assets or infrastructure that would have significant impact on utilities operations if damaged or destroyed and quantify the estimated criticality along with the physical and financial loss with the likelihood of occurrence. The methodology set forth meets this standard.
[29] RUS applicants are advised to consider “critical facilities” as facilities whose loss would disrupt utility service to large areas for a considerable period of time or would disrupt utility service to critical facilities such as hospitals. Critical facilities include water treatment plants, wastewater treatment facilities, large pump stations, and centralized operations or communication facilities.

4. Identification and analysis of the vulnerabilities of each,
5. Assessment of the risk and determination of priorities and
6. Identification of countermeasures, costs and trade-offs.

As a final step in the VRA process, each cooperative prioritized its remedial attention to those critical facilities and functions identified to utilize funds in the most prudent manner.

Following the completion of the VRA process, each cooperative developed, either individually or in conjunction with other electric utilities, an Emergency Restoration Plan (ERP) which, at a minimum included:

a. A list of key contact emergency telephone numbers (emergency agencies, borrower management and other key personnel, contractors and equipment suppliers, other utilities, and others that might need to be reached in an emergency); and

b. A list of key utility management and other personnel and identification of a chain of command and delegation of authority and responsibility during an emergency; and

c. Procedures for recovery from loss of power to the headquarters, key offices, and/or operation center facilities; and

d. A Business Continuity Section describing a plan to maintain or re-establish business operations following an event which disrupts business systems (computer, financial, and other business systems); and

e. Other items identified by the borrower as essential for inclusion in the ERP.[30]

The IAEC, on behalf of its members, drafted a comprehensive Model ERP which addresses the requisite emergency restoration and business continuity and recovery planning. This model ERP has been adopted, in whole or as revised, by all of Iowa's cooperatives.

As a final step in this emergency planning process, Iowa's cooperatives have "exercised" their ERP (which is to occur at least annually) to ensure its operability and that cooperative employees are familiar with the Plan.[31] The methodology chosen by the cooperatives for the exercise is the "table top" exercise. During the exercise a hypothetical emergency response scenario is presented and participants, in real time, identify the policy, communications, resources, data, coordination, and organizational elements associated with the emergency response.

Ultimately, the tabletop exercise allows Iowa's cooperatives to review the ERP response process and to make the revisions necessary to ensure that the Plan and emergency response personnel respond to an emergency or disaster situation in the most efficient and effective

[30] 7 CFR §1730.28(e)
[31] 7 CFR §1730.28(h)

manner possible.

Cyber Security

The world is a more dangerous place today than ever before and in ways that could not have been imagined even twenty years ago. The Internet, which was designed with the free flow of information and interoperability in mind, has grown into a global system of interconnected networks and information systems that may better connect us, and inform us and maximize our productivity and efficiency but is now also used every day to maliciously commit crimes against us as individuals, the world's corporations, big and small, and, most frighteningly, nations, including their militaries and intelligence agencies.

Electric power systems were identified in Presidential Decision Directive 63 (PDD–63 1998) as one of the critical infrastructures of the United States. PDD–63 states:

> "Critical infrastructures are those physical and cyber–based systems essential to the minimum operations of the economy and government. They include, but are not limited to, telecommunications, energy, banking and finance, transportation, water systems and emergency services, both governmental and private."

Electric power generation and distribution has always been physically vulnerable due to the nature of its overhead and underground facilities; much of which is located in remote unguarded areas. New vulnerabilities have been introduced in the form of energy management and supervisory control and data acquisition (SCADA) systems that manage and control transmission and delivery of electric power, and distributed control systems (DCS) and programmable logic controllers (PLCs) that control the production of electricity. These systems are vulnerable to malicious attacks or other cyber impacts. Some utilities have introduced security measures to address vulnerabilities in IT systems that link to control systems.

Online attackers target power companies' information systems that could be used for access into the actual control systems. The electric energy sector is vulnerable to cyber impacts, whether in the form of an attack, system failure or accident. Accidents or errors have caused small local or regional outages or disruptions and could be duplicated by skilled cyber attackers. Recent events have shown that, due to the interconnectivity of the grid, what would appear to be a local event can cause regional effects. For example, in 2003, a widespread blackout occurred in the Northeast U.S. and portions of Canada due to a software bug in an alarm system at a control room of the FirstEnergy Corporation in Ohio. The blackout cascaded into a widespread event effecting an estimated 10 million people in Ontario and 45 million people in eight U.S. States.

Attacks against regional power networks are also possible but would require a certain level of planning and specialized knowledge. Attacks that in some way disrupt the national power grid appear possible, but too little information is currently available to accurately assess the potential impact of cyber attacks on the national grid.

Under the Energy Independence and Security Act (EISA) of 2007, the National Institute of Standards and Technology (NIST) has *"primary responsibility to* *coordinate development of a framework that includes protocols and model standards for information management to achieve interoperability of smart grid devices and systems…"*

As is explicitly recognized in EISA, effective cyber security is integral to achieving a nationwide Smart Grid:

> "It is the policy of the United States to support the modernization of the Nation's electricity transmission and distribution system to maintain a reliable and secure electricity infrastructure that can meet future demand growth and to achieve each of the following, which together characterize a Smart Grid:
>
> (1) Increased use of digital information and controls technology to improve reliability, security, and efficiency of the electric grid.
>
> (2) Dynamic optimization of grid operations and resources, with full cyber-security."

The Department of Energy has a long history of working closely with Federal partners, including Department of Homeland Security, on cybersecurity of the North American electric grid. Iowa's cooperatives have access to various tools to help better understand their cybersecurity risks, assess severity, and allocate resources more efficiently to manage those risks and to design, install, operate, and maintain an energy delivery system capable of surviving cyber incidents while sustaining critical functions.

The industry as a whole and the federal government have also taken steps to improve reliability coordination and regional planning and to encourage infrastructure investment through the creation of Regional Transmission Organizations or RTOs. An RTO serving Iowa, the Midwest Independent Transmission System Operator, Inc. (MISO) is an independent, not–for–profit organization that has three (3) goals:

- To operate the transmission grid system reliably
- Transmission planning for reliability and bringing the lowest cost wholesale power to the consumer; and
- Managing a wholesale power market that is designed to bring the lowest economically efficient wholesale cost of power to the consumer.

Iowa's cooperatives are taking the actions necessary to keep their operating and support data and technology systems secure.

SECTION SEVEN. CRITICAL FACILITIES

Today more than at any time in history, a safe and reliable source of electricity is important. Everything that we rely on is powered by electricity. Gas stations can't pump gas without it. Businesses close when electric service is interrupted. Restaurants can't cook food without it. Our lives almost come to a standstill without electricity. Nearly every mile of the overhead line built in the State, which is enough to circle the globe, at the equator, 2.5 times, is, itself, a "critical" facility.

As is discussed in Section Six, the integrity of the electric grid is vulnerable to physical and cyber attacks, accidents and the weather. Given the world's increasing reliance on electricity the consequences of service interruption cannot be overstated.[32] In addition to the electric facilities themselves, Iowa's electric cooperatives' provide electricity to businesses, hospitals and care units and other similar facilities that provide services or products that are essential to the health and welfare of Iowan's.

A VRA process was undertaken by Iowa's cooperatives to identify the business facilities and functions that each cooperative considers "critical facilities", that is, those facilities considered by the cooperative to be facilities or business functions that if damaged or destroyed:

- are necessary for the reliability and security of the electric power grid
- would severely impact the reliability and security of the electric power grid
- would cause significant risk to the safety and health of the public
- are critical assets or infrastructure owned or served by the borrower's electric system, are determined, identified and communicated as elements of national security by the consumer, State or Federal government[33] or
- would impact the ability to provide service to consumers over an extended period of time.[34]

In addition to these facilities, Iowa's cooperatives have identified numerous other facilities that are important to the community which are broadly described to be essential facilities, transportation systems, lifeline utility systems, high potential loss facilities, and hazardous materials facilities. See Attachment A for a listing of critical facilities and the customers affected by REC Regions. These facilities are more specifically described to be:

> _Essential Facilities_ are essential to the health and welfare of the whole population and are especially important following hazard events. The potential consequences of losing them are so great that they are inventoried. Vulnerability of these facilities is due to the service they provide rather than just their physical aspects; therefore, not only their structural integrity and content value should be considered, but also the effects of interrupting their functions.

[32] In the March 2000, "Report of the U.S. Department of Energy's Power Outage Study Team – Findings and Recommendation to Enhance Reliability for the Summer of 1999" it is reported that Western Power outages in August 1996 cost consumers several billions of dollars. Also, an 8–hour power outage on May 14, 1996 which affected 290,000 customers through southern Delaware and across the eastern shores of Maryland and Virginia cost local businesses more than $30 million.

[33] 7 CFR §1730.27(e)(3)

[34] 7 CFR §1730.27(e)

Essential facilities include hospitals and other medical facilities, police and fire stations, emergency operations centers and evacuation shelters, and schools.

Transportation Systems include airways (airports, airstrips, and heliports); highways (bridges, tunnels, roadbeds, overpasses, and transfer centers); railways (track, tunnels, bridges, rail yards, and depots); waterways (canals, locks, seaports, ferries, harbors, dry docks, and piers).

Lifeline Utility Systems such as potable water, wastewater, oil, natural gas, electric power, and communication systems. This includes such facilities as electrical substations, water treatment facilities, telephone central offices, and wastewater facilities.

High Potential Loss Facilities are facilities that would have a high loss associated with them, such as nuclear power plants, dams and military installations, confinement facilities.

Hazardous Material Facilities include facilities housing industrial/hazardous materials, such as corrosives, explosives, flammable materials, radioactive materials, and toxins.

Economic/Communication Facilities include commercial, farming or industrial facilities that account for a significant portion of an electric cooperative's load, and thereby income, and communication facilities that are necessary for the operation, safety and welfare of the cooperative, its members and the general public. These facilities may include dairy farms, scrap metal processing plants, internet server facilities, livestock confinement facilities, industrial parks and shopping malls.

A survey of each of Iowa's cooperatives was conducted to identify the full range of critical facilities served by Iowa's cooperatives, their numbers and locations by region of the state. Information regarding these facilities is included in Attachment A.

SECTION EIGHT. RISK ANALYSIS

Because electric cooperatives exist throughout the state and are vulnerable to interruptions or failures, there is a high probability that loss of service may occur at anytime or anyplace throughout the state. In many cases, these are small isolated events, well within the capabilities of the local utility to address. In other cases the event will result in wide-spread damage and its effects will overwhelm the response capabilities of the electric cooperatives.

The risks that may have a substantial effect on Iowa's electric cooperative's electric distribution and information technology systems include natural, technological and human-caused events. Natural events that may occur and have a severe effect on the electricity generation, transmission and distribution system in Iowa include ice and snow storms, windstorms, thunderstorms, fires, solar magnetic disturbances and floods. Technological events include equipment failure and the unanticipated loss of inter-dependent services such as telecommunications, fuel shortages, transportation and water supply. Human-caused events include human error, criminal acts, terrorism, vandalism and labor disruptions such as strike or lockout.

Iowa's cooperatives have performed a hazard analysis and risk assessment which is comprehensive and multi–hazard to identify and prioritize hazards, both natural and human caused. The cooperatives have also familiarized themselves with Iowa's State and local hazard analysis and risk assessment that is described in the State of Iowa Hazard Mitigation Plan in Section 1.3 and have determined that the hazards identified and profiled in that Section are consistent with the hazards that threaten Iowa's electric cooperatives. For these reasons, the Iowa electric cooperatives adopts the State of Iowa's list of hazards set forth in Section 1.3 of the State Plan.

The Iowa electric cooperatives have also considered the ranking of the hazards which are described in the State Plan list of hazards. On the basis of the probability of occurrence, Iowa's electric cooperatives believe that the likelihood of occurrence and potential for economic loss to their systems posed by these hazards are ranked in the following order:

1. Winter Storm
2. Tornado
3. Thunderstorms/Lightning/Flood
4. Infrastructure Failure
5. Terrorism/Sabotage

Common Causes of Power Outages

Lightning is a frequent cause of localized power outages during the summer months. Fuses and devices called lightning arrestors are installed throughout distribution systems. They are designed to protect electric lines, in most cases, from serious damage; still, it takes time for field crews to locate affected pieces of equipment and make the needed repairs.

High winds mainly from thunderstorms, but sometimes from tornadoes, are often the cause of both local and widespread outages. Damage generally occurs when trees or tree limbs fall onto our power lines.

Ice storms can create a heavy buildup of ice on power lines and trees. In rare cases, the buildup can be so great that wooden utility poles and metal lattice transmission towers collapse under the enormous weight.

Heavy rains can cause flooding that damages both above-ground and underground electrical equipment. Flooding may also make travel difficult for repair crews.

Falling trees and tree limbs, resulting from severe weather conditions, is the single leading cause of power outages during storms. While Iowa's Cooperatives cannot prevent trees from toppling into power lines due to high winds, cooperatives strive to limit tree interference through regularly scheduled vegetation maintenance programs. By redirecting tree growth away from power lines, cooperatives can limit damage that could be caused by severe weather.

Equipment failure can take place on the electric system. This can be created by exposure to the elements and high electric loads over time. To increase reliability, Iowa's cooperatives routinely monitor loads on their systems, constantly balancing and upgrading circuits to meet higher demand. Older wooden poles are regularly checked for deterioration from weather, insects and woodpeckers, and replaced when necessary. Overhead transmission lines and rights-of-way are routinely patrolled by helicopter. Critical electrical connections on transmission and distribution systems are monitored for higher-than-normal temperatures using infrared measuring devices.

Congestion on the nation's electric transmission grids occurs when actual or scheduled flows of electricity over a line or piece of equipment are constrained below desired levels. These restrictions may be imposed either by the physical or electrical capacity of the line or by operational directives that are created and enforced to protect the security and reliability of the grid. Because wholesale power purchasers typically seek to buy the least expensive electricity available, if transmission constraints frequently limit the amount of electricity that can be delivered into an area where demand for it is high, the power purchasers must buy more often from higher-cost suppliers, and the result is higher electricity costs for consumers. In more severe congestion conditions, transmission constraints can impair grid reliability by reducing the diversity of available electricity supplies and rendering the area more vulnerable to unanticipated outages of major generators or transmission lines.

SECTION NINE. HISTORY OF STORM EVENTS

Iowa's electric cooperative's principal hazards are those associated with severe weather including, heavy rains and flooding, tornadoes and high winds, ice storms, and blizzards and heavy snow. Total damages from each event are estimated with public utility data being obtained from FEMA and State Public Assistance reports. Approximately 85% of all reported damages were to overhead utility structures such as poles and conductor. Below is a breakout of a number of noteworthy storm events which resulted in significant damage to the public utility system since the last update of the REC annex to the State Mitigation Plan:

Year	Date	Disaster #	Disaster Event	Estimated Damage
2011	07/27	4018	Severe Storms and Flooding	$7,435,052
2011	07/09	4016	Severe Storms, Straight Line Winds, Flooding	$10,755,119
2011	05/25	1998	Flooding	$49,367,981
2011	04/9	1977	Severe Storms, Flooding Tornadoes	$5,304,069
2010	03/02	1880	Severe Winter Storms	$146,000,000
2010	02/25	1877	Severe Winter Storms Snowstorm	$5,500,000
2009	08/13	1854	Severe Storm	$6,713,589
2008	05/27	1763	Severe Storms, Tornadoes, and Flooding	$211,089,298
2008	01/04	1737	Severe Winter Storm	$20,399,349
2007	09/14	1727	Severe Storms and Flooding	$421,999
2007	05/25	1705	Severe Storms, Flooding, and Tornadoes	$684,513
2007	03/14	1688	Ice Storm	$90,000,000

One or more of Iowa's electric cooperatives were significantly adversely impacted by each of the events listed above. With respect to disasters 1763 and 1880, the damage to cooperative facilities is estimated to exceed $200M and $100M respectively. This damage was primarily to overhead electric lines and required the replacement and rebuilding of hundreds of miles of poles, conductor and associated equipment. A total of 5,500 poles and 48 substations were damaged during disaster 1688. One of the hardest hit cooperatives will be required to replace 260 miles or 14% of its system at a cost of more than $11,000,000.

SECTION TEN. EFFECTS OF POWER OUTAGES ON THE POPULATIONS

The loss of electrical service to homes, schools, commercial establishments, and essential facilities such as police and fire stations, hospitals, nursing homes, water pumping stations, railroad crossings, and industrial facilities that handle hazardous materials can significantly affect public health and safety.

At most facilities, the loss of electrical service would cause a significant disruption of government and business services to the public. Although direct health and safety issues may not be present, the loss of electric service can have significant consequences. These types of facilities include traffic intersections, where heavy congestion can develop; elevator-served, high rise buildings, where people can be forced to climb many steps to get into or out of the building; auditoriums, where loss of power can create difficulties for a large number of people exiting the facility; and facilities equipped with security alarms triggered by loss of power and that require numerous investigations by local government response personnel.

Other facilities, such as, industrial factories, food handling establishments (restaurants, supermarkets), and computer-based businesses experience significant economic loss as a result of electrical service disruptions.

Loss of electrical service at some facilities can affect other public infrastructure. For example, loss of power at a telephone switching office can interrupt communications, and loss of power at a natural gas compressor station can affect gas delivery. In worst-case conditions, these effects, known as "infrastructure interdependencies," can cascade with drastic consequences.

Computer and internet technology (IT) relies solely upon electrical service. Unanticipated power outages can cause a loss of critical applications, such as email, and data which could have significant legal and financial impacts.

Regardless of the business impacted by an outage, downtime costs money. Those costs vary from industry to industry and also significantly within industries. Although business size is the biggest factor, it is not the only one. Companies that can revert to manual processing can continue to function when their systems are unavailable, although usually at an appreciably lower level of activity. In contrast, some companies, such as online retailers, cannot conduct any business during system downtime. Similarly, certain manufacturing businesses must destroy all of the work in progress (such as food and pharmaceuticals).

In addition to these tangible effects, IT downtime can have a considerable adverse impact on a company’s reputation and will lead to customer dissatisfaction, both of which are difficult to quantify.

Persons with medically essential electric service should make plans to evacuate prior to the storm event. Although most electric cooperatives do give priority to customers with medically essential electric service during isolated electric outages, during natural disasters with widespread outages it is impossible to give individual priority due to the extent of the damage and the order in which power must be restored.

The loss of power can be in isolated areas or more widespread depending upon the storm event. During

Storm event No. 1688, February and March 2007, approximately 108,000 cooperative member-consumers were without power, many for more than one week. The outages occurred in each of the 46 counties within the disaster declaration area.

Power outages present problems with food safety as well as with heating. If people at home or those in food establishments have had a loss of power for more than four hours, it is recommended that precautions be taken with refrigerated food products.

Death due to carbon monoxide poisoning is a common concern during extended outages. Health officials warn those who may seek alternative power or fuel sources such as generators, grills, camp stoves or other gasoline, propane, natural gas or charcoal-burning devices that these should never be used inside a home, garage, or camper -- or even outside near an open window. The use of these alternative fuel or electricity sources can cause carbon monoxide to build up and poison people and animals inside. Carbon monoxide is an odorless, colorless gas found in combustion fumes and can cause sudden illness and death.

Such power outages can also create an increased risk of fire, as home occupants use alternative fuel sources (wood, kerosene, etc. for heat, and fuel-burning lanterns or candles for emergency lighting).

Loss of power can cause major disruption in water supplies and other critical facilities, such as wells, fire protection and medical facilities. At times, local officials have been forced to impose emergency water rationing. This restriction creates hygiene problems, sanitation difficulties and seriously affects the fire department's response capability until power is restored.

At the time power lines are damaged by the storm, or at the time power is restored, a small percentage of customers may suffer property damage because of open neutral conditions or other related service abnormalities.

SECTION ELEVEN. HAZARD MITIGATION OPTIONS

Any declared emergency event in Iowa will impact consumer members of Iowa's electric cooperatives. As a result, the cooperatives have responded to numerous natural disasters and have identified mitigation options which can be employed to significantly reduce or eliminate the potential for adverse consequences associated with those events.

Below is a list of the mitigation options identified to date:

ICE STORM COSTS	MITIGATION OPTIONS
ICE STORM MITIGATION FOR ELECTRIC DISTRIBUTION SYSTEMS Electric cooperatives serve over 650,000 member/consumers (approximately a quarter of a million meters) in all 99 Iowa counties. Hundreds of customers have been without power for up to several days due to various natural storm events. Factors which attribute to reducing the effects of this storms include underground lines, large parts inventories, aggressive tree removal programs, heavier poles, thicker lines, shorter spans, locating equipment closer to roadways and excellent cooperation with other cooperatives.	1. Employ current construction design standards on all new construction thereby constructing overhead line that utilizes hazard resistant conductor (typically ACSR), thicker poles and shorter spans. 2. Explore installation of ice resistant wire. (One possibility is "T-2" wire, a twisted pair conductor made of a combination of two identical aluminum conductors twisted together to replace the more common single copper conductor. The ice resistant and anti-galloping qualities of T-2 wire offer an excellent possibility for alleviation of power outage problems on above ground lines in future ice storms.) 3. Fund an applied research program to develop recommended design and engineering changes to mitigate electric distribution system losses due to ice storms. Establish a team that would rapidly respond to any icing-related line collapse to gather data while ice is still on the wires. 4. Map areas that are susceptible to ice storms, identify recurrence intervals and develop other data useful for planning an ice storm mitigation program for electric cooperatives. 5. Create an aggressive vegetation management plan for pruning trees along power line rights-of-way. In critical areas and new developments, on a case by case basis,

	tall trees or potentially hazardous trees should be removed and replaced with low-growing trees. 6. Underground utilities should be considered for future subdivision and cluster developments. 7. Explore adding a “safety factor” to construction design standards on an individual cooperative basis.
RIGHT-OF-WAY AND POLE MAINTENANCE Long sections of electric distribution lines collapsed. Sequential periods of icing especially impacted locations having old design line span lengths in excess of 300 feet. A cascading effect often followed the first pole failure and/or conductor break. The current power distribution system is under designed. The poles that carried a single phase and a phone line 30 years ago, now usually carry two additional phases, or bundled conductors, as well as additional phone cables, cable TV and fiber-optics. Heavy transformers may have been added to poles without upgrading the poles.	1. Provide a "design-failure" mode for power lines to fail at predetermined locations, permitting easier and safer repairs while minimizing the affected areas. 2. Construct power "dead-ends," wherever possible to limit the geographic extent of failures. 3. Cooperatives to continue maintenance and inspection programs to lessen storm damage. 4. Replace power poles and cross-arms to maintain the design structural strength of the transmission system during ice storms and earthquakes. 5. Review existing easement requirements and laws. Enforce existing easements and expand inferior easements through cooperative efforts and eminent domain.

Attachment A

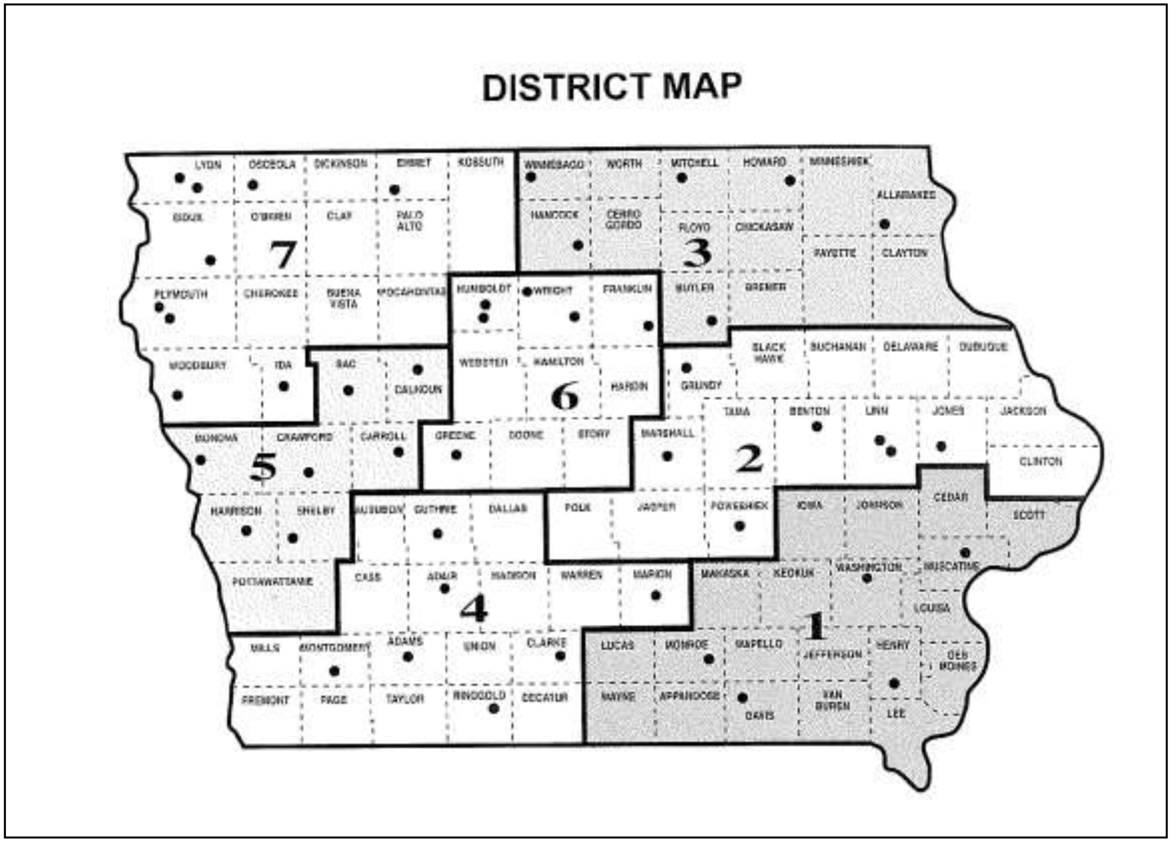
CRITICAL FACILITIES SUMMARY (By Region)												
Regions	Region 1		Region 2		Region 3		Region 4		Region 5		Region 6	
Facility Type	Number of Sites/ Facilities	Number of People Impacted	Number of Sites/ Facilities	Number of People Impacted	Number of Sites/ Facilities	Number of People Impacted	Number of Sites/ Facilities	Number of People Impacted	Number of Sites/ Facilities	Number of People Impacted	Number of Sites/ Facilities	Number of People Impacted
Electric System Infrastructure												
Substations	118	79,867	46	20,810	16	3,698	103	23,990	61	30,304	95	39,274
Transformers	5,472	49	12,156	25,040	15,713	30,480	11,283	9,636	5,323	20,950	23,833	50,774
Emergency Services												
Police Stations	1	18,678					1		1	3,500	2	
Fire Stations	5	6,515	3	430	1	10	3	1,120	1	2,800	4	610
Paramedic Stations	2	5,000							1	2,800	1	
Emergency Communication	134	78,861	48	21,712	79	116,350	72	21,812	99	31,660	63	42,500
Emergency Operation Center	1	15,000										
Water System												
Water Supply Pumping Stations	10	10,555	9	6,020	73	21,700	17	14,763	34	13,500	32	13,115
Wastewater Pumping Stations	25	6,430	2	1,099	28	2,400	6	215	10	5,020	35	1,040
Wastewater Treatment Plants	10	17,629	2	1,099			3	4,000	10	9,860	16	15,750
Medical Facilities												
Hospital, nursing homes	2	200	1	52			3	300	5	1,075	3	360
Mental Health Treatment									1		2	300
Specialized Treatment Centers[35]	4	3,500	1	50	1	60			3	30	5	4,000
Rehabilitation Centers									3	25		
Blood donation Centers							1	200	1	80		
Schools												
Nursery Schools/Pre-school	1	50	1	40			1	25	3	50		
Kindergarten Schools	3	120	2	40	1	97	2	100	3	630		
Elementary Schools	9	2,280	2	200	2	565	4	1,320	3	625	7	2,100
High Schools	3	1,070	2	534	1	212	3	473	2	400	7	890
Colleges	1	200							1	40	2	600
Business and Trade Schools	1	50							1	125		
Day Care												
Registered Day Care Facilities	32	260	1	20	8	76	9	81	4	165	5	75
Sitter Services							3	45			6	36
After School Centers							1	40				
Senior												
Senior Citizen Centers					2	100	3		2	100		
Retirement Communities	2	180			2	40	1	63	10	290	2	
Assisted Living	1	150										

35 E.g. out-patient surgery, dialysis, cancer therapy

CRITICAL FACILITIES SUMMARY (By Region												
Regions	Region 1		Regions 2		Regions 3		Regions 4		Regions 5		Regions 6	
Facility Type	Number of Sites Facilities	Number of People Impacted	Number of Sites Facilities	Number of People Impacted	Number of Sites Facilities	Number of People Impacted	Number of Sites Facilities	Number of People Impacted	Number of Sites Facilities	Number of People Impacted	Number of Sites Facilities	Number of People Impacted
Social Service												
Homeless/Transient Shelters											1	
Battered Persons Shelters	2	30							1		1	15
Detention Centers												
Jails and Prisons	2	19,678							1	15	2	900
Youth Detention Centers	1	75			3	120						
Community Centers												
Libraries	2	350	1	5	1	5	2	2	2	120		
Civic Centers	1	330										
Recreational facilities	5	370	8	1,475	5	230	5	225	19	580	20	300
Public Assembly												
Sports Stadiums	4	750					1	400			5	150
Concert Auditoriums									1	300	1	
Theaters and Cinemas	1	1,000					1		1	100	2	
Religious Facilities	75	8,925	27	1,245	24	1,005	33	1,835	46	2,880	84	7,600
Shopping Malls									3			
Conference Centers	1	500					1	300	3			
Museums	1	10	1	20			1		1	200		
Art Centers			1	35								
Hotels												
Hotels and Motels	7	405	5	238	6	105	6	162	11	175	8	
Boarding Houses							4	17	1	20	1	
High-Rise Buildings												
Apartment Complexes					6		3	8	5	218	10	
Condos	1	70					1	6			15	
Office Buildings	2	850					6	114	6	150	5	
Food Service												
Restaurants	31	2,570	10	100	7	255	19	575	24	10,000	33	905
Grocery Stores/Supermarkets	6	14,700					6	430	3	11,500	2	3,800
Food Processing Facilities	3	22,000			26	720	5	404			8	10,280
Industry												
Hazardous Material Handling	4	10,000	10	577	3	230	2	10	1			
Miscellaneous												
Airports	1	200										
Truckstops/Convenience Store	2	500							3			
Natural Gas Pumping Facility	1				2	6			3	500		
Ethanol/Biodiesel Facility					6	154	3	100				

Attachment B

ELECTRIC COOPERATIVE REGIONS



Attachment C

Hazard Mitigation Plan Review Committee			
Name	Position	Email Address	Company
Mark Landa	Attorney	mlanda@sullivan-ward.com	Sullivan & Ward, P.C.
John Dvorak	Director, Safety and Loss Control	jdvorak@iowarec.org	Iowa Association of Electric Cooperatives
Regi Goodale	Director, Regulatory Affairs	rgoodale@iowarec.org	
Teresa Floyd	Manager Finance/Consumer Service	teresa.floyd@ecirec.coop	East–Central Iowa REC
Steve Marlow	Manager Operations/Engineering	steve.marlow@ecirec.coop	
Len Tow	Line Superintendent	ltow@linncountyrec.com	Linn County REC
Ken “Butch” Norem	Director Operations/Engineering	knorem@prairieenergy.coop	Prairie Energy Cooperative
Bryon Stilley	Operations Manager	bstilley@cvrec.com	Chariton Valley EC
Shelly Girolamo	Chief Financial Officer	shruska@hawkeyerec.com	Hawkeye REC
Mike “Wally” Walton	Operations Manager	mwalton@hawkeyerec.com	
Rick Olesen	VP Operations/Engineering	ricko@ilec.coop	Iowa Lakes Electric Cooperative
Tresa Hussong	VP Customer/Corp Relations	tresah@ilec.coop	
September Dau	VP Finance/Human Resources	septemberd@ilec.coop	
Bob Emgarten	Manager of Engineering	bobe@ilec.coop	
Aaron Ruschy	Supt. Field Operations	aaronr@ilec.coop	
Bob Swindell	General Manager/CEO	bswindell@accessenergycoop.com	Access Energy Cooperative
Kevin Bornhoft	VP Engineering/Operations	kevin.bornhoft@cbpower.coop	Corn Belt Power
Kent Pauling	Executive VP/General Manager	kpauling@nipco.coop	NIPCO
Lori Beach	Financial Accountant	lbeach@butlerrec.coop	Butler County REC
Mark Siefkin	Engineering Manager	sief@butlerrec.coop	
Roxanne Carisch	CEO	rcarisch@calhounrec.coop	Calhoun County Electric
Mike Terwilliger	Line Superintendent	mterwilliger@calhounrec.coop	
John Euchner	CEO	jeuchner@nvrec.com	Nishnabotna Valley REC
Dan Stelpflug	Director, Operations/Engineering	dstelpflug@acrec.coop	Allamakee–Clayton EC
Karen Ringleb	Office Manage/Accountant	kringleb@franklinrec.coop	Franklin REC
Kevin White	Engineering/operations Manager	kwhite@northeast-power.coop	Northeast Missouri Electric Power Cooperative