APPENDIX 1
Identifying Hazards

The Cities of Lisbon and Mount Vernon have adopted a strategy for hazard mitigation based on a hazard analysis and risk assessment that is comprehensive and multi-hazard. This means that multiple hazards that can possibly occur anywhere near the Cities are considered and analyzed, and that the risk that each hazard poses is assessed in terms of a disaster or emergency that can be created from that hazard. The comprehensive planning approach depends upon a clear understanding of what hazards exist, what risks they pose, and who and what can be impacted.

The purpose of the Hazard Analysis and Risk Assessment (HARA) is to identify and prioritize hazards, both natural and human caused, that pose a risk to the Cities of Lisbon and Mount Vernon and to the health and safety of its citizens, property, and economy. The HARA documents both the methodology into which the Cities of Lisbon and Mount Vernon entered in developing the Hazard Analysis and Risk Assessment and describes the hazards identified through the process along with their resulting priority rank. It is also the primary vehicle in documenting and distributing concise yet informative results of the process to stakeholders in and around the Cities of Lisbon and Mount Vernon. The Profile Hazard Events provides the historical information to include the previous occurrences available for this update. These decisions are based on the best data available.

State and Local Hazard Analysis and Risk Assessment

Hazard Analysis and Risk Assessment (HARA) is a shared responsibility between the state and local communities. Both the state and local communities assess their risks from hazards as part of their respective planning processes. While local governments focus on the hazards, vulnerabilities, and risks on a local or regional scale, the state focuses on the regional and statewide implications of hazards. The Lisbon and Mount Vernon Hazard Mitigation Plan relies heavily on the HARA process, which was taken directly from the State Hazard Mitigation Plan and tailored to the Cities.

Multi-Hazard Approach

Where appropriate, the document includes specific information to estimate losses for several hazards. While the guide does not provide specific direction for all hazards, the basic procedures explained could be adapted for any hazard with variations that respond to the peculiar nature of each hazard.

Getting Started

The HARA process helps answer the following questions:

- What kinds of hazards can affect the jurisdiction?
- What may have happened in the past that the community should know?

Quite naturally, many people are only aware of the most obvious risks, usually as a result of a disaster that affected their community or state in the recent past such as a tornado or flood. In many cases, however, there are hazards about which most people are not aware because they haven't affected the community during the lifetimes of current residents.

Step One of this process – Identifying Hazards – helps explain how to determine which hazards can affect the community.

What will be affected by these hazards?

Are there buildings, roads, or other facilities in the community that will be damaged or destroyed by these hazards? Are there concentrations of certain populations in hazard areas that are especially vulnerable, such as elderly or non-English speaking people? Are there unique or symbolic characteristics about the community that will be impacted adversely by a hazard? How will the economy of the community or region be impacted by the occurrence of the hazard?

An inventory will help identify the assets that can be damaged or affected by the hazard event. For detailed assessments, the inventory will also include information on special populations and building characteristics like size, replacement value, content value, and occupancy. In many cases, community assets may be vulnerable to more than one type of hazard, and different characteristics of the same asset may need consideration to understand its vulnerability to each type of hazard. For example, if a building is subject to both floods and earthquakes, the location and elevation of the building will be relevant to how much of its structure and contents may be damaged by flooding. Other relevant factors will be the construction of the building and its ability to resist physical damage caused by the anticipated ground movements during an earthquake.

Step Two of this process – Community Profile – will help determine if and to what extent these hazards will affect the assets of the jurisdiction.

How bad can it get?

How "big" is each hazard's potential impact? Will it affect every area equally or will certain areas get hit harder than others? How often will each type of hazard impact the community?

It is important to know the location and amount of land area that may be affected by certain kinds of hazards. For example, there may be areas that can be affected repetitively by a hazard in one part of the community (such as floodplains adjacent to streams and rivers or areas around chemical facilities) or there may be potential community-wide impacts from events such as windstorms or winter storms. A specific type of hazard can have varying effects on a community, depending on the severity of individual hazard events. For example, differences in the depth of floodwaters from discrete flood events will yield corresponding differences in the amount of damages.

Step Three of this process – Profile Hazard Events – will help determine how bad a hazard can get.

What secondary impacts can the hazard create?

What secondary hazards can be triggered by another hazard? What are the likely cascading effects of certain hazards?

Hazards create direct damages, indirect effects, and secondary hazards to the community. Direct damages are caused immediately by the event itself, such as a bridge washing out during a flood. Indirect effects usually involve interruptions in asset operations and community functions, also called functional use. For example, when a bridge is washed out due to a flood, traffic is delayed or rerouted, which then impacts individuals, businesses, and public services such as fire and police departments that depend on the bridge for transportation. Secondary hazards are caused by the initial hazard event, such as when an earthquake causes a tsunami, landslide, or dam break. While these are disasters in their own right, their consequent damages should be included in the damage calculations of the initial hazard event. Loss estimations will include a determination of the extent of direct damages to property and indirect effects on functional use.

Step Four of this process – Considering Cascading Events – will help determine how secondary hazards will affect the community.

Which hazards are priorities for planning?

Which hazards are candidates for special attention for response planning? On which hazards should mitigation efforts be focused? Which hazards require further planning for post-disaster recovery?

Through completion of steps 1-4, the hazards can be sorted by their composite score. The hazard with a higher score represents the hazard with a higher risk to the community. At first glance, the top third can be taken as the first priority group, the following third as the second priority group, and the remaining third as the third priority group. Adjustments can be made to this preliminary ranking by the planning team. The hazard analysis and risk assessment is a sound prioritization tool and can be used to set priorities, but the planning team should make the final determination of the priority group in which a hazard is placed.

Step Five of this process – Prioritizing Hazards – will help determine which hazards need to be addressed through mitigation planning. The hazards or impacts that cannot be mitigated need to be addressed in the response plan and the recovery plan.

The hazard analysis and risk assessment is a process for determining the emergency management needs for the City. This is possible when the knowledge of the hazard is combined with the knowledge of the impact it would have on citizens and property in the Cities of Lisbon and Mount Vernon. The result is a measure of the state's vulnerability

and the probability of an incident occurring. Adequate information about the hazards will enable the Cities of Lisbon and Mount Vernon to know:

- how frequently damage from a particular event could occur,
- the extent of the damage, and
- which portions of the Cities could be impacted.

When the data for each hazard is combined, state and local officials can determine the relative vulnerability to each hazard, the potential risk, and the direct impact on the citizens and public or private property. This will allow assignment of priorities for emergency management needs and mitigation efforts.

Current hazard analysis and risk assessments received at HSEMD from local jurisdictions were used to accumulate a list of all hazards that occur in the State. Along with gathering information from local plans, other resources, including data from the NCDC website, were gathered for analysis. A well-written local hazard mitigation plan includes a list of high-risk hazards in that jurisdiction. The main text of the plan includes strategies to minimize the risk from those identified hazards.

The hazard identification portion of the hazard analysis and risk assessment is an inventory of all the hazards that could potentially impact the State of Iowa. The planning team developed a list of all foreseeable and potentially significant hazards. The overall list was very inclusive. The team did not want to leave a hazard off the identification list because of its lack of historical occurrence in the state.

As a result of this process the State Hazard Mitigation Team (SHMT) identified 40 hazards in two categories, with a total of 16 natural hazards and 24 human caused/combination hazards. The full list of hazards is provided in the table below.

Iowa Hazards

Natural Hazards	Human Caused/Combined Hazards
Dam Failure	Agro-Terrorism
Drought	Air Transportation
Earthquakes	Animal/Plant/Crop Disease
Expansive Soils	Bioterrorism
Extreme Heat	Chemical Terrorism
Flash Flood	Communications Failure
Grass or Wild Land Fire	Conventional Terrorism
Hailstorms	Cyber Terrorism
Landslides	Enemy Attack
Levee Failure	Energy Failure
River Flooding	Fixed Hazardous Materials
Severe Winter Storms	Fixed Radiological Incident
Sink Holes	Human Disease Incident
Thunder and Lightning	Human Disease Pandemic
Tornadoes	Pipeline Transportation Incident
Windstorms	Public Disorder

	Radiological Terrorism
	Radiological Transportation
	Rail Transportation
	Roadway Transportation Incident
	Structural Failure
	Structural Fire
	Transportation Hazardous Materials Incident
	Waterway Incident

Source: Iowa HSEMD

Methodology for Assigning Ratings

The assessment of the risk to people and property in and around the Cities of Lisbon and Mount Vernon from a variety of hazards requires a tremendous amount of data from all levels of government and the private sector. To accomplish this task and to do it as objectively as possible, a number of factors were taken into account:

- History of occurrence;
- Probability of the hazard occurring in the future;
- Vulnerability of people in the hazard area;
- Maximum geographic extent the hazard could cover;
- Severity of impact in terms of human lives, property, infrastructure, etc.
- Amount of warning time available before the hazard occurs.

The economic impact of disasters is a relatively new area of record-keeping and is generally restricted to major disasters involving both state and federal funding. Smaller, less significant events often do not reflect the economic impact of the incident. For these smaller events, there is a greater reliance on local information and records of impacts.

Members of the State Hazard Mitigation Team were asked to discuss each of the hazards. They were also asked to provide a score of one through four using the scoring guides provided to them. Members of the Cities of Lisbon and Mount Vernon Hazard Mitigation Planning Committee went through a similar process and have tailored the State's list to be specific for the Cities of Lisbon and Mount Vernon.

This hazard analysis seeks to strike a balance between evaluation criteria, for example, the evaluation of low probability-high impact events versus high probability-low impact events. Each category of a particular hazard is rated on a scale of one through four. Totaling the categorical ratings will provide an overall rating for each hazard (total score will be between 6 and 24). The hazard worksheet score was recorded on the Composite Scoring Worksheet.

It was important for the assessment team to score each hazard as a single event. Only impacts from that particular hazard were to be considered in the analysis. Cascading hazards are examined in later steps to show how cascading events can result in exponential consequences.

A scale of one through four was used in all of the scoring guide tables because of the large variation in historical occurrences, probabilities, percentages of vulnerabilities, percentage of spatial extent, the number of casualties, or the value of property damaged. Often this data was not available or would have been impossible to extract from aggregate data. Using this scale provided the best option for comparison of vastly different types of hazards. There are overlapping values between each of the categories. This design was to allow scorers to "ride the fence" and feel more comfortable when deciding between two different categories. Other hazard analyses across the country have used the "high, medium, and low" criteria to score the categories. Using a quantifiable system gives more detail and still allows for adjustments where necessary. The idea of weighting certain categories relative to the other categories was discussed at length and found to be largely counteractive. By its nature, weighting one category of the worksheet diminished the value of other important categories. It simply made sense to leave all categories with their original weight of 1. The following is a brief description of the categories and guidelines that were used to score each hazard.

Historical Occurrence

Historical occurrence represents how many times a hazard occurred in the past. Each hazard may or may not have a complete documented historical record. Because each hazard has a different period for which historical occurrences have been collected, each hazard was prorated to a twenty-five year period. Local, state, and federal government agencies have improved record keeping on incidents, accidents, and disasters that affect people and property (e.g. areas of hazardous materials incidents, transportation accidents, fires, etc.). The National Weather Service, a division of the National Oceanic and Atmospheric Administration (NOAA), and the State Climatologist's Office maintain a history of weather events in Iowa. Below is an explanation of the rating system that was used.

Rating	Number of Occurrences
1	Less than 4
2	4 to 7
3	8 to 12
4	more than 12

Probability of Occurrence

Probability reflects the estimated frequency of the hazard occurring in the future. The historical occurrence can be extrapolated into the future, but this methodology may result in inaccuracies. Mitigating impacts of a hazard will likely result in future occurrences being lower than the historical numbers. However, there may be new hazards that present themselves to the community. For example, a new industry producing or housing hazardous material creates a new localized hazard in the jurisdiction. Below is an explanation of the rating system that was used.

Rating	Probability of Occurrences

1	Less than 1% in the next 100 years
2	1 to 10% in the next year or 1 chance in 100 years
3	10 to 100% in the next year or 1chance in 10years
4	near 100% in the next year

Vulnerability

Vulnerability is the measure of the percentage of people that will be adversely affected by the occurrence of the hazard. The Lisbon and Mount Vernon Hazard Mitigation Plan uses the 2000 Census Data. Below is an explanation of the rating system that was used.

Rating	Magnitude	Percentage of the People Affected
1	Negligible	Less than 10
2	Limited	10 to 25
3	Critical	25 to 50
4	Catastrophic	more than 50

Maximum Threat

The maximum geographic extent is the percentage of the jurisdiction impacted by the hazard. As an example, a snowstorm will likely impact the entire community, whereas a small hazardous materials incident may cover only a few city blocks. Below is an explanation of the rating system that was used.

Rating	Magnitude	Percentage of the Property and People Affected
1	Negligible	Less than 10
2	Limited	10 to 25
3	Critical	25 to 50
4	Catastrophic	more than 50

Severity of Impact

The severity of impact is the most complex of the scoring guides. Many considerations must be made including, at a minimum, the following:

A. Health and safety of persons in the affected area at the time of the incident (injury and death);
B. Health and safety of personnel responding to the incident;
C. Continuity of operations;
D. Property, facilities, and infrastructure;
E. Delivery of services;
F. The environment;
G. Economic and financial condition;
H. Regulatory and contractual obligations; and
I. Reputation of the entity.

Each of the above impacts must be considered and discussed in narrative format in the Severity of Impact section in order to meet the Emergency Management Accreditation Program's (EMAP) Section 3-3.2 of the assessment tool which states: "The entity shall conduct an impact analysis to determine the potential for detrimental impact of the hazards to include but not limited to the above bulleted data."

This scoring guide was provided to help the assessment team provide an appropriate score for this complex section. We found that impacts to certain areas call for a score in one category while impacts to another area call for a different score. Providing an appropriate score for that hazard characteristic in the overall scale of one (1) through (4) was the overriding factor. The scoring guides were provided as guides only, and served to provide a uniform frame of reference for all users of the assessment tool. Below is an explanation of the rating system that was used.

Rating	Magnitude	Percentage of the Property and People Affected
1	Negligible	• Few injuries. • Minor quality of life lost. • No loss of property. • Brief interruption of essential facilities.
2	Limited	• Minor injuries. • Minor short term property damage. • Shut down of essential facilities for 4 to 24 hours.
3	Critical	• Serious injuries. • Major long term damage. • Essential facilities down 24 to 72 hours.
4	Catastrophic	• Multiple deaths. • Property damage beyond repair. • Complete shutdown of essential facilities 3 days or more.

Speed of Onset

The speed of onset is quite simply the amount of warning time available before the hazard occurs. This should be taken as an average warning time. For many of the

atmospheric natural hazards there is a considerable amount of warning time as opposed to the human caused accidental hazards that occur instantaneously or without any significant warning time. Below is an explanation of the rating system that was used.

Rating	Probable Amount of Warning Time
1	more than 24 hours
2	12 to 24 hours
3	5-12 hours
4	minimal warning time

Appendix 2
FEMA STAPLEE CRITERIA

Below is an explanation of the STAPLEE criteria taken from FEMA's State and Local Mitigation Planning Guidance (April 2003):

> **S – Social:** Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.
>
> **T – Technical:** Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.
>
> **A – Administrative:** Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.
>
> **P – Political:** Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.
>
> **L – Legal:** It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.
>
> **E – Economical:** Budget constraints can significantly deter the implementation of mitigations actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.
>
> **E – Environmental:** Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound.

Each of the STAPLEE criteria were considered separately and given a positive (+), negative (-), or neutral (0) rating. For example, if a project would be acceptable to a community, it would receive a positive (+) rating or if a project would adversely impact one or more segments of a community, it would receive a (-) rating.

Appendix 3
PLANNING GOALS AND PRIORITIES

Iowa HSEMD identified, in the State Hazard Mitigation Plan, that mitigation measures can be grouped into six categories. The Lisbon and Mount Vernon Hazard Mitigation Committee has chosen to include this grouping in the Lisbon and Mount Vernon Hazard Mitigation Plan. The Mitigation Action Matrixes below identify within which group a specific measure falls.

1. Prevention: Government administrative or regulatory measures or processes that influence the way land and buildings are developed and built. These measures also include public actions to reduce hazard losses. Examples include:
   - Planning and zoning
   - Hazard mapping
   - Building codes
   - Subdivision regulations
   - Studies/data collection and analysis to support prevention measures
   - Floodplain regulations
   - Storm water management regulations
   - Multi-jurisdictional agreements that reduce hazard risks
   - Other regulatory measures or processes that reduce hazard risks

2. Property Protection: Measures that involve modifying existing buildings or structures to protect them from a hazard, or removing buildings or structures from the hazard area, or providing insurance to cover potential losses. Examples include:
   - Acquisition, elevation, or relocation of hazard-prone property
   - Safe room/storm shelter retrofits
   - Security retrofits
   - Critical facility protection
   - Risk reduction retrofits (modifications) to hazard prone properties
   - Studies/data collection and analysis to develop property protection measures
   - National Flood Insurance Program (NFIP) participation

3. Public Education and Awareness: Measures to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them. Examples include:
   - Programs to improve awareness of hazard risk
   - Programs to improve awareness of hazard risk prevention and reduction
   - Education programs directed toward specialized audience, i.e. buildings, developers, and hazard prone neighborhoods

4. Natural Resource Protection: Measures that, in addition to minimizing hazard losses; preserve or restore the functions of natural systems. Examples include:
   - Sediment and erosion control
   - Stream corridor restoration, watershed management

- Forest and vegetation management
- Wetland restoration and preservation

5. Emergency Services: Measures taken before, during and after a hazard event to protect people, and property; although these measures are not typically considered "mitigation, they significantly minimize the events impact and preserve the community's health and safety. Examples include:
   - Emergency/response facilities and personnel
   - Hazard warning systems and equipment
   - Health/safety/environmental risk prevention/reduction
   - Emergency/response infrastructure
   - Emergency/response planning
   - Emergency/response training
   - Emergency/response vehicles, equipment and protective gear
   - Emergency/response services studies and data collection
   - Emergency/response communication systems

6. Structural Projects: These are measures that involve the construction and maintenance of structures and infrastructure that will reduce the impact of a hazard or redirect the impact away from people and property. Examples include:
   - Channel modification/maintenance
   - Dam and reservoir construction/maintenance
   - Levee and floodwall construction and maintenance
   - Safe room construction
   - Infrastructure construction and maintenance – roads and bridges
   - Infrastructure construction and maintenance – utility systems
   - Infrastructure construction and maintenance – urban and rural drainage systems
   - Studies and data collection to develop structural projects

The Lisbon and Mount Vernon Hazard Mitigation Committee used the following values in prioritizing mitigation actions:

1. Mitigation actions ongoing and need to be sustained. These actions have been determined to be the largest and provide the most immediate impact or these mitigation actions are required to satisfy regulations or compliance.
2. Mitigation efforts are beyond the Cities' resources.
3. These mitigation actions have the lowest impact. The actions are remote in nature to occur.

Appendix 4
Glossary of Terms

Acceleration: The rate of change of velocity with respect to time. Acceleration due to gravity at the earth's surface is 9.8 meters per second squared (9.8 m2). That means that every second that something falls toward the surface of earth its velocity increases by 9.8 meters per second.

Anchoring: Special connections made to ensure that a building will not float off, blow off or be pushed off its foundation during a flood or storm.

Asset: Any manmade or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Base Flood: Flood that has a 1 percent probability of being equaled or exceeded in any given year. Also known as the 100-year flood.

Base Flood Elevation (BFE): Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.

Basement: Any floor level below grade.

Bedrock: The solid rock that underlies loose material, such as soil, sand, clay, or gravel.

Building: A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Community Rating System (CRS): A National Flood Insurance Program (NFIP) that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.

Computer-Aided Design And Drafting (CADD): A computerized system enabling quick and accurate electronic 2-D and 3-D drawings, topographic mapping, site plans, and profile/cross-section drawings.

Consequences: The damages, injuries, and loss of life, property, environment, and business that can be quantified by some unit of measure, often in economic or financial terms.

Contour: A line of equal ground elevation on a topographic (contour) map.

Critical Facility: Facilities that are critical to the health and welfare of the population and that are especially important during and following hazard events. Critical facilities include shelters, police and fire stations, schools, childcare centers, senior citizen centers, hospitals, disability centers, vehicle and equipment storage facilities, emergency operations centers, and city hall. The term also includes buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities, vulnerable facilities, day care centers, nursing homes, and housing likely to contain occupants who are not very mobile. Other critical city infrastructure such as telephone exchanges and water treatment plants are referred to as lifelines. See Lifelines.

Crosswalk: The crosswalk is a tool for jurisdictions to use in developing hazard mitigation plans, providing guidance concerning the requirements and recommendations to ensure the plans are in compliance with Section 322 of the Disaster Mitigation Act of 2000. The latest crosswalk should always accompany each plan when submitted to the State and FEMA Region offices. It is then used by the State and FEMA Region plan reviewers in the plan review process of evaluating the plans from local or multi-

jurisdiction entities to record comments on whether the plans satisfactorily meet or do not meet the required criteria for approval by FEMA.

Dam Breach Inundation Area: The area flooded by a dam failure or programmed release.

Debris: The scattered remains of assets broken or destroyed in a hazard event. Debris caused by a wind or water hazard event can cause additional damage to other assets.

Development: Any man-made change to real estate.

Department of Homeland Security (DHS): commonly known in the United States as "Homeland Security", is a Cabinet department of the U.S. federal government with the responsibility of protecting the territory of the U.S. from terrorist attacks and responding to natural disasters. The Department of Homeland Security works in the civilian sphere to protect the United States within, at, and outside its borders. Its goal is to prepare for, prevent, and respond to domestic emergencies, particularly terrorism. On March 1, 2003, DHS absorbed the now defunct United States Immigration and Naturalization Service and assumed its duties. In doing so, it divided the enforcement and services functions into two separate and new agencies – U.S. Immigration and Customs Enforcement and U.S. Citizenship and Immigration Services. The creation of DHS constitutes the biggest reorganization of U.S. government in American history and the most substantial reorganization of federal government agencies since the National Security Act of 1947, which placed the different military departments under a secretary of defense and created the National Security Council and Central Intelligence Agency. DHS also constitutes the most diverse merger of federal functions and responsibilities, incorporating 22 government agencies into a single organization.

Digitize: To convert electronically points, lines, and area boundaries shown on maps into x, y coordinates (e.g., latitude and longitude, universal transverse mercator (UTM), or table coordinates) for use in computer applications.

Duration: How long a hazard event lasts.

Earthquake: A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.

Emergency: Any hurricane, tornado, storm, flood, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, drought, fire, explosion, or other catastrophe in any part of the United States which requires federal emergency assistance to supplement State and local efforts to save lives and protect property, public health and safety, or to avert or lessen the threat of a disaster. Defined in Title V of Public Law 93-288, Section 102(1).

Emergency Operations Center (EOC): A facility that houses communications equipment that is used to coordinate the response to a disaster or emergency.

Emergency Operations Plan (EOP): Sets forth actions to be taken by State or local governments for response to emergencies or major disasters.

Emergency Response Plan: A document that contains information on the actions that may be taken by a governmental jurisdiction to protect people and property before, during, and after a disaster.

Extent: The size of an area affected by a hazard or hazard event.

Fault: A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.

Federal Emergency Management Agency (FEMA): an agency of the United States government that helps anticipate, prepare for, and respond to disasters and major civil emergencies. FEMA's main function is to coordinate federal disaster relief activities for natural hazards and terrorist attacks. It coordinates

disaster preparedness programs with state and local authorities with nonprofit organizations setup for response. FEMA was created in 1979 by executive order and in 2003, became part of the Department of Homeland Security.

FIPS: Stands for Federal Information Processing Standards. Under the Information Technology Management Reform Act (Public Law 104-106), the Secretary of Commerce approves standards and guidelines that are developed by the National Institute of Standards and Technology (NIST) for Federal computer systems. These standards and guidelines are issued by NIST as Federal Information Processing Standards (FIPS) for use government-wide. NIST develops FIPS when there are compelling Federal government requirements such as for security and interoperability and there are no acceptable industry standards or solutions.

Fire Potential Index (FPI): Developed by United States Geological Survey (USGS) and United States Forest Service (USFS) to assess and map fire hazard potential over broad areas. Based on such geographic information, national policy makers and on-the-ground fire managers established priorities for prevention activities in the defined area to reduce the risk of managed and wildfire ignition and spread. Prediction of fire hazard shortens the time between fire ignition and initial attack by enabling fire managers to pre-allocate and stage suppression forces to high fire risk areas.

Flash Flood: A flood event occurring with little or no warning where water levels rise at an extremely fast rate.

Flood: A general and temporary condition of partial or complete inundation of normally dry land areas from (1) the overflow of inland or tidal waters, (2) the unusual and rapid accumulation or runoff of surface waters from any source, or (3) mudflows or the sudden collapse of shoreline land.

Flood Depth: Height of the flood water surface above the ground surface.

Flood Elevation: Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.

Flood Hazard Area: The area shown to be inundated by a flood of a given magnitude on a map.

Flood Insurance Rate Map (FIRM): Map of a community, prepared by the Federal Emergency Management Agency, which shows both the special flood hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study (FIS): A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.

Flood Mitigation Assistance Program (FMA): A planning and project implementation grant program funded by the National Flood Insurance Program. Provides pre-disaster grants to State and local governments for both planning and implementation of mitigation strategies. Grant funds are made available from NFIP insurance premiums, and therefore are only available to communities participating in the NFIP.

Flood of Record: The highest known flood level for the area, as recorded in historical documents.

Floodplain: Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

Flood proofing: Protective measures added to or incorporated in a building to prevent or minimize flood damage. "Dry flood proofing" measures are designed to keep water from entering a building. "Wet flood proofing" measures minimize damage to a structure and its contents from water that is allowed into a building.

Floodway: The stream channel and that portion of the adjacent floodplain which must remain open to

permit conveyance of the base flood. Floodwaters are generally the swiftest and deepest in the floodway. The floodway should remain clear of buildings and impediments to the flow of water.

Freeboard: A margin of safety added to a protection measure to account for waves, debris, miscalculations, lack of scientific data, floodplain fill, or upstream development.

Frequency: A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance – its probability – of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.

Fujita Scale of Tornado Intensity: Rates tornadoes with numeric values from F0 to F5 based on tornado wind speed and damage sustained. An F0 indicates minimal damage such as broken tree limbs or signs, while an F5 indicates severe damage sustained. This scale was updated in 2007 to the **Enhanced Fujita Scale**, with changes to the speeds and rating designations. The scale ratings are now referred to as EF0 through EF5.

Functional Downtime: The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.

Geographic Area Impacted: The physical area in which the effects of the hazard are experienced.

Geographic Information System (GIS): A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Ground Motion: The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.

Hazard: A source of potential danger or adverse condition. An event or physical condition that has the potential to cause fatalities, injuries, property and infrastructure damage, agriculture loss, damage to the environment, interruption of business, or other types of harm or loss. Hazards, as defined in this study, will include naturally occurring events such as floods, dam failures, levee failures, tornadoes, high winds, hailstorms, lightning, winter storms, extreme heat, drought, expansive soils, urban fires, wildfires that strike populated areas, and earthquakes. A natural event is a hazard when it has the potential to harm people or property. For purposes of this study, hazardous materials events are also included.

Hazard Event: A specific occurrence of a particular type of hazard.

Hazard Identification: The process of defining and describing a hazard, including its physical characteristics, magnitude and severity, probability and frequency, causative factors, and locations or areas affected.

Hazard Mitigation: Sustained actions taken to reduce or eliminate long-term risk to human life and property from natural and technological hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery.

Hazard Mitigation Grant Program (HMGP): Authorized under Section 404 of the Stafford Act; a FEMA disaster assistance grant program that funds mitigation projects in conformance with post-disaster mitigation plans required under Section 409 of the Stafford Act. The program is available only after a Presidential disaster declaration.

Hazard Mitigation Plan: The plan resulting from a systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards present in society that includes the actions needed to

minimize future vulnerability to hazards. Section 409 of the Stafford Act requires the identification and evaluation of mitigation opportunities, and that all repairs be made to applicable codes and standards, as condition for receiving Federal disaster assistance. Enacted to encourage identification and mitigation of hazards at all levels of government.

Hazard Profile: A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

HAZUS-MH (Hazards U.S.-Multi-Hazards): A GIS-based nationally standardized estimation tool developed by FEMA for losses from the hazard events of earthquake, hurricane winds and flooding. Other hazards, such as, tornadoes, are being considered to be added.

Hydrology: The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.

Infrastructure: The public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology such as phone lines or Internet access, vital services such as public water supplies and sewer treatment facilities, and includes an area's transportation system such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots, and waterways, canals, locks, and regional dams.

Insurance Service Office, Inc. (ISO): An insurance organization that administers several programs that rate a community's hazard mitigation activities.

Iowa Homeland Security and Emergency Management Division (HSEMD): The Iowa Homeland Security and Emergency Management Division (HSEMD) plans for and responds to both natural and human-caused disasters. The Division helps to coordinate activities before, during and after emergencies through partnerships with local, state, federal and private agencies. The Division's main objectives are to preserve life and reduce the impact of disasters.

Intensity: A measure of the effects of a hazard event at a particular place.

Landslide: Downward movement of a slope and materials under the force of gravity.

Lifelines: Transportation and utility systems that are essential to the function of a region and to the well being of its inhabitants. Transportation systems include highways, air, rail, and waterways, ports, and harbors. Utility systems include electric power, gas and liquid fuels, telecommunications, water, and wastewater.

Liquefaction: The phenomenon that occurs when ground shaking causes loose soils to lose strength and act like viscous fluid. Liquefaction causes two types of ground failure: lateral spread and loss of bearing strength.

Lowest Floor: Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.

Magnitude: A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.

Microburst: A localized column of sinking air, producing damaging divergent and strait line winds at the surface that are similar to but distinguished from tornadoes which generally have convergent damage.

Mitigation: Sustained action taken to reduce or eliminate the long-term risk to human life and property from natural and technological hazards and their effects. Note that this emphasis on long-term risk distinguishes mitigation from actions geared primarily to emergency preparedness and short-term recovery (Burby, 1998).

National Flood Insurance Program (NFIP): A federal program created by Congress in 1968 that provides the availability of flood insurance to communities in exchange for the adoption and enforcement of a minimum floodplain management ordinance specified in 44 CFR §60.3. The ordinance regulates new and substantially damaged or improved development in identified flood hazard areas.

National Geodetic Vertical Datum of 1929 (NGVD): Datum established in 1929 and used in the NFIP as a basis for measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or Mean Sea Level. The Base Flood
Elevations shown on most of the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency are referenced to NGVD.

National Weather Service (NWS): Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and state entities in preparing weather and flood warning plans.

Planimetric: Describes maps that indicate only man-made features like buildings.

Planning: The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.

Planning for Post-Disaster Reconstruction: The process of planning (preferably prior to an actual disaster) those steps the community will take to implement long-term reconstruction with one of the primary goals being to reduce or minimize its vulnerability to future disasters. These measures can include a wide variety of land-use planning tools, such as acquisition, design review, zoning, and subdivision review procedures. It can also involve coordination with other types of plans and agencies but is distinct from planning for emergency operations, such as restoration of utility services and basic infrastructure.

Preparedness: Activities to ensure that people are ready for a disaster and respond to it effectively. Preparedness requires figuring out what will be done if essential services break down, developing a plan for contingencies, and practicing the plan.

Probability: A statistical measure of the likelihood that a hazard event will occur.

Project Impact: A program that encourages business, government agencies and the public to work together to build disaster-resistant communities.

Reconstruction: The long-term process of rebuilding the community's destroyed or damaged buildings, public facilities, or other structures.

Recovery: The process of restoring normal public or utility services following a disaster, perhaps starting during but extending beyond the emergency period to that point when the vast majority of such services, including electricity, water, communications, and public transportation have resumed normal operations. Recovery activities necessary to rebuild after a disaster include rebuilding homes, businesses and public facilities, clearing debris, repairing roads and bridges, and restoring water, sewer and other essential services. Short-term recovery does not include the reconstruction of the built environment, although reconstruction may commence during this period.

Recurrence Interval: The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.

Repetitive Loss Property: A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than ten days apart) of at least $1000 each have been paid within any 10-year period since 1978. While Repetitive Loss Properties constitute only 2% of insured properties, they account for 40% of flood damage claims against the NFIP.

Replacement Value: The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type and quality.

Retrofitting: Modifications to a building or other structure to reduce its susceptibility to damage by a hazard.

Richter Scale: A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.

Risk: The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Risk Assessment: A process or method for evaluating risk associated with a specific hazard and defined in terms of probability and frequency of occurrence, magnitude and severity, exposure and consequences. Also defined as: "The process of measuring the potential loss of life, personal property, housing, public facilities, equipment, and infrastructure; lost jobs, business earnings, and lost revenues, as well as indirect losses caused by interruption of business and production; and the public cost of planning, preparedness, mitigation, response, and recovery. (Burby, 1998).

Riverine: Of or produced by a river.

Scale: A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.

Scarp: A steep slope.

Scour: Removal of soil or fill material by the flow of flood waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.

Seismicity: Describes the likelihood of an area being subject to earthquakes.

Special Flood Hazard Area (SFHA): An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.

Stafford Act: The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988 and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.

State Hazard Mitigation Team: Composed of key State agency representatives, the team evaluates hazards, identifies strategies, coordinates resources, and implements measures that will reduce the vulnerability of people and property to damage from hazards.

State Hazard Mitigation Officer (SHMO): The representative of state government who is the primary point of contact with FEMA, other state and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

Storm water Management: Efforts to reduce the impact of storm water or snowmelt runoff on flooding and water quality.

Storm water Detention: The storing of storm water runoff for release at a restricted rate after the storm subsides, or the flood crest passes.

Substantial Damage: Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.

Surface Faulting: The differential movement of two sides of a fracture – in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.

Tectonic Plate: Torsionally rigid, thin segments of the earth's lithosphere that may be assumed to move horizontally and adjoin other plates. It is the friction between plate boundaries that cause seismic activity.

Topographic: Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include man-made features.

Tornado: A violently rotating column of air extending from a thunderstorm to the ground.

Vulnerability: Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power – if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment: The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Wildfire: An uncontrolled fire spreading through vegetative fuels, exposing and possibly consuming structures.

Zone: A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

APPENDIX 5
Community Meeting Information

June 9, 2010 sign in

June 28, 2010 sign in and agenda

July 6, 2010 sign in and agenda

July 14, 2010 sign in

October 13, 2010 sign in

December 8, 2010 sign in

January 18, 2011 agenda, sign in sheet, notice

February 3, 2011 agenda, notice, and sign in sheet

February 9, 2011 sign in

Lisbon ??? Agenda and sign in sheet

Mt Vernon??? Agenda and sign in sheet

APPENDIX 6
Supporting Agency Resources

AREA AMBULANCE SERVICE
(Cedar Rapids Medical Emergency Dispatch)

Staffing Available

Day 0700-2300 6 paramedics, 1 dispatcher/4 Office people/1 wheelchair van driver
Night 2300-0700 4 paramedics, 1 dispatcher
600-1800 2 additional paramedics
1000-1800 2 additional paramedics
(More available upon activation of disaster list.) Total staff of 62

Communications Systems

- 3 Base radios
- 3 800 Mhz Bases
- 10 Mobile radios
- 24 VHF Portable radios
- 16 800 Mhz Portable radios

Vehicles

- 10 Ambulances, plus 1 disaster vehicle.
- 1 Wheel Chair Van
- 1 Supervisor Response Vehicle

Emergency Medical Supplies

In all ambulances, all Advanced Life Support (ALS) and Basic Life Support (BLS) recommended supplies. Disaster vehicles set up to treat 36 patients with all needed ALS and BLS Supplies Hospital supplies as backup.

Radiological Equipment

- 8 Eberline E120s with HP - 260 probe
- 8 RO2As
- 16 Dosimetry packets, including KI
- 24 MSA Advantage 1000 RCA/CBA Masks
- 18 Extra Filters
- 24 Level "C" Tyvek suits

HIAWATHA FIRE DEPARTMENT

Staffing Available

8 Day
8 Afternoon
20 Night

Communications Systems

1 Base radio
10 Mobile radios
17 Portable radios

Vehicles

3 Pumpers
1 75' aerial
1 Tanker
1 Mini-pumper
1 Rescue van with 25KW PTO generator plus 4 bottle cascade system w/breathing air
2 ALS Ambulances

Emergency Medical Supplies

2 KEDS
1 Scoop stretcher
1 Stokes basket stretcher
4 Long back boards
1 Short back board
1 Inhalator
4 Resuscitators
1 11-ft. A-frame ladder

Miscellaneous Equipment

1 Portable pump
2 Portable generators
4 Floodlights
Port-a-power
2 Chain Saws
3000 ft. 5-inch hose
4000 ft. 2-1/2-inch hose
2 Circular Saws
3 Ventilation fans
2 Gas-powered ventilation fan
1 Hurst power unit
1 Hurst extrication tool
spreader and cutter
1 Com-a-long
Cribbing
2 Electric Ventilation Fans
ATC foam
Air tools
Stretchers
Air-bag System
Power saw
Chain saw-small
Various ram bars

LINN COUNTY EMERGENCY MANAGEMENT AGENCY

Staffing Available

5 Normal work week – on call 24 hrs.

Communications Systems

10 Base radios
19 Mobile radios
15 Portable radios

Vehicles

3 Sedans
1 Pickup (joint EMA and LC HazMat)
1 Mobile Command Post (joint EMA & HAZMAT)
1 800-gallon water tanker
4 400 Gallon Water Trailers

Aircraft

2 Civil Air Patrol (CAP) Fixed Wing

Emergency Supplies

200 Stretchers (assigned)
50 Bed Mobile Shelter Trailer
50 Cots
50 Stretchers
100 Blankets
1 MRC Trailer 50 Bed Hospital
50,000 sandbags

Radiological Response Equipment

13 Survey meters – Eberline E -120 w/HP-260 probes
6 Eberline E-120 located at LC Correction Center (2-IMCC & 2-Anamosa)
1 Ludlum 52 Portal Monitor
2500 SRD for emergency workers
2400 TLD for emergency workers
3100 KI packets for emergency workers

LINN COUNTY HAZMAT TEAM

Staffing

18 On call HAZMAT Team Members

Communications Systems

18 Portable radios
2 Base radios
6 Mobile radios

Vehicles

1 Pickup (joint EMA & HAZMAT)
1 Mobile Command Post (joint EMA & HAZMAT)
2 HAZMAT Response Vehicles
1 Trailer Mass Decontamination

LINN COUNTY SHERIFF'S OFFICE

Staffing Available

100 Deputies
35 Special deputies

Communications Systems

65 Mobiles
107 Walkie-talkies

Vehicles

60 Vehicles
3 Rescue Vehicles
1 Crime Scene Unit
1 Tower Truck
1 Shop Truck

Emergency Medical Supplies

All vehicles equipped with standard first aid kits. Rescue trucks equipped with emergency gear, etc.

LINN COUNTY SHERIFF'S RESCUE

Staffing Available

1 On-duty Rescue
3 More can be called

Communications Systems

3 Rescue units with medical and fire frequency radios

Vehicles

2 Rescue trucks
3 Rescue boats
1 Tower Unit Bucket Truck w/Lg Generator & Lighting Unit

Emergency Medical Supplies

2 Sets Advanced Emergency Medical Care equipment, including cardiac monitor/defibrillator units, anti-shock trousers.

Miscellaneous Equipment

2 Portable generators
5 Floodlights
2 Hurst jaws
3 Complete sets of extrication equip.
Repelling equipment and rope
4 Proximity suits
4 30 min. SCBA
2 extra tanks
4 Cold Water Dry Suits
4 Stokes baskets
5 Chain saws
6 Stretchers
6 Long boards
6 Sets turn-out gear

Radiological Equipment

2 Eberline E120s with HP-260 probes (one per each rescue truck)
2 RO2As (one per each rescue truck)
4 Dosimetry packets, including KI (two per each rescue truck)

MOUNT VERNON FIRE DEPARTMENT

Staffing Available

30 Fire Fighters

Vehicles

3	Engines
1	Tanker
2	Grass Trucks
1	17' Jonboat
1	Medical Truck

LISBON AND MOUNT VERNON AMBULANCE SERVICE

Staffing Available

4	Paramedics
2	EMT-I
12	EMT-B

Vehicles

2	Ambulances

MULTI-JURISDICTIONAL

HAZARD MITIGATION PLAN

for the cities of
Lisbon and Mount Vernon, Iowa

Adopted:
xxxxxxx, 2011

TABLE OF CONTENTS

Cross-Reference for the Local Mitigation Plan Review

Prerequisites:
Element

Planning Process:
Element

Risk Assessment:
Element

Mitigation Goals:
Element

Plan Maintenance Process:
Element

RESOLUTION NO. _____

A RESOLUTION ADOPTING A HAZARD MITIGATION PLAN

WHEREAS, the City Council of Mount Vernon, Iowa, has authorized the development of a Multi Jurisdiction Hazard Mitigation Plan for Mount Vernon and Lisbon; and

WHEREAS, a committee was established to review the Hazard Mitigation Plan as originally drafted and make appropriate recommendations to the City Council concerning the same; and

WHEREAS, the Hazard Mitigation Plan has been made available in various draft forms to the Council and to the general public for at least two months prior to its adoption; and

WHEREAS, public hearings and other public forums have been held for the purpose of obtaining citizen input on the Hazard Mitigation Plan, including a public hearing on this date; and

WHEREAS, the City Council has determined the Hazard Mitigation Plan in its final form is appropriate and in the best interests of the City of Mt. Vernon and its citizens.

NOW THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF MOUNT VERNON, IOWA, THAT the City of Mount Vernon, Iowa, hereby adopts the Lisbon and Mount Vernon Hazard Mitigation Plan dated _____.

APPROVED AND ADOPTED this _____ day of _____, 2009.

_____
Paul Tuerler, Mayor

ATTEST:

_____
Michael Beimer, City Clerk

RESOLUTION NO. _____

A RESOLUTION ADOPTING A HAZARD MITIGATION PLAN

WHEREAS, the City Council of Lisbon, Iowa, has authorized the development of a Multi Jurisdiction Hazard Mitigation Plan for Mount Vernon and Lisbon; and

WHEREAS, a committee was established to review the Hazard Mitigation Plan as originally drafted and make appropriate recommendations to the City Council concerning the same; and

WHEREAS, the Hazard Mitigation Plan has been made available in various draft forms to the Council and to the general public for at least two months prior to its adoption; and

WHEREAS, public hearings and other public forums have been held for the purpose of obtaining citizen input on the Hazard Mitigation Plan, including a public hearing on this date; and

WHEREAS, the City Council has determined the Hazard Mitigation Plan in its final form is appropriate and in the best interests of the City of Lisbon and its citizens.

NOW THEREFORE BE IT RESOLVED BY THE CITY COUNCIL OF LISBON, IOWA, THAT the City of Lisbon, Iowa, hereby adopts the Lisbon and Mount Vernon Hazard Mitigation Plan dated _____.

APPROVED AND ADOPTED this _____ day of _____, 2009.

_____
Rex Cook, Mayor

ATTEST:

_____
Chris Yancey, City Administrator/Clerk

Hazard Mitigation Plan

PURPOSE:

The purpose of the Hazard Mitigation Plan is to identify steps to prevent or reduce the impact of disasters on the residents and property in the Cities of Lisbon and Mount Vernon in Linn County. This is accomplished through compliance with the Federal Emergency Management Agency's (FEMA) Mitigation Planning Regulation under Code of Federal Regulations (CFR), Title 44, Part 201 (Standard 44 CFR 201.4, 44CFR 201.5) and Iowa Administrative Code 29C 605-7.3(4)(d)(1)(2).

The development of the Lisbon and Mount Vernon Hazard Mitigation Plan is the result of the input from elected officials, emergency management and other government personnel, agency representatives, business people, and interested citizens, and incorporates elements from the Linn County and State of Iowa Hazard Mitigation Plans.

As the cost of disasters continues to rise, it is evident that more pre-disaster steps are necessary if the Cities expects to reduce the damage that can affect its communities. Lisbon and Mount Vernon asked for the assistance of the Linn County Emergency Management Agency to write the Local Hazard Mitigation Plan in conjunction with the City Councils and the Hazard Mitigation Committee. This plan identifies all natural, human-caused, and combination hazards that affect the Cities of Lisbon and Mount Vernon and risks that pose a threat to the Cities of Lisbon and Mount Vernon and the surrounding area. A hazard analysis, which is a part of this Plan, provides a better understanding of each hazard, knowledge of the impacts the hazard could have on the Cities of Lisbon and Mount Vernon, and a prioritized list of actions for each hazard identified as a possible threat to the Cities. By assessing the current mitigation actions already in effect, evaluating alternatives, prioritizing and outlining a strategy for implementation, the Hazard Mitigation Plan has been developed and written. See the Hazard Mitigation Committee and City Council Lists on the following pages.

The Committee reviewed various different resources in the development of the Lisbon and Mount Vernon's Local Hazard Mitigation Plan some of which include:

- U.S Census Bureau: Environmental Protection Agency
- Iowa Department of Natural Resources
- United States Geological Survey
- Federal Emergency Management Agency
- Linn County Emergency Management Agency
- National Weather Service, National Climatic Data Center
- Iowa Homeland Security and Emergency Management Division
- Iowa Climate Change Adaption and Resilience Report 2011

Planning Process

The Lisbon and Mount Vernon City Councils and Hazard Mitigation Planning Committee developed the Hazard Mitigation Plan. Mike Buser led the Planning Committee through the planning process. Don Vincent, the Plans Officer for the Linn County Emergency Management Agency, compiled and wrote the drafts of the Plan which were given to the Hazard Mitigation Committee for comment and review. The Committee consisted of

Mount Vernon:
Paul Tuerler-Mayor
Mike Beimer-City Administrator
Mark Winder-Police Chief
Doug Shannon-Police Sergeant
Dan Gaines-Fire Chief
Andy Pitlik-Assistant Fire Chief
Derek Boren-Secretary/Treasurer
Mike Buser-EMA/Fire/Emergency Planning
Dan Boggs-City Engineer

Mount Vernon School District:
Pam Ewell-Superintendent
Duane Orr-High School Assist Principal/Emergency Planner

Cornell College:
Mike Williamson-Security/Emergency Planner

Lisbon:
Rex Cook-Mayor
Chris Yancey-City Administrator
Rick Scott-Police Chief
Brandon Siggins-EMA/Police
Joe Long-Fire Chief

Lisbon School District:
Brad Laures-Superintendent
Julie Light-School Nurse/Emergency Planner

Lisbon Mount Vernon Ambulance Service:
Amanda Brodin
Ashley Rogers-Asst Chief
Terri Durgin-Emergency Planner

Linn County Emergency Management Agency:
Don Vincent Linn County-Plans Officer
Mike Goldberg-Director

The following plans were used or incorporated into the Mount Vernon Hazard Mitigation Plan:

- Iowa Comprehensive Emergency Plan: Iowa Hazard Mitigation Plan-September 2007
- Cedar Rapids Metro-Area Hazard Mitigation Plan 2007
- Linn County Multi Hazard Emergency Operations Plan: Annex W-Linn County Hazard Mitigation Strategy-January 2008
- Palo Hazard Mitigation Plan-February 2009
- Unincorporated Linn County Hazard Mitigation Plan 2010

A list of stakeholders including residents, local governmental agencies, businesses, and non-profit organizations was compiled by the Linn County Emergency Management Agency staff. Representatives from these groups were identified and asked to serve on the Lisbon and Mount Vernon Hazard Mitigation Planning Committee. The individuals listed above agreed to participate and individually review each draft as it was completed and provide input at each of the committee meetings described below. During these committee meetings, each member also participated in review of input provided by agencies and community members who were asked to review each draft. The public was encouraged to comment through out the planning process. Each committee member reviewed input provided by the general public in consideration of each draft.

An additional list of stakeholders was compiled by the Linn County Emergency Management Agency staff. This list was made up of additional local governmental agencies, businesses, and non-profit organizations that did not wish to participate in the planning committee. These stakeholders were asked to review and comment on each of the drafts generated during the planning process. This group provided input on the first and final drafts of the plan during the public comment periods below.

A public comment period followed the publication of each of the drafts. Public input was collected, reviewed, and incorporated into the adopted draft of the Hazard Mitigation Plan. The public comment period considering the first draft ran from January 12, 2011 to February 1, 2011. The input provided by the general public and the group asked to comment on the draft was reviewed and incorporated into the final draft of the document. The public comment period considering the final draft ran from February 8, 2011 to February 28, 2011. The input provided by the general public and the group asked to comment on the draft was reviewed and incorporated into the final document.

Each of the public comment periods was announced through a public notice that ran in the Cedar Rapids Gazette, Mt. Vernon-Lisbon Sun, and appeared on the Linn County Emergency Management Agency, IA website. An announcement was also posted at the Lisbon and Mount Vernon City Halls. Drafts of the Plan were made available in the Lisbon and Mount Vernon City Halls and the Linn County Emergency Management Agency.

The initial Hazard Mitigation Planning Meeting took place on June 6, 2010 at the Lisbon and Mount Vernon Ambulance Service. Members from the Planning Committee and members of the public discussed the purpose and intent of a Local Hazard Mitigation Plan.

Local Planning Committee members and a representative from the Linn County Emergency Management Agency met with the Lisbon City Council on June 28, 2010 and the Mount Vernon City Council on July 6, 2010 to present to the public and the council the importance of the community having an approved hazard mitigation plan, the hazard mitigation planning process, to encourage public to participate in the planning process, and to answer any questions.

The second open meeting took place on July 14, 2010 at the Lisbon and Mount Vernon Ambulance Service. Members of the Planning Committee and members of the public met to review the Communities Profile Information, identification of critical facilities, and the hazards to which Lisbon, Mount Vernon, and the surrounding areas and towns are most susceptible. Those present were encouraged to take copies of the working document for review. The analysis by those present established the level of impact, the severity, and the probability of the hazards.

The third open meeting took place on October 13, 2010 at the Lisbon and Mount Vernon Ambulance Service. Members of the Planning Committee and members of the public met to review the mitigation goals for Lisbon and Mount Vernon.

The fourth open meeting took place on December 8, 2010 at the Lisbon and Mount Vernon Ambulance Service. Members of the Planning Committee and members of the public met to review the mitigation strategies, and establish priority of action. A determination of method, implementation, monitoring of the Plan, and possible funding was also discussed.

The fifth open meeting took place on January 18, 2011 during a meeting of the Linn County Emergency Management Commission at the Linn County Emergency Operations Center. The Linn County Emergency Management Committee is made up of the Mayor or his designee from each City in Linn County, a representative from the Linn County Board of Supervisors, the Linn County Sherriff, and the Linn County Emergency Management Coordinator. Members of the Lisbon and Mount Vernon Hazard Mitigation Planning Committee, the Linn County Emergency Management Committee, members of the public, and a representative from the Duane Arnold Energy Center, the only nuclear energy center in the State of Iowa, met to review the Lisbon and Mount Vernon Hazard Mitigation Plan. Those present were asked to provide additional input into the mitigation goals for Lisbon and Mount Vernon, mitigation strategies, and priority of action were established at the previous meetings. Those present were provided a copy of the first draft and asked for additional input.

The sixth open meeting took place on February 3, 2011 during a meeting of the Linn County Local Emergency Planning Committee at the Linn County Emergency Operations

Center. The Linn County Local Emergency Planning Committee is made up of representatives from elected officials, emergency management, emergency medical, fire services, law enforcement, public health, hospitals, and business and industry throughout the county. Members of the Lisbon and Mount Vernon Hazard Mitigation Planning Committee, the Linn County Local Emergency Planning Committee, and members of the public met to review the Lisbon and Mount Vernon Hazard Mitigation Plan. Those present were asked to provide additional input into the mitigation goals for Lisbon and Mount Vernon, mitigation strategies, and priority of action were established at the previous meetings. Those present were provided a copy of the first draft and asked for additional input.

The seventh open meeting took place on February 9, 2011 at the Lisbon and Mount Vernon Ambulance Service. Members of the Planning Committee and members of the public met to review the changes that had been made to the first draft and to open the second public comment period.

The final meetings took place in Lisbon on [redacted] and Mount Vernon on [redacted] to formally pass the resolution adopting the Lisbon and Mount Vernon Hazard Mitigation Plan; the Planning Committee, Lisbon and Mount Vernon City Councils, the attending public, and other interested parties reviewed and discussed the final draft prior to submission for review by FEMA and the State. All actions discussed during the planning process were included in the plan.

All meetings complied with the Iowa Open Meetings Law. This simply means all sessions are open to the public. Notices for all but the seventh and eighth Planning Committee Meetings were announced by the Lisbon and Mount Vernon City Councils, the seventh and eighth meetings were announced by the Linn County Emergency Management Agency inviting the public, local businesses, academia, special needs representatives, and other interested parties. These announcements were posted in compliance to the Iowa Opens Meetings Law. See appendix 5 for sign in sheets, copy of notices, and the form letter sent to neighboring communities with distribution list.

Common Goals

The two jurisdictions participating in this plan identified and prioritized, through the hazard analysis and risk assessment process, hazards that posed the most risk to their communities. The individual jurisdictions found the hazards they identified as a priority that could or have caused property damage, serious injury, or loss of life.

Each jurisdiction went through the same hazard analysis and risk assessment separately. Each jurisdiction developed a unique list of hazards that posed the greatest risk. Through each jurisdiction had its own unique list of hazards, all of the jurisdictions agreed on four common goals to focus their mitigation strategies:

1. Minimize injuries and loss of life.
2. Reduce or eliminate damages due to natural and man-made disasters.

3. Manage response operations with or without County, State, and Federal assistance.
4. Return to pre-disaster conditions in a timely and pre-planned manner.

Based on these goals the local communities refined their list of alternative mitigation activities, to activities they felt the community could implement to support these goals and reduce the damages to new and existing structures and infrastructure. The local communities refined their list of mitigation activates based on what was most feasible and would provide the most cost benefit.

Lisbon Section

LISBON COMMUNITY PROFILE:

The city of Lisbon, located in eastern Linn County, is in the eastern central half of the state.

Lisbon is located on the western edge of land that was ceded to United States Government from the Sac and Fox tribes following "Chief Black Hawk's War". The land was surveyed by the federal government in 1832 following the treaty that ended the war. Settlers first arrived in this area in 1837 and the land official became available for sale in 1838 for $1.25 an acre. The City of Lisbon was incorporated on February 10, 1875.

Taking cues from the lessons learned from other communities after the unprecedented flooding in June of 2008, Planning Committee members have placed urgency on the development of the Cities of Lisbon and Mount Vernon's Hazard Mitigation Plan.

Many years of flooding, tornados, high winds, and the near by nuclear power plant have made the citizens' of the community stand up and take charge on several future projects. Residents of the community have increased their awareness and actions in hopes to continue to protect their town.

The average residence for the City of Lisbon varies throughout town but each is located on a 17,117 acre lot. The estimated cost to rebuild the average structure is $115,656.

City Government

The City of Lisbon is managed by Mayor-Council form of government. The Mayor is elected for a term of four years and City Council Members are elected by the residents of Lisbon in staggered four year terms. Members of the City Council have been empowered, except as expressly limited by the State of Iowa, to exercise any power and perform any function they may deem appropriate to protect and preserve the rights, privileges, and property of the city and of its residents, and to preserve and improve the safety, peace, health, welfare, comfort, and convenience of its residents.

The current members of the Lisbon City Government are:

- Rex Cook-Mayor
- John Bardsley-Council Member/Mayor Pro Tem
- Larry McAtee-Council Member
- Travis Jubeck-Council Member
- Lance Zerbe-Council Member
- Doug Kamberling-Council Member

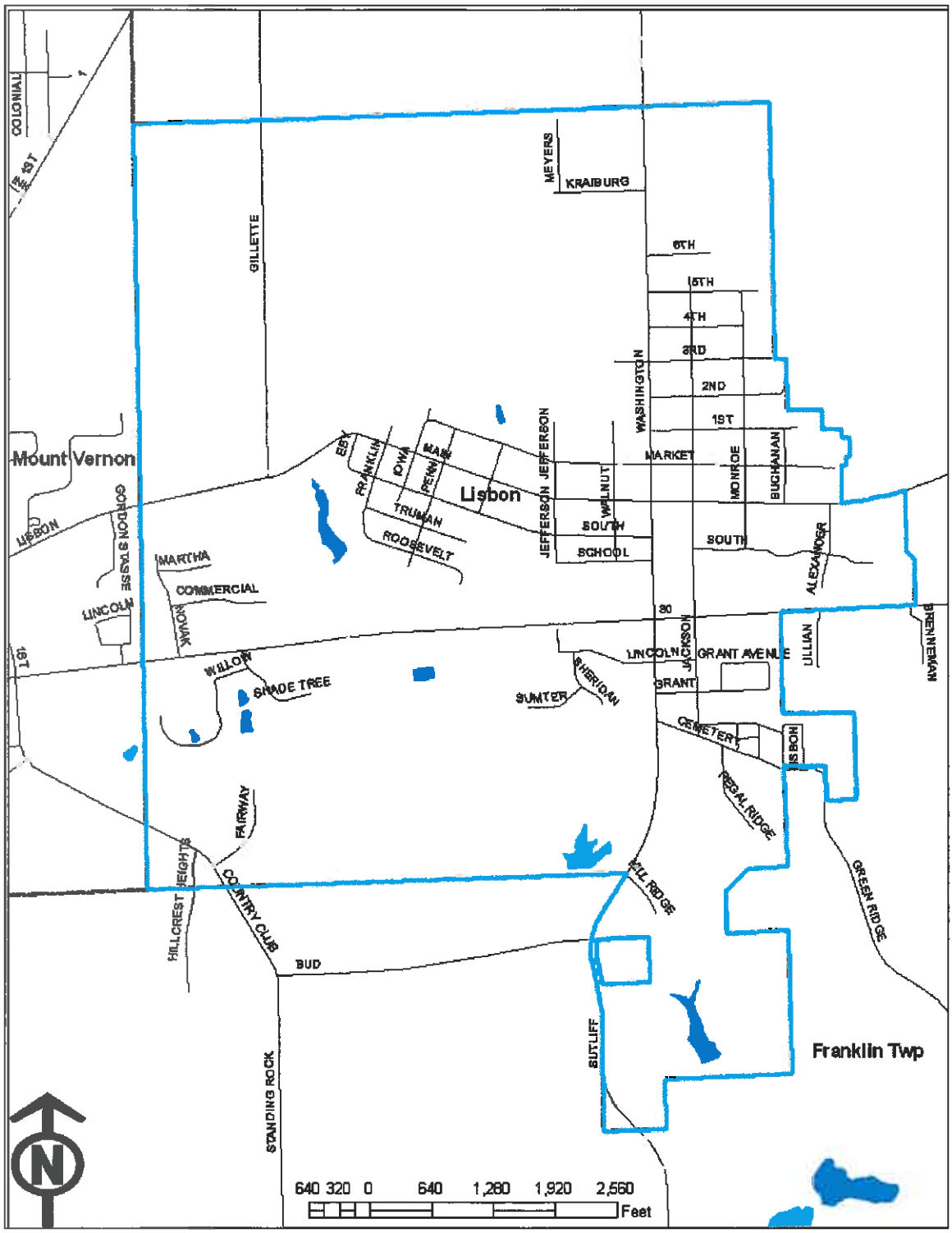
The city is governed by the Code of Ordnances of the City of Lisbon, Iowa. The following is a list of the chapters contained in the Code that affect mitigation efforts:

Chapter 36 Hazardous Substances
Chapter 37 Disaster Recovery and Reconstruction
Chapter 38 Floodplain Management
Chapter 105 Solid Waste Control
Chapter 155 Building Code
Chapter 165 Zoning Regulations
Chapter 165.07.E Mobile homes and Mobile Home Parks

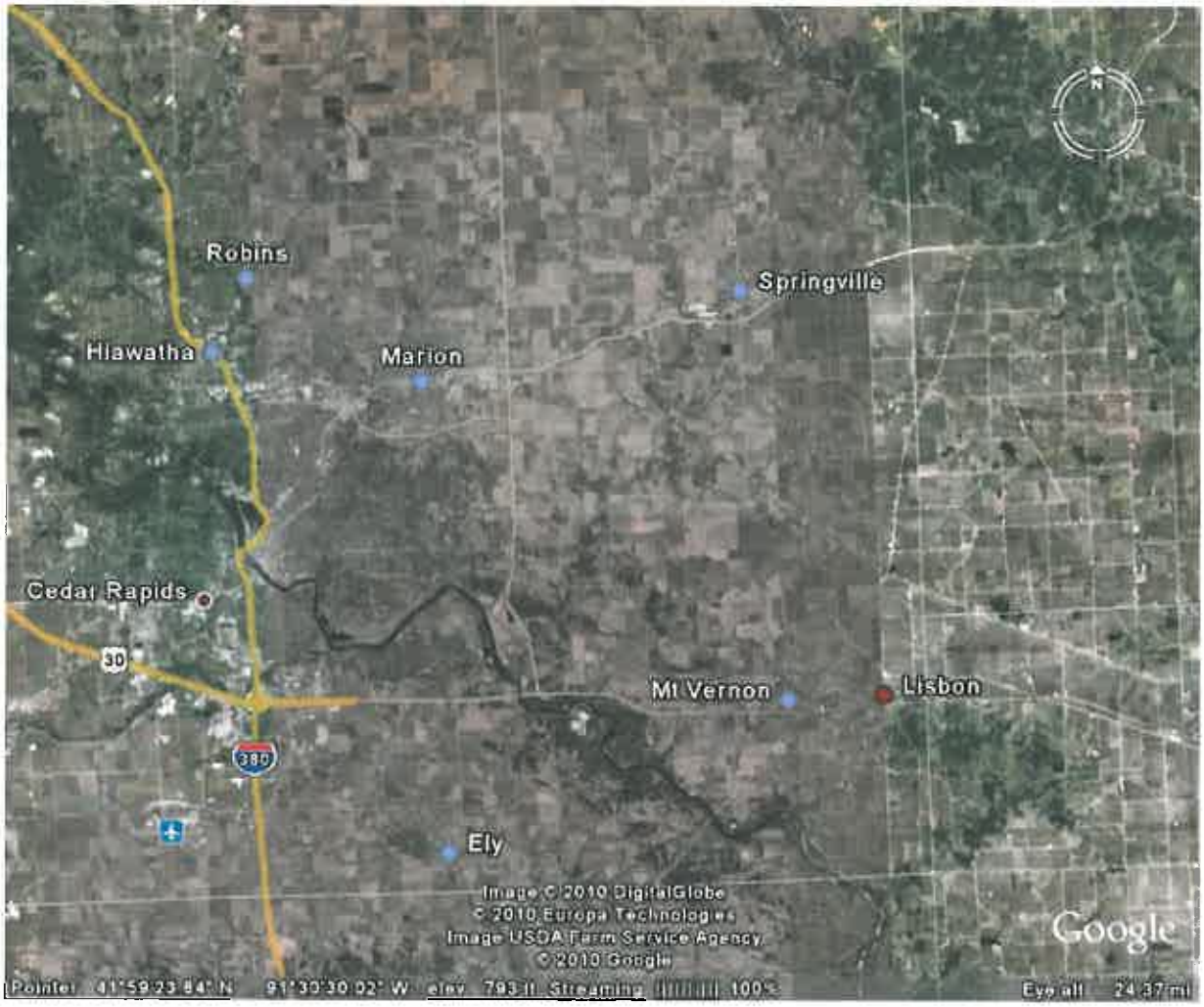
Economic Development Organizations

The Mt Vernon-Lisbon Community Development Group actively works to develop and promote economic development in the communities of Lisbon and Mt Vernon. This group evolved by consolidating the Mount Vernon-Lisbon Chamber of Commerce, Mount Vernon-Lisbon Marketing and Tourism Board, Mount Vernon Economic Development Corporation, Vision Mount Vernon, and Lisbon Economic Development Corporation into a single entity working for the good of both communities.

City Map of Lisbon, Iowa



City of Lisbon



Transportation Information

The City of Lisbon is approximately 14 miles east of I-380, 8 miles east of highway 151 and highway 30 runs through the city. On an average day 380-560 trucks containing hazardous materials will use I-380, 117 will use Highway 30, and 72 will use Highway 151.

Linn County is served by five railroads with more than 19,000 railroad cars of hazardous materials that move through each month. The Union Pacific Railroad Company (UP) operates 1,752 miles of track in Iowa and has one spur which runs along the north side of the City of Lisbon. The UP averages 107.1 million tons of cargo through Iowa each year. Many different high hazard chemicals are shipped through the Lisbon City limits on a daily basis.

Increased air traffic overflies Linn County East-West between Chicago and Denver/Seattle. The Eastern Iowa Airport (CID), located in Cedar Rapids, is 15 miles west southwest of the City of Lisbon. There were 63,421 takeoffs and landings and 24,794 metric tons of mail, freight, and baggage handled at CID during calendar year 2007.

CITY INFRASTRUCTURE

Streets

The City of Mount Vernon has 16 miles of 41 streets divided into 148 blocks.

Water System

There are three deep wells in place providing water for the City of Lisbon through 15.25 miles of pipeline.

Sewer System

The City of Lisbon is serviced by an extended aeration plant, located along Highway 30 in the City of Lisbon. The Waste Water Treatment Plant was expanded in 2004 and employs three employees. The City of Lisbon Waste Water Treatment Plant has an average wet weather capacity of 0.4 million gallons a day and a municipal waste water capacity of 0.61 million gallons a day. This plant has a storm water equalization basin, two sludge thickening tanks, and two aerobic digesters.

Law Enforcement

The City of Lisbon employs a full time Police Chief, one full time officer, and four part time officers. The police department is augmented by four reserve officers.

Fire Department

The Lisbon Volunteer Fire Department was organized in January of 1961. They respond to an average of 250 calls per year which vary from structural fires, medical assists, storm watching, and mutual aid in the surrounding areas. All fire departments in Linn County are signatories of the 28E agreement for mutual aid fire protection in Linn County. See Appendix 6 for a list of available resources.

Emergency Management

Emergency Management support for the City of Lisbon is provided by the Linn County Emergency Management Agency (EMA), which is located in Cedar Rapids. Linn County EMA is staffed with five full time employees, consisting of a dedicated Administrative Officer, Coordinator, Logistics Officer, Operations Officer, and Plans Officer. Linn County EMA is managed by the Linn County Emergency Management

Commission which seats representatives from the communities in Linn County, including the City of Lisbon.

Hospital

The City of Lisbon does not have a local medical facility and is supported by Mercy Medical Center and St. Luke's Hospital in Cedar Rapids.

HAZMAT

The City of Lisbon does not have a local HAZMAT team but has a 28E agreement in place with the Linn County Regional HAZMAT Team.

Utilities

Electrical services for the City of Lisbon are provided by Alliant Energy. In addition to electrical service, Alliant provides natural gas to all customers including the City of Lisbon. Telephone services are provided by Windstream, which is located in Newton, IA, although there is a large substation located in Lisbon.

Schools

The Lisbon Community School District provides for the education needs of the City of Lisbon. During the 2009-2010 school year the Lisbon Community School District had 345 elementary students; 26 elementary staff; 134 middle school students; 12 middle school staff; 179 high school students; 20 high school staff; 120 preschool students; and four preschool staff. The Lisbon Community School district has 4 school buses and other vehicles capable of carrying 378 people and 1 wheel chair bound people.

Other Special Needs Populations

There is one child care center and six in-home day care facilities in the City of Lisbon, according to the 2010 List of Regulated Child Care Providers by the Iowa Department of Human Services.

Insurance

The City of Lisbon currently has a Fire Insurance Rating of 5.

The City of Lisbon is enrolled in the National Flood Insurance Program (NFIP) on March 19, 1976, (NFIP# 190607) and has a Flood Plain Management Program which is included in Chapter 38, Code of Ordnances of the City of Lisbon, Iowa. The Flood Insurance Rate Map for the City of Lisbon is contained on Community Panel Number 190607 0470 D and was effective April 5, 2010. The City of Lisbon currently is not enrolled in the Community Rating System.

As of May 31, 2010 there was only one flood insurance policy issued in the City of Lisbon, amounted to $210,000 in insurance coverage and $326 in written premiums.

There is one property parcel located in the 100 year flood plain however there are no structures located on it.

There are no properties listed as repetitive loss properties in the City of Lisbon.

All 757 residential, 98 businesses, and 10 public facilities in the City of Lisbon are vulnerable to tornadoes and HAZMAT incidents. The assessed value for a potential total loss to the City of Lisbon is $136,732,287.

Critical Facilities

The City of Lisbon has identified the following structures as critical facilities and infrastructure:

- Lisbon City Hall, 115 N. Washington
- Lisbon Fire Station, 115 N. Washington
- Lisbon Police Station, 941 U.S. 30
- Lisbon Waste Water Treatment Plant, Highway 30 W.
- Highway 30 to the south of the city
- Highway 1 to the east of the city

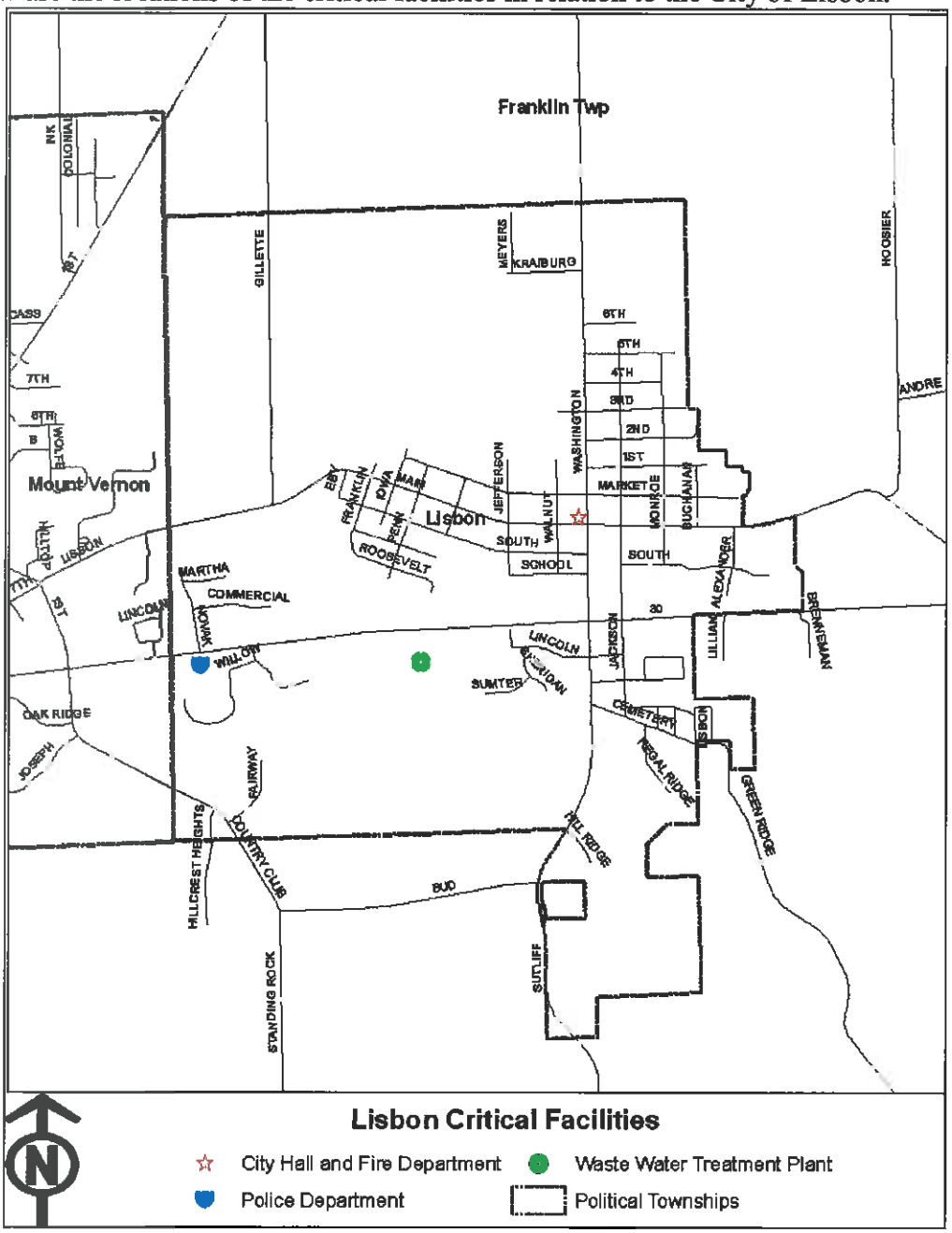
Based on figures provided by the Linn County Auditor's Office these critical facilities are estimated to be valued at $5,195,791.

An inventory and assessment of assets for the City of Lisbon was completed June 2010 by the Lisbon City Clerk and Linn County Auditor's Office. These assets are shown in the chart below.

Type of Structure (Occupancy Class)	Number of Structures in Community**	Value of Structures in Community **	Number of People Directly Affected
Residential	757	$93,819,754	1,895*
Commercial	77	$11,393,237	-
Industrial	7	$1,908,950	-
Educational	3	$20,077,332***	-
Agricultural	7	$3,011,005	3
Religious/Non-profit	7	$1,132,922	-
Government	7	$5,389,087	-
Total	**865**	**$136,732,287**	**1,898**

* Based on 2002 Census Data
** Based on figures provided by Linn County Auditor's Office for FY10
*** Based on figures provided by the Lisbon School District

Below are the locations of the critical facilities in relation to the City of Lisbon.



DEMOGRAPHICS:

Population

The population for Linn County was estimated by the US Census Bureau to be 205,836 in 2007, which is an increase of 6.9% from 2000. The population for the City of Lisbon is estimated to be 2,011. Compared with just seven years ago, there has been a steady increase of 19.5%. In comparison, the City of Cedar Rapids has grown 4.5%, the City of Marion 18.3%, the City of Hiawatha 3.2%, and the City of Robins showed a growth of 33.5%. According to City-Data.com, there has been an average of 12 new single family home construction building permits issued in the City of Lisbon with an average cost of $108,386.

Below are the demographics for the City of Lisbon in comparison to the entire country. The 2006 data is not available at this time.

Census Year	1990	2000	2009
Total Population	1,452	1,898	2,011

Census 2000 Demographic Profile Highlights:

General Characteristics -	Number	Percent	U.S.
Total population	1,898		
Male	953	50.2	49.1%
Female	945	49.8	50.9%
Median age (years)	34.5	(X)	35.3
Under 5 years	157	8.3	6.8%
18 years and over	1,326	69.9	74.3%
65 years and over	194	10.2	12.4%
One race	1,869	98.5	97.6%
White	1,852	97.6	75.1%
Black or African American	7	0.4	12.3%
American Indian and Alaska Native	6	0.3	0.9%
Asian	2	0.1	3.6%
Native Hawaiian and Other Pacific Islander	0	0.0	0.1%
Some other race	2	0.1	5.5%
Two or more races	29	1.5	2.4%
Hispanic or Latino (of any race)	18	0.9	12.5%
Household population	1,898	100.0	97.2%
Group quarters population	0	0.0	2.8%
Average household size	2.61	(X)	2.59
Average family size	3.16	(X)	3.14

Total housing units	752		
Occupied housing units	728	96.8	91.0%
Owner-occupied housing units	541	74.3	66.2%
Renter-occupied housing units	187	25.7	33.8%
Vacant housing units	24	3.2	9.0%
Social Characteristics -	**Number**	**Percent**	**U.S.**
Population 25 years and over	1,130		
High school graduate or higher	1,022	90.4	80.4%
Bachelor's degree or higher	237	21.0	24.4%
Civilian veterans (civilian population 18 years and over)	183	14.4	12.7%
Disability status (population 5 years and over)	203	11.5	19.3%
Foreign born	16	0.8	11.1%
Male, Now married, except separated (population 15 years and over)	439	62.5	56.7%
Female, Now married, except separated (population 15 years and over)	438	64.2	52.1%
Speak a language other than English at home (population 5 years and over)	53	3.0	17.9%
Economic Characteristics -	**Number**	**Percent**	**U.S.**
In labor force (population 16 years and over)	1,017	76.4	63.9%
Mean travel time to work in minutes (workers 16 years and over)	22.9	(X)	25.5
Median household income in 1999 (dollars)	45,139	(X)	41,994
Median family income in 1999 (dollars)	55,583	(X)	50,046
Per capita income in 1999 (dollars)	18,275	(X)	21,587
Families below poverty level	31	6.0	9.2%
Individuals below poverty level	131	6.8	12.4%
Housing Characteristics -	**Number**	**Percent**	**U.S.**
Single-family owner-occupied homes	497		
Median value (dollars)	93,500	(X)	119,600
Median of selected monthly owner costs	(X)	(X)	
With a mortgage (dollars)	974	(X)	1,088
Not mortgaged (dollars)	338	(X)	295

(X) Not applicable.
Source: Us Census Bureau

Climatic Data

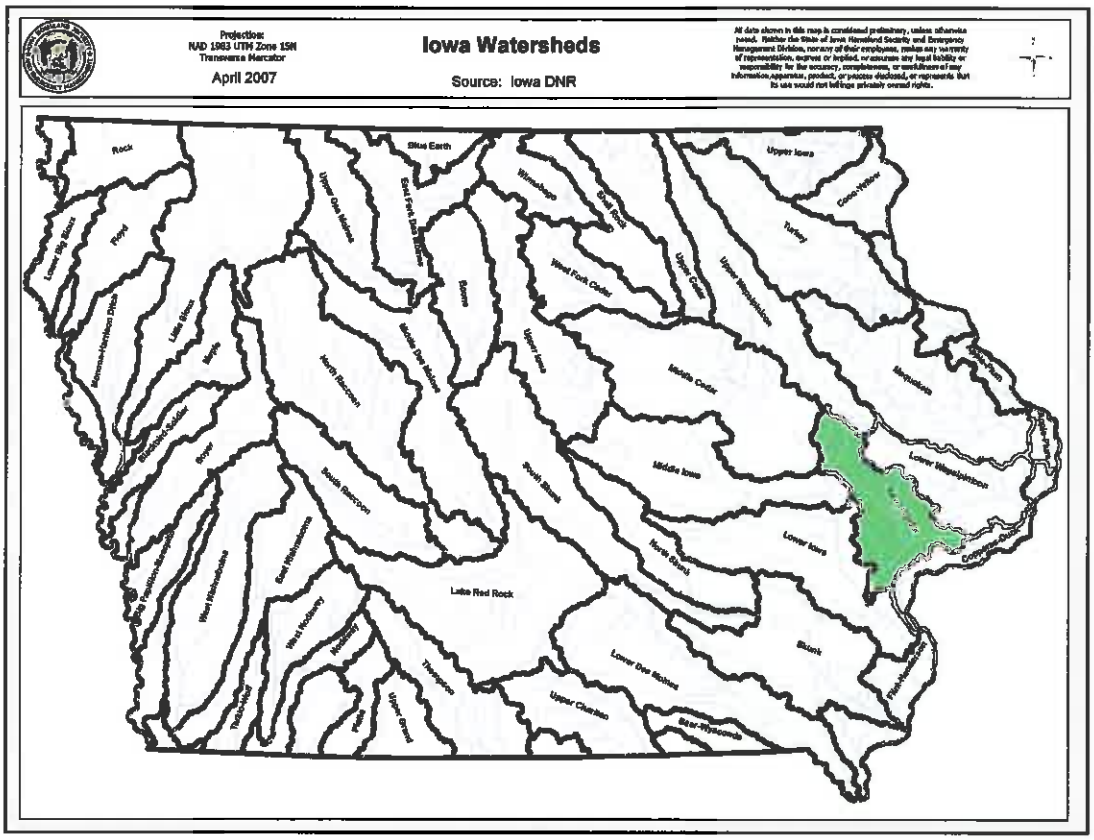
Below are the monthly average temperature and precipitation for the City of Lisbon.

Month	Avg. High Temp.	Avg. Low Temp.	Mean Temp.	Avg. Precip.	Record High Temp.	Record Low Temp.
JAN	28°F	12°F	20°F	1.13 in.	68°F (1989)	-27°F (1930)
FEB	35°F	18°F	26°F	1.10 in.	73°F (1921)	-28°F (1996)
MAR	47°F	28°F	38°F	2.08 in.	88°F (1986)	-17°F (1962)
APR	62°F	39°F	50°F	3.46 in.	94°F (1925)	3°F (1982)
MAY	73°F	50°F	62°F	4.50 in.	104°F (1934)	24°F (1925)
JUN	82°F	60°F	71°F	4.80 in.	103°F (1934)	36°F (1945)
JUL	85°F	64°F	75°F	4.47 in.	110°F (1911)	42°F (1924)
AUG	83°F	62°F	73°F	4.73 in.	108°F (1936)	37°F (1915)
SEP	76°F	54°F	65°F	3.79 in.	105°F (1925)	22°F (1899)
OCT	64°F	42°F	53°F	2.58 in.	94°F (1997)	-2°F (1925)
NOV	46°F	30°F	38°F	2.50 in.	80°F (1999)	-10°F (1977)
DEC	33°F	17°F	25°F	1.48 in.	69°F (1998)	-28°F (1924)

Source: Weather Channel

Watershed Information

The City of Lisbon is located in the Lower Cedar Watershed (07080206). Below is the location of the watershed in the State of Iowa and the City of Lisbon in the watershed.



Source: Iowa HSEMD

Source: EPA

HAZARD AND RISK ASSESSMENT

The City of Lisbon has adopted a strategy for hazard mitigation based on a hazard analysis and risk assessment that is comprehensive and multi-hazard. The Cities of Lisbon and Mount Vernon's Hazard Mitigation Plan takes the 41 hazards that were identified by the State Hazard Mitigation Team and further refine the hazards that could affect each city. An explanation of the methodology used to identify the hazards as well as how the ratings are assigned can be found in Appendix I. Below is a matrix that is made up of the hazards that have been identified by the State and the likelihood of that hazard occurring in the City of Lisbon.

Hazard	Has Occurred	May Occur	Not Likely to Occur
Natural Hazards			
Dam Failure			X
Drought	X		
Earthquakes			X
Expansive Soils			X
Extreme Heat	X		
Flash Flood	X		
Grass or Wild Land Fire			X
Hailstorms	X		
Landslides			X
Levee Failure			X
River Flooding			X
Severe Winter Storms	X		
Sink Holes			X
Thunderstorm and Lightning	X		
Tornadoes	X		
Windstorms	X		
Human Caused/Combined Hazards			
Agro-Terrorism		X	
Air Transportation			X
Animal/Plant/Crop Disease		X	
Bioterrorism		X	
Chemical Terrorism		X	
Communications Failure		X	
Conventional Terrorism		X	
Cyber Terrorism		X	
Enemy Attack			X
Energy Failure		X	
Fixed Hazardous Materials		X	
Fixed Radiological Incident		X	
Human Disease Incident		X	
Human Disease Pandemic	X		
Pipeline Transportation Incident		X	
Public Disorder		X	
Radiological Terrorism		X	

Radiological Transportation			X
Rail Transportation		X	
Roadway Transportation Incident	X		
Structural Failure		X	
Structural Fire	X		
Transportation Hazardous Materials Incident		X	
Waterway Incident			X

Hazards Not Considered

Below is a list of the natural hazards that were not considered and a brief explanation of why the planning committee has chosen to omit them.

- Dam Failure: The Cedar River is approximately three miles from the City and there are no dams located along the Cedar River that could affect the City. Therefore this does not constitute a threat to the City.
- Earthquakes: According to the Iowa Department of Natural Resources the City of Lisbon is located in low risk zones Seismic Zone 1. This does not mean that the City of Lisbon is not vulnerable to earthquake effects. Most structures in Iowa are not built to earthquake standards, but because of the relatively low magnitude of a possible quake, property damage would likely be minor foundational damage, and there have been no historic events of this type in Linn County.
- Expansive Soil: According to the U.S. Geological Survey of Swelling Clays Map of the Conterminous U.S., the City of Lisbon is located in an area that contains little or no swelling clay, there have been no historic events of this type in Linn County, and therefore expansive soil does not constitute a threat.
- Grass or wild land fire: According to the National Climatic Data Center, there have been no historic events of this type in Linn County nor are there suitable conditions that would make this a threat to the City of Lisbon.
- Landslides: According to the Iowa Homeland Security and Emergency Management Division the City of Lisbon is in a location that has a low susceptibility to landslides, there have been no historic events of this type in Linn County, and therefore they do not constitute a threat.
- Levee Failure: There are no levees in or around the City of Lisbon. Therefore this does not constitute a threat to the City.
- River Flood: The Cedar River is the closest river to the City of Lisbon and is located approximately three miles away. Due to its distance and the lack of historic events of this type for the City this does not constitute a threat to the City.
- Sink Holes: According to the Iowa Department of Natural Resources conditions in Linn County are not conducive to sinkholes, there have been no historic events of this type in Linn County, and therefore they do not constitute a threat.
- Air Transportation Incident: According to the Federal Aviation Administration, there are no approaches to any airport over the City of Lisbon.
- Enemy Attack: Due to historic records and the location of Linn County in the United States, the planning committee felt there is no threat from this hazard.

- Waterway Incident: The Cedar River is the closest waterway to the City. Due to it being approximately three miles from the City the effects of a waterway incident would have little to no effect on the City of Lisbon.

Natural Hazards

Drought

Description	Description	Rating
Description	There are three types of drought conditions that are relevant to Iowa: 1. Meteorological drought, which refers to precipitation deficiency; 2. hydrological drought, which refers to declining surface water and groundwater supplies; 3. and agricultural drought, which refers to soil moisture deficiencies. These drought conditions are measured by Palmer Indices which are described below. Droughts can be spotty or widespread and last from weeks to a period of years. A prolonged drought can have serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Moreover, food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock. While droughts are generally associated with extreme heat, droughts can and do occur during cooler months.	
Historical Occurrence	According to the National Climactic Data Center, Iowa has had 21 periods of drought from 1985-2010. During this time frame there was $645.15 million in property damages, and $2.01 billion in crop damages that resulted from drought periods. The most common trend was the consistency of drought periods during the month of August. There were 9 drought events reported in Linn County from 1950-2010 causing $1 billion in crop damages. The table below shows the drought events to affect Linn County between August 30, 1985 and August 30, 2010. It is important to keep in mind that extreme weather events such as this affect a large area and are not broken down by city.	3
Probability	Drought is part of normal climate fluctuations. Climatic variability can bring dry conditions to the region for up to years at a time. Research and observations of the El Nino/La Nina climatic events are resulting in more predictable climatic forecasts. Based on historical averages there is a 15% chance of drought conditions within the next year.	3
Vulnerability	Those dependent on rain would be the most vulnerable to a drought. This means that agriculture, agribusiness, and consumers (if the drought lasted long enough or impacted a large area) would be impacted. A drought limits the ability to produce goods and provide services. Because citizens draw their drinking water from surface water and groundwater sources, a prolonged severe drought may impact all citizens if there were to be a dramatic drop in the stream flow coupled with the drop in the water table. Fire suppression can also become a problem due to the dryness of the vegetation and possible lack of water.	2
Maximum Threat	A drought would likely affect most of Iowa if not the Midwest as a whole. Because of the dependence on precipitation and water, the agricultural community would be impacted the most. The agricultural areas would be most adversely impacted, but the entire state would likely feel at least some impact.	4
Severity of Impact	A. Few if any health impacts to people in the affected area because of secondary sources of water. Drought in the U.S. seldom results directly in the loss of life. Health impacts would be more significant on livestock without auxiliary water supplies. B. Response personnel are at minimal risk. C. Continuity of operations would not be affected. D. Property losses would be limited to livestock and crops to the agricultural community. Facilities would not be impacted. Infrastructure could be affected in areas of expansive soils due to drying soils, lower water levels around dams, etc. E. Delivery of services would be limited to source water delivery and those services that consume large amounts of water. F. Drought is a naturally occurring hazard that occurs about every 20 years. G. The environmental impacts are usually short-term (resilient) and the natural environment is used to drought cycles. Drought more directly affects agricultural crops, livestock, natural vegetation, wildlife, and stream flows (fish and aquatic vegetation). H. Drought can lead to large and damaging impacts to the agricultural economy. Because of Iowa's reliance on the agricultural economy, the economic and financial impacts would certainly ripple out into other sectors. Rural areas can be especially affected by long-term drought. If restrictions are put on manufacturers that use large amounts of water, the local economy can be impacted that way as well. Regulations in the agricultural sector can be and are often adjusted to provide some lenience for adverse conditions for livestock and crop loss. I. Drought is a naturally occurring hazard and is "out of the hands" of local and state officials. Local jurisdictions can have their reputation damaged if they do not provide source water to residents or respond in a satisfactory manner to provide an alternative supply.	2

Speed of Onset	Drought warning is based on a complex interaction of many different variables, water uses, and consumer needs. Drought warning is directly related to the ability to predict the occurrence of atmospheric conditions that produce the physical aspects of drought, primarily precipitation and temperature. There are so many variables that can affect the outcome of climatic interactions, and it is difficult to predict a drought in advance. In fact, an area may already be in a drought before it is even recognized. While the warning of the drought may not come until the drought is already occurring, the secondary effects of a drought may be predicted and warned against weeks in advance.	1
Total		15

Linn County Drought Events

9 DROUGHT events were reported in **Linn County, Iowa** between **09/30/1983** and **09/30/2010**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Iowa

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 All Of Iowa	08/01/1995	0000	Drought	N/A	0	0	0	0.5B
2 Linn County	08/01/2003	0000	Drought	N/A	0	0	0	312.5M
3 Linn County	07/01/2005	0000	Drought	N/A	0	0	0	154.7M
4 Linn County	08/01/2005	0000	Drought	N/A	0	0	0	42.7M
5 Linn County	09/01/2005	0000	Drought	N/A	0	0	0	0
6 Linn County	10/01/2005	0000	Drought	N/A	0	0	0	0
7 Linn County	11/01/2005	0000	Drought	N/A	0	0	0	0
8 Linn County	12/01/2005	0000	Drought	N/A	0	0	0	0
9 Linn County	01/01/2006	0000	Drought	N/A	0	0	0	0
TOTALS:					0	0	0	1.010B

Source: NCDC

The Palmer Drought Indices

The Palmer Z Index measures short-term drought on a monthly scale. The Palmer Crop Moisture Index (CMI) measures short-term drought on a weekly scale and is used to quantify a drought's impacts on agriculture during the growing season.

The Palmer Drought Severity Index (PDSI) (known operationally as the Palmer Drought Index (PDI)) attempts to measure the duration and intensity of the long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during the current month is dependent on the current weather patterns plus the cumulative patterns of previous months. Since weather patterns can change almost literally overnight from a long-term drought pattern to a long-term wet pattern, the PDSI (PDI) can respond fairly rapidly.

The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop and it takes longer to recover from them. The Palmer Hydrological Drought Index (PHDI), another long-term drought index, was developed to quantify these

hydrological effects. The PHDI responds more slowly to changing conditions than the PDSI (PDI).

Source: NCDC

Extreme Heat

Classification	Description	Rating
Description	Conditions for extreme heat are defined by summertime weather that is substantially hotter and/or more humid than average for a location at that time of year. This includes temperatures (including heat index) in excess of 100 degrees Fahrenheit or three successive days of 90+ degrees Fahrenheit. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees. The heat index is a number in degrees Fahrenheit that tells how hot it really feels when relative humidity is added to the actual air temperature. Exposure to full sunshine can increase the heat index by at least 15 degrees. Extreme heat can impose stress on humans and animals. Heatstroke, sunstroke, cramps, exhaustion, and fatigue are possible with prolonged exposure and/or physical activity due to the body's inability to dissipate the heat. Urban areas are particularly at risk because of air stagnation and large quantities of heat absorbing materials such as streets and buildings. Extreme heat can also result in distortion and failure of structures and surfaces such as roadways and railroad tracks.	
Historical Occurrence	From 1985-2010 Iowa experienced 19 extreme heat events. These high heat events caused five deaths, 22 injuries and caused $6.2 million in damage. During the period between January 1950 and May 2008 Linn County experienced three extreme heat events. The heat wave that occurred in July of 1995 had a major impact across the entire state, temperatures ranged from 98 degrees to 108 degrees with heat indices reaching a high of 131 degrees. This event lasted two days causing almost four million dollars of property damage and resulted in three fatalities state wide. The table below shows the extreme heat events to affect Linn County from January 1, 1985 until September 1, 2010. It is important to keep in mind that extreme weather events such as this affect a large area and are not broken down by city.	1
Probability	Based on historical information, Iowa will likely experience about 26 days a year with temperatures above 90 degrees. There is a very good chance that there will also be a period of 3 consecutive days or more with temperatures in the 90s. It is also common for the temperature to hit 100 degrees or more once every three years during the summer months.	3
Vulnerability	Elderly persons, small children, chronic invalids, those on certain medications or drugs (especially tranquilizers and anticholinergics), and persons with weight and alcohol problems are particularly susceptible to heat reactions. Healthy individuals working outdoors in the sun and heat are vulnerable as well. Individuals and families with low budgets as well as inner city dwellers can also be susceptible due to poor access to air-conditioned rooms.	2
Maximum Threat	Most of the state would likely be impacted by extreme heat, but urban areas pose special risks. The stagnant atmospheric conditions of the heat wave trap pollutants in urban areas and add to the stresses of hot weather.	4
Severity of Impact	A. Nationally, over the last 30 years, excessive heat accounts for more reported deaths annually than hurricanes, floods, tornadoes, and lightning combined. B. Response personnel could suffer heat stroke and dehydration working in extreme heat conditions. C. None directly, see E). D. Transportation impacts include the loss of lift for aircrafts, softening of asphalt roads, buckling of highways and railways, and stress on automobiles and trucks (increase in mechanical failures). E. Electric transmission systems are impacted when power lines sag in high temperatures. High demand for electricity also outstrips supply, causing electric companies to have rolling black outs. The demand for water also increases sharply during periods of extreme heat. This can contribute to fire suppression problems for both urban and rural fire departments. F. Livestock and other animals are adversely impacted by extreme heat. High temperatures at the wrong time inhibit crop yields as well. G. Economic costs in transportation, agriculture, production, energy, and infrastructure. These direct costs could impact many other economic sectors indirectly. H. None I. None if response is adequate and timely.	3

Speed of Onset	As with other weather phenomena, periods of extreme heat are predictable within a few degrees within 3 days or so. Variations in local conditions can affect the actual temperature within a matter of hours or even minutes. The National Weather Service will initiate alert procedures when the heat index is expected to exceed 105 degrees Fahrenheit for at least two consecutive days.	1
Total		14

Linn County Extreme Heat Events

3 Extreme Heat Events were reported in **Linn County, Iowa** between **01/01/1985** and **09/01/2010**.

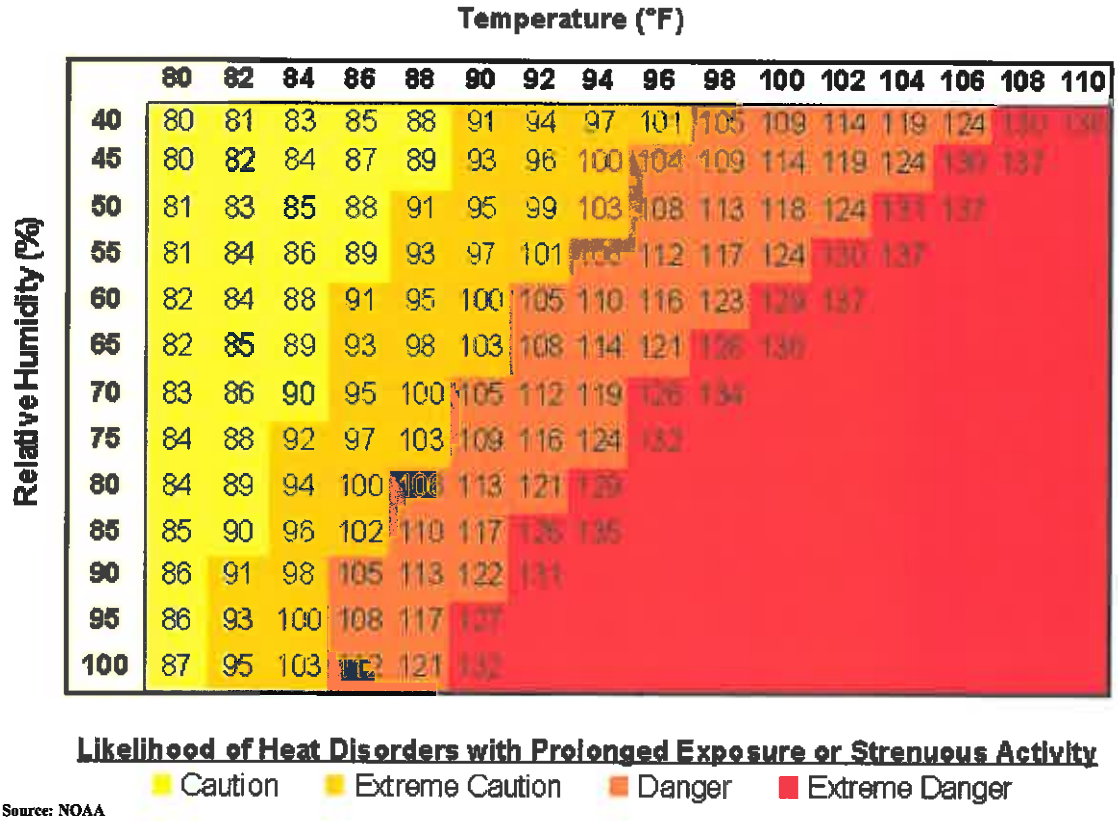
Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Iowa

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 All Of Iowa	07/12/1995	1100	Heat Wave	N/A	3	0	3.8M	0
2 Linn County	07/25/1997	0400	Excessive Heat	N/A	0	12	1K	0
3 Linn County	07/19/1999	0400	Excessive Heat	N/A	0	0	0	0
				TOTALS:	3	12	4.801 M	0

Source: NCDC

NOAA's National Weather Service
Heat Index



Source: NOAA

Flash Flooding

Classification	Description	Rating
Description	A flash flood is an event that occurs with little or no warning where water levels rise at an extremely fast rate. Flash flooding results from intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is an extremely dangerous form of flooding which can reach full peak in only a few minutes and allows little or no time for protective measures to be taken by those in its path. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding often results in higher loss of life, both human and animal, than slower developing river and stream flooding.	
Historical Occurrence	Floods are the most common and widespread of all-natural disasters except fire. In Iowa, as much as 21 inches of rain has fallen in a 24 hour period. The National Climatic Data Center lists 6 flash flooding/urban or small stream flooding events from January 1995- September 2010 that could have affected Lisbon or the surrounding communities and resulted in over five million dollars of property damage and fifty thousand dollars in crop damage. Between 1995 and 2010 there have been no deaths or injuries attributed to flash flooding in Linn County. The table below shows the flash flooding and urban/small stream flooding events throughout Linn County that possibly could have affected Lisbon or the surrounding community from January 1, 1983 until September 1, 2010. According to the NWS the last urban and flash flooding event to affect the City was in 2002 and resulted in no loss of life, injuries, or widespread damage.	2
Probability	As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization increases runoff two to six times over what would occur on natural terrain. Portions of Linn County are very developed with significant amounts of impervious surfaces, as more development occurs in the watersheds; the amount of runoff produced also increases. If measures are not taken to reduce the amount of runoff (or slow its movement), flash floods will continue to occur and may possibly increase.	2
Vulnerability	Flash floods occur in all 50 states in the U.S. Particularly at risk are those in low-lying areas; close to dry creek beds or drainage ditches; near water; or downstream from a dam, levee, or storage basin. People and property in areas with insufficient storm sewers and other drainage infrastructure can also be put at risk because the drains cannot rid the area of the runoff quickly enough. Nearly half of all flash flood fatalities are auto-related. Motorists often try to traverse water-covered roads and bridges and are swept away by the current. Six inches of swiftly moving water can knock persons off their feet and only two feet of water can float a full-sized automobile. Recreational vehicles and mobile homes located in low-lying areas can also be swept away by the water. There is one parcel property located in the 100 year flood plain however there is no structures on it.	2
Maximum Threat	Areas in a floodplain, downstream from a dam or levee, or in low-lying areas can certainly be impacted. People and property located in areas with narrow stream channels, saturated soil, or on land with large amounts of impermeable surfaces are likely to be impacted in the event of a significant rainfall. Unlike areas impacted by a river/stream flood, flash floods can impact areas a good distance from the stream itself. Flash flood prone areas are not particularly those areas adjacent to rivers and streams. Streets can become swift moving rivers, and basements can become deathtraps because flash floods can fill them with water in a manner of minutes. The geographic area that is vulnerable to future flooding in the city is the low lying areas adjacent to West Spring Creek.	2
Severity of Impact	A. Flash floods are the number 1 weather-related killer in the United States. There have been no deaths or injuries in Linn County related to flash flooding between 1985 and 2010. B. Rescuers are at significant risk when attempting to work in swift moving floodwaters associated with flash flooding. Special training in swift water rescue exists, but very few are trained in Iowa on this type of rescue. C. Continuity of operations can be affected because of facilities directly affected, transportation limitations, and government services delayed or postponed. D. Personal property can be extensively damaged and destroyed by swift moving water. Facilities and infrastructure can be scoured around and degrading its structural integrity. Because flash flood water is off premises quickly, damages related to standing water are limited, but the current associated with flash floods causes abrasive type damages such as erosion and undercutting.	2

	E. Flash floods can quickly inundate areas thought to be out of flood-prone areas. Loss of life; property damage and destruction; damage and disruption of communications, transportation, electric service, and community services; crop and livestock damage and loss and interruption of business are common impacts from flash flooding. F. Hazards of fire, health and transportation accidents, and contamination of water supplies are likely effects of flash flooding situations. Materials swept away by flood waters can contaminate and leave a lasting impact on the environment. G. Most impacts are indirect due to disruption of business and damage to infrastructure on which industry and services rely upon. H. None directly. I. Flash floods can be damaging to the reputation of the community if proper notification and warning are not given. Often times the victim will blame development or other changes in the community as the cause of the flooding on their property.	
Speed of Onset	Flash floods are somewhat unpredictable, but there are factors that can point to the likelihood of a flood's occurring in the area. Flash floods occur within a few minutes or hours of excessive rainfall, a dam or levee failure, or a sudden release of water held by an ice jam. Warnings may not always be possible for these sudden flash floods. Predictability of flash floods depends primarily on the data available on the causal rain. Individual basins react differently to precipitation events. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. Knowledge of the watershed characteristics, modeling, monitoring, and warning systems increase the predictability of flash floods. Depending on the location in the watershed, warning times can be increased. The NWS forecasts the height of flood crests, the data, and time the flow is expected to occur at a particular location.	4
Total		14

Linn County Flooding

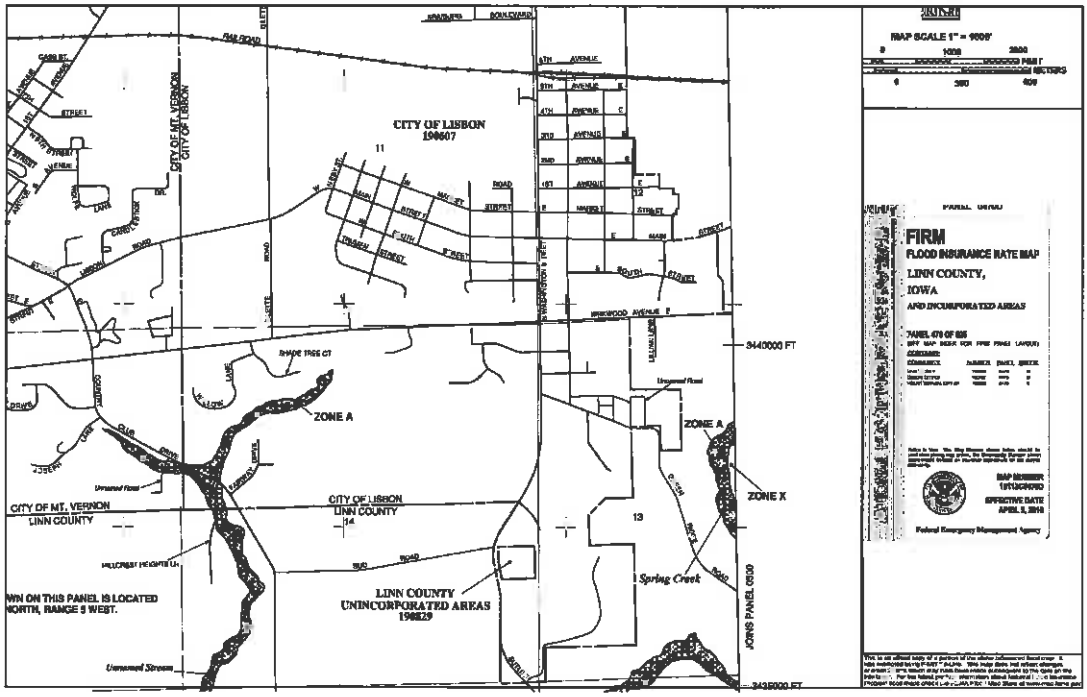
6 Flash Flood or Urban/Small Stream Flooding Events were reported countywide in **Linn County, Iowa** between **01/01/1983** and **09/01/2010**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Location or County	Date	Time	Type	Dth	Inj	PrD	CrD
1 Countywide	5/2/1993	1415	Flash Flood	N/A	0	50K	0
2 Countywide	8/9/1993	2100	Flash Flood	N/A	0	5M	50K
3 Countywide	5/9/1995	1600	Flash Flooding	N/A	0	100K	0
4 Countywide	10/14/1998	1900	Urban/sml Stream Fld	N/A	0	0	0
5 Countywide	2/24/2001	0900	Urban/sml Stream Fld	N/A	0	0	0
6 Countywide	8/12/2002	1810	Urban/sml Stream Fld	N/A	0	0	0
				0	0	5.2M	50K

Source: NCDC

The FEMA FIRM map below shows the areas of the City that could be inundated by the 1% annual chance flood (shaded areas). All other areas have been determined to be outside the 0.2% annual chance floodplain.



Source: FEMA

Hailstorms

Classification	Description	Rating
Description	Hail is produced by many strong thunderstorms. Strong rising currents of air within a storm carry water droplets to a height where freezing occurs. Ice particles grow in size until they are too heavy to be supported by the updraft. Hail can be smaller than a pea or as large as a softball and can be very destructive to plants and crops. Pets and livestock are particularly vulnerable to hail.	
Historical Occurrence	From 1985-2010 Iowa experienced 8485 hailstorms. From 1950-2008 Linn County experiences 135 hailstorms causing 5.8 million dollars in property damage and 109 thousand dollars in crop damage. During that time period there were 2 hail events that have occurred in the City of Lisbon causing 3 thousand dollars in crop damage. The table below shows hailstorm events that have occurred within 10 miles of Lisbon from January 1, 1985 until September 1, 2010.	4
Probability	Data on probability and frequency of occurrence of hailstorms is limited, but research indicates that any given point in Iowa can expect on average two to three hailstorms in a year, according to the IA HSEMD.	4
Vulnerability	Agricultural crops such as corn and beans are particularly vulnerable to hailstorms stripping the plant of its leaves. Hail can also do considerable damage to vehicles and buildings. Hail only rarely results in loss of life directly although injuries can occur.	1
Maximum Threat	The land area affected by individual hail events is not much smaller that that of parent thunderstorm, an average of 15 miles in diameter around the center of the storm.	4
Severity of Impact	A. 99 injuries and 4 deaths are attributed to hail in Iowa since 1980; however none have occurred in Linn County since 1950. Exposure to hail larger than a nickel can be very dangerous and life threatening. B. Risk to response personnel is the same as the risk to others without shelter from the hail. C. Operations should not be affected to any significant degree. D. Damage to property, facilities, and infrastructure is usually limited to broken windows and damaged roofs. E. Delivery of services should not be affected to any significant degree. There may be	1

	minor disruptions, but they would likely come from high winds and lightning (usually associated with hailstorms). F. Hail can strip plants of their vegetation in very little time. If this occurs at a critical time in the life cycle of plants, it could have fatal consequences. G. Hailstorms cause nearly $1 billion dollars annually in property and crop damage in the United States. The peak hail activity coincides with the Midwest's peak agricultural season. Financial impacts resulting from damage to property is in the millions of dollars every year, most of which is covered by crop and hazard insurance. H. None known. I. Timely and adequate response to the event is the key.	
Speed of Onset	Forecasting hailstorms as with their parent thunderstorms, is becoming quite accurate due to the advancement in Doppler Radar and other technologies operated by the National Weather Service and many televisions weather departments. Warnings in the 20 to 30 minute range are usually available prior to the occurrence of the storm.	4
Total		18

Hail Events within 10 Miles of Lisbon

29 HAIL events were reported **within a 10 mile Radius of Lisbon** between **11/30/1985** and **09/01/2010**.

Magnitude
Mag: Deaths
Dth: Injuries
Inj: Property
PrD: Damage
CrD: Crop Damage

Iowa

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 LINN	04/29/1986	1759	Hail	1.00 in.	0	0	0	0
2 LINN	07/06/1987	1459	Hail	0.75 in.	0	0	0	0
3 LINN	07/06/1987	1520	Hail	0.75 in.	0	0	0	0
4 LINN	07/06/1987	1603	Hail	1.00 in.	0	0	0	0
5 LINN	07/06/1987	1617	Hail	1.00 in.	0	0	0	0
6 LINN	08/20/1987	2315	Hail	0.75 in.	0	0	0	0
7 LINN	04/26/1989	1515	Hail	1.25 in.	0	0	0	0
8 LINN	06/27/1990	1434	Hail	1.75 in.	0	0	0	0
9 LINN	05/17/1991	1435	Hail	1.75 in.	0	0	0	0
10 LINN	04/10/1992	1815	Hail	1.75 in.	0	0	0	0
11 LINN	04/15/1992	1541	Hail	1.00 in.	0	0	0	0
12 LINN	04/15/1992	2152	Hail	1.75	0	0	0	0

				in.				
13 Ely	05/18/2000	1130	Hail	1.75 in.	0	0	0	0
14 Springville	05/30/2002	1842	Hail	1.00 in.	0	0	0	0
15 Springville	05/30/2002	1855	Hail	0.88 in.	0	0	0	0
16 Springville	05/30/2002	1900	Hail	0.75 in.	0	0	0	0
17 Springville	07/05/2003	0115	Hail	0.75 in.	0	0	15K	10K
18 Springville	05/07/2004	1035	Hail	1.75 in.	0	0	20K	10K
19 Mt Vernon	05/17/2004	1913	Hail	0.75 in.	0	0	0	5K
20 Springville	05/21/2004	1554	Hail	1.75 in.	0	0	5K	0
21 Lisbon	04/02/2006	1648	Hail	1.00 in.	0	0	1K	0
22 Lisbon	04/13/2006	1932	Hail	1.00 in.	0	0	2K	0
23 Mt Vernon	03/31/2007	1610	Hail	0.75 in.	0	0	0	0
24 Ely	08/15/2007	0924	Hail	0.75 in.	0	0	0	0
25 Bertram	06/12/2008	2037	Hail	0.88 in.	0	0	0	0
26 Springville	06/12/2008	2045	Hail	2.00 in.	0	0	0	0
27 Mt Vernon	06/15/2008	0350	Hail	0.75 in.	0	0	0	0
28 Cedar Rapids	04/25/2009	2016	Hail	0.75 in.	0	0	0	0
29 Cedar Rapids	04/06/2010	1944	Hail	1.00 in.	0	0	0	0
				TOTALS:	0	0	43K	25K

Source: NCDC

Common Hailstone Size Comparisons

Common Coin Sizes	
Dime	0.70 in
Cent (or "Penny")	0.75 in
Five cents (Nickel)	0.83 in
Quarter dollar	0.955 in
Dollar	1.04 in
50 Cents/Half Dollar	1.20 in

Other Objects		
Object	**Diameter**	
	Inches	**MM**
Pea	0.24 in	5-9
Marble (small)	0.51 in	10-15

Other Objects		
Object	**Diameter**	
	Inches	**MM**
Walnut/Ping-pong ball	1.5 in	16-20
Golf ball	1.7 in	21-30
Lime/Hen egg	2.0 in	31-40
Tennis Ball	2.5 in	41-50
Baseball	2.8 in	51-60
Apple/Teacup	3.0 in	61-75
Grapefruit	4.3 in	76-90
Softball	4.5 in	91-100
Computer CD	5.0 in	>100

Typical Hail Diameter (mm)	Typical Damage Impacts
5	No damage
5-**15**	Slight general damage to plants, crops
10-**20**	Significant damage to fruit, crops, vegetation
20-**30**	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
25-**40**	Widespread glass damage, vehicle bodywork damage
30-**50**	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
40-**60**	Bodywork of grounded aircraft dented, brick walls pitted
50-**75**	Severe roof damage, risk of serious injuries
60-**90**	Severe damage to aircraft bodywork
75-**100**	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
>100	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Wikipedia

Severe Winter Storms

Classification	Description	Rating

Description	Severe winter weather conditions can affect day-to-day activities. These can include blizzard conditions, heavy snow, blowing snow, freezing rain, heavy sleet, and extreme cold. Winter storms are common during the winter months of October through April. The various types of extreme winter weather cause considerable damage. Heavy snows cause immobilized transportation systems, downed trees and power lines, collapsed buildings, and loss of livestock and wildlife. Blizzard conditions are winter storms which last at least three hours with sustained wind speeds of 35 mph or more, reduced visibility of ¼ mile or less, and whiteout conditions. Heavy snows of more than 6 inches in a 12-hour period or freezing rain greater than ¼ inch accumulation causing hazardous conditions in the community can slow or stop the flow of vital supplies as well as disrupt emergency and medical services. Loose snow begins to drift when the wind speed reaches 9 to 10 mph under freezing conditions. The potential for some drifting is substantially higher in open country than in urban areas where buildings, trees, and other features obstruct the wind. Ice storms result in fallen trees, broken tree limbs, downed power lines and utility poles, fallen communications towers, and impassable transportation routes. Severe ice storms have caused total electric power losses over large areas of Iowa and rendered assistance unavailable to those in need due to impassable roads. Frigid temperatures and wind chills are dangerous to people, particularly the elderly and the very young. Dangers include frostbite or hypothermia. Water pipes, livestock, fish and wildlife, and pets are also at risk from extreme cold and severe winter weather.	
Historical Occurrence	From 1985-2010, Iowa has had 1221 heavy snow, ice storm, or extreme wind-chill events. There are many accounts of large numbers of deaths due to cold and blizzards in Iowa's history. While we are not as vulnerable as the early settlers, there are recent accounts of multiple deaths from snowstorms and extreme cold around the state. From 1953-2008, four Presidential Declarations of Major Disaster have been declared in Iowa that were related to severe winter storms. There were 120 severe winter storms reported in Linn County from 1985-2010 with 7 being Presidential Declarations of Major Disasters. The table below shows the winter storm events to affect Linn County between January 1, 1985 and September 1, 2010. These storms were responsible for 5 deaths, 14 injuries and over $18 million in damages. It is important to keep in mind that extreme weather events such as this affect a large area and are not broken down by city.	4
Probability	Winter storms regularly move easterly and use both the southward plunge of arctic cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow and sometimes blizzard conditions in Iowa and other parts of the Midwest. The cold temperatures, strong winds, and heavy precipitation are the ingredients of winter storms. Most counties can usually expect 2 or 3 winter storms a season with an extreme storm every 3 to 5 years on average (more in the northwest, fewer in the southeast). A snowfall of six inches or more from one storm only occurs in 49% of Iowa winters, while a large winter storm event of 10 inches or more will occur about once every 3 years.	3
Vulnerability	Hazardous driving conditions due to snow and ice on highways and bridges lead to many traffic accidents. The leading cause of death during winter storms is transportation accidents. About 70% of winter-related deaths occur in automobiles and about 25% are people caught out in the storm. The majority of these are males over 40 years of age. Emergency services such as police, fire, and ambulance are unable to respond due to road conditions. Emergency needs of remote or isolated residents for food or fuel, as well as for feed, water and shelter for livestock are unable to be met. People, pets, and livestock are also susceptible to frostbite and hypothermia during winter storms. Those at risk are primarily either engaged in outdoor activity (shoveling snow, digging out vehicles, or assisting stranded motorists), or are the elderly or very young. Schools often close during extreme cold or heavy snow conditions to protect the safety of children and bus drivers. Citizens' use of kerosene heaters and other alternative forms of heating may create other hazards such as structural fires and carbon monoxide poisoning.	2
Maximum Threat	Even though the developments in technology have been very beneficial in reducing the long term negative effects of winter storms, certain dangers still exist. The maximum threat of winter conditions would be if power outages occurred or travel was impaired by hazardous conditions. This could result in the inability for some of the population to maintain temperatures necessary for the body. In addition, medical response time could be limited.	4
Severity of Impact	A. From 1985-2010, Linn County has had 5 deaths and 14 injuries related to winter storms. This does not include the automobile accidents and the casualties associated with them. Cold temperature impacts on agriculture are frequently discussed in terms of frost and freeze impacts early or late in growing seasons and unprotected livestock. B. Response personnel are exposed to cold temperatures and traffic accidents when responding to the victims needs. C. Operations can be limited or halted when critical services are not available. Staff may not be able to make it to the place of work, thus, limiting the continuity of operations. D. Immobilized transportation (including emergency vehicles), downed trees and electrical wires, building and communication tower collapse, and bodily injury/death are just a few of the impacts of a severe winter storm. Vehicle batteries and diesel	2

	engines are stressed and the fuel often gels in extreme cold weather. This impacts transportation, trucking, and rail traffic. E. Fire during winter storms presents a great danger because water supplies may freeze and firefighting equipment may not function effectively, or personnel and equipment may be unable to get to the fire. If power is out, interiors of homes become very cold and lead to pipes freezing and possibly bursting. Rivers and lakes freeze and subsequent ice jams threaten bridges and can close major highways. Ice jams can also create flooding problems when temperatures begin to rise. Ice coating at least one-fourth inch in thickness is heavy enough to damage trees, overhead wires, and similar objects and to produce widespread power outages. Buried water pipes can burst causing massive ice problems and loss of water and subsequent evacuations during sub-zero temperatures. F. Winter storms are a natural occurrence and there would be no direct significant impact on the environment. G. The cost of snow removal, repairing damage, and loss of business can have large economic impacts on the community. Also, the state estimated $76,159,000 in property damage, and $346,900,000 in lost crops due to heavy snow, ice storm, or extreme wind-chill events statewide. Linn County experienced $18.4 million in property damage related to winter storms. H. Enforced snow ordinances allow the jurisdiction to more affectively open transportation routes. Delivery and adequate supplies of salt, sand, and saline are important inputs to the snow removal process. These contracts should be in place. Removal of debris and reinstatement of energy are vital to safety of the public as well. Agreements should be in place with the power company to ensure power is restored in an effective and timely manner following the storm. I. Effective and timely response to the snowstorm is key maintaining a good reputation. Streets clear of snow and ice are important factors to the mobile public.	
Speed of Onset	The National Weather Service (NWS) has developed effective weather advisories that are promptly and widely distributed. Radio, TV, and Weather Alert Radios provide the most immediate means to do this. Accurate information is made available to public officials and the public up to days in advance. Notifications made by the National Weather Service include winter storm watch, winter storm warning, blizzard warning, winter weather advisory, and a frost/freeze advisory.	1
Total		16

Linn County Winter Storm Events

120 SNOW & ICE event(s) were reported in **Linn County, Iowa** between **01/01/1985** and **05/31/2010**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Iowa

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Linn Co.	01/11/1993	0900	Snow And Heavy Snow	N/A	0	0	50K	0
2 Linn Co.	01/20/1993	0430	Ice Storm	N/A	0	0	50K	0
3 Linn Co.	02/08/1993	2230	Freezing Rain	N/A	0	0	1K	0
4 Linn Co.	02/10/1993	2100	Freezing Rain	N/A	1	0	50K	0
5 Linn Co.	02/20/1993	1400	Heavy Snow	N/A	0	0	50K	0
6 Linn Co.	04/15/1993	1900	Snow	N/A	0	0	50K	0
7 Linn Co.	01/02/1994	0600	Snow/heavy Snow	N/A	0	0	500K	0
8 Linn Co.	01/26/1994	1300	Freezing Rain	N/A	0	0	500K	0
9 Linn Co.	02/22/1994	1000	Snow	N/A	0	0	5K	0
10 Linn Co.	12/06/1994	0000	Ice Storm	N/A	0	0	15.0M	0

11 Linn Co.	12/07/1994	0600	Heavy Snow	N/A	0	0	500K	0
12 Linn Co.	01/26/1995	2300	Freezing Rain	N/A	0	0	100K	0
13 Linn Co.	11/10/1995	0400	Snow/sleet/freezing Rain	N/A	0	0	0	0
14 Linn Co.	11/27/1995	0400	Snow/sleet/freezing Rain	N/A	0	0	0	0
15 Linn Co.	12/08/1995	0200	Snow	N/A	0	0	20K	0
16 Linn Co.	12/08/1995	0600	Snow- High Wind-Wind Chill	N/A	0	0	0	0
17 Linn Co.	01/18/1996	0430	Heavy Snow	N/A	0	0	0	0
18 Linn Co.	01/26/1996	0400	Winter Storm	N/A	0	0	0	0
19 Linn Co.	11/14/1996	0600	Winter Storm	N/A	1	11	184K	0
20 Linn Co.	12/25/1996	1700	Winter Storm	N/A	0	0	0	0
21 Linn Co.	12/27/1996	1800	Winter Storm	N/A	0	3	100K	0
22 Linn Co.	01/09/1997	0400	Winter Storm	N/A	0	0	0	0
23 Linn Co.	01/15/1997	0400	Winter Storm	N/A	0	0	0	0
24 Linn Co.	01/24/1997	0400	Winter Storm	N/A	0	0	0	0
25 Linn Co.	02/03/1997	2000	Winter Storm	N/A	0	0	0	0
26 Linn Co.	10/26/1997	0200	Heavy Snow	N/A	0	0	0	0
27 Linn Co.	11/14/1997	2100	Winter Storm	N/A	0	0	0	0
28 Linn Co.	12/24/1997	1100	Heavy Snow	N/A	0	0	0	0
29 Linn Co.	01/20/1998	2200	Winter Storm	N/A	0	0	0	0
30 Linn Co.	02/28/1998	1600	Winter Storm	N/A	0	0	0	0
31 Linn Co.	03/08/1998	1000	Heavy Snow	N/A	0	0	0	0
32 Linn Co.	12/06/1998	1500	Winter Storm	N/A	0	0	0	0
33 Linn Co.	12/06/1998	1500	Winter Storm	N/A	0	0	0	0
34 Linn Co.	12/30/1998	1600	Winter Storm	N/A	0	0	0	0
35 Linn Co.	01/01/1999	0517	Winter Storm	N/A	2	0	0	0
36 Linn Co.	01/18/1999	0405	Winter Storm	N/A	0	0	0	0
37 Linn Co.	03/05/1999	1300	Winter Storm	N/A	0	0	0	0
38 Linn Co.	03/08/1999	1500	Winter Storm	N/A	0	0	0	0
39 Linn Co.	12/16/1999	1900	Winter Storm	N/A	0	0	0	0
40 Linn Co.	12/19/1999	1500	Winter Storm	N/A	0	0	0	0
41 Linn Co.	12/23/1999	1400	Winter Storm	N/A	0	0	0	0
42 Linn Co.	01/03/2000	1500	Winter Storm	N/A	0	0	0	0
43 Linn Co.	01/17/2000	0800	Winter Storm	N/A	0	0	0	0
44 Linn Co.	01/19/2000	1000	Winter Storm	N/A	0	0	0	0
45 Linn Co.	01/29/2000	1500	Winter Storm	N/A	0	0	0	0

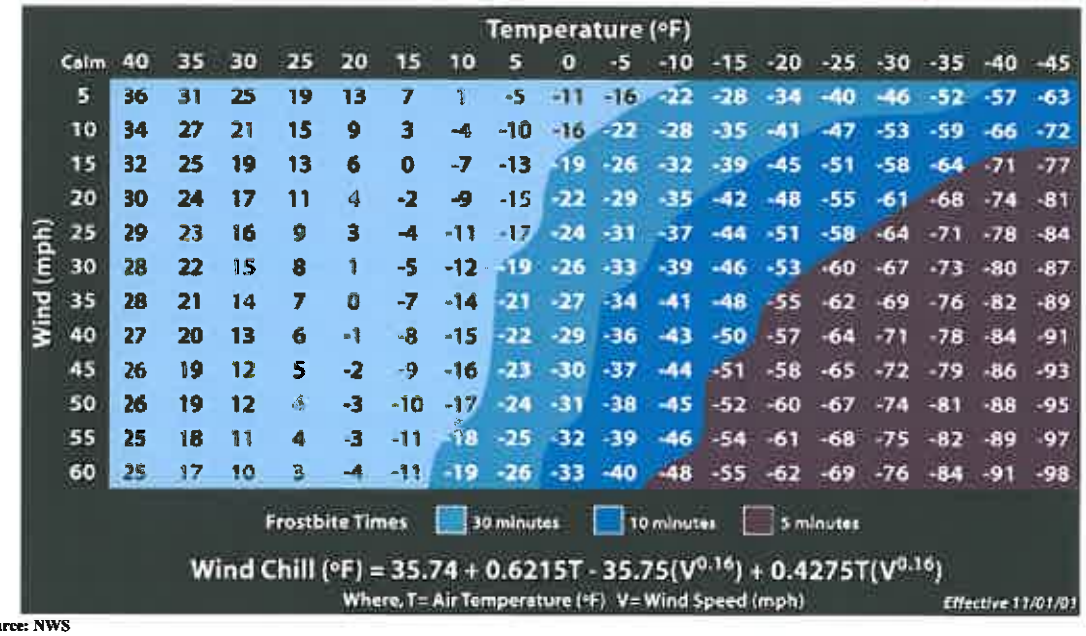
46 Linn Co.	02/13/2000	0400	Winter Storm	N/A	0	0	0	0
47 Linn Co.	02/17/2000	1900	Winter Storm	N/A	0	0	0	0
48 Linn Co.	04/07/2000	1200	Snow	N/A	0	0	0	0
49 Linn Co.	12/01/2000	0200	Snow	N/A	0	0	0	0
50 Linn Co.	12/07/2000	0400	Snow/freezing Rain	N/A	0	0	0	0
51 Linn Co.	12/10/2000	2200	Winter Storm	N/A	0	0	0	0
52 Linn Co.	12/15/2000	1300	Ice Storm	N/A	0	0	0	0
53 Linn Co.	12/18/2000	0400	Snow/blowing Snow	N/A	0	0	0	0
54 Linn Co.	12/20/2000	0700	Snow	N/A	0	0	0	0
55 Linn Co.	12/23/2000	0100	Snow	N/A	0	0	0	0
56 Linn Co.	12/28/2000	1000	Snow	N/A	0	0	0	0
57 Linn Co.	01/01/2001	0001	Snow	N/A	0	0	0	0
58 Linn Co.	01/13/2001	1900	Snow/freezing Rain	N/A	0	0	0	0
59 Linn Co.	01/26/2001	0200	Snow/blowing Snow	N/A	0	0	0	0
60 Linn Co.	01/28/2001	2100	Ice Storm	N/A	0	0	0	0
61 Linn Co.	02/07/2001	1500	Ice Storm	N/A	0	0	0	0
62 Linn Co.	02/08/2001	2300	Winter Storm	N/A	0	0	0	0
63 Linn Co.	02/14/2001	0500	Freezing Rain	N/A	0	0	0	0
64 Linn Co.	02/23/2001	2230	Winter Storm	N/A	0	0	0	0
65 Linn Co.	03/15/2001	0001	Winter Storm	N/A	0	0	0	0
66 Linn Co.	04/14/2001	0530	Snowmelt Flooding	N/A	0	0	0	0
67 Linn Co.	03/01/2002	1500	Winter Storm	N/A	0	0	0	0
68 Linn Co.	01/28/2003	1000	Winter Storm	N/A	0	0	0	0
69 Linn Co.	02/14/2003	1600	Winter Storm	N/A	0	0	0	0
70 Linn Co.	03/04/2003	1300	Winter Storm	N/A	0	0	0	0
71 Linn Co.	01/16/2004	1900	Winter Weather/mix	N/A	0	0	45K	0
72 Linn Co.	02/05/2004	0001	Heavy Snow	N/A	0	0	40K	0
73 Linn Co.	01/05/2005	1700	Heavy Snow	N/A	0	0	120K	0
74 Linn Co.	01/10/2005	1915	Winter Weather/mix	N/A	0	0	10K	0
75 Linn Co.	12/08/2005	0300	Winter Weather/mix	N/A	0	0	0	0
76 Linn Co.	02/15/2006	2030	Winter Weather	N/A	0	0	37K	0
77 Linn Co.	01/13/2007	1120	Winter Weather	N/A	0	0	0K	0K
78 Linn Co.	01/20/2007	2255	Winter Weather	N/A	0	0	0K	0K

79 Linn Co.	02/06/2007	0515	Winter Weather	N/A	0	0	0K	0K
80 Linn Co.	02/13/2007	0005	Winter Weather	N/A	0	0	0K	0K
81 Linn Co.	02/16/2007	1520	Winter Weather	N/A	0	0	0K	0K
82 Linn Co.	02/23/2007	1550	Winter Weather	N/A	0	0	0K	0K
83 Linn Co.	02/24/2007	0725	Ice Storm	N/A	0	0	989K	0K
84 Linn Co.	03/01/2007	1445	Winter Weather	N/A	0	0	0K	0K
85 Linn Co.	04/11/2007	2025	Winter Weather	N/A	0	0	0K	0K
86 Linn Co.	11/21/2007	1452	Winter Weather	N/A	0	0	0K	0K
87 Linn Co.	12/01/2007	0829	Winter Storm	N/A	0	0	0K	0K
88 Linn Co.	12/06/2007	1335	Winter Weather	N/A	0	0	0K	0K
89 Linn Co.	12/11/2007	0015	Ice Storm	N/A	1	0	0K	0K
90 Linn Co.	12/22/2007	1445	Winter Storm	N/A	0	0	0K	0K
91 Linn Co.	12/28/2007	0400	Winter Weather	N/A	0	0	0K	0K
92 Linn Co.	01/16/2008	2210	Winter Weather	N/A	0	0	0K	0K
93 Linn Co.	01/20/2008	2240	Winter Weather	N/A	0	0	0K	0K
94 Linn Co.	01/29/2008	1035	Winter Weather	N/A	0	0	0K	0K
95 Linn Co.	02/03/2008	1400	Winter Weather	N/A	0	0	0K	0K
96 Linn Co.	02/05/2008	1230	Winter Storm	N/A	0	0	0K	0K
97 Linn Co.	02/11/2008	1100	Winter Weather	N/A	0	0	0K	0K
98 Linn Co.	02/16/2008	2315	Winter Storm	N/A	0	0	0K	0K
99 Linn Co.	02/28/2008	1325	Winter Weather	N/A	0	0	0K	0K
100 Linn Co.	03/03/2008	0215	Winter Weather	N/A	0	0	0K	0K
101 Linn Co.	03/27/2008	0740	Winter Weather	N/A	0	0	0K	0K
102 Linn Co.	11/29/2008	2200	Winter Weather	N/A	0	0	0K	0K
103 Linn Co.	12/03/2008	0625	Winter Weather	N/A	0	0	0K	0K
104 Linn Co.	12/08/2008	0945	Winter Weather	N/A	0	0	0K	0K
105 Linn Co.	12/08/2008	1730	Ice Storm	N/A	0	0	0K	0K
106 Linn Co.	12/16/2008	0935	Winter Weather	N/A	0	0	0K	0K
107 Linn Co.	12/18/2008	1915	Heavy Snow	N/A	0	0	0K	0K
108 Linn Co.	12/18/2008	1915	Winter Storm	N/A	0	0	0K	0K
109 Linn	12/24/2008	0315	Winter Weather	N/A	0	0	0K	0K

Co.								
110 Linn Co.	01/09/2009	1825	Heavy Snow	N/A	0	0	0K	0K
111 Linn Co.	01/13/2009	1920	Heavy Snow	N/A	0	0	0K	0K
112 Linn Co.	02/13/2009	1435	Winter Weather	N/A	0	0	0K	0K
113 Linn Co.	03/28/2009	1430	Winter Storm	N/A	0	0	0K	0K
114 Linn Co.	03/28/2009	1430	Winter Weather	N/A	0	0	0K	0K
115 Linn Co.	12/08/2009	0005	Winter Storm	N/A	0	0	0K	0K
116 Linn Co.	12/23/2009	0625	Ice Storm	N/A	0	0	0K	0K
117 Linn Co.	12/25/2009	1000	Winter Weather	N/A	0	0	0K	0K
118 Linn Co.	01/25/2010	0400	Winter Weather	N/A	0	0	0K	0K
119 Linn Co.	02/07/2010	2200	Winter Weather	N/A	0	0	0K	0K
120 Linn Co.	03/19/2010	1800	Winter Weather	N/A	0	0	0K	0K
				TOTALS:	5	14	18.400M	0

Source: NCDC

NWS Windchill Chart



Source: NWS

Thunderstorm and Lightning

Classification	Description	Rating

Description	Atmospheric imbalance and turbulence caused by: (1) the rapid rising of unstable warm air into the atmosphere, (2) a sufficient amount of moisture to form clouds and produce rain, and (3) the collision of separate weather fronts (warm and cold) creating an upward lift of air currents. These conditions may result in thunderstorm, heavy rains (which may cause flash flooding), and strong winds reaching or exceeding 58 mph resulting in tornadoes, or surface hail of at least 0.75 inches in diameter. When the water rises to between 15,000 and 25,000 feet above sea level, it begins a chemical process to turn the water into ice. This process creates a build up of positive and negative charges that produce a buildup of electricity that releases towards the earth in 50-yard sections called ladders that are searching for a source of conduction. When a suitable source is located, the connection is made creating a circuit. When the circuit is complete, the charge is then transferred from the cloud where it was formed, to the site in the ground where the circuit was made. A lightning bolt can approach a temperature of 50,000 degrees Fahrenheit at the site of impact in a split second. This rapid heating, expansion, and cooling of air near the lightning bolts create thunder. Thunderstorms are common in Iowa and can occur singly, in clusters, or in lines. Most thunderstorms produce only thunder, lightning, and rain. Severe storms however, can produce tornadoes, high straight-line winds above 58 mph, microburst, lightning, hailstorms, and flooding. High straight-line winds, which can often exceed 60 mph, are common occurrences and are often mistaken for tornadoes. Lightning occurs with all thunderstorms even if the buildup of electricity isn't strong enough to send a bolt to the ground.	
Historical Occurrence	At least 8099 severe thunderstorm, high wind, or lightning events have impacted Iowa from 1985-2010. Because thunderstorms may occur singly, in clusters, or in lines, it is possible that several thunderstorms may affect the area in the course of a few hours. It is likely that more than the 6698 individual severe storm systems occurred in the state. One system may spawn multiple events. A number of these thunderstorms have caused other hazards such as flash flooding, river flooding, and tornadoes. There have been 30 Presidential Declarations of Major Disaster since 1968 related to Severe Storms. There have been 242 severe thunderstorms, high winds, or lightning events that have affected Linn County from 1985-2010. The table below shows severe lightning events that have occurred in Linn County between January 1, 1985 and September 1, 2010. In that time the City of Lisbon has been directly affected by 1 thunderstorm and high wind event that resulted in no damage. It is also important to keep in mind that the cities of Ely, Springville, Mt Vernon, and Bertram are within ten miles of the City of Lisbon and any event that affects them ultimately affects the City of Lisbon.	4
Probability	Iowa experiences between 30 and 50 thunderstorm days per year on average. With Iowa's location in the interior of the U.S., there is a very high likelihood that a few of these summer storms will become severe and cause damage. Because of the humid continental climate that Iowa experiences, ingredients of a severe thunderstorms are usually available (moisture to form clouds and rain, relatively warm and unstable air that can rise rapidly, and weather fronts and convective systems that lift air masses). Based on historical averages Linn County has a 10% chance of experiencing a severe thunderstorm, high wind, or lightning event in a given year.	3
Vulnerability	Those in unprotected areas, mobile homes, or automobiles during a storm are at risk. Sudden strong winds often accompany a severe thunderstorm and may blow down trees across roads and power lines. Lightning presents the greatest immediate danger to people and livestock during a thunderstorm. It is the second most frequent weather-related killer in the U.S. with nearly 100 deaths and 500 injuries each year. (Floods and flash floods are the number one cause of weather related deaths in the U.S.) Livestock and people who are outdoors, especially under a tree or other natural lightning rods, in or on water, or on or near hilltops are at risk from lightning. Hail can be very dangerous to people, pets, and livestock if shelter is not available. Flash floods and tornadoes can develop during thunderstorms as well. People who are in automobiles or along low-lying areas when flash flooding occurs and people who are in mobile homes are vulnerable to the impacts of severe thunderstorms. For more details on the vulnerabilities from the flooding and tornado hazards, see the specific hazard worksheet for that hazard.	2
Maximum Threat	Severe thunderstorms can be quite expansive with areas of localized severe conditions. Most severe thunderstorm cells are 5 to 25 miles wide with a larger area of heavy rain and strong winds around the main cell. Most non-severe thunderstorms have a lifespan of 20 to 30 minutes, while severe thunderstorms last longer than 30 minutes.	4

Severity of Impact	A. Like tornadoes, thunderstorms and lightning can cause death, serious injury, and substantial property damage. The power of lightning's electrical charge and intense heat can electrocute people and livestock on contact, split trees, ignite fires, and cause electrical failures. Thunderstorms can also bring large hail that can damage homes and businesses, break glass, destroy vehicles, and cause bodily injury to people, pets, and livestock. Linn County has experienced 2 deaths and 15 injuries resulting from severe thunderstorms, high winds, and lightning from 1985-2010. B. Response personnel are exposed to the same risk as the general public when caught in the storm without shelter. Work on ladders and other apparatus during lightning can expose responders to higher risk situations. C. Continuity of operations would be affected through indirect impacts such as loss of critical services. D. High winds can damage trees, homes (especially mobile homes), and businesses and can knock vehicles off of the road. Straight-line winds are responsible for most thunderstorm damage. E. One or more severe thunderstorms occurring over a short period (especially on saturated ground) can lead to flooding and cause extensive power and communication outages as well as agricultural damage. F. High winds can damage trees, but this is a naturally occurring hazard and the environment proves to be resilient following these and other natural hazards. G. Windstorms and lightning occur rapidly and do not persist. The aftermath may cause moderate economic impacts, but most will be related to cascading hazards such as flooding. H. None known. I. Timely and adequate response will stave off any negative reputation that the jurisdiction could be exposed to. Clean up procedures should be established including a debris removal and disposal plan.	2
Speed of Onset	Some thunderstorms can be seen approaching, while others hit without warning. The National Weather Service issues severe thunderstorm watches and warnings as well as statements about severe weather and localized storms.	4
Total		19

Linn County Lightning Events

12 LIGHTNING events were reported in **Linn County, Iowa** between **01/01//1985** and **09/1/2010**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Iowa

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Cedar Rapids	06/25/1995	1230	Lightning	N/A	0	2	1K	0
2 Cedar Rapids	06/21/1997	0130	Lightning	N/A	0	0	15K	0
3 Cedar Rapids	07/27/1997	1400	Lightning	N/A	0	1	0	0
4 Cedar Rapids	06/04/2000	0615	Lightning	N/A	0	0	20K	0
5 Cedar Rapids	08/05/2000	0800	Lightning	N/A	0	0	6K	0
6 Cedar Rapids	10/03/2000	1745	Lightning	N/A	0	0	0	0
7 Fairfax	07/08/2001	1102	Lightning	N/A	0	1	0	0
8 Marion	10/22/2004	0020	Lightning	N/A	0	0	2K	0
9 (cid)Cedar Rapids Airport	09/04/2005	1012	Lightning	N/A	1	1	0	0
10 Cedar Rapids	04/13/2006	1829	Lightning	N/A	0	0	0	0
11 Cedar Rapids	06/22/2007	0400	Lightning	N/A	0	0	25K	0K
12 Cedar Rapids	06/22/2007	20:00	Lightning	N/A	0	0	15K	0K

TOTALS:	1	5	84K	0

Source: NCDC

Tornadoes

Classification	Description	Rating
Description	A tornado is a violent whirling wind characteristically accompanied by a funnel shaped cloud extending down from a cumulonimbus cloud that progress in a narrow, erratic path. Rotating wind speeds can exceed 300 mph and travel across the ground at average speeds of 25-30 mph. A tornado can be a few yards to about a mile wide where it touches the ground, however, an average tornado, is a few hundred yards wide. It can move over land for distances ranging from short hops to many miles, causing great damage wherever it descends. The funnel is made visible by the dust sucked up and condensation of water droplets in the center of the funnel. The Enhanced Fujita (E/F) Scale measures tornado severity. The E/F Scale assigns a numerical value based on wind speed and extent of damage. It breaks down each event by Damage Indicators (DI), and Degrees of Damage (DOD). DI's are broken down into 28 categories of structures. Each individual type of structure is given an abbreviation code as well as a number code for easy reference. DOD's are broken down into categories of possible damage that might occur. Each of these categories is also assigned a number. The new scale is designed to more accurately depict the actual severity and damage that has occurred from an event.	
Historical Occurrence	In the U.S., Iowa is ranked third in the number of tornadoes per 10,000 square miles. From 1985-2010, Iowa averaged 53 twisters per year. In Iowa most tornadoes occur in the spring and summer months, but twisters can and have occurred in every month of the year. Late afternoon to evening hour tornadoes are the most common, but they can occur at any time of the day. Iowa has had 1333 tornado events from 1985-2010. The largest single event took place on April 11, 2001 with 28 tornadoes. Our biggest year was 2004 with 120 tornadoes. From 1985-2010, 11 Presidential Declarations of Major Disaster have been declared in Iowa that were related to tornadoes out of 1930 total events nationwide. The City of Lisbon has experienced two tornadoes. In May 1997, an E/F 1 tornado and in June 1998 an E/F 0 tornado neither of which caused any damage. The table below shows all tornadic events in Linn County from January 1, 1985 until September 1, 2010. It is also important to keep in mind that the cities of Ely, Springville, Mt Vernon, and Bertram are within ten miles of the City of Lisbon and any event that affects them ultimately affects the City of Lisbon.	1
Probability	Historically, 40 - 50 tornadoes are confirmed in Iowa per year. Developed areas occupy a growing portion of Iowa and stand a likely chance of having a tornado occur in the next ten years. Because tornadoes are sporadic there can not be a reliable long term prediction made as to where they may occur. However, if the tornadic events hold true to their average, Lisbon can expect to receive minimal funnel cloud activity in a given year, if any at all.	1
Vulnerability	Those most at risk from tornadoes include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to twisters. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of destruction. People who may not understand watches and warnings due to language barriers are also at risk	2
Maximum Threat	Generally the destructive path of a tornado is only a couple hundred feet in width, but stronger tornadoes can leave a path of devastation up to a mile wide. Normally a tornado will stay on the ground for no more than 20 minutes; however, one tornado can touch ground several times in different areas. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area.	3

Severity of Impact	A. Injury or death related to tornadoes most often occurs when buildings collapse; people are hit by flying objects or are caught trying to escape the tornado in a vehicle. From 1985-2010, Iowa has had 23 deaths and 570 injuries due to tornadoes. B. Response personnel are exposed to the same risk as the general public when caught in the storm without shelter. C. Tornadoes can destroy government facilities just as they could other property. Disruption of critical services can also affect operations. Employees may be affected and unable to attend work-related issues. D. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows; all the way to complete destruction and disintegration of well-constructed structures, infrastructure, and trees. E. Tornadoes can impact many critical services, mainly electrical power. Buried services are not as vulnerable, but can be affected by their system components that are above ground. F. Tornadoes are naturally occurring phenomena. Damages to the environment could result from spills and other contaminants from the built environment. G. Whole towns have been known to be "wiped off the map." Economic impacts can result from direct damages to facilities or business disruption from the lack of critical services such as power, gas, or water. H. Debris removal is a vital service that is often too vast for the jurisdiction to do without contractual assistance. These plans should be in place and monitored. I. Adequate warning is key to the positive reputation of the jurisdiction. Responding in a timely manner and reconstructing the community is also important. Bringing critical services back on line quickly will ensure the residents can begin their personal recovery process sooner.	3
Speed of Onset	Tornadoes strike with an incredible velocity. Wind speeds may exceed 300 miles per hour and the storm can travel across the ground at more than 70 mph. These winds can uproot trees and structures and turn harmless objects into deadly missiles, all in a matter of seconds. The advancement in weather forecasting has allowed watches to be delivered to those in the path of these storms up to hours in advance. The best lead-time for a specific severe storm and tornado is about 30 minutes. Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground due to blowing dust or driving rain and hail.	4
Total		14

Linn County Tornadic Activity

28 Tornadoes were reported in **Linn County, Iowa** between **01/01/1985** and **09/01/2010**.

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Iowa

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Linn County	08/14/1985	1125	Tornado	F1	0	0	25K	0
2 Linn County	08/18/1987	0523	Tornado	F0	0	0	25K	0
3 Linn County	04/26/1989	1522	Tornado	F1	0	0	25K	0
4 Linn County	03/13/1990	1653	Tornado	F4	0	0	25.0M	0
5 Linn County	07/04/1990	2220	Tornado	F0	0	0	3K	0
6 Linn County	05/14/1991	1258	Tornado	F1	0	0	0K	0
7 Linn County	09/12/1991	1559	Tornado	F0	0	0	25K	0

8 Robins	07/27/1995	1745	Tornado	F0	0	0	1K	1K
9 Lisbon	05/18/1997	1540	Tornado	F1	0	0	0	0
10 Center Pt	05/08/1998	1740	Tornado	F0	0	0	1K	0
11 Toddville	05/08/1998	1801	Tornado	F0	0	0	0	0
12 Palo	05/28/1998	1805	Tornado	F0	0	0	0	0
13 Cedar Rapids Airpark	05/28/1998	1812	Tornado	F0	0	0	0	0
14 Lisbon	06/18/1998	1540	Tornado	F0	0	0	0	0
15 Cedar Rapids	06/10/1999	1300	Tornado	F0	0	0	0	0
16 Coggon	06/10/1999	1317	Tornado	F0	0	0	0	0
17 Alburnett	05/31/2000	1012	Tornado	F1	0	1	50K	0
18 Cedar Rapids	04/11/2001	1620	Tornado	F0	0	0	0	0
19 Covington	07/20/2003	2158	Tornado	F2	0	0	500K	45K
20 Cedar Rapids	07/20/2003	2206	Tornado	F2	0	0	2.0M	0
21 Mt Vernon	07/20/2003	2252	Tornado	F1	0	0	10K	10K
22 Palo	05/21/2004	1522	Tornado	F3	0	0	250K	50K
23 Marion	08/26/2004	2128	Tornado	F1	0	0	10K	0
24 Whittier	08/26/2004	2136	Tornado	F1	0	0	0	10K
25 Waubeek	06/29/2005	2251	Tornado	F0	0	0	0	5K
26 Marion	04/13/2006	1840	Tornado	F0	0	0	70K	0
27 Paris	07/18/2007	1815	Tornado	F1	0	0	50K	0K
28 Lafayette	04/26/2009	1552	Tornado	F1	0	0	500K	0K
				TOTALS:	0	1	28.544M	121K

Source: NCDC

Enhanced Fujita Scale Explanation

The E/F-scale was unveiled by the NWS to the public and the full meteorological community early in 2006. On 1 February 2007, the Enhanced Fujita scale replaced the original Fujita scale in all tornado damage surveys in the United States. It is important to note that, despite the improvements, the E/F-scale still remains a set of *wind estimates* based on 8 levels of damage to 28 different types of structures and vegetation.

Below is a table comparing the estimated winds in the original F-scale and the operational E/F-scale that is currently in use by the NWS.

The Enhanced Fujita Tornado Scale

FUJITA SCALE			OPERATIONAL EF-SCALE	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	**0**	**65-85**
1	73-112	79-117	**1**	**86-110**
2	113-157	118-161	**2**	**111-135**
3	158-207	162-209	**3**	**136-165**
4	208-260	210-261	**4**	**166-200**
5	261-318	262-317	**5**	**Over 200**

Source: NCDC

Parameters

The six categories for the EF Scale are listed below, in order of increasing intensity. Although the wind speeds and photographic damage examples are updated, the damage descriptions given are those from the Fujita scale, which are more or less still accurate. However, for the actual EF scale in practice, one must look up the damage indicator (the type of structure which has been damaged) and consult the degrees of damage associated for that particular indicator.

Scale	Wind speed mph	Wind speed km/h	Relative frequency	Potential damage
EF0	65–85	105–137	53.5%	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0. 
EF1	86–110	138–178	31.6%	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken. 

				Considerable damage.	
EF2	111–135	179–218	10.7%	Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.	
				Severe damage.	
EF3	136–165	219–266	3.4%	Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.	
				Devastating damage.	
EF4	166–200	267–322	0.7%	Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.	
				Total destruction.	
EF5	>200	>322	<0.1%	Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (300 ft); steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation; incredible phenomena will occur. So far there have been two EF5 tornadoes recorded since the Enhanced Fujita Scale was introduced on February 1, 2007. The most recent one occurred in Parkersburg, Iowa on May 25, 2008 and leveled half the city.	

Damage Indicators and Degrees of Damage

The EF Scale currently has 28 Damage Indicators (DI), or types of structures and vegetation, with a varying number of Degrees of Damage (DOD) for each.

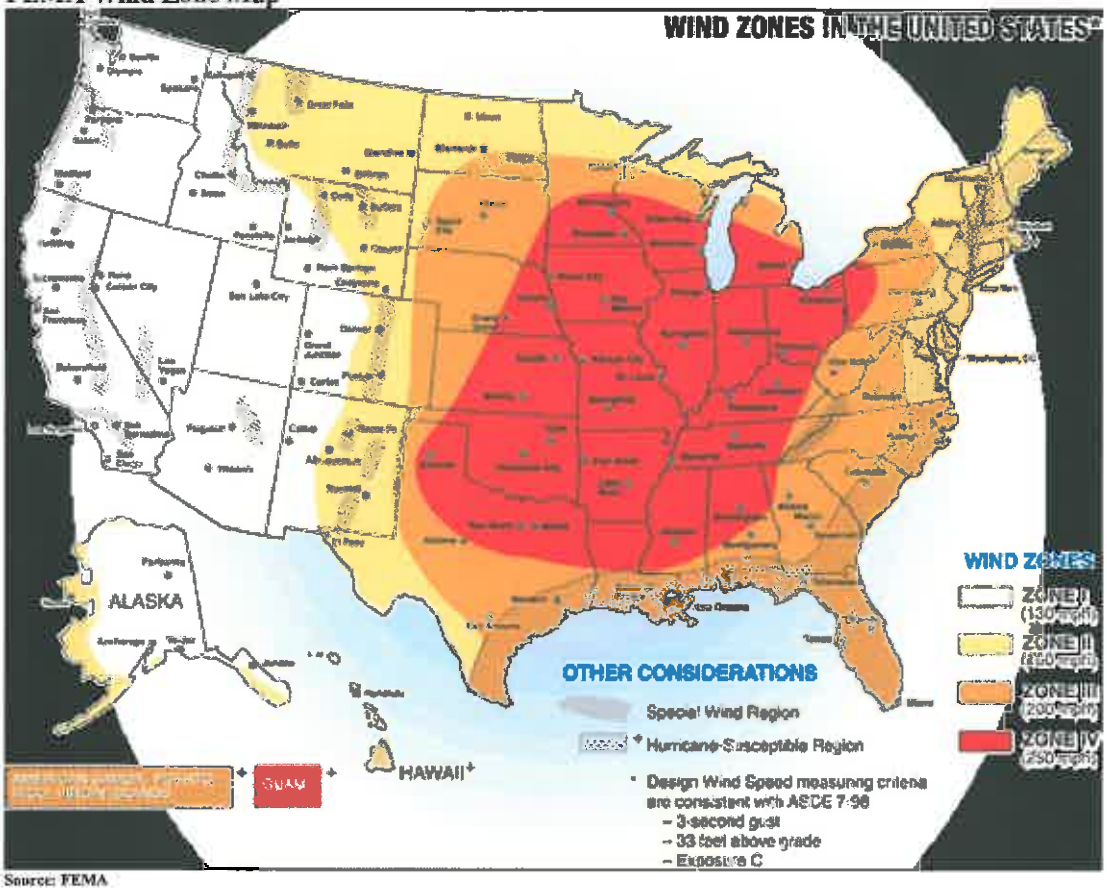
DI No.	Damage Indicator (DI)	Degrees of Damage (DOD)
1	Small Barns or Farm Outbuildings (SBO)	8
2	One- or Two-Family Residences (FR12)	10
3	Manufactured Home – Single Wide (MHSW)	9
4	Manufactured Home – Double Wide (MHDW)	12
5	Apartments, Condos, Townhouses [3 stories or less] (ACT)	6
6	Motel (M)	10
7	Masonry Apartment or Motel Building (MAM)	7
8	Small Retail Building [Fast Food Restaurants] (SRB)	8
9	Small Professional Building [Doctor's Office, Branch Banks] (SPB)	9
10	Strip Mall (SM)	9
11	Large Shopping Mall (LSM)	9
12	Large, Isolated Retail Building [K-Mart, Wal-Mart] (LIRB)	7
13	Automobile Showroom (ASR)	8
14	Automobile Service Building (ASB)	8
15	Elementary School [Single Story; Interior or Exterior Hallways] (ES)	10
16	Junior or Senior High School (JHSH)	11
17	Low-Rise Building [1–4 Stories] (LRB)	7
18	Mid-Rise Building [5–20 Stories] (MRB)	10
19	High-Rise Building [More than 20 Stories] (HRB)	10
20	Institutional Building [Hospital, Government or University Building] (IB)	11
21	Metal Building System (MBS)	8
22	Service Station Canopy (SSC)	6
23	Warehouse Building [Tilt-up Walls or Heavy-Timber Construction] (WHB)	7
24	Electrical Transmission Lines (ETL)	6
25	Free-Standing Towers (FST)	3
26	Free-Standing Light Poles, Luminary Poles, Flag Poles (FSP)	3
27	Trees: Hardwood (TH)	5
28	Trees: Softwood (TS)	5

Source: Wikipedia.org

U.S. Wind Zone Map

The wind zone map below shows how the frequency and strength of extreme windstorms vary across the United States. This map is based on 40 years of tornado history. Zone IV, the darkest area on the map, has experienced both the greatest number of tornadoes and the strongest tornadoes. As shown by the map key, wind speeds in Zone IV can be as high as 250 mph. The tornado hazard in Zone III, while not as great as in Zone IV, is still significant. In addition Zone III includes coastal areas susceptible to hurricanes.

FEMA Wind Zone Map



Source: FEMA

Windstorms

Classification	Description	Rating
Description	Wind is defined as motion of air relative to the Earth's surface. In the mainland U.S. the mean annual wind speed is reported to be 8 to 12 mph, with frequent speeds of 50 mph. and occasional wind speeds greater than 70 mph. Large scale extreme wind phenomena are experienced over every region of the U.S. High winds can result from thunderstorms inflow and outflow, or downburst winds when the storm cloud collapses, and can result from strong frontal systems, or gradient winds (high or low pressure systems) moving across the region. High winds are defined as speeds exceeding 64 knots (73 mph) or greater, either sustaining or gusting. Downdraft winds are from strong thunderstorm downburst which causes damaging winds on or near ground, and can extend to as little as 2 ½ miles or extend over a hundred miles. Downdraft wind speeds can be from 80 mph up to 168 mph, and occur quite suddenly as a thunderstorm cloud collapses. This is different from the winds associated with tornadoes. Winds associated with storms are convective. Non-convective winds are caused by fronts or gradient winds. These speeds can range from light breezes to sustained speeds of 80 to 100 mph.	

Historical Occurrence	Large-scale extreme wind phenomena are experienced over every region of the United States. Historically, high wind events are associated with severe thunderstorms and blizzards. It is often difficult to separate windstorms and tornado damage when winds get above 64 knots. There were 852 wind events in Iowa between 1985 and 2010 in which wind speeds have exceeded 64 knots. There have been 26 high wind events in Linn County since 1985 where wind speeds exceeded 64 knots (73 mph). The table below shows high wind events that have occurred in Linn County between January 1, 1985 and September 1, 2010. In that time there are no reported high wind events that have affected the City of Lisbon. It is also important to keep in mind that the cities of Ely, Springville, Mt Vernon, and Bertram are within ten miles of the City of Lisbon and any event that affects them ultimately affects the City of Lisbon.	1
Probability	Based on historical averages, the City of Lisbon would expect to have about 1 or 2 wind events each year in which wind speeds exceed 64 knots.	1
Vulnerability	Those most at risk from windstorms include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to seek shelter or escape the path of destruction. People who may not understand watches and warnings due to language barriers are also at risk.	1
Maximum Threat	Unlike tornadoes, windstorms may have a destructive path that is tens of miles wide and several hundred miles long. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area.	2
Severity of Impact	A. Injury or death related to windstorms most often occur from building failure, or people struck by flying objects B. Response personnel are exposed to the same risk as the public when caught in storms without shelter. C. Windstorms can damage government facilities just as they could other property. Disruption of critical services can also affect operations. Employees may be affected and unable to attend work-related issues. D. Impacts can range from broken tree branches, shingle damage to roofs, and some broken windows; all the way to complete destruction of well constructed structures, infrastructure, and trees. E. Windstorms can affect many critical services, especially electrical power. Buried Services are not as vulnerable, but can be affected by their system components that are above ground. F. Windstorms are naturally occurring phenomena. Damages to the environment could result from hazardous materials spills and other contaminants from the built environment. G. Economic impacts can result from direct damages to facilities or business disruption from the lack of critical services such as power. Crop damage is often associated with windstorms; laying down crops, breaking stalks, and twisting plants, reducing the yield and making it difficult to harvest. H. Debris removal is a vital service that is often too vast for the jurisdiction to do without contractual assistance. These plans should be in place and monitored. I. Adequate warning is key to the positive reputation of the jurisdiction. Responding in a timely manner and reconstructing the community is also important. Bringing critical services back on line quickly will ensure the residents can begin their personal recovery process sooner.	2
Speed of Onset	Wind speeds may approach 168 miles per hour and the storm can travel at more than 50 mph. These winds can uproot trees and structures and turn harmless objects into deadly missiles, all in a matter of seconds. The National Weather Service has developed a windstorm warning system similar to other events such as, tornado, winter storm, and thunderstorm. Watches are issued when conditions are favorable for high winds to develop and they come 12 to 24 hours in advance. Advisories are issued when existing or imminent high winds cover part or all of the area and pose a mere inconvenience. High wind warnings are issued when existing or imminent high winds cover part or all of the forecast area and pose a threat to life and property. The best warning lead-time for a specific severe storm is about 30 minutes.	4
Total		11

Linn County High Wind Events

26 HIGH WIND Events were reported in **Linn County, Iowa** between **01/01/1985** and **09/01/2010**.
High Wind events are events with winds in excess of 64 knots (73mph).

Mag: Magnitude
Dth: Deaths
Inj: Injuries
PrD: Property Damage
CrD: Crop Damage

Iowa

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Linn County	04/26/1989	1535	Tstm Wind	70 kts.	0	0	0	0
2 Linn County	08/05/1989	1000	Tstm Wind	64 kts.	0	0	0	0
3 Linn County	07/13/1992	1405	Tstm Wind	87 kts.	1	2	0	0
4 Cedar Rapids	08/14/1993	1604	Tstm Wind	74 kts.	0	0	500K	5K
5 Palo	05/23/1994	1533	Tstm Wind	70 kts.	0	0	50K	0
6 Fairfax	06/19/1994	1807	Tstm Wind	70 kts.	0	0	500K	5K
7 Cedar Rapids	07/06/1994	1540	Tstm Wind	70 kts.	0	0	500K	0
8 Springville	05/09/1995	1530	Tstm Wind	70 kts.	0	0	75K	0
9 Mt Vernon	05/18/1997	1630	Tstm Wind	65 kts.	0	0	20K	0
10 Fairfax	06/18/1998	1700	Tstm Wind	65 kts.	0	0	0	0
11 Cedar Rapids Airport	06/29/1998	1409	Tstm Wind	68 kts.	0	0	0	0
12 Fairfax	05/17/2004	1851	Tstm Wind	65 kts.	0	0	15K	10K
13 Marion Airport	08/26/2004	2135	Tstm Wind	65 kts.	0	0	20K	10K
14 Fairfax	06/25/2005	1712	Tstm Wind	72 kts.	0	0	8K	0
15 Waubeek	06/29/2005	2250	Tstm Wind	65 kts.	0	0	7K	12K
16 Cedar Rapids	07/09/2007	2040	Tstm Wind	65 kts.	0	0	5K	0K
17 Marion Airport	06/08/2008	1740	Tstm Wind	65 kts.	0	0	25K	0K
18 Marion	06/08/2008	1749	Tstm Wind	70 kts.	0	0	0K	0K
19 Walker	06/19/2009	0645	Tstm Wind	70 kts.	0	0	250K	0K
20 Troy	06/19/2009	0700	Tstm Wind	65	0	0	25K	0K

Mills				kts.				
21 Cedar Rapids	06/23/2009	1617	Tstm Wind	65 kts.	0	1	0K	0K
22 Cedar Rapids	06/23/2009	1620	Tstm Wind	65 kts.	0	0	0K	0K
23 Cedar Rapids	06/23/2009	1620	Tstm Wind	65 kts.	0	0	0K	0K
24 Cedar Rapids	06/23/2009	1625	Tstm Wind	65 kts.	0	0	0K	0K
25 Cedar Rapids	06/23/2009	1634	Tstm Wind	65 kts.	0	0	0K	0K
26 Cedar Rapids	06/23/2009	1655	Tstm Wind	65 kts.	0	0	0K	0K
				TOTALS:	1	10	10.733M	191K

Source: NCDC

Natural Hazard Ranking

The natural hazards below have been rated and ordered in accordance to their effects to the City of Lisbon.

Hazard	Rating
Natural Hazards	
Thunderstorm and Lightning	**19**
Hailstorms	**18**
Severe Winter Storms	**16**
Drought	**15**
Flash Flood	**14**
Tornadoes	**14**
Extreme Heat	**14**
Windstorms	**11**
Dam Failure	**n/a**
Grass or Wild Land Fire	**n/a**
Earthquakes	**n/a**
Expansive Soils	**n/a**
Landslides	**n/a**
Levee Failure	**n/a**
River Flooding	**n/a**
Sink Holes	**n/a**

Human Caused/Combination Hazards

Agro-Terrorism

Classification	Description	Rating
Description	An action causing intentional harm to an agricultural product or vandalism of an agricultural / animal related facility. Activities could include the following examples: animal rights activists who release mink or lab animals; disgruntled employees who intentionally contaminate bulk milk tanks or poison animals; ecological terrorists who destroy crops / facilities; theft of agricultural products, machinery, or chemicals; or criminals who vandalize agricultural facilities. This category covers a large variety of incidents from potential intentional introduction of disease; vandalism of facilities; theft of agricultural products, machinery, or chemicals; release of animals; and contamination of agricultural products. Depending upon the type of action taken, the implications will vary greatly.	
Historical Occurrence	Incidents such as this have occurred in the state of Iowa. Over the past 10 years Iowa has experienced at least 10 incidents in which animal rights activists have vandalized or released animals in our agricultural facilities. Additionally, vandalism to agricultural facilities or incidents of disgruntled employees causing damage to animals and animal products. There are frequent cases of theft of agricultural machinery, products, and chemicals. There have been no known instances of agro terrorism in the City of Lisbon.	1
Probability	Iowa experiences the types of incidents outlined above. The City of Lisbon could experience the above mentioned incidents.	1
Vulnerability	Usually these incidents have a limited area of impact. They may involve one herd of animals, one facility, one field of crops, etc. In most cases, the human impact would be limited to a small proportion of the population.	1
Maximum Threat	Usually these incidents have a limited area of impact. They may involve one herd of animals, one facility, one field of crops, etc.	1
Severity of Impact	In most cases the severity of impact would be limited.	1
Speed of Onset	In most incidents we would have no warning time. The only exception would be if someone called in a threat.	4
Total		9

Animal/Plant/Crop Disease

Classification	Description	Rating
Description	An outbreak of disease that can be transmitted from animal to animal. The disease outbreak will likely have a significant economic implications or public health impact. The crop/plant pest infestation will likely have severe economic implications, cause significant crop production losses, or significant environmental damage. The crop/plant pests may also have implications for public health. The introduction of some high consequence diseases may severely limit or eliminate our ability to move, slaughter, and export animals and animal products. The outbreak will have wide spread economic and societal implications for our state. Response and recovery to infectious animal disease outbreaks will be lengthy, and many producers may never be able to return to business. There will be many indirect effects on our economy. Rumors of an infectious animal disease outbreak could cause significant damage to the markets; as was evidenced in an incident in Kansas in 2003 where the mere rumor of a Foot and Mouth Disease outbreak cause the markets to plummet. Crop/plant pest infestations can cause widespread crop/plant loss and severe economic hardship on farmers and landowners and related businesses. Once infestation occurs, the pest may become endemic causing repeated losses in subsequent growing years. Loss of production will affect all related industries, such as fuel, food, synthetics, processors, etc.	
Historical Occurrence	Every year the Iowa Department of Agriculture and Land Stewardship (IDALS) conduct numerous animal disease investigations. In 2005, IDALS and USDA conducted 19 highly infectious disease investigations. Fortunately the investigation results are negative. IDALS, under the direction of the state plant regulatory official works with Iowa's universities and industries to conduct regular crop / plant pest surveillance. There have been no known instances of animal, plant, or crop disease in the City of Lisbon.	1
Probability	Disease/pests are present in many other areas of the country/world. Many disease/pests are easily transmitted therefore the probability of introduction is high. Iowa leads the nation in production of pork, soybeans, eggs, and corn and is among the leading beef production states.	2
Vulnerability	The movement of people, animals, animal products, wildlife, plants, crops and potential disease/pest vectors could all cause the introduction of diseases/pests. Diseases/pests could also be introduced naturally, for example by hurricanes or jet streams. Emerging disease is also a threat such as West Nile Virus, new more virulent influenza strains, etc. Because many diseases/pests are not present in Iowa, our populations of animals, crops, and plants have not immunity and are susceptible.	2

Maximum Threat	The impact will vary by disease/pest and the type of animal/crop/plant infected/infested. When the United Kingdom faced an outbreak of Foot and Mouth Disease in 2001, the total economic loss to that country exceeded $7 billion. This incident was one of the most economically significant historically, second only to World War II. The state of Michigan is currently dealing with an Emerald Ash Borer infestation. To date the state and federal governments have spent in excess of $550 million to detect, delimit, control and eradicate the pest. Should the disease/pest have public health implications, the economic and social impact would be even greater.	2
Severity of Impact	The severity will vary by disease/pest. The types of animals, crops, or plants affected will also significantly influence the severity.	1
Speed of Onset	If the diseases / pests are highly infectious (many animals that are infected with disease can be transmitting disease before they show clinical signs), by the time they are discovered, they will likely have spread across the state or nation. This will put us at a severe disadvantage during response and recovery.	3
Total		11

Bioterrorism

Classification	Description	Rating
Description	Use of biological agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits and moving sprayers. Biological agents may pose viable threats from hours to years depending upon the agent and the conditions in which it exits. Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infections can be spread via human or animal vectors. Argo-terrorism is the direct, generally covert contamination of food supplies or introduction of pests or disease agents to crops and livestock.	
Historical Occurrence	Iowa has not been immune to acts of terrorism or sabotage. The state has experienced many threats in the past. Most incidents have been limited to reported "suspect" powders, actual threats and hoaxes. Beginning in October 2001, following the original Anthrax scares, we experienced a large number of responses for suspicious powders. Following the development of a threat assessment/response protocol the number of responses was reduced, and now averages a few responses each month. The City of Lisbon has experienced no known or suspected incidents of biological terrorism.	1
Probability	Internationally, such acts have, unfortunately, become quite commonplace, as various religious, ethnic, and nationalistic groups have attempted to alter and dictate political and social agendas, seek revenge for perceived past wrongdoing, or intentionally disrupt the political, social, and economic infrastructure of individual businesses, units of government, or nations. Unfortunately, there will never be a way to totally eliminate all types of these clandestine activities. Persons inclined to cause death and destruction, are usually capable of finding a way to carry out their plans. As perpetrators of terrorism improve their ability to collect information, raise money and issue rhetoric, implementation of effective counter measures becomes even more important. Because Iowa serves as the breadbasket to the world, there is an increased risk to agro-terrorist activity.	1
Vulnerability	Innocent people are often victims of terrorist activity targeted at certain organizations and activities. Based on the method of delivery, the general public is vulnerable to bioterrorism. State and local agencies developed the Chemical, Biological, Radiological, Nuclear, and High Explosive (CBRNE) Threat Protocol Model to guide response agencies. The American public is not vaccinated for many of the agents used as weapons by Terrorist groups. Iowa vaccinated volunteers against smallpox at 15 hospitals in early 2003. The U.S. Postal Service installed Bio-Detection Systems (BDS) in 2005-2006 in several postal sorting facilities in Iowa, to address early detection since many of the threats have used the postal system for delivery.	1
Maximum Threat	Because of the characteristics of the weapons terrorists use, the area can be limited to a room, building, or the entire community. Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infections can be spread via human or animal vectors. Because of the variables described above, the geographic extent can become quite broad before the incident is recognized as a terrorist act.	2

Severity of Impact	A. The intent of the terrorist is to cause fear based on illness, injury, and death. A bioterrorism incident would likely result in illness at a minimum, with multiple deaths and long-term health problems as a worst-case. B. Responders may not initially be aware that they are responding to a biological incident and may not have the personal protective equipment necessary to protect them against the released agent. This could result in injuries, illness, and death among responders at a high rate as well. C. Indirect impacts would be felt, but chain of command could limit the impact. D. Limited direct impact in a biological incident. E. Critical services could be affected such as health care. Capability of health care services to diagnose and treat a biological agent may severely be limited in rural areas. Most services would be impacted by being overwhelmed. F. Biological agents could contaminate soil, air, and water resulting in loss of flora and fauna in the initial targeted area and eventually contaminated by transported biological agents. G. Economic impacts from an agro-terrorism incident would be far-reaching and severely damaging because of loss of production and long-term disruption of commodity flows. H. Widespread losses of crops would affect many contractual obligations related to commodity flows. I. Would be based on the adequacy of the response.	3
Speed of Onset	Acts of terrorism can be immediate and often come after little or no warning. There are occasions when terrorists have warned the targeted organization beforehand, but often the attack comes without previous threat. Terrorists threaten people and facilities through "bomb threats" and other scare tactics. Even if it is a shallow threat, precautions must be taken to ensure the safety of the people and property involved.	4
Total		**12**

Chemical Terrorism

Classification	Description	Rating
Description	Use or threat of chemical agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Liquid/aerosol, or dry contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions. Other dispersal methods may include intentional releases from petro-chemical facilities or intentional releases during rail or truck transportation. Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists. Contamination can be carried out of the initial target area by persons, vehicles, water and wind. Chemicals may be corrosive or otherwise damaging over time if not mitigated.	
Historical Occurrence	Iowa has not been immune to acts of terrorism or sabotage. The chemical terrorism history, fortunately, has been limited. The state has experienced at least one event in 2005, where a subject mailed "rat poison" to a number of state and local officials. One of the letters was torn open in a mail sorting machine in Des Moines, that lead to the closure of the Main Post Office and the Emergency Room of Mercy Medical Center. Iowa experienced at least one event where subjects broke into a city's water supply and it was suspected that chemicals may have been deposited in the water supply. Iowa experienced many releases of anhydrous ammonia by persons engaged in clandestine drug manufacturing. There have been no instances of chemical terrorism in or around the City of Lisbon.	1
Probability	Unfortunately, there will never be a way to totally eliminate all types of these clandestine activities. Persons inclined to cause death and destruction is usually capable of finding a way to carry out their plans. As perpetrators of terrorism improve their ability to collect information, raise money and issue rhetoric, implementation of effective counter measures becomes even more important.	1
Vulnerability	Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists. Shielding in the form of sheltering in place can protect people and property from harmful effects. There are a limited number of antidotes available to reduce the vulnerability from chemical agents.	2
Maximum Threat	Contamination can be carried out of the initial target area by persons, vehicles, water and wind. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. The extent is largely determined by the type of chemical, the method of dispersal, and the conditions at the time it is released.	2

Severity of Impact	A. Because the public may be the target of the attack, the terrorists will try to maximize injuries, illnesses, and deaths among the population. B. A highly trained and properly equipped response force would be well protected from harm from a chemical terrorism event. Recognizing the hazardous environment is not always possible in the early stages of the response. Responders may become victims if they do not recognize the hazardous environment. C. Evacuations would shut down most operations until an alternative operations site could be set up outside the effected area. This may take days to weeks and may be a degraded operation because of assets that are unable to be duplicated. D. A highly persistent chemical would not destroy property, facilities, or infrastructure, but would render the facility useless until the facility was decontaminated. E. Services will be compromised in the effected area. Services outside the effected area will also be compromised because assets will be called to respond to the effected area. F. Depending upon the chemicals used, soil, air, and water could be affected. Dilution, disbursement, and natural factors may lessen the impact over time depending upon the chemical's persistence. G. Economic impacts would vary depending upon the persistence of the chemical used and the time required for decontamination. H. No significant impacts known at this time. I. Timely and adequate response will minimize damage to the jurisdiction's reputation. Given today's environment, even a small chemical terrorism incident will receive national media attention.	3
Speed of Onset	Acts of terrorism can be immediate and often come after little or no warning. There are occasions where terrorists have warned the targeted organization beforehand, but often the attack comes without previous threat. Even if it is a shallow threat, precautions must be taken to ensure the safety of the people and property involved	4
Total		**13**

Communications Failure

Classification	Description	Rating
Description	The widespread breakdown or disruption of normal communication capabilities. This could include major telephone outages, loss of local government radio facilities, or long-term interruption of electronic broadcast services. Emergency 911, law enforcement, fire, emergency medical services, public works, and emergency warning systems are just a few of the vital services which rely on communication systems to effectively protect citizens. Business and industry rely heavily on various communication media as well. Mechanical failure, traffic accidents, power failure, line severance, and weather can affect communication systems and disrupt service. Disruptions and failures can range from localized and temporary to widespread and long-term. If switching stations are affected, outage could be more widespread.	
Historical Occurrence	No widespread communications failures have occurred in Iowa. Local incidents due to weather conditions, equipment failure, excavation incidents, and traffic accidents have been reported, but outages have usually been resolved in a timely manner.	1
Probability	Widespread communications losses are unlikely due to backup systems and redundant system designs. Local communications failures are likely to affect small areas of the county.	1
Vulnerability	Citizens of the community would be impacted only indirectly. Phone and data transmission could be impacted. Most communication systems that are highly necessary have backup and redundant designs to provide continuity of service.	1
Maximum Threat	Most communications failures would be limited to localized areas. In the event of a widespread communications failure, only portions of Iowa would be impacted, but this is highly unlikely due to the support of other jurisdictions and secondary communication devices.	1

Severity of Impact	A. A communications failure would not directly result in injuries or fatalities. B. If 911 systems were to fail due to phone communication disruption, secondary impacts could occur by the inability of citizens to alert responders of their needs. C. None directly. D. Inter-agency and intra-agency communications would be limited. Data transmission could also be affected. E. Financial losses would be incurred due to the direct damage to electronic equipment and the communication system infrastructure. F. Failed communications could result in malfunctioning systems and potential does exist for facilities to discharge hazardous materials into the environment. G. Most economic impacts would be felt on those sectors dependent upon the communication system. This could result in multi-sector far reaching impacts due to business disruption. H. None known. I. Widespread communication failures could moderately harm the reputation of the jurisdiction. If 911 systems are affected, the reputation damage could be more serious.	2
Speed of Onset	A communications failure would likely occur with little or no warning. It is usually impossible to predict a communications failure. Some communications may be shut down for a short while for improvements or maintenance. These disruptions are usually made during periods of low demand and those who rely on them are given previous notice that the system will be out of service.	4
Total		**10**

Conventional Terrorism

Classification	Description	Rating
Description	Use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Detonation of explosive device on or near target; delivery via person, vehicle, or projectile. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failures, etc. Conventional terrorism can also include tactical assault or sniping from remote locations.	
Historical Occurrence	Iowa has not been immune to acts of terrorism or sabotage. Law Enforcement agencies respond to barricaded subject calls and deliver high risk warrants against armed persons, with a few each year involving an exchange of gunfire. While statewide statistics are not easily found, the City of Des Moines averages one bomb threat investigation every 6.9 days, generally targeting government agencies and schools. The state experienced several major bombings during 1969 – 1970, which represented the most bombings per capita in the Continental U.S. During 1993 the Midwest Bank Bombers (Aryan Republic Army) struck in Des Moines, and West Des Moines, with investigative ties to the bombing in Oklahoma City. During 1999 Harry Barber terrorized Des Moines with different pipe bombings injuring one person. During the spring of 2002, 18 pipe bombs were found in mailboxes in five states stretching from Illinois to Texas, including Iowa. Six people were injured in the bombings in Iowa and Illinois. In 2005 and 2006, pipe bombs were used in attempted murder cases in Forest City and Altoona. There have been no known instances of conventional terrorism in the City of Lisbon.	1
Probability	Unfortunately, there will never be a way to totally eliminate all types of these clandestine activities. Persons inclined to cause death and destruction is usually capable of finding a way to carry out their plans. As perpetrators of terrorism improve their ability to collect information, raise money and issue rhetoric, implementation of effective counter measures becomes even more important.	1
Vulnerability	Energy decreases logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers/shielding; poor construction; and ease of concealment of device.	1
Maximum Threat	Extent of damage is determined by type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failure, etc.	1

Severity of Impact	A. As with an explosion or structural collapse, injuries and deaths are not uncommon especially in a terrorism incident where one of the intended acts is to harm people and property to cause fear among the population. B. Secondary devices have been used to intentionally harm the responders assisting victims of the initial attack. Injuries and deaths could also result from unstable structures, fire, etc. C. Operations will be minimally affected unless the target is a critical facility such as government buildings, emergency operations centers, communication hubs, etc. D. Property, facilities, and infrastructure can be severely impacted from a conventional terrorism incident. One of the intended results is damaged or destroyed property and infrastructure. E. Delivery of services will be moderately affected unless the target is a particular service. Other impacts could result from reallocation of resources to respond to the incident. F. Minimal impact on the environment unless the damaged or destroyed property, facility, or infrastructure contained a hazardous material and that material was released. G. Threats and scares have psychological impacts and disrupt activities at a cost to productivity. Damaged facilities disrupt productivity, but many times have difficulty reopening and may eliminate jobs in the area. H. No significant impacts known. I. Reputation of the entity will depend on a quality response to the incident.	2
Speed of Onset	Explosions are usually instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear.	4
Total		10

Cyber Terrorism

Classification	Description	Rating
Description	Electronic attack using one computer system against another in order to intimidate people or disrupt other systems. Cyber terrorism may last from minutes to days depending upon the type of intrusion, disruption, or infection. Generally, there are no direct effects on the built environment, but secondary effects may be felt depending upon the system being terrorized. Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.	
Historical Occurrence	Cyber-security and critical infrastructure protection are among the most important national security issues facing our country today, and they will only become more challenging in the years to come. Recent attacks on our infrastructure components have taught us that security has been a relatively low priority in the development of computer software and Internet systems. These attacks not only have disrupted electronic commerce, but also have had a debilitating effect on public confidence in the Internet. The City of Lisbon has never experienced an instance of cyber terrorism.	1
Probability	Security experts describe the threat as eminent. Intrusion detection systems log thousands of attempts in a single month. There are constant probes by individuals and groups with intent to cause anything from total system shutdown to simply "seeing if they can do it." The City of Lisbon has never experienced an instance of cyber probing.	2
Vulnerability	Security professionals argue that current approaches are inadequate. With companies increasingly using the Internet to connect to suppliers and customers, they say organizations place too much faith in technology to protect their data, and do not pay enough attention to security education and awareness. Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.	1
Maximum Threat	Our society is highly networked and interconnected. An attack could be launched from anywhere on earth and could cause impacts as small as a computer lab to as large as the world wide web.	1
Severity of Impact	A. No direct loss of life. Indirect injuries or deaths may result from secondary impacts to critical life sustaining sectors such as energy, water, etc. B. None directly. C. Severe impacts to continuity of operations could result if cyber attack reached critical operational systems or systems that were needed to carry out the operation. D. Generally, there are no direct effects on the built environment. E. Impacts can range from annoyance to complete shutdown of critical infrastructures due to infiltration of supervisory control and data acquisition (SCADA) systems. Secondary impacts could affect welfare of people and property by denying service or providing false readings. F. Only impacts would result if system was infiltrated and directed to malfunction by self	1

	destructing, overloading, etc. G. Because of the heavy reliance on the electronic transfer of economic and commercial information, the economy could be impacted because of communication difficulties. H. No significant impacts other than the possible elimination of electronic records of regulatory and contractual obligations. I. If exposed vulnerabilities were known and not reduced or eliminated before the attack, the entity would suffer major damage to their reputation for not taking action before the incident.	
Speed of Onset	Because of the networks (formal and informal) that exist to share intrusion attempts and impacts, warnings can be put out in advance to alert those in similar situations to take protective security recommendations such as updating virus detection software, making sure security patches are in place, etc. Warning times can range from no warning to days. Because of our highly evolved computer networks and data sharing, bugs, viruses, and worms can proliferate rapidly. Effects of hacking can be instantaneous.	4
Total		**10**

Energy Failure

[illegible]	Description	Rating
Description	An extended interruption of electric, petroleum or natural gas service, which could create a potential health problem for the population and possibly mass panic. International events could potentially affect supplies of energy-producing products, while local conditions could affect distribution of electricity, petroleum or natural gas. The magnitude and frequency of energy shortages are associated with international markets. Local and state events such as ice storms can disrupt transportation and distribution systems. If disruptions are long lasting, public shelters may need to be activated to provide shelter from either extreme cold or extreme heat. Stockpiles of energy products eliminate short disruptions, but can also increase the level of risk to the safety of people and property in proximity to the storage site.	
Historical Occurrence	The energy crisis of the 1970s had significant impacts on many consumers in Iowa. High inflation and unemployment were associated with the excessive dependence on foreign oil during the early and mid 1970s. An energy shortage of that magnitude has not affected Iowa in recent years.	1
Probability	Only when free market forces cease to provide for the health, welfare, and safety of the citizens, can governments take appropriate actions to limit the effects of an energy shortage. The state of Iowa has three strategies to limit the likelihood of an energy shortage. Through voluntary and mandatory demand reduction mechanisms; the substitution of alternative energy sources when possible; and state government programs to curtail excessive use, energy supply and demand can be kept in check. The federal government has a strategic petroleum reserve to supplement the fuel supply during energy emergencies. Shortages, especially electrical shortages, can be unpredictable with immediate effects. Natural events, human destruction, price escalation, and national security energy emergencies can cause unavoidable energy shortages.	1
Vulnerability	Because Iowa is almost entirely dependent on out-of-state resources for energy, Iowans must purchase oil, coal, and natural gas from outside sources. World and regional fuel disruptions are felt in Iowa. It is likely that increasing prices will occur as market mechanisms are used to manage supply disruptions. This will disproportionately affect the low-income population because of their lower purchasing power. Agricultural, industrial, and transportation sectors are also vulnerable to supply, consumption, and price fluctuations. In Iowa, petroleum represents 97% of transportation fuel. Individual consumers such as commuters are also vulnerable.	2
Maximum Threat	The effects of an energy shortage would be felt throughout the state. Because the distribution systems are very developed, local shortages can quickly be covered.	1
Severity of Impact	A. Injuries and fatalities would not be directly caused by an energy shortage. Injuries and fatalities could occur if energy was not available for heating during extreme cold periods or for cooling during extreme heat. B. None directly. C. Hospitals, shelters, emergency response vehicles and facilities, and other critical facilities would have priority during energy shortages. D. No direct damages. E. Effects could range from minor heating and air conditioning disruptions to transportation limitations all the way to civil unrest due to the high demand, low supply, and subsequent high price. F. None directly. G. Rotating blackouts, voluntary conservation measures, and possibly mandatory restrictions could be used to limit the severity of an energy shortage. Business disruption and increased cost of business would have far-reaching financial implications across many sectors of the economy.	3

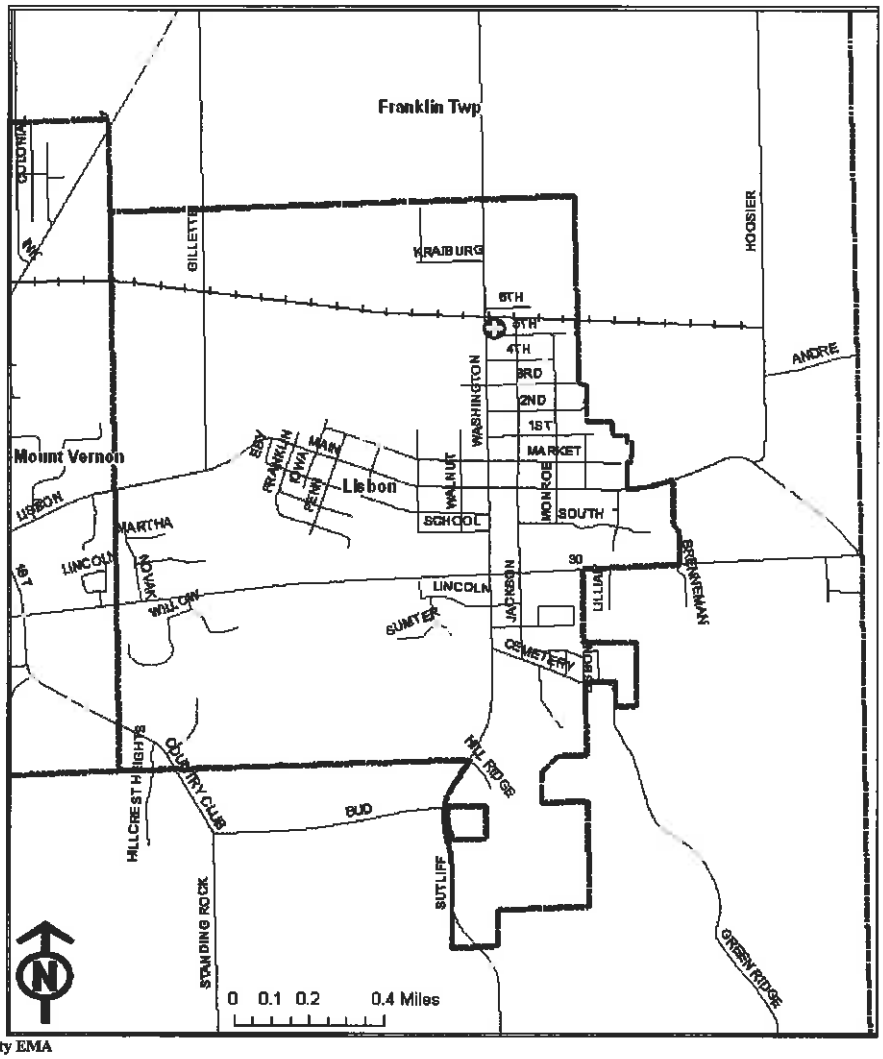
	H. None known. I. Reputation could be harmed if the reason for the shortage or failure could have been avoided by good planning. If caused by natural events, there would be no significant impact unless the response to the outage was poor.	
Speed of Onset	The Iowa Department of Natural Resources Energy Bureau monitors domestic and international energy situations and has developed a plan to deal with an energy crisis. Signs that an energy shortage may be developing can be recognized even months in advance, but energy shortages/emergencies can rise suddenly and unexpectedly. Supply distribution problems in other countries and local weather situations can lead to low supply coupled with high demand in a matter of a day or two.	4
Total		**12**

Fixed Hazardous Materials

Classification	Description	Rating
Description	Accidental release of chemical substances or mixtures that presents danger to the public health or safety during production or handling at a fixed facility. A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. Chemicals are manufactured and used in ever increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incidents generally affect a localized area and the use of planning and zoning can minimize the area of impact.	
Historical Occurrence	During the period 2002-2005, fixed facilities experienced 1,888 incidents according to the Iowa Department Natural Resources. Fixed facility incidents accounted for about 60% of total incidents. (Note: the number of responses to drug-related operations has also risen sharply in the state.) There have been no recorded hazardous material (HAZMAT) events in the City of Lisbon nor have there been any reported deaths due to HAZMAT events to this date.	1
Probability	There are 2,728 sites in Iowa that because of the volume or toxicity of the materials on site are designated as Tier Two facilities under the Superfund Amendments and Reauthorization Act. Despite increasing safeguards, more and more potentially hazardous materials are being used in commercial, agricultural, and domestic activities. There are 172 facilities located throughout Linn County that are required to file Tier II reports. Of those facilities 94 have reported that they are storing EPA/SARA Title III, Extremely Hazardous Substances (EHS). There is 1 facilities located in or near the City of Lisbon that are required to file Tier II reports. Of those facilities none are reported that they are storing EPA/SARA Title III, Extremely Hazardous Substances (EHS). The map below shows the facilities.	1
Vulnerability	A hazardous materials accident can occur almost anywhere, so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to facilities producing, storing, or transporting hazardous substances are at higher risk. Populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated food and water. Facilities are required to have an off-site consequence plan that addresses the population of the surrounding area. Responding personnel are required to be trained to HAZMAT Operations Level to respond to the scene, and those personnel that come into direct contact with the substances released are required to have HAZMAT Technician level training.	1
Maximum Threat	Most of the hazardous materials incidents are localized and are quickly contained or stabilized by the highly trained fire departments and hazardous materials teams. Depending on the characteristic of the hazardous material or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. Many times, additional regions outside the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as a river, lake, or aquifer.	1

Severity of Impact	A. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Some chemicals may cause painful and damaging burns to skin if they come in direct contact with your body. The amount and types of EHS chemical stored presents minimal risk to the health and safety of the residents of Lisbon. B. Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the general public exposed to the toxic materials. Proper training and equipment greatly reduce the risk to response personnel. C. None directly unless the incident occurs on or near critical facilities or services. D. Damage is usually limited to the immediate property involved. Proper decontamination is needed before the facilities go back in service. E. Contaminated water resources may be unsafe and unusable, depending on the amount of contaminant. F. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time. G. Loss of livestock and crops may lead to economic hardships within the community. H. None known. I. Safe and timely response will greatly limit any damage to the jurisdiction's reputation. Proper warning and public information before, during, and after the incident can also limit reputation damage.	1
Speed of Onset	When managed properly under regulations, hazardous materials pose little risk. However, when handled improperly or in the event of an accident, hazardous materials can pose a significant risk to the population. Hazardous materials incidents usually occur very rapidly with little or no warning. Even if reported immediately, people in the area of the release have very little time to be warned and evacuated. During some events, sheltering in-place is the best alternative to evacuation because the material has already affected the area and there is no time to evacuate safely. Public address systems, television, radio, and the NOAA Weather Alert Radios are used to disseminate emergency messages about hazardous materials incidents.	4
Total		**9**

Below is a map of the City of Lisbon with the facility that files a Tier II report and could affect the City. There are no facilities in the City that store EPA/EHS substances on site.



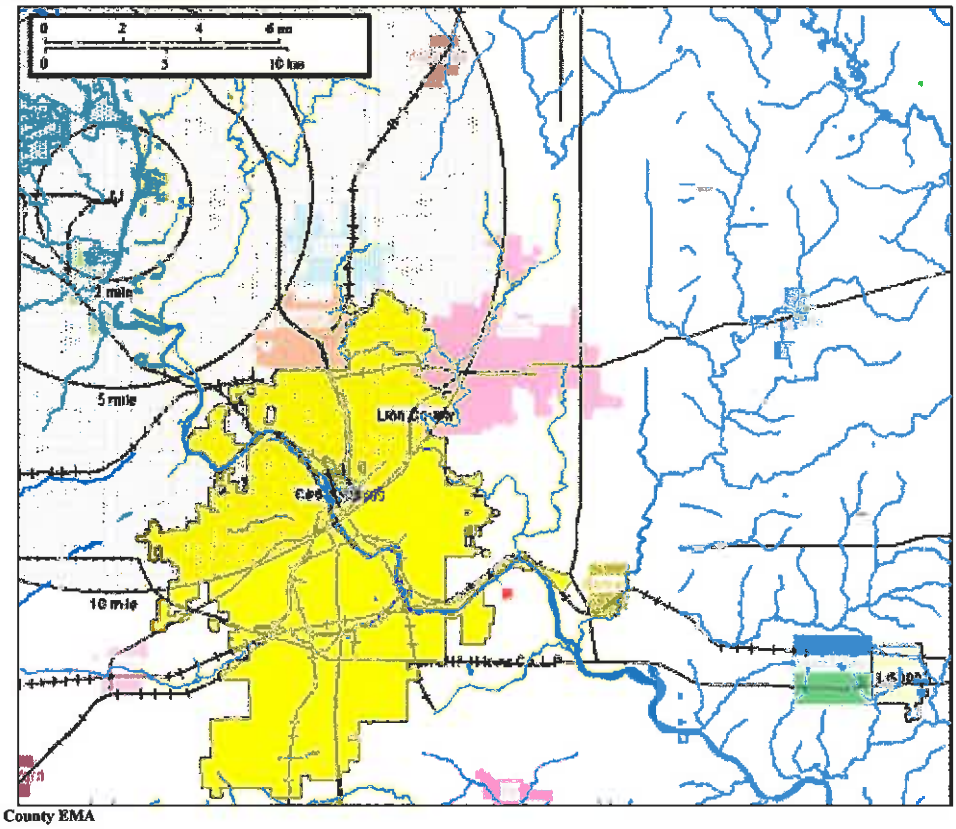
Source: Linn County EMA

Fixed Radiological Incident

Classification	Description	Rating
Description	An incident resulting in a release of radiological material at a fixed facility to include power plants, hospitals, laboratories and the like. Although the term "nuclear accident" has no strict technical definition, it generally refers to events involving the release of significant levels of radiation. Most commercial nuclear reactors in the United States were developed in the mid-1960s and are designed to withstand aircraft attack. Therefore, they should withstand most natural hazards even though they may not have been specifically designed for those forces.	
Historical Occurrence	Historically there has never been a release of radiation off site that has exceeded EPA Protective Action Guidelines in the United States.	1
Probability	Iowa has one nuclear power plant located within its borders. Duane Arnold Energy Center (DAEC) is located near Palo in Linn County. Three other nuclear facilities border Iowa. Facilities are located across the Missouri River north of Omaha, NE, and south of Nebraska City, NE. Across the Mississippi River is the Quad Cities Nuclear Power Plant. Operators of facilities that use radioactive materials and transporters of radioactive waste are trained in the packaging, handling, and shipment of the radioactive waste; and, since they are closely regulated by State and Federal regulations, the likelihood of an incident is remote.	1
Vulnerability	Sources of radioactive materials include medical products, industrial products, nuclear power plant fuel, nuclear weapons, and radioactive waste from hospitals, laboratories, nuclear reactors, and military facilities. The City of Lisbon is located approximately 23 miles south east of DAEC and is outside the 10 mile Emergency Planning Zone.	1
Maximum	In 50 years of nuclear power production in the U.S., no deaths or injuries from radiation	1

Threat	have been recorded among the general public. The City of Lisbon is located approximately 23 miles south east of DAEC and is outside the 10 mile Emergency Planning Zone.	
Severity of Impact	A. Depending on the level of exposure, radiation can cause loss of life and long and short term health effects. Time, distance, and shielding minimize radiation exposure to the body. Nuclear radiation above normal levels could be a health and safety consideration because of its ability to damage human cells biologically. B. Specialized training is needed to respond to these types of incidents. If inadequately trained personnel attempt to respond, the impacts could be the same as those for the general public exposed to the toxic materials. Proper training and equipment greatly reduce the risk to response personnel. C. None directly. D. Property damage can result from contamination and disruption of business because of evacuations. E. Power plants may be taken off line for extended periods of time. Other impacts would be indirect and only if in the contaminated area. F. Damage to the environment can be very long-lasting depending on the half-life of the products involved. Land, water, and air would be affected. The land and water would have to be isolated until treated or product deteriorated to an acceptable level. G. If the land and facilities cannot be used for weeks, months, or even years, the loss of production would be devastating. Economic impacts would be multi-sector and long-lasting, especially in and around the affected region. H. Indemnification would be a vital issue to address. Because of the ownership of the facility by the private sector, the courts would have to address all of the diverse issues related to damages direct and indirect. I. Reputation of the entity can be very damaging because of the high profile of these events. The negative impact can be felt for decades following a contamination.	2
Speed of Onset	Ionizing radiation cannot be detected with human senses. Detection instruments are needed to indicate the existence of radiation. Distance from the incident would dictate the amount of time needed to avoid exposure from damaging radiation. Scenarios that have been developed show that there will be a buildup of problems that will lead to any potential release and there are extensive warning systems in the DAEC EPZ.	1
Total		**7**

Below is a map of the DAEC EPZ that shows the City of Lisbon, the pale yellow square in the south east portion of the map, in relation to DAEC. The City of Lisbon is over twenty three miles from DAEC.



Source: Linn County EMA

Human Disease Incident

Classification	Description	Rating
Description	A medical, health, or sanitation threat to the general public (such as contamination, epidemics, plagues, and insect infestation). Public health action to control infectious diseases in the 21st century is based on the 19th century discovery of microorganisms as the cause of many serious diseases (e.g., cholera and TB). Disease control has resulted from improvements in sanitation and hygiene, the discovery of antibiotics, and the implementation of universal childhood vaccination programs. Scientific and technologic advances have played a major role in each of these areas and are the foundation for today's disease surveillance and control systems. Scientific findings also have contributed to a new understanding of the evolving relation between humans and microbes. As of January 1, 2000, a total of 60 infectious diseases were designated as notifiable at the national level. A notifiable disease is one for which regular, frequent, and timely information regarding individual cases is considered necessary for the prevention and control of the disease.	
Historical Occurrence	The Iowa Department of Public Health tracks epidemiological statistics in Iowa. Their data indicate no major incidents of diseases that have high percentages of loss of life or severe illness in the last 25 years.	1
Probability	Public health agencies work to protect Iowans from infectious diseases and preserve the health and safety of Iowans through disease surveillance, investigation of suspect outbreaks, education and consultation to county, local, public health agencies	1
Vulnerability	Public health agencies also work to reduce the impact of communicable diseases in Iowa and to eliminate the morbidity associated with these diseases. Programs guide community-based prevention planning, monitor current infectious disease trends, prevent transmission of infectious diseases, provide early detection and treatment for infected persons, and ensure access to health care for refugees in Iowa. While vaccines are available for many diseases, Iowans remain vulnerable to other diseases known and unknown.	1
Maximum Threat	Because of our highly mobile society, these diseases can move rapidly across the state and across the nation within days, weeks, or months.	2

Severity of Impact	A. Many of the diseases on the national notification list result in serious illness if not death. Some diseases are treatable, and with others only the symptoms are treatable. B. Doctors, nurses, paramedics, and emergency medical technicians are vulnerable to contagious diseases. Universal precautions can greatly diminish the transfer rate and risk to responders to human disease. C. Minor. D. None. E. Limited impact on critical services. Healthcare services may be at the limits of capacity. F. No direct impact. G. No direct impact, but large outbreaks may warrant travel advisories to the area and will impact the tourism and general commerce in the area. H. None known. I. Adequate disease prevention programs and response to the outbreak can limit the damage to the jurisdiction's reputation.	2
Speed of Onset	The private practitioner is the first line of defense and will undoubtedly be the first to witness the symptoms of human disease incidents. The Iowa Department of Public Health and the U.S. Centers for Disease Control monitor reports submitted by doctors, hospitals, and labs to identify patterns. The Department and CDC are proactive in providing information to the health care community on medical concerns. Conditions related to scope and magnitude can escalate quickly and area resources can be drained of personnel, medications, and vaccinations rather quickly.	3
Total		**10**

Human Disease Pandemic

Classification	Description	Rating
Description	Pandemic refers to a microbe that has the ability to spread across the world. The word, 'pandemic', means that a disease has caused illness in a person on nearly every continent. Many diseases throughout the history of the world have been pandemic. Examples are HIV/AIDS/Influenza. A pandemic will have wide spread economic and societal implications for our state. Response and recovery to a pandemic will likely be lengthy.	
Historical Occurrence	From 1900-2009, there have been 5 influenza pandemics. The latest was the 2009 H1N1 influenza. The most recent prior to the H1N1 pandemic was the Hong Cong Flu in 1968. In 2003 there were 80 new HIV patients and 76 new AID's patients in Iowa.	1
Probability	Public health agencies work to protect Iowans from infectious diseases and preserve the health and safety of Iowans through disease surveillance, investigation of suspect outbreaks, education and consultation to county, local and public/private health agencies. The last influenza pandemic in the US was in 2009, historically pandemics occur every 30 years, and prior to the H1N1 pandemic it was 41 years since the last incident. The H1N1 pandemic had little affect on the City of Lisbon.	1
Vulnerability	Influenza (flu) happens every year in nearly every country in the world. It spreads through a population for a few months and then will disappear or will move onto another country. Influenza usually occurs in the fall and winter months. Typically people who usually become ill are the elderly, the very young and people with chronic medical conditions and high risk behaviors. The individuals that travel internationally and have high exposure to potential vectors of disease are the most susceptible. Greater than 20% of Iowa's population is considered high risk.	1
Maximum Threat	Because of our highly mobile society, these diseases can move rapidly across the state and across the nation within days, weeks, or months.	4
Severity of Impact	A. Historically pandemics result in serious illness if not death. Some are treatable, other only symptoms are treatable. B. Doctors, nurses, paramedics, and emergency medical technicians are vulnerable to contagious diseases. Universal precautions can greatly diminish the transfer rate and risk to responders to human disease. C. Potential for severe or complete disruption. D. None. E. Healthcare & essential services infrastructure impact - human resource personnel infrastructure. F. Potential impact to essential environmental service personnel. G. Large outbreaks may warrant travel advisories to the area and will impact the tourism and general commerce in the area. High number of ill human resources across the board. H. None known. I. None known.	4

Speed of Onset	If the disease is highly infectious by the time it is discovered, it will likely have already spread across the state or nation. This will put us at a severe disadvantage during response and recovery.	1
Total		**12**

Pipeline Transportation Incident

Classification	Description	Rating
Description	A pipeline transportation incident would be a break in a pipeline creating a potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. Iowa is served by many high pressure pipelines to residents and industries. An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small slow leak that is not ignited to a large rupture in which the gas is ignited. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those in proximity to the pipelines.	
Historical Occurrence	According to the Iowa Utilities Board, 186 pipeline accidents, incidents, or service outages were reported between 2000 and 2005, resulting in a total of 29 injuries and 6 fatalities. There have been no Pipeline Transportation Incidents in the City of Lisbon.	1
Probability	The vast majority of pipeline incidents that occur are caused by third-party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations. With development occurring at an unprecedented rate and the ground becoming more and more congested with utilities, the probability of an underground pipeline incident occurring somewhere in the state is significant. Petroleum and natural gas pipeline accidents occur with some regularity, but they usually have a limited impact and are quickly and adequately handled by pipeline company emergency crews and local and state responders. Pipeline operators are required to coordinate all safety preparedness and response activities with the communities. Planning, training, and exercising of emergency procedures with all involved parties help to limit the occurrence and severity of incidents.	2
Vulnerability	About 5 interstate pipelines operate in the state under federal pipeline jurisdiction. There are many high-pressure gas mains throughout the state which supply residential and industrial users. People and property with pipelines on their land or nearby are the most at risk. People excavating earth near a pipeline are also at risk. Whether the greater hazard is posed to those upwind or downwind from a site depends on the product spilled, for example - natural gas is lighter than air. Private homes and business served by natural gas have smaller diameter pipelines connected to their structure. The underground pipelines cross public streets, roads, and highways as well as streams. Iowa's natural environment is also vulnerable to contamination from an underground pipeline incident. There is one interstate pipeline that runs north of the City of Lisbon. There are no homes within a half mile of the pipeline, resulting in minimal risk to the City.	2
Maximum Threat	Though often overlooked, petroleum and natural gas pipelines pose a real threat in the community. Most incidents affect only the area directly above or near the damaged pipeline. Depending on the size of pipeline and amount of product released, the extent of impact could be several hundred feet in diameter. Large areas may need to be evacuated to remove people from the threat of fire, explosion, or exposure. Pipelines have automatic shutoff valves installed so that damaged sections can be isolated and the volume of product escaping can be limited. Identification and caution signs are posted wherever pipelines pass under roads, streams, fence lines, or at any aboveground utilities.	2
Severity of Impact	A. All petroleum liquids pose dangers from fire or explosion and the fire may produce poisonous or irritating gasses. Toxic fumes and direct contact can cause health hazards. Vapor clouds can travel a distance and settle in low-lying areas where the fumes may overcome people and animals. Released products should be treated as any other hazardous material. Large areas may need to be evacuated to remove people from the threat of fire, explosion, or exposure. B. Specialized training is required to work around the pipeline because of hazardous materials, potential high pressure liquids and gases, and trench rescue techniques. C. Services that depend on the product moving through the pipeline may be impacted if they do not have an auxiliary source. D. Petroleum and natural gas pipelines can leak or erupt and cause property damage, environmental contamination, injuries, and even loss of life. Accidents may be caused by internal or external corrosion, defective welds, incorrect operation, outside damage, or other defective pipeline or equipment. The explosion can damage adjacent properties. E. A break in water pipelines may impact fire protection. Petroleum products will not be delivered or will be delivered in limited quantity. F. Impacts to the area result from saturating the soil with hazardous materials and/or causing rapid erosion. G. These evacuations potentially save lives and limit injury, but they also disrupt	3

	businesses and inconvenience residents. H. None known. I. A well informed public before, during, and after an incident will greatly reduce the impact to the jurisdiction's reputation.	
Speed of Onset	A pipeline incident may occur suddenly, but sight, sound, and smell can alert individuals that there may have been damage done to a pipeline in the area. Products may bubble up from the ground or collect in low-lying areas, a roaring or hissing noise may be heard, and most products give off a distinct odor. These warning signs can alert individuals not to use any devices that may act as ignition sources and cause a fire or explosion.	4
Total		**14**

Public Disorder

Classification	Description	Rating
Description	Mass demonstrations or direct conflict by large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes. People assembled together in a manner to substantially interfere with public peace constitute a threat, by use of unlawful force or violence against another person, causing property damage; or attempting to interfere with, disrupting, or destroying the government, political subdivision, or group of people. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target group or institution. Most events are within the capacity of local law enforcement.	
Historical Occurrence	Large-scale civil disturbances rarely occur; but when they do, they are usually an offshoot or result of one or more of the following events: 1) labor disputes in which there is a high degree of animosity between the participating parties; 2) high profile/controversial laws or other governmental actions; 3) resources shortages caused by a catastrophic event; 4) disagreements between special interest groups over a particular issue or cause; or 5) a perceived unjust death or injury to a person held in high esteem or regard by a particular segment of society. There have been numerous labor disputes and protests in Iowa, but these have remained fairly nonviolent. Other non-peaceful incidents have occurred in the state, but were within the response capabilities of local law enforcement. There have been no known violent incidents of public disorder in the City of Lisbon.	1
Probability	Although destructive civil disturbances are rare, the potential is always there for an incident to occur. This is even more true today, where television, radio, and the internet provide the ability to instantly broadcast information (factual or not), in real time, to the entire community. Oftentimes, that coverage helps to spread the incident to other, uninvolved or unaffected areas, exacerbating an already difficult situation. This also allows insightful people, previously not involved, to participate in the disturbance for no other reason than to riot, loot, burn, and destruct. Alcohol is often involved in public disorder, especially related to college campuses, sporting events, and concerts.	1
Vulnerability	Civil disturbances are often difficult for local communities to handle. There is a fine line between the Constitutional right of individuals and groups to assemble and air their grievances and the overall needs of the community to provide essential services, ensure personal safety of citizens, prevent property damage, and facilitate normal commerce. Fortunately, most demonstrations and large public gatherings are held in a peaceful, responsible manner. However, there never seems to be a shortage of groups (drugs and alcohol are often involved) whose primary objective is to disrupt normal activities and perhaps even cause injury and property damage. People at risk are mainly the willing participants and law enforcement officials. Innocent bystanders and their property can be at risk as well.	1
Maximum Threat	The social rage that causes civil unrest often comes from racism, poverty, lack of economic opportunity, and unemployment. Events usually affect a localized area of the community. Often times only a couple of blocks or streets are affected. The local government units are left to pick up the pieces in the aftermath, cleaning up the area, reestablishing services, repairing or replacing damaged public facilities and infrastructure, and trying to restore some level of citizen and private investor confidence in the community.	1
Severity of Impact	Civil unrest often results in injuries, deaths, and property damage. Perhaps even more tragic has been the lingering, negative impact and loss of investment in the communities ravaged by the uprisings. Many riot areas do not fully recover from the damage, destruction, and negative image brought on by such events. Looting, burning, and sniping can occur during severe civil disturbances. Fires can sometimes burn uncontrolled because firefighters and equipment are unable to respond due to resistance from rioters.	1
Speed of Onset	Events that incite such activity can build up over hours, days, or years, and the violent disturbance is a culmination of the long-term situation. Civil disruptions can also escalate very rapidly following events where people are gathered such as sporting events, concerts, or speeches.	3

Total		8

Radiological Terrorism

Classification	Description	Rating
Description	The use of radiological materials against a person or persons in order to bestow fear upon a larger group of people with the ultimate goal of creating coercion to achieve a specific political or religious agenda. It is the strategic use of intimidation, threats, and pressure in order to cause disruption to an opposing system, and align that system with that of a specific group or organization. Radioactive materials can be dispersed using sprayers/aerosol generators, or by point of line sources such as munitions, covert deposits and moving sprayers.	
Historical Occurrence	There are no known instances of nuclear terrorism in the state of Iowa.	1
Probability	With no prior events by which to judge probability, it becomes necessary to consider the technical feasibility of radiological terrorism. There are two types of radiological threat. The first is the threat from a device which would produce a nuclear detonation. Given the sophistication and that the radiation would kill anyone before they could amass enough material to produce a weapon, this threat is relatively low and it is the decision of the planning committee that this is not a threat is so low that it will not be considered. The second threat is from a device designed to disperse radioactive material with the use of a conventional explosive. This type of device could be easily produced and the material is moderately difficult to obtain. However the damage from this type of device is primarily from the conventional explosive and shrapnel. The radiological damage from this type of device would be negligible. The threat from this type of device is also low for the City of Lisbon.	1
Vulnerability	The type of isotope, route of exposure, duration of exposure, distance from the source of radiation, and the amount of shielding between source and target determine exposure to radiation.	1
Maximum Threat	Initial effects will be localized to site of attack. Damage from this type of device is primarily from the conventional explosive and shrapnel. The radiological damage from this type of device would be negligible; however the discovery of slightly elevated radiation levels would incite hysteria amongst the uninformed public.	1
Severity of Impact	A. The primary threat from a radiological dispersion device is from the conventional explosive and shrapnel. The radiological damage from this type of device would be negligible; however the discovery of slightly elevated radiation levels would incite hysteria amongst the uninformed public. B. First responders, not being aware of the radioactive elements involved, could become contaminated with small amounts of radiation. C. See conventional terrorism. D. See conventional terrorism. E. See conventional terrorism. F. Depending on the isotope involved there would be little risk to the environment. G. See conventional terrorism. H. See conventional terrorism. I. See conventional terrorism. Additionally the discovery of slightly elevated radiation levels would incite hysteria amongst the uninformed public.	1
Speed of Onset	Acts of terrorism can be immediate and often come after little or no warning. There are occasions where terrorists have warned the targeted organization beforehand, but often the attack comes without previous threat. Even if it is a shallow threat, precautions must be taken to ensure the safety of the people and property involved. With radiation, the initial release may not be identified for a period of time until symptoms become apparent.	4
Total		9

Radiological Transportation Accidents

Classification	Description	Rating
Description	An incident resulting in a release of radioactive material during transportation. The transportation of radioactive material by all means of transport is regulated by the federal government.	
Historical Occurrence	Since 1990, hundreds of shipments have been made through Iowa. There have been no occurrences of radiological transportation incidents in the United States.	1
Probability	Transportation accidents are the most common type of incident involving radioactive materials because of the sheer number of radioactive shipments. Operators of facilities that use radioactive materials and transporters of radioactive waste are trained in the packaging,	1

	handling, and shipment of the radioactive waste; and, since they are closely regulated by a variety of federal, state, and local organizations, the likelihood of an incident is remote.	
Vulnerability	The danger to the public is less than a wide array of other hazardous materials. Those working with or near sources of radiation are at a greater risk than the general citizens of the state. Those responding to a radiological incident should be trained in recognizing a radiological incident and minimizing exposure to radioactive materials.	1
Maximum Threat	Other than a transportation incident involving large amounts of high-level radioactive materials, radiation exposure will be limited to much localized areas.	1
Severity of Impact	A. Time, distance, and shielding minimize radiation exposure to the body. Nuclear radiation above normal levels could be a health and safety consideration because of its ability to damage human cells biologically as well as its long-lasting effect on the environment. B. Despite the frequency of shipments, there have been no known serious nuclear radiation exposures resulting from transportation accidents. C. None Directly D. Depending on the level of exposure, radiation can cause loss of life, long and short-term health effects, and property damage from contamination. E. Disruption in evacuated areas F. Long lasting impacts on the environment from radiological fallout could include soil, air, and water contamination. G. Disruption of business because of potential evacuations. H. Indemnification would be a vital issue to address, because of the ownership of the facility by the private sector. The courts would address damages. I. Reputation of the entity can be very damaging because of the high profile of these events. The negative impact could be felt for decades following a contamination.	2
Speed of Onset	A radiological incident in Iowa could result from an incident in handling or transporting radioactive materials. This accident could occur with little or no warning. Ionizing radiation cannot be detected with human senses. Detection instruments are needed to indicate the existence of radiation. Distance from the incident would dictate the amount of time needed to avoid exposure from damaging radiation.	4
Total		**10**

Rail Transportation Incident

Classification	Description	Rating
Description	A derailment or a train accident which directly threatens life or property, or which adversely impacts a community's capabilities to provide emergency services. Railway incidents may include derailments, collisions, and highway/rail crossing incidents. Train incidents can result from a variety of causes. Human error, mechanical failure, faulty signals, and problems with the track can all lead to railway incidents. Results of an incident can be range from minor "track hops" to catastrophic hazardous materials incidents and even passenger casualties. With the many miles of track in Iowa, there are numerous at-grade crossings at which vehicles must cross the railroad tracks.	
Historical Occurrence	From January 1985 to June 2010, there have been 2948 documented rail incidents in Iowa. There have been 2,948 injuries, 215 deaths, and 1,076 injuries related to these incidents. During the same time period there have been 169 rail accidents resulting in 5 deaths and 40 injuries in Linn County. There have been no known railway incidents in or near the City of Lisbon along the Union Pacific (UP) rail line.	1
Probability	There are 7,900 railroad crossings in Iowa. The miles of railroad track in the state, combined with the large number of street and highway crossings, makes the probability of a highway/rail collision significant statewide. Derailments are also possible, while a major derailment would occur less frequently. The UP operates 1,752 miles of track in Iowa and has one spur that runs through the City of Lisbon. This line averages 107.1 million tons of cargo hauled each year. There are four street crossings over this line. Due to the historic information available for the area near the City of Lisbon there is a low probability of a railway accident happening.	1
Vulnerability	People and property in close proximity to the railway lines, crossings, sidings, switching stations, and loading/unloading points are most at risk. Those away from railroad tracks and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved.	1
Maximum Threat	Numerous railways crisscross Iowa. Vehicle/train collisions are usually limited to areas in and near intersections. Rarely, the incident will result in widespread effects. The direct area of impact is usually quite small, but depending on the products and materials involved, the area could become extensive. If hazardous materials are involved, the effects could reach areas up to 1.5 miles from the scene. Harmful products may contaminate streams, rivers, water distribution systems, and storm water systems. If this occurs, a large portion of the	1

	community could be affected. The ability of response agencies to contain the product on-scene usually limits the area affected.	
Severity of Impact	A. Deaths and injuries can range from those directly involved, to citizens in the community affected by hazardous materials. Depending on the materials involved, evacuations may occur, moving residents away from dangerous products and the possibility of explosion. B. If hazardous materials are involved, (see transportation hazmat incident). Railroad officials have specially trained personnel and equipment to respond to rail incidents. C. No significant impacts. D. Damage may be limited to the train, railcars, and cargo involved, but it could also include rail infrastructure and adjacent properties. E. Rail transportation routes may be out of commission until the accident is cleaned up and the infrastructure repaired. Cargo will be delayed significantly and services that depend on the rail line. F. Gases, liquids, and solids can contaminate air, soil, and water in and near the incident scene. G. Impacts include loss of production, business disruption due to evacuations, and business disruptions of those served by the railroad. Business and traffic disruptions could last several days until the clean-up efforts are complete. H. None known. I. Most communities with rail routes in them are familiar with the level of rail traffic, but they may not be familiar with the cargo that may be transported on them. Most are not aware of the significant risk that hazardous materials pose to the community. Education, public information, and a timely and effective response will determine the impact to the jurisdiction's reputation.	2
Speed of Onset	Like other transportation incidents, a railway incident would occur with no warning. There may be a limited amount of time to warn those in the pathway of the harmful effects.	4
Total		10

Below are rail transportation incidents by year for the State of Iowa and Linn County.

Statewide			
Year	Accident	Killed	Injuries
1985	165	11	53
1986	135	9	54
1987	162	14	46
1988	167	10	69
1989	168	10	64
1990	189	5	69
1991	172	11	73
1992	127	7	55
1993	137	15	46
1994	159	19	56
1995	123	9	67
1996	123	8	38
1997	106	12	55
1998	104	3	30
1999	99	10	28
2000	109	6	31
2001	110	16	35
2002	69	4	28
2003	65	3	21
2004	81	5	25
2005	77	6	32
2006	69	6	20

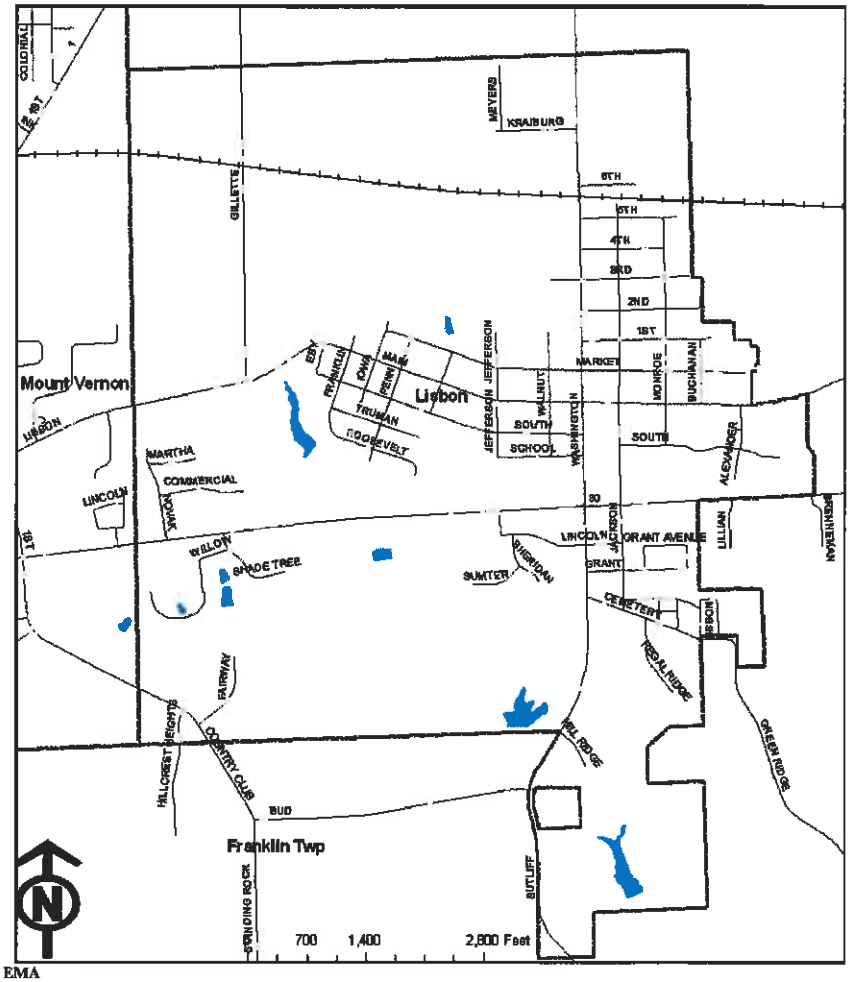
Linn County			
Year	Accident	Killed	Injuries
1985	6	0	0
1986	8	0	2
1987	10	0	0
1988	15	0	7
1989	7	1	2
1990	10	0	2
1991	5	0	0
1992	16	1	5
1993	7	1	4
1994	8	0	2
1995	9	0	1
1996	4	0	0
1997	6	0	3
1998	9	0	1
1999	5	0	1
2000	5	0	1
2001	4	2	0
2002	6	0	2
2003	0	0	0
2004	4	0	1
2005	1	0	0
2006	5	0	2

2007	82	7	27
2008	72	5	25
2009	52	4	19
2010	26	0	10
Total	**2948**	**215**	**1076**

2007	7	0	0
2008	6	0	2
2009	4	0	2
2010	2	0	0
Total	**169**	**5**	**40**

Source: Federal Railroad Administration

Below is a map showing the UP line and how it interacts with the roadways in the City of Mount Vernon.



Source: Linn County EMA

Roadway Transportation Incident

Classification	Description	Rating
Description	A single or multi-vehicle incident which results in property damage and/or death(s)/injury(s). An extensive surface transportation network exists in Iowa. Local residents, travelers, business, and industry rely on this network on a daily basis. Thousands of trips a day are made on the streets, roads, highways, and interstates in the state. If the designed capacity of the roadway is exceeded, the potential for a major roadway incident increases. Weather conditions play a major factor in the ability of traffic to flow safely in and through the state as does the time of day (rush hour) and day of week. Incidents involving buses and other high-occupancy vehicles could trigger a response that exceeds the normal day-to-day capabilities of response agencies.	

Historical Occurrence	Traffic accidents are not an uncommon occurrence in the City of Lisbon. According to the Iowa DOT, from 2004-2008 there have been approximately 3 accidents with major injuries and 13 with minor injuries in or near the City of Lisbon with none resulting in fatalities.	4
Probability	Although traffic engineering, inspection of traffic facilities, land use management of areas adjacent to roads and highways, and the readiness of local response agencies have increased, roadway incidents continue to occur. As the volume of traffic on the state's streets, highways, and interstates increases, the number of traffic accidents will likely also increase. The combination of large numbers of people on the road, wildlife, unpredictable weather conditions, potential mechanical problems, and human error always leaves open the potential for a transportation accident.	4
Vulnerability	Those who use the surface transportation system are most vulnerable. Travelers, truckers, delivery personnel, and commuters are at risk at all times that they are on the road. During rush hours and holidays the number of people on the road in Iowa is significantly higher. This is also true before and after major gatherings such as sporting events, concerts, and conventions. Pedestrians and citizens of the community are less vulnerable but still not immune from the impacts of a roadway incident.	1
Maximum Threat	Iowa is crisscrossed by thousands of miles of roads, highways, and interstates. Roadway incidents are usually contained to areas on the roadway or directly adjacent to the roadway. Very few highway incidents affect areas outside the traveled portion of the road and the right-of-way. Extensive segments of the transportation system can be impacted during significant weather events, such as a large snowstorm, when multiple separate accidents occur. The area of impact can extend beyond the localized area if the vehicle(s) involved transporting hazardous materials.	1
Severity of Impact	A. Roadway incidents threaten the health and lives of people in the vehicles, pedestrians, and citizens of the community if hazardous materials are involved. Mass casualty events can occur if mass transit vehicles are involved. Community bus lines, metro transit buses, and school buses have a good safety record, but accidents can and do occur. Numerous injuries are a very real possibility in situations involving mass transit vehicles B. Response personnel are certainly not immune to traffic accidents. Because of the number of hours that law enforcement are on the road, they have a higher risk than do other response personnel. C. No significant. D. Property damage would be limited to vehicles and cargo involved; roads, bridges, and other infrastructure; utilities such as light and power poles; and third party property adjacent to the accident scene such as buildings and yards. E. No significant impacts. There may be short term localized impacts if utility poles are affected and the like. F. Fuel and other fluids can be spilled from the affected vehicles and affect the environment. If hazardous materials hauling vehicles are involved, the impact could be much greater. Thousands of gallons or pounds of product can be released to the environment if the container is damaged. G. No significant impact other than business disruption of those in the affected area. H. None known. I. Unfortunately, these incidents occur very frequently and are not a significant impact on the reputation of the jurisdiction.	1
Speed of Onset	There is usually no warning of roadway incidents. During snow storms and other weather events that may impede travel, travelers, response agencies, and hospitals alike can be notified of hazardous travel conditions.	4
Total		**15**

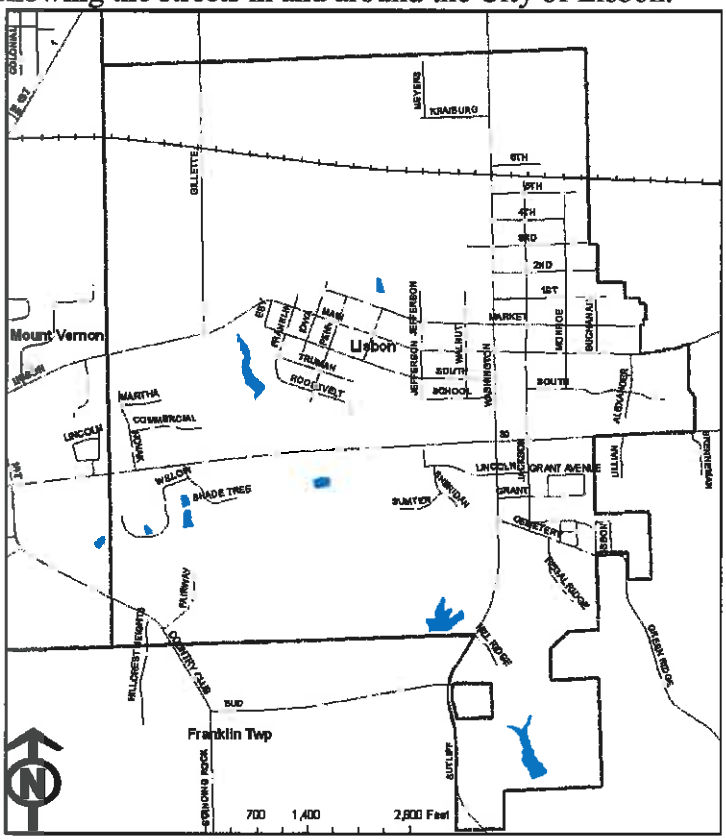
Roadway Accidents Resulting in Deaths or Injuries reported in or near **Lisbon, Iowa** between **01/01/2004** and **01/01/2008.**

Roadway Accident Cause	Number of Accidents with Major Injuries	Number of Accidents with Minor Injuries
DUI	1	1

Inattentive Driver	0	0
Older Driver	0	1
Speed	1	7
Inexperienced Driver	1	3
Weather	0	1
TOTAL:	3	13

Source: IA DOT

Below is a map showing the streets in and around the City of Lisbon.



Source: Linn County EMA

Structural Failure

Classification	Description	Rating
Description	The collapse (part or all) of any public or private structure including roads, bridges, towers, and buildings. A road, bridge, or building may collapse due to the failure of the structural components or because the structure was overloaded. Natural events such as heavy snow may cause a roof of a building to collapse under the weight of the snow. Heavy rains and flooding can undercut and washout a road or bridge. The age of the structure is sometimes independent of the cause of the failure. Enforcement of building codes can better guarantee that structures are designed to hold up under normal conditions. Routine inspection of older structures may alert inspectors to "weak" points. The level of damage and severity of the failure is dependent on factors such as the size of the building or bridge, the number of occupants of the building, the time of day, day of week, amount of traffic on the road or bridge, and the type and amount of products stored in the structure.	
Historical Occurrence	There have been several sporadic structural failures across the state. They have included homes, commercial structures, and communications towers. There have been no known instances of structural failure in the City of Lisbon.	1

Probability	Civil structures may fail in a variety of modes. The unprecedented growth in technology has resulted in a host of problems related to complex structures, special materials, and severe operational and environmental loads, such as fire, flood waters, excessive vibrations, explosion, and high-energy piping failures. With the possible exception of misuse, accidental or environmental loads, the causes of failure may be found in deficiencies of design, detailing, material, workmanship, or inspection. With the aging structures in the country along with problems with new materials discussed above, structural failures will continue to occur. Efforts to inspect and maintain these structures will lessen the probability of a failure, but not guarantee that it will not happen in the future. Internal weaknesses can be hidden from inspectors and not be realized until it is too late.	1
Vulnerability	There are many buildings in Iowa that are very old or which may become hazardous in the event of a fire, high winds, or other natural events. All bridges are vulnerable to the effects of the elements and the deterioration that results. Increases in the amount and weight of traffic they are expected to support increase their vulnerability to failure.	1
Maximum Threat	The impacts of the failed structure would be contained to the immediate area and adjacent properties. This could be as small as the house and yard of a fallen chimney, or the area could be relatively extensive if the structure that failed was a multi-story building of a downtown high-rise or a tall communication tower. Dam and levee failures would affect a much larger area and are discussed as separate hazards.	1
Severity of Impact	A. Personal injury, death, and property damage may occur in the collapse itself or by falling debris from nearby structures. B. Response personnel could limit their risk through proper training and equipment. Structural collapse rescue is a specialized form of rescue and can result in injury or death to responders. C. Functional purpose of the building would be terminated or suspended until the integrity of the structure could be restored. D. Impacts could range from minor disruption to full destruction of the structure. Structures that could be impacted would range from private homes and businesses to government facilities to transportation infrastructure. E. Bridge failures and debris in the streets and sidewalks would interrupt normal routes of travel. Utilities may be cut off to surrounding areas and communication transmissions may be lost for a period of time. F. No severe impact to the environment unless the structural failure released a hazardous substance that could contaminate the air, water, or soil. G. There would also be a considerable price tag to replace or fix the structure, not to mention the loss of revenue that would occur because the structure could not be used. H. Failure during construction can be the liability of the contractor or the owner. This would depend upon the contract for construction and at which time the property ownership is transferred. Code development and enforcement can play a significant role in limiting the impact from structural failures in the jurisdiction. I. If the structural collapse could have been averted or limited in any way by code enforcement, the reputation could suffer from public outcry.	2
Speed of Onset	The actual failure of the structure would likely occur suddenly with little or no warning. There are several events that could lead up to the failure, and these have various warning times and are discussed in separate hazard worksheets. Casual hazards can include fire, explosion, overloading of ice and snow, vibration, flooding, high wind, erosion, chemical corrosion, subsidence, and lack of general upkeep.	4
Total		**10**

Structural Fire

Classification	Description	Rating
Description	An uncontrolled fire in populated area that threatens life and property and is beyond normal day-to-day response capabilities. Structural fires present a far greater threat to life and property and the potential for much larger economic losses. Modern fire codes and fire suppression requirements in new construction and building renovations, coupled with improved fire fighting equipment, training, and techniques, lessen the chance and impact of a major urban fire. Most structural fires occur in residential structures, but the occurrence of a fire in a commercial or industrial facility could affect more people and pose a greater threat to those near the fire or fighting the fire because of the volume or type of the material involved.	
Historical Occurrence	Structural fires are not uncommon in the City of Lisbon yet nearly all are quickly extinguished by on-site personnel or local fire departments.	1
Probability	Much of the fire prevention efforts have gone into nonresidential fires and the results have been highly effective. Even with an increase in the prevention efforts in residential fires, both residential and nonresidential fires can still occur. During colder months, clogged chimneys and faulty furnaces and fire places can increase the probability of structural fires.	2

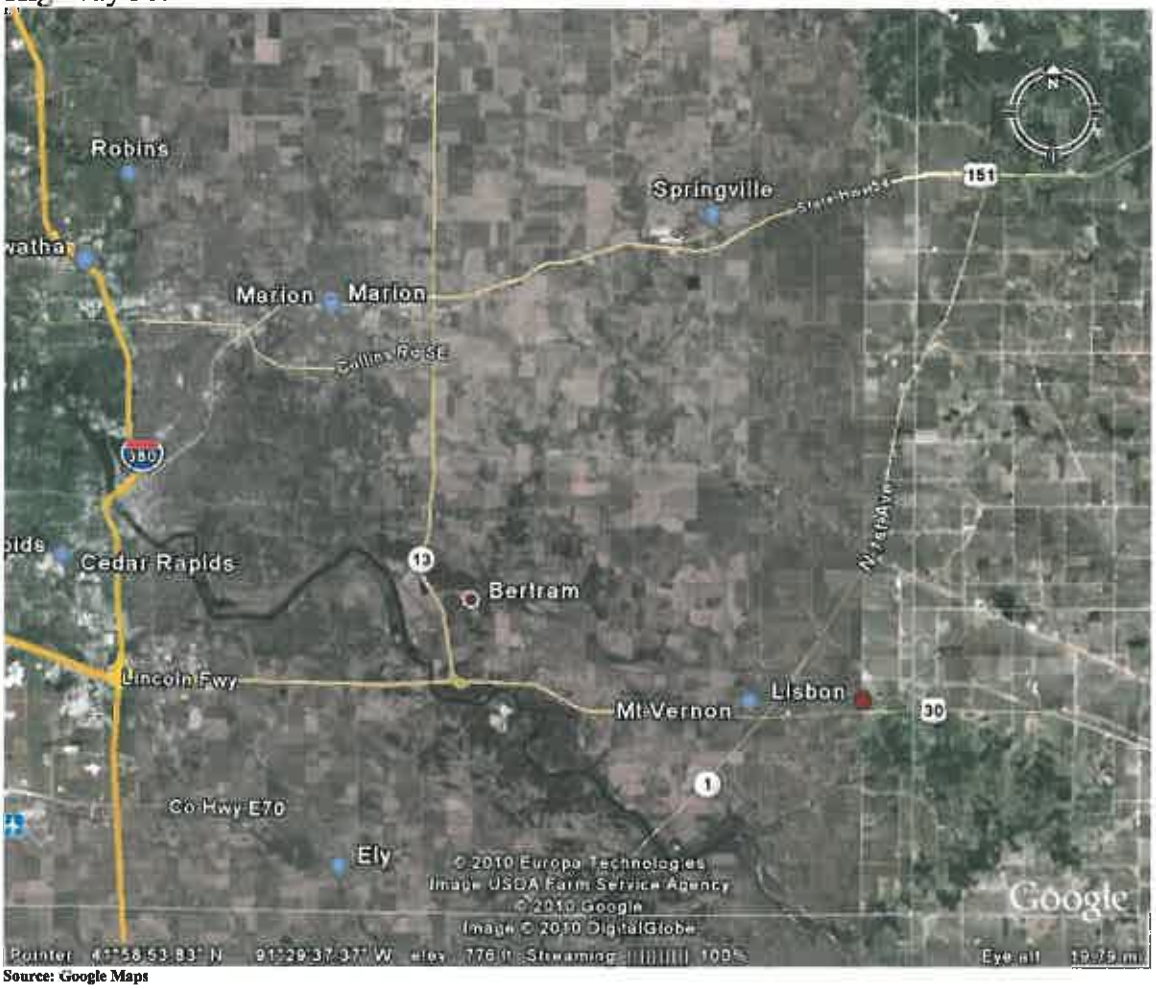
Vulnerability	Older structures with outdated electrical systems not built to current fire codes are particularly vulnerable to fire. Combustible building materials obviously are more vulnerable than structures constructed of steel or concrete. Structures without early detection devices are more likely to be completely destroyed before containment by response agencies. Structures in areas served by older, smaller, or otherwise inadequate water distribution infrastructure such as water mains and hydrants are also at significant risk. Problems vary from region to region, often because of climate, poverty, education, and demographics. The fire death risk for the elderly and children under 5 years of age is more than two times that of the average population.	1
Maximum Threat	With modern training, equipment, fire detection devices, and building regulations and inspections, most fires can be quickly contained and limited to the immediate structure involved. Certain circumstances, such as the involvement of highly combustible materials or high winds, can threaten a larger area. The age and density of a particular neighborhood can also make it more vulnerable to fire due to the spreading of fire from neighboring structures.	1
Severity of Impact	A. Based on national averages in the 1990s, there is one death for every 119 residential structure fires and one injury for every 22 residential fires, in nonresidential fires there is one death for every 917 fires and one injury for each 52 fires. Statistically, in 1999 Iowa had 15 fire-related deaths per million people. (According to best available information, data is unchanged.) B. In the US, about 100 firefighters die each year in duty-related incidents. (According to best available information, data is unchanged.) C. Only in rare cases would a structural fire affect continuity of operations. These cases could be fire at a critical facility, data storage areas, communications, infrastructure, etc. D. On average, each residential fire causes nearly $11,000 of damage. Each nonresidential fire causes an average of $20,000 in damage. (According to best available information, data is unchanged.) E. Fires can affect critical services such as electrical energy. F. No significant impacts. G. Localized impacts. H. No significant impact known. I. Structural fires are common occurrences hence little damage is done to reputations.	
Speed of Onset	While fires usually start with little or no warning time, alert devices can allow time for responders to contain the fire and allow occupants to evacuate the area.	4
Total		**9**

Transportation Hazardous Material Incident

Classification	Description	Rating
Description	An accidental release of chemical substances or mixtures that present a danger to public health or safety as a result of transportation. A hazardous substance is one that may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced and transported across the county via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incidents generally affect a localized area, and the use of planning and zoning can minimize the area of impact.	
Historical Occurrence	According to the PHMSA Office of Hazardous Materials Safety there have been 200 incidents involving the transportation of hazardous materials in Iowa between 2000 and 2010. There have been no known incidents involving the transportation of hazardous materials in or affecting the City of Lisbon.	1
Probability	Large quantities of hazardous materials are transported daily on Iowa streets, highways, interstates, and railways. Roadways are a common site for the release of hazardous materials. Railways are another source for hazardous materials releases. The Department of Transportation regulates routes and speed limits used by carriers and monitor the types of hazardous materials crossing state lines. Despite increasing safeguards, more and more potentially hazardous materials are being used in commercial, agricultural, and domestic uses and are being transported on Iowa roads and railways. The City of Lisbon is approximately 14 miles east of I-380, 8 miles east of highway 151 and highway 30 runs through the city. There are many hazardous chemicals transported on these routes daily.	2
Vulnerability	A hazardous materials incident can occur almost anywhere, so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to transportation corridors and populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance	1

	released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated food and water.	
Maximum Threat	Most of the hazardous materials incidents are localized and are quickly contained or stabilized by the highly trained fire departments and hazardous materials teams. Depending on the characteristic of the hazardous material or the volume of product involved, the affected area can be as small as a room in a building or as large as 5 square miles or more. Many times, additional regions outside the immediately affected area are evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as a river, lake, or aquifer.	1
Severity of Impact	A. During calendar year 2004, 5 incidents resulted in $125,000 of damage in the State of Iowa. There have been no known incidents affecting the City of Lisbon. Immediate dangers from hazardous materials include fires and explosions. B. The release of some toxic gases may cause immediate death, disablement, or sickness if absorbed through the skin, injected, ingested, or inhaled. Some chemicals cause painful and damaging burns if they come in direct contact with skin. C. The occurrence of a hazmat incident many times shuts down transportation corridors for hours at a time while the scene is stabilized, the product is off-loaded, and reloaded on a replacement container. D. Damage may be limited to the cargo liner, and cargo involved, but it could also include highway, interstate, or street infrastructure, and adjacent properties. E. Contaminated water resources may be unsafe and unusable, depending on the amount of contaminant. F. Contamination of air, ground, or water may result in harm to fish, wildlife, livestock, and crops. The release of hazardous materials into the environment may cause debilitation, disease, or birth defects over a long period of time. G. Loss of livestock and crops may lead to economic hardships within the community. H. Transportation of hazardous materials is regulated by the Department of Transportation. However, if a release of hazardous materials were to take place, then the Department of Natural Resources becomes the regulatory and managing agency. I. Although citizens are aware of the shipping industry, they may not be as aware of the dangers that some of their cargo may pose. Most are not aware of the significant risk that hazardous materials pose to the community. Education, public information, and a timely and effective response will determine the impact to the jurisdiction's reputation.	3
Speed of Onset	When managed properly under current regulations, hazardous materials pose little risk. However, when handled improperly or in the event of an accident, hazardous materials can pose a significant risk to the population. Hazardous materials incidents usually occur very rapidly with little or no warning. Even if reported immediately, people in the area of the release have very little time to be warned and evacuated. During some events, sheltering in-place is the best alternative to evacuation because the material has already affected the area and there is no time to evacuate safely. Public address systems, television, radio, and the NOAA Weather Alert Radios are used to disseminate emergency messages about hazardous materials incidents.	4
Total		**12**

Below is a map showing the City of Lisbon in reference to I-380, Highway 151, and Highway 30.



Source: Google Maps

Human Caused/Combination Hazards

The human caused or combination hazards have been rated below and ordered in accordance to their effects to the City of Lisbon.

Hazard	Rating
Human Caused/Combined Hazards	
Roadway Transportation Incident	15
Pipeline Transportation Incident	14
Chemical Terrorism	13
Transportation Hazardous Materials Incident	12
Energy Failure	12
Human Disease Pandemic	12
Bioterrorism	12
Animal/Plant/Crop Disease	11
Conventional Terrorism	10
Structural Failure	10

Rail Transportation	10
Communications Failure	10
Human Disease Incident	10
Radiological Transportation	10
Cyber Terrorism	10
Structural Fire	9
Radiological Terrorism	9
Fixed Hazardous Materials	9
Agro-Terrorism	9
Public Disorder	8
Fixed Radiological Incident	7
Waterway Incident	n/a
Air Transportation	n/a
Enemy Attack	n/a

Composite Scoring

The Iowa HSEMD has provided communities with a Cascading Event Matrix. This matrix analyzes each hazard and how each hazard has the potential to cause and affect other hazards. The worst credible scenarios were used and the secondary hazard was counted if the hazard was possible under those scenarios. The composite score is derived from: the event's Hazard Worksheet Score; the number of hazards that can be caused by the event; and the number of hazards that can trigger the event. Based on the matrix scores and the scoring process for the risk assessment, each of the hazards the City of Lisbon could face was given a composite score. These are listed below in accordance to their effects to the City of Lisbon based on the hazard worksheet score.

Hazard	Hazard Worksheet Score	Number Caused	Number Resulting From	Composite Score
Thunderstorm and Lightning	19	0	8	27
Hailstorms	18	1	3	22
Severe Winter Storms	16	0	7	23
Roadway Transportation Incident	15	8	2	25
Drought	15	1	5	21
Flash Flood	14	2	8	24
Tornadoes	14	1	9	24
Pipeline Transportation Incident	14	4	5	23
Extreme Heat	14	0	2	16
Chemical Terrorism	13	0	2	15
Transportation Hazardous Materials Incident	12	10	2	24
Energy Failure	12	11	1	24
Human Disease Pandemic	12	0	2	14
Bioterrorism	12	0	2	14
Windstorms	11	2	7	20
Animal/Plant/Crop Disease	11	2	2	15
Conventional Terrorism	10	0	7	17
Structural Failure	10	9	1	20

Rail Transportation	10	10	1	21
Communications Failure	10	10	2	22
Human Disease Incident	10	6	1	17
Cyber Terrorism	10	0	1	11
Structural Fire	9	6	2	17
Radiological Terrorism	9	0	1	10
Fixed Hazardous Materials	9	6	2	17
Agro-Terrorism	9	0	2	11
Radiological Transportation	9	10	2	21
Public Disorder	8	8	4	20
Fixed Radiological Incident	7	4	1	12

The composite score is important as it shows how one hazard can quickly lead to a larger, more disastrous event. When examining the above table, Thunderstorms, Roadway Transportation Incidents, Flash Floods, Tornadoes, Pipeline Transportation Incidents, and Transportation Hazardous Materials Incidents received the highest composite scores. This occurrence is due to the fact that so many other events can result from these types of incidents. These are examples of how cascading events can result in exponential consequences and are used to drive the overall priority the community places on each hazard.

VULNERABILITY ASSESSMENT

Asset Inventory

In order to identify the most appropriate mitigation techniques and projects, the City determined to identify the assets in the community. The following table lists community assets that would be affected in the event of a large hazard that could affect the entire community. These hazards include: thunderstorms, tornadoes, drought, hailstorms, extreme heat, severe winter storms, and windstorms. In these events the entire City is in the hazard area.

Type of Structure (Occupancy Class)	Number of Structures			Value of Structures			Number of People		
	# in Community	# in Hazard Area	% in Hazard Area	$ in Community	$ in Hazard Area	% in Hazard Area	# in Community	# in Hazard Area	% in Hazard Area
Residential	757	757	100	93,819,754	93,819,754	100	1,895	1,895	100
Commercial	77	77	100	11,393,237	11,393,237	100	-	-	-
Industrial	7	7	100	1,908,950	1,908,950	100	-	-	-
Education	3	3	100	20,077,332	20,077,332	100	-	-	-
Agricultural	7	7	100	3,011,005	3,011,005	100	3	3	100
Religious/Non-profit	7	7	100	1,132,922	1,132,922	100	-	-	-
Government	7	7	100	5,389,087	5,389,087	100	-	-	-
Total	865	865	100	136,732,287	136,732,287	100	1,898	1,898	100

Vulnerability Assessment

Below is the vulnerability assessment of all of the hazards, both natural and human caused or combination hazards, listed according to their effects to the City of Lisbon.

1. Thunderstorm and Lightning

These result from atmospheric imbalance and turbulence caused by: (1) the rapid rising of unstable warm air into the atmosphere, (2) a sufficient amount of moisture to form clouds and produce rain, and (3) the collision of separate weather fronts (warm and cold) creating an upward lift of air currents. These conditions may result in thunderstorms, heavy rains (which may cause flash flooding), and strong winds reaching or exceeding 58 mph resulting in tornadoes, or surface hail of at least 0.75 inches in diameter. When the water rises to between 15,000 and 25,000 feet above sea level, it begins a chemical process to turn the water into ice. This process creates a build up of positive and negative charges that produce a buildup of electricity that releases towards the earth in 50-yard sections called ladders that are searching for a source of conduction. When a suitable source is located, the connection is made creating a circuit. When the circuit is complete, the charge is then transferred from the cloud where it was formed, to the site in the ground where the circuit was made. A lightning bolt can approach a temperature of 50,000 degrees Fahrenheit at the site of impact in a split second. This rapid heating, expansion, and cooling of air near the lightning bolts create thunder. Thunderstorms are common in Iowa and can occur singly, in clusters, or in lines. Most thunderstorms produce only thunder, lightning, and rain. Severe storms, however, can produce tornadoes, high straight-line winds above 58 mph, microbursts, lightning, hailstorms, and flooding. High straight-line winds, which can often exceed 60 mph, are common occurrences and are often mistaken for tornadoes. Lightning occurs with all thunderstorms even if the buildup of electricity isn't strong enough to send a bolt to the ground.

At least 8,099 severe thunderstorm, high wind, or lightning events have impacted Iowa from 1985-2010. Because thunderstorms may occur singly, in clusters, or in lines, it is possible that several thunderstorms may affect an area in the course of a few hours. It is likely that more than the 6,698 individual severe storm systems occurred in the state. One system may spawn multiple events. A number of these thunderstorms have caused other hazards such as flash flooding, river flooding, and tornadoes. There have been 30 Presidential Declarations of Major Disaster since 1968 related to severe storms. There have been 242 severe thunderstorms, high wind, or lightning events that have affected Linn County from 1985-2010. In that time the City of Lisbon has been directly affected by one thunderstorm and high wind events that have resulted in no damage. Based on historical averages Linn County has a 10% chance of experiencing a severe thunderstorm, high wind, or lightning event in a given year.

Those in unprotected areas, mobile homes, or automobiles during a storm are at risk. Sudden strong winds often accompany a severe thunderstorm and may blow across roads and down trees and power lines. Lightning presents the greatest immediate danger to people and livestock during a thunderstorm. It is the second most frequent weather-related killer in the U.S., with nearly 100 deaths and 500 injuries each year. (Floods and flash floods are the number one cause of weather related deaths in the U.S.) Livestock

and people who are outdoors, especially under a tree or other natural lightning rods, in or on water, or on or near hilltops are at risk from lightning.

It is possible that in the event of a thunderstorm, the entire community could be vulnerable. In that event a total of 865 structures, 1,898 persons would be affected, and buildings worth a total of $136,732,287 could be damaged. Using the asset inventory information for the entire town of Lisbon listed above, estimates can be made as to the cost of such an event.

At the time of the 2000 Census there were 25 mobile homes in the City with an average total value of $2,337,500. Using the average persons per household there are approximately 65 persons living in mobile homes in the City.

Within the City there exists groups that may be even more vulnerable to thunderstorm events, specifically elderly and disabled who may not be able to reach safety. According to the 2000 Census, there were a total of 194 people over the age of 65 (representing 9.8% of the population). In addition, there were a total of 203 people with disabilities in the City. Of these 71 were over the age of 65 and 132 were younger than 65. In addition, there were 157 children under the age of 5.

2. Hailstorms

Hail is produced by many strong thunderstorms. Strong rising currents of air within a storm carry water droplets to a height where freezing occurs. Ice particles grow in size until they are too heavy to be supported by the updraft. Hail can be smaller than a pea or as large as a softball and can be very destructive to plants and crops. Pets and livestock are particularly vulnerable to hail.

Data on probability and frequency of occurrence of hailstorms is limited, but research indicates that any given point in Iowa can expect on average two to three hailstorms in a year, according to the IA HSEMD.

From 1985-2010 Iowa experienced 8,485 hailstorms. From 1950-2008, Linn County experienced 135 hailstorms causing 5.8 million dollars in property damage and 109 thousand dollars in crop damage. During that time period the City of Lisbon experienced two hailstorms that caused three thousand dollars in crop damage.

As with thunderstorms and tornadoes, the entire community would be vulnerable to a hailstorm. In that event a total of 865 structures, 1,898 persons would be affected, and buildings worth a total of $136,732,287 could be damaged. Using the asset inventory information for the entire town of Lisbon listed above, estimates can be made as to the cost of such an event.

Again, within the City there exist groups that may be even more vulnerable to thunderstorm events, specifically elderly and disabled who may not be able to reach safety. According to the 2000 Census, there were a total of 194 people over the age of 65 (representing 9.8% of the population). In addition, there were a total of 203 people with

disabilities in the City. Of these 71 were over the age of 65 and 132 were younger than 65. In addition, there were 157 children under the age of 5.

3. Severe Winter Storms

Severe winter weather conditions can affect day-to-day activities. These can include blizzard conditions, heavy snow, blowing snow, freezing rain, heavy sleet, and extreme cold. Winter storms are common during the months of October through April. The various types of extreme winter weather cause considerable damage. Heavy snows cause immobilized transportation systems, downed trees and power lines, collapsed buildings, and loss of livestock and wildlife. Blizzard conditions are winter storms which last at least three hours with sustained wind speeds of 35 mph or more, reduced visibility of 1/4 mile or less, and whiteout conditions. Heavy snows of more than 6 inches in a 12-hour period or freezing rain greater than 1/4 inch accumulation causing hazardous conditions in the community can slow or stop the flow of vital supplies as well as disrupt emergency and medical services. Loose snow begins to drift when the wind speed reaches 9 to 10 mph under freezing conditions. The potential for some drifting is substantially higher in open country than in urban areas where buildings, trees, and other features obstruct the wind. Ice storms result in fallen trees, broken tree limbs, downed power lines and utility poles, fallen communications towers, and impassable transportation routes. Severe ice storms have caused total electric power losses over large areas of Iowa and rendered assistance unavailable to those in need due to impassable roads. Frigid temperatures and wind chills are dangerous to people, particularly the elderly and the very young. Dangers include frostbite or hypothermia. Water pipes, livestock, fish and wildlife, and pets are also at risk from extreme cold and severe winter weather.

Hazardous driving conditions due to snow and ice on highways and bridges lead to many traffic accidents. The leading cause of death during winter storms is transportation accidents. About 70% of winter-related deaths occur in automobiles and about 25% are people caught outdoors in the storm. The majority of these are males over 40 years of age. Emergency services such as police, fire, and ambulance are unable to respond due to road conditions. Emergency needs of remote or isolated residents for food or fuel, as well as for feed, water, and shelter for livestock are unable to be met. People, pets, and livestock are also susceptible to frostbite and hypothermia during winter storms. Those at risk are primarily either engaged in outdoor activity (shoveling snow, digging out vehicles, or assisting stranded motorists) or are the elderly or very young. Schools often close during extreme cold or heavy snow conditions to protect the safety of children and bus drivers. Citizens' use of kerosene heaters and other alternative forms of heating may create other hazards such as structural fires and carbon monoxide poisoning.

Winter storms regularly move easterly and use both the southward plunge of arctic cold air from Canada and the northward flow of moisture from the Gulf of Mexico to produce heavy snow and sometimes blizzard conditions in Iowa and other parts of the Midwest. Cold temperatures, strong winds, and heavy precipitation are the ingredients of winter storms. Most counties can usually expect 2 or 3 winter storms a season, with an extreme storm every 3 to 5 years on average (more in the northwest, fewer in the southeast). A snowfall of six inches or more from one storm only occurs in 49% of Iowa winters, while

a large winter storm event of 10 inches or more will occur about once every 3 years. There were 120 severe winter storms reported in Linn County from 1985-2010 with seven being Presidential Declarations of Major Disasters.

As with thunderstorms and tornadoes, the entire community would be vulnerable to a hailstorm. In that event a total of 865 structures, 1,898 persons would be affected, and buildings worth a total of $136,732,287 could be damaged. Using the asset inventory information for the entire town of Lisbon listed above, estimates can be made as to the cost of such an event.

Again, within the City there exist groups that may be even more vulnerable to thunderstorm events, specifically elderly and disabled who may not be able to reach safety. According to the 2000 Census, there were a total of 194 people over the age of 65 (representing 9.8% of the population). In addition, there were a total of 203 people with disabilities in the City. Of these 71 were over the age of 65 and 132 were younger than 65. In addition, there were 157 children under the age of 5.

4. Roadway Transportation Incident

A roadway transportation incident is a single or multi-vehicle incident which results in property damage and/or death(s)/injury(s). An extensive surface transportation network exists in Iowa. Local residents, travelers, business, and industry rely on this network on a daily basis. Thousands of trips a day are made on the streets, roads, highways, and interstates in the state. If the designed capacity of the roadway is exceeded, the potential for a major roadway incident increases. Weather conditions play a major factor in the ability of traffic to flow safely in and through the state, as does the time of day (rush hour) and day of week. Incidents involving buses and other high-occupancy vehicles could trigger a response that exceeds the normal day-to-day capabilities of response agencies.

Traffic accidents are not an uncommon occurrence in the City of Lisbon. According to the Iowa DOT, there have been 3 accidents from 2004-2008 in or near the City of Lisbon with major injuries and 13 with minor injuries, none resulting in fatalities. Extensive segments of the transportation system can be impacted during significant weather events, such as a large snowstorm, when multiple separate accidents occur. Those who use the surface transportation system are most vulnerable. Travelers, truckers, delivery personnel, and commuters are at risk at all times that they are on the road. Pedestrians and citizens of the community are less vulnerable but still not immune from the impacts of a roadway incident.

Population and structures that could be affected by a roadway incident would not extend beyond those directly involved in the incident and are considered to be limited. The worst case for a residential structure would be $93,500 in damage to the structure itself. In addition, worst case for a commercial site would cost approximately $147,964 and a public facility would cost approximately $769,869. These values assume a total loss based on the average value of each type of facility.

Drought

There are three types of drought conditions that are relevant to Iowa:

1. meteorological drought, which refers to precipitation deficiency;
2. hydrological drought, which refers to declining surface water and groundwater supplies; and
3. agricultural drought, which refers to soil moisture deficiencies.

Droughts can be spotty or widespread and last from weeks to a period of years. A prolonged drought can have serious economic impact on a community. Increased demand for water and electricity may result in shortages of resources. Moreover, food shortages may occur if agricultural production is damaged or destroyed by a loss of crops or livestock. While droughts are generally associated with extreme heat, droughts can and do occur during cooler months. Drought is part of normal climate fluctuations. Climatic variability can bring dry conditions to the region for up to years at a time. Research and observations of the El Nino/La Nina climatic events are resulting in more predictable climatic forecasts. According to historical averages, there is an 15% chance of drought conditions within the next year.

Those dependent on rain would be the most vulnerable to a drought. This means that agriculture, agribusiness, and consumers (if the drought lasted long enough or impacted a large area) would be impacted. A drought limits the ability to produce goods and provide services. Because citizens draw their drinking water from surface water and groundwater sources, a prolonged severe drought may impact all citizens if there were to be a dramatic drop in the stream flow coupled with the drop in the water table. Fire suppression can also become a problem due to the dryness of the vegetation and possible lack of water.

A drought would likely affect most of Iowa if not the Midwest as a whole. Because of the dependence on precipitation and water, the agricultural community would be impacted the most. The agricultural areas would be most adversely impacted, but the entire state would likely feel at least some impact. According to the National Climatic Data Center, Iowa has had 21 periods of drought from 1985-2010. During this time frame there was $645.15 million in property damages, and $2.1 billion in crop damage that resulted from drought periods. There were nine drought events reported in Linn County from 1950-2010 causing $1 billion in crop damages.

While the entire community would be affected by a drought, those dependent on rain would be the most vulnerable. This means that agriculture, agribusiness, and consumers (if the drought lasted long enough or impacted a large area) would be impacted. Because residents draw their drinking water from surface water and ground water sources, a prolonged severe drought may impact all residents if there were to be a dramatic drop in the stream flow coupled with the drop in the water table. In addition, while a drought may not cause structural damage to properties, a drought could cause damage to the city utilities, especially the water and well system. Fire suppression can also become a problem due to the dryness of the vegetation and possible lack of water.

No structures are vulnerable to this type of event.

5. Flash Flood

A flash flood is an event that occurs with little or no warning where water levels rise at an extremely fast rate. Flash flooding results from intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is an extremely dangerous form of flooding which can reach full peak in only a few minutes and allows little or no time for protective measures to be taken by those in its path. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding often results in higher loss of life, both human and animal, than slower developing river and stream flooding.

Floods are the most common and widespread of all-natural disasters except fire. In Iowa, as much as 21 inches of rain has fallen in a 24 hour period. The National Climatic Data Center lists six flash flooding/urban or small stream flooding events from 1995 to 2010 thea could have affected the City of Lisbon or the surrounding communities and resulted in over five million dollars in property damage and fifty thousand dollars in crop damage. Between 1995 and 2010 there have been no deaths or injuries attributed to flash flooding in Linn County.

Areas in a floodplain or in low lying areas can certainly be impacted. People and property located in areas with saturated soil or on land with large amounts of impermeable surfaces are likely to be impacted in the event of a significant rainfall. Unlike areas impacted by a river/stream flood, flash floods can impact areas a good distance from the stream itself. Flash flood prone areas are not particularly those areas adjacent to rivers and streams. Streets can become swift moving rivers, and basements can become deathtraps because flash floods can fill them with water in a manner of minutes. The geographic area that is vulnerable to future flash flooding in the City is the low-lying areas adjacent to West Spring Creek.

There is one parcel property located within the 100 year flood plain however there are no structures located there.

6. Tornado

A tornado is a violent whirling wind characteristically accompanied by a funnel shaped cloud extending down from a cumulonimbus cloud that progresses in a narrow, erratic path. Rotating wind speeds can exceed 300 mph and travel across the ground at average speeds of 25-30 mph. A tornado can be a few yards to about a mile wide where it touches the ground; however, an average tornado is a few hundred yards wide. It can move over land for distances ranging from short hops to many miles, causing great damage wherever it descends. The funnel is made visible by the dust and condensation of water droplets in the center of the funnel.

The Enhanced Fujita (E/F) Scale measures tornado severity. The E/F Scale assigns a numerical value based on wind speed and extent of damage. It breaks down each event by

Damage Indicators (DI), and Degrees of Damage (DOD). DI are broken down into 28 categories of structures. Each individual type of structure is given an abbreviation code as well as a number code for easy reference. DOD are broken down into categories of possible damage that might occur. Each of these categories is also assigned a number. The new scale is designed to more accurately depict the actual severity and damage that has occurred from an event. Generally the destructive path of a tornado is only a couple hundred feet in width, but stronger tornadoes can leave a path of devastation up to a mile wide. Normally a tornado will stay on the ground for no more than 20 minutes; however, one tornado can touch ground several times in different areas. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area.

The City of Lisbon has experienced two tornadoes; in May 1997 an E/F 1 tornado and in June 1998 an E/F 0, neither of which caused any damage.

Those most at risk from tornadoes include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. People in automobiles are also very vulnerable to twisters. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to escape the path of destruction. People who may not understand watches and warnings due to language barriers are also at risk. Because tornadoes are sporadic there can not be a reliable long term prediction made as to where they may occur. However, if the tornadic events hold true to their average, Lisbon can expect to receive minimal funnel cloud activity in a given year, if any at all.

As with thunderstorms and tornadoes, the entire community would be vulnerable to a hailstorm. In that event a total of 865 structures, 1,898 persons would be affected, and buildings worth a total of $136,732,287 could be damaged. Using the asset inventory information for the entire town of Lisbon listed above, estimates can be made as to the cost of such an event.

At the time of the 2000 Census there were 25 mobile homes in the City with an average total value of $2,337,500. Using the average persons per household there are approximately 65 persons living in mobile homes in the City.

Again, within the City there exist groups that may be even more vulnerable to thunderstorm events, specifically elderly and disabled who may not be able to reach safety. According to the 2000 Census, there were a total of 194 people over the age of 65 (representing 9.8% of the population). In addition, there were a total of 203 people with disabilities in the City. Of these 71 were over the age of 65 and 132 were younger than 65. In addition, there were 157 children under the age of 5.

7. Pipeline Transportation Incident

A pipeline transportation incident would be a break in a pipeline creating a potential for an explosion or leak of a dangerous substance (oil, gas, etc.) possibly requiring evacuation. Iowa is served by many high pressure pipelines to residents and industries.

An underground pipeline incident can be caused by environmental disruption, accidental damage, or sabotage. Incidents can range from a small slow leak that is not ignited to a large rupture in which the gas is ignited. Inspection and maintenance of the pipeline system along with marked gas line locations and an early warning and response procedure can lessen the risk to those in proximity to the pipelines.

About 5 interstate pipelines operate in the state under federal pipeline jurisdiction. There are many high-pressure gas mains throughout the state which supply residential and industrial users. People and property with pipelines on their land or nearby are the most at risk. People excavating earth near a pipeline are also at risk. Whether the greater hazard is posed to those upwind or downwind from a site depends on the product spilled, for example - natural gas is lighter than air. Private homes and business served by natural gas have smaller diameter pipelines connected to their structure. The underground pipelines cross public streets, roads, and highways as well as streams. Iowa's natural environment is also vulnerable to contamination from an underground pipeline incident.

The vast majority of pipeline incidents that occur are caused by third-party damage to the pipeline, often due to construction or some other activity that involves trenching or digging operations. With development occurring at an unprecedented rate and the ground becoming more and more congested with utilities, the probability of an underground pipeline incident occurring somewhere in the state is significant. Petroleum and natural gas pipeline accidents occur with some regularity, but they usually have a limited impact and are quickly and adequately handled by pipeline company emergency crews and local and state responders. Pipeline operators are required to coordinate all safety preparedness and response activities with the communities. Planning, training, and exercising of emergency procedures with all involved parties help to limit the occurrence and severity of incidents.

There is one interstate pipeline that runs north of the City of Lisbon. There are no homes within a half mile of the pipeline, resulting in minimal risk to the City.

8. Extreme Heat

Conditions for extreme heat are defined by summertime weather that is substantially hotter and/or more humid than average for a location at that time of year. This includes temperatures (including heat index) in excess of 100 degrees Fahrenheit or three successive days of 90+ degrees Fahrenheit. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees. The heat index is a number in degrees Fahrenheit that tells how hot it really feels when relative humidity is added to the actual air temperature. Exposure to full sunshine can increase the heat index by at least 15 degrees. Extreme heat can impose stress on humans and animals. Heatstroke, sunstroke, cramps, exhaustion, and fatigue are possible with prolonged exposure and/or physical activity due to the body's inability to dissipate the heat. Urban areas are particularly at risk because of air stagnation and large quantities of heat absorbing materials such as streets and buildings. Extreme heat can also result in distortion and failure of structures and surfaces such as roadways and railroad tracks.

Based on historical information, Iowa will likely experience about 26 days per year with temperatures above 90 degrees. There is a very good chance that there will also be a period of three consecutive days or more with temperatures in the 90s. It is also common for the temperature to hit 100 degrees or more once every three years during the summer months.

During the period between 1950 and 2010, Linn County experienced three extreme heat events. The heat wave that occurred in July of 1995 had a major impact across the entire state, temperatures ranged from 98 degrees to 108 degrees with heat indices reaching a high of 131 degrees. This event lasted two days causing almost four million dollars of property damage and resulted in three fatalities state wide. Most of the state would likely be impacted by extreme heat, but urban areas pose special risks. The stagnant atmospheric conditions of the heat wave trap pollutants in urban areas and add to the stresses of hot weather.

Elderly persons, small children, chronic invalids, those on certain medications or drugs (especially tranquilizers and anticholinergics), and persons with weight and alcohol problems are particularly susceptible to heat reactions. Healthy individuals working outdoors in the sun and heat are vulnerable as well. Individuals and families with low budgets can be susceptible due to poor access to air-conditioned rooms.

According to the 2000 Census, there were a total of 194 people over the age of 65 (representing 9.8% of the population). In addition, there were a total of 203 people with disabilities in the City. Of these 71 were over the age of 65 and 132 were younger than 65. In addition, there were 157 children under the age of 5.

The amount of vulnerability can be greatly reduced by taking certain precautionary measures. Such measures include, but are not limited to drinking plenty of water to stay hydrated, staying in air conditioned areas, using sun block, reducing the amount of physical exertion, etc.

No structures are vulnerable to this type of event.

9. Chemical Terrorism

Chemical terrorism is the use or threat of chemical agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Liquid/aerosol or dry contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions. Other dispersal methods may include intentional releases from petro-chemical facilities or intentional releases during rail or truck transportation. Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which they exist. Contamination can be carried out of the initial target area by persons, vehicles, water and wind. Chemicals may be corrosive or otherwise damaging over time if not mitigated.

Contamination can be carried out of the initial target area by persons, vehicles, water and wind. The micro-meteorological effects of buildings and terrain can alter travel and

duration of agents. The extent is largely determined by the type of chemical, the method of dispersal, and the conditions at the time it is released.

Unfortunately, there will never be a way to totally eliminate all types of these clandestine activities. Persons inclined to cause death and destruction are usually capable of finding a way to carry out their plans. As perpetrators of terrorism improve their ability to collect information, raise money and issue rhetoric, implementation of effective counter measures becomes even more important.

There have been no instances of chemical terrorism in or around the City of Lisbon.

A chemical terrorism incident can happen anywhere, so any area is considered vulnerable to this type of incident. Populations downstream, downhill, and downwind of a released chemical agent are particularly vulnerable.

In the event of a chemical agent release, evacuation may be required for a time. The City does have an emergency evacuation plan in place. It is unlikely that the entire town would be evacuated and this would have at least a minimal impact on the remainder of the city. Structures that could be affected by a chemical terrorism incident would not extend beyond those directly involved in the incident and are considered to be limited. The worst case for a residential structure would be $93,500 in damage to the structure itself. In addition, worst case for a commercial site would cost approximately $147,964 and a public facility would cost approximately $769,869. These values assume a total loss based on the average value of each type of facility.

10. Transportation Hazardous Materials Incident

A transportation hazardous material incident is an accidental release of chemical substances or mixtures that present a danger to public health or safety as a result of transportation. A hazardous substance is one that may cause damage to persons, property, or the environment when released. Chemicals are manufactured and used in ever-increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced and transported across the county via semi truck and train. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incidents generally affect a localized area, and the use of planning and zoning can minimize the area of impact.

The City of Lisbon is approximately 14 miles east of I-380, eight miles east of highway 151, highway 30 runs trough the city, and there is a railroad line going through the City. There are many hazardous chemicals transported on these routes daily. A hazardous materials incident can occur almost anywhere, so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to transportation corridors and populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or

inhalation. Occupants of areas previously contaminated by a persistent material may also be harmed either directly or through consumption of contaminated food and water.

Most of the hazardous materials incidents are localized and are quickly contained or stabilized by the highly trained fire departments and hazardous materials teams. Depending on the characteristic of the hazardous material or the volume of product involved, the affected area can be as small as a room in a building or as large as five square miles or more. Additional regions outside the immediately affected area may be evacuated for precautionary reasons. More widespread effects occur when the product contaminates the municipal water supply or water system such as a river, lake, or aquifer.

There have been no known incidents involving the transportation of hazardous materials in or affecting the City of Lisbon.

If the spill involved a dangerous chemical, evacuation may be required for a time. The City does have an emergency evacuation plan in place. If a portion of the city were evacuated, this would have at least a minimal impact on the remainder of the city. Structures that could be affected by a hazardous materials incident would not extend beyond those directly involved in the incident and are considered to be limited. The worst case for a residential structure would be $93,500 in damage to the structure itself. In addition, worst case for a commercial site would cost approximately $147,964 and a public facility would cost approximately $769,869. These values assume a total loss based on the average value of each type of facility.

11. Energy Failure

An energy failure is an extended interruption of electric, petroleum or natural gas service, which could create a potential health problem for the population and possibly mass panic. International events could potentially affect supplies of energy-producing products, while local conditions could affect distribution of electricity, petroleum or natural gas. The magnitude and frequency of energy shortages are associated with international markets. Local and state events such as ice storms can disrupt transportation and distribution systems. If disruptions are long lasting, public shelters may need to be activated to provide shelter from either extreme cold or extreme heat. Stockpiles of energy products eliminate short disruptions, but can also increase the level of risk to the safety of people and property in proximity to the storage site.

Only when free market forces cease to provide for the health, welfare, and safety of the citizens can governments take appropriate actions to limit the effects of an energy shortage. The State of Iowa has three strategies to limit the likelihood of an energy shortage. Energy supply and demand can be kept in check through voluntary and mandatory demand reduction mechanisms, the substitution of alternative energy sources when possible, and state government programs to curtail excessive use. The federal government has a strategic petroleum reserve to supplement the fuel supply during energy emergencies. Shortages, especially electrical shortages, can be unpredictable with

immediate effects. Natural events, human destruction, price escalation, and national security energy emergencies can cause unavoidable energy shortages.

The effects of an energy shortage would be felt throughout the state. Because the distribution systems are very developed, local shortages can quickly be covered.

12. Human Disease Pandemic

Pandemic refers to a microbe that has the ability to spread across the world. The word 'pandemic' means that a disease has caused illness in a person on nearly every continent. Many diseases throughout the history of the world have been pandemic. Examples are HIV/AIDS and Influenza. A pandemic will have wide spread economic and societal implications for the state. Response and recovery to a pandemic will likely be lengthy.

Influenza (flu) happens every year in nearly every country in the world. It spreads through a population for a few months and then will disappear or will move to another country. Influenza usually occurs in the fall and winter months. Typically people who become ill are the elderly, the very young, and people with chronic medical conditions and high risk behaviors. Individuals who travel internationally and have high exposure to potential vectors of disease are the most susceptible.

Public health agencies work to protect Iowans from infectious diseases and preserve the health and safety of Iowans through disease surveillance, investigation of suspect outbreaks, and education and consultation to county, local and public/private health agencies. The last influenza pandemic in the U.S. was in 2009. Historically pandemics occur every 30 years. To date it has been 41 years since the last incident. The H1N1 pandemic had little affect on the City of Lisbon.

However, if residents of the City were to become infected with an infectious disease, the very young and the very old would be most as risk. These persons may not be able to fight off the disease as easily as other portions of the population. At the time of the 2000 Census, there were a total of 194 persons over the age of 65 in Lisbon (representing 9.8% of the population) and there were 157 children under the age of five.

Implementing certain precautionary measures can reduce the amount of vulnerability. Some precautions for humans include education on how diseases are contracted and/or spread, cleanliness, safe food handling practices, vaccinations, and implementing monitoring programs.

13. Bioterrorism

Bioterrorism is the use of biological agents against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits and moving sprayers. Biological agents may pose viable threats from hours to years depending upon the agent and the conditions in which it exists. Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infections can be

spread via human or animal vectors. Agro-terrorism is the direct, generally covert, contamination of food supplies or introduction of pests or disease agents to crops and livestock.

Internationally, such acts have, unfortunately, become quite commonplace as various religious, ethnic, and nationalistic groups have attempted to alter and dictate political and social agendas, seek revenge for perceived past wrongdoing, or intentionally disrupt the political, social, and economic infrastructure of individual businesses, units of government, or nations. Unfortunately, there will never be a way to totally eliminate all types of these clandestine activities. Persons inclined to cause death and destruction are usually capable of finding a way to carry out their plans. As perpetrators of terrorism improve their ability to collect information, raise money and issue rhetoric, implementation of effective counter measures becomes even more important.

Iowa has not been immune to acts of terrorism or sabotage. The state has experienced many threats in the past. Most incidents have been limited to reported "suspect" powders, actual threats and hoaxes. Beginning in October 2001, following the original Anthrax scares, Iowa experienced a large number of responses for suspicious powders. Following the development of a threat assessment/response protocol the number of responses was reduced and now averages a few responses each month.

The City of Lisbon has experienced no known or suspected incidents of biological terrorism.

However, if residents of the City were to become infected with a biological agent, the very young and the very old would be most as risk. These persons may not be able to fight off the agent as easily as other portions of the population. At the time of the 2000 Census, there were a total of 194 persons over the age of 65 in Lisbon (representing 9.8% of the population) and there were 157 children under the age of 5.

Implementing certain precautionary measures can reduce the amount of vulnerability. Some precautions for humans include education on how the biological agent is spread, vaccinations, and implementing monitoring programs.

14. Windstorms

Windstorms can be described as extreme winds associated with severe winter storms, severe thunderstorms, downbursts, and very steep pressure gradients. Extreme winds, other than tornadoes, are experienced in all regions of the United States. It is difficult to separate the various wind components that cause damage from other wind-related natural events that often occur with or generate windstorms.

Unlike tornadoes, windstorms may have a destructive path that is tens of miles wide and several hundred miles long. Large hail, strong straight-line winds, heavy rains, flash flooding, and lightning are also associated with severe storms and may cause significant damage to a wider area.

Those most at risk from windstorms include people living in mobile homes, campgrounds, and other dwellings without secure foundations or basements. The elderly, very young, and the physically and mentally handicapped are most vulnerable because of the lack of mobility to seek shelter. People who may not understand watches and warnings due to language barriers are also at risk.

There have been 26 high wind events in Linn County since 1985 where wind speeds exceeded 64 knots (73 mph). In that time the National Climatic Data Center did not list the City of Lisbon as having been affected by events of this type. However, it is important to keep in mind that the cities of Ely, Springville, Mt. Vernon, and Bertram are within ten miles of the City and events that affect them also affect the City of Lisbon. Based on historical averages, the City of Lisbon would expect to have about one or two wind events each year in which wind speeds exceed 64 knots.

As with thunderstorms and tornadoes, the entire community would be vulnerable to a windstorm. In that event a total of 865 structures, 1,898 persons would be affected, and buildings worth a total of $136,732,287 could be damaged. Using the asset inventory information for the entire town of Lisbon listed above, estimates can be made as to the cost of such an event.

At the time of the 2000 Census there were 25 mobile homes in the City with an average total value of $2,337,500. Using the average persons per household there are approximately 65 persons living in mobile homes in the City.

Again, within the City there exist groups that may be even more vulnerable to thunderstorm events, specifically elderly and disabled who may not be able to reach safety. According to the 2000 Census, there were a total of 194 people over the age of 65 (representing 9.8% of the population). In addition, there were a total of 203 people with disabilities in the City. Of these 71 were over the age of 65 and 132 were younger than 65. In addition, there were 157 children under the age of 5.

15. Animal/Plant/Crop Disease

An animal disease is an outbreak of disease that can be transmitted from animal to animal. The disease outbreak will likely have significant economic implications or public health impact. The crop/plant pest infestation will likely have severe economic implications, cause significant crop production losses, or cause significant environmental damage. The crop/plant pests may also have implications for public health. The introduction of some high consequence diseases may severely limit or eliminate the ability to move, slaughter, and export animals and animal products. The outbreak will have widespread economic and societal implications for the state. Response and recovery to infectious animal disease outbreaks will be lengthy, and many producers may never be able to return to business. There will be many indirect effects on the economy. Rumors of an infectious animal disease outbreak could cause significant damage to the markets, as was evidenced in an incident in Kansas in 2003 where the mere rumor of a Foot and Mouth Disease outbreak caused the markets to plummet. Crop/plant pest infestations can cause widespread crop/plant loss and severe economic hardship on farmers, landowners,

and businesses. Once infestation occurs, the pest may become endemic causing repeated losses in subsequent growing years. Loss of production will affect all related industries, such as fuel, food, synthetics, and processors.

The impact will vary by disease/pest and the type of animal/crop/plant infected/infested. When the United Kingdom faced an outbreak of Foot and Mouth Disease in 2001, the total economic loss to that country exceeded $7 billion. This incident was one of the most economically significant historically, second only to World War II. The state of Michigan is currently dealing with an Emerald Ash Borer infestation. To date the state and federal governments have spent in excess of $550 million to detect, delimit, control and eradicate the pest. Should the disease/pest have public health implications, the economic and social impact would be even greater.

Every year the Iowa Department of Agriculture and Land Stewardship (IDALS) conducts numerous animal disease investigations. In 2005, IDALS and USDA conducted 19 highly infectious disease investigations. Fortunately the investigation results were negative. IDALS, under the direction of the state plant regulatory official, works with Iowa's universities and industries to conduct regular crop / plant pest surveillance. There have been no known instances of animal, plant, or crop damage in the City of Lisbon.

Any animal, plant, or crop disease would have a mostly economic impact on the City. Agriculture, agribusiness, and consumers would be impacted. According to the Linn County Assessors Office there is only one agricultural business located in the City. According to the Us Census there are no residents in the City of Lisbon that list their occupation as farming or are listed as being employed in an agricultural profession. The effect on the City would therefore be minimal.

16. Conventional Terrorism

Conventional terrorism is the use of conventional weapons and explosives against persons or property in violation of the criminal laws of the United States for purposes of intimidation, coercion or ransom. It can be accomplished by detonation of an explosive device on or near target; delivery via person, vehicle, or projectile. Hazard effects are instantaneous; additional secondary devices may be used, lengthening the duration of the hazard until the attack site is determined to be clear. The extent of damage is determined by the type and quantity of explosive. Effects are generally static other than cascading consequences, incremental structural failures, etc. Conventional terrorism can also include tactical assault or sniping from remote locations.

Unfortunately, there will never be a way to totally eliminate all types of these clandestine activities. Persons inclined to cause death and destruction are usually capable of finding a way to carry out their plans. As perpetrators of terrorism improve their ability to collect information, raise money and issue rhetoric, implementation of effective counter measures becomes even more important.

There have been no known instances of conventional terrorism in the City of Lisbon. Population and structures that could be affected by a conventional terrorism incident

would not extend beyond those directly involved in the incident and are considered to be limited. The worst case for a residential structure approximately 3 people would be affected and there could be $93,500 in damage to the structure itself. In addition, worst case for a commercial site would cost approximately $147,964 and a public facility would cost approximately $769,869. These values assume a total loss based on the average value of each type of facility.

17. Structural Failure

Structural failure is the collapse (partial or complete) of any public or private structure including roads, bridges, towers, and buildings. A road, bridge, or building may collapse due to the failure of the structural components or because the structure was overloaded. Natural events such as heavy snow may cause a roof of a building to collapse under the weight of the snow. Heavy rains and flooding can undercut and washout a road or bridge. The age of the structure is sometimes independent of the cause of the failure. Enforcement of building codes can better guarantee that structures are designed to hold up under normal conditions. Routine inspection of older structures may alert inspectors to "weak" points. The level of damage and severity of the failure is dependent on factors such as the size of the building or bridge, the number of occupants of the building, the time of day, day of week, amount of traffic on the road or bridge, and the type and amount of products stored in the structure.

There are many buildings in Iowa that are very old or which may become hazardous in the event of a fire, high winds, or other natural events. All bridges are vulnerable to the effects of the elements and the deterioration that results. Increases in the amount and weight of traffic they are expected to support increase their vulnerability to failure.

There have been several sporadic structural failures across the state. They have included homes, commercial structures, and communications towers.

There have been no known instances of structural failure in the City of Lisbon.

A structural failure of a residence would cost approximately $93,500 in damage to the structure itself. In addition, worst case for a commercial site would cost approximately $147,964 and a public facility would cost approximately $769,869. These values assume a total loss based on the average value of each type of facility.

18. Rail Transportation Incident

A rail transportation incident is a derailment or a train accident which directly threatens life or property, or which adversely impacts a community's capabilities to provide emergency services. Railway incidents may include derailments, collisions, and highway/rail crossing incidents. Train incidents can result from a variety of causes. Human error, mechanical failure, faulty signals, and problems with the track can all lead to railway incidents. Results of an incident can be range from minor "track hops" to catastrophic hazardous materials incidents and even passenger casualties. With the many miles of track in Iowa, there are numerous at-grade crossings at which vehicles must cross the railroad tracks.

People and property in close proximity to the railway lines, crossings, sidings, switching stations, and loading/unloading points are most at risk. Those away from railroad tracks and facilities are vulnerable only to large-scale incidents including those in which hazardous materials are involved.

The Union Pacific (UP) operates 1,752 miles of tracks in Iowa and has one spur that runs through the City of Lisbon. This line averages 107.1 million miles of cargo hauled each year. There are four street crossings over this line in the City. Based on the historic information available for the area near the City of Lisbon there is a low probability of a railway accident happening. From 1985 to 2006, there have been 2,948 documented rail incidents in Iowa. There have been 1076 injuries and 215 deaths related to these incidents. There have been no known railway incidents in or near the City of Lisbon along the UP rail line.

In the event of a railway accident, most of the damage would occur along the railway. There are no homes within a city block (.5 mile) of the railway; therefore there would be little risk for residential structural damage. There are commercial structures with a city block of the railway. Assuming a total loss, the damage to a commercial building would be $147,964; this value is based on the average value of this type of facility. According to information gathered from the Federal Railroad Administration by www.cuerpo8.es/STOL/tecnico/STOLT3dsistem1.html, the average cost of a railway accident in 2001 was $105,000.

19. Communications Failure

A communications failure is the widespread breakdown or disruption of normal communication capabilities. This could include major telephone outages, loss of local government radio facilities, or long-term interruption of electronic broadcast services. Emergency 911, law enforcement, fire, emergency medical services, public works, and emergency warning systems are just a few of the vital services which rely on communication systems to effectively protect citizens. Business and industry rely heavily on various communication media as well.

Mechanical failure, traffic accidents, power failure, line severance, and weather can affect communication systems and disrupt service. Disruptions and failures can range from localized and temporary to widespread and long-term. If switching stations are affected, outage could be more widespread.

Citizens of the community would be impacted only indirectly. Phone and data transmission could be impacted. Most communication systems that are highly necessary have backup and redundant designs to provide continuity of service.

No widespread communications failures have occurred in Iowa. Local incidents due to weather conditions, equipment failure, excavation incidents, and traffic accidents have been reported, but outages have usually been resolved in a timely manner.

20. Human Disease Incident

A human disease incident is a medical, health, or sanitation threat to the general public (such as contamination, epidemics, plagues, and insect infestation). Public health action to control infectious diseases in the 21st century is based on the 19th century discovery of microorganisms as the cause of many serious diseases, for example, cholera and tuberculosis. Disease control has resulted from improvements in sanitation and hygiene, the discovery of antibiotics, and the implementation of universal childhood vaccination programs. Scientific and technologic advances have played a major role in each of these areas and are the foundation for today's disease surveillance and control systems. Scientific findings also have contributed to a new understanding of the evolving relation between humans and microbes. As of January 1, 2000, a total of 60 infectious diseases were designated as notifiable at the national level. A notifiable disease is one for which regular, frequent, and timely information regarding individual cases is considered necessary for the prevention and control of the disease.

Public health agencies also work to reduce the impact of communicable diseases in Iowa and to eliminate the morbidity associated with these diseases. Programs guide community-based prevention planning, monitor current infectious disease trends, prevent transmission of infectious diseases, provide early detection and treatment for infected persons, and ensure access to health care for refugees in Iowa. While vaccines are available for many diseases, Iowans remain vulnerable to other diseases known and unknown.

The Iowa Department of Public Health tracks epidemiological statistics in Iowa. Their data indicates no major incidents of diseases that have high percentages of loss of life or severe illness in the last 25 years.

However, if residents of the City were to become infected with an infectious disease, the very young and the very old would be most as risk. These persons may not be able to fight off the disease as easily as other portions of the population. At the time of the 2000 Census, there were a total of 194 people over the age of 65 (representing 9.8% of the population) and there were 157 children under the age of five.

Implementing certain precautionary measures can reduce the amount of vulnerability. Some precautions for humans include education on how diseases are contracted and/or spread, cleanliness, safe food handling practices, vaccinations, and implementing monitoring programs.

21. Cyber Terrorism

Cyber- terrorism is an electronic attack using one computer system against another in order to intimidate people or disrupt other systems. Cyber terrorism may last from minutes to days depending upon the type of intrusion, disruption, or infection. Generally, there are no direct effects on the built environment, but secondary effects may be felt depending upon the system being terrorized. Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.

The City of Lisbon has never experienced an instance of cyber terrorism.

Citizens of the community would be impacted only indirectly.

22. Structural Fire

Structural fires are uncontrolled fires in populated areas that threaten life and property and are beyond normal day-to-day response capabilities. Structural fires present a far greater threat to life and property and have the potential for much larger economic losses. Modern fire codes and fire suppression requirements in new construction and building renovations, coupled with improved fire fighting equipment, training, and techniques lessen the chance and impact of a major urban fire. Most structural fires occur in residential structures, but the occurrence of a fire in a commercial or industrial facility could affect more people and pose a greater threat to those near the fire or fighting the fire because of the volume or type of the material involved.

Much of the fire prevention efforts have gone into nonresidential fires and the results have been highly effective. Even with an increase in the prevention efforts in residential fires, both residential and nonresidential fires can still occur. During colder months, clogged chimneys and faulty furnaces and fireplaces can increase the probability of structural fires.

Older structures with outdated electrical systems not built to current fire codes are particularly vulnerable to fire. Combustible building materials obviously are more vulnerable than structures constructed of steel or concrete. Structures without early detection devices are more likely to be completely destroyed before containment by response agencies. Structures in areas served by older, smaller, or otherwise inadequate water distribution infrastructure such as water mains and hydrants are also at significant risk. Problems vary from region to region, often because of climate, poverty, education, and demographics. The fire death risk for the elderly and children under 5 years of age is more than two times that of the average population.

Structural fires are not uncommon in the City of Lisbon and nearly all are quickly extinguished by on-site personnel or local fire departments.

Structural fires typically affect individual structures and their owners. In the event of a residential fire, approximately 3 people would be affected and the damage would be estimated at $93,500. Assuming a total loss, the damage to a commercial building would be $147,964 and the damage to an industrial building would be $272,707.

23. Radiological Terrorism

Radiological terrorism is the use of radiological materials against a person or persons in order to bestow fear upon a larger group of people with the ultimate goal of creating coercion to achieve a specific political or religious agenda. It is the strategic use of intimidation, threats, and pressure in order to cause disruption to an opposing system and align that system with that of a specific group or organization. Radioactive materials can

be dispersed using sprayers/aerosol generators or by point of line sources such as munitions, covert deposits and moving sprayers.

With no prior events by which to judge probability, it becomes necessary to consider the technical feasibility of radiological terrorism. There are two types of radiological threat. The first is the threat from a device which would produce a nuclear detonation. Given the sophistication and that the radiation would kill anyone before they could amass enough material to produce a weapon, this threat is relatively low and it is the decision of the planning committee that this threat is so low that it will not be considered.
The second threat is from a device designed to disperse radioactive material with the use of a conventional explosive. This type of device could be easily produced and the material is moderately difficult to obtain. However the damage from this type of device is primarily from the conventional explosive and shrapnel. The radiological damage from this type of device would be negligible.

The threat from this type of device is also low for the City of Lisbon.

Initial effects will be localized to site of attack and are considered to be minimal. Damage from this type of device is primarily from the conventional explosive and shrapnel. The worst case for a residential structure approximately 3 people would be affected and there could be $93,500 in damage to the structure itself. In addition, worst case for a commercial site would cost approximately $147,964 and a public facility would cost approximately $769,869. These values assume a total loss based on the average value of each type of facility. The radiological damage from this type of device would be negligible; however the discovery of slightly elevated radiation levels would incite hysteria amongst the uninformed public.

24. Fixed Hazardous Materials

Fixed hazardous materials incidents are the accidental release of chemical substances or mixtures during production or handling at a fixed facility that presents danger to the public health or safety. A hazardous substance is one that may cause damage to persons, property, or the environment when released to soil, water, or air. Chemicals are manufactured and used in ever increasing types and quantities. As many as 500,000 products pose physical or health hazards and can be defined as "hazardous chemicals." Each year, over 1,000 new synthetic chemicals are introduced. Hazardous substances are categorized as toxic, corrosive, flammable, irritant, or explosive. Hazardous materials incidents generally affect a localized area and the use of planning and zoning can minimize the area of impact.

A hazardous materials accident can occur almost anywhere, so any area is considered vulnerable to an accident. People, pets, livestock, and vegetation in close proximity to facilities producing, storing, or transporting hazardous substances are at higher risk. Populations downstream, downwind, and downhill of a released substance are particularly vulnerable. Depending on the characteristics of the substance released, a larger area may be in danger from explosion, absorption, injection, ingestion, or inhalation. Occupants of areas previously contaminated by a persistent material may also

be harmed either directly or through consumption of contaminated food and water. Facilities are required to have an off-site consequence plan that addresses the population of the surrounding area. Responding personnel are required to be trained to HAZMAT Operations Level to respond to the scene, and those personnel that come into direct contact with the substances released are required to have HAZMAT Technician Level training.

There is one facility located in or near the City of Lisbon that are required to file Tier II reports. This facility is not manufacturing or storing EPA/SARA Title III, Extremely Hazardous Substances (EHS).

There have been no recorded hazardous material (HAZMAT) events in the City of Lisbon nor have there been any reported deaths due to HAZMAT events to this date.

There are currently no known facilities storing EHS chemicals located in, or near enough to, the City for an event of this type to affect it.

25. Agro-Terrorism

Agro-terrorism is an action causing intentional harm to an agricultural product or vandalism of an agricultural / animal-related facility. Activities could include the following examples: animal rights activists who release mink or lab animals; disgruntled employees who intentionally contaminate bulk milk tanks or poison animals; ecological terrorists who destroy crops / facilities; theft of agricultural products, machinery, or chemicals; or criminals who vandalize agricultural facilities. This category covers a large variety of incidents from potential intentional introduction of disease; vandalism of facilities; theft of agricultural products, machinery, or chemicals; release of animals; and contamination of agricultural products. Depending upon the type of action taken, the implications will vary greatly.

Incidents such as this have occurred in the state of Iowa. Over the past 10 years, Iowa has experienced at least 10 incidents in which animal rights activists have vandalized or released animals in agricultural facilities, additionally, vandalism to agricultural facilities or incidents of disgruntled employees causing damage to animals and animal products. There are frequent cases of theft of agricultural machinery, products, and chemicals.

There have been no known instances of agro-terrorism in the City of Lisbon.

Population and structures that could be affected by an agro-terrorism incident would not extend beyond those directly involved in the incident and are considered to be minimal. According to the Linn County Assessors Office there are seven agricultural businesses located in the City. According to the Us Census there are three residents in the City of Lisbon that list their occupation as farming or are listed as being employed in an agricultural profession. The effect on the City would therefore be nominal.

26. Radiological Transportation

A radiological transportation accident is an incident resulting in a release of radioactive material during transportation. The transportation of radioactive material by all means of transport is regulated by the federal government. Transportation accidents are the most common type of incident involving radioactive materials because of the sheer number of radioactive shipments. Operators of facilities that use radioactive materials and transporters of radioactive waste are trained in the packaging, handling, and shipment of the radioactive waste, and since they are closely regulated by a variety of federal, state, and local organizations, the likelihood of an incident is remote.

The danger to the public is less than a wide array of other hazardous materials usually being isolated to the immediate accident site. Those working with or near sources of radiation are at a greater risk than the general citizens of the state. Those responding to a radiological incident should be trained in recognizing a radiological incident and minimizing exposure to radioactive materials.

Since 1990, hundreds of shipments have been made through Iowa. There have been no occurrences of radiological incidents in Iowa.

Population and structures that could be affected by a radiological transportation incident would not extend beyond those directly involved in the incident and are considered to be limited. The worst case for a residential structure approximately 3 people would be affected and there could be $93,500 in damage to the structure itself. In addition, worst case for a commercial site would cost approximately $147,964 and a public facility would cost approximately $769,869. These values assume a total loss based on the average value of each type of facility.

27. Public Disorder

Public disorder is a mass demonstration or direct conflict by large groups of citizens, as in marches, protest rallies, riots, and non-peaceful strikes. People assembled together in a manner to substantially interfere with public peace constitute a threat by use of unlawful force or violence against another person, causing property damage, or attempting to interfere with, disrupting, or destroying the government, political subdivision, or group of people. Labor strikes and work stoppages are not considered in this hazard unless they escalate into a threat to the community. Vandalism is usually initiated by a small number of individuals and limited to a small target group or institution. Most events are within the capacity of local law enforcement.

Civil disturbances are often difficult for local communities to handle. There is a fine line between the Constitutional right of individuals and groups to assemble and air their grievances and the overall needs of the community to provide essential services, ensure personal safety of citizens, prevent property damage, and facilitate normal commerce. Fortunately, most demonstrations and large public gatherings are held in a peaceful, responsible manner. However, there never seems to be a shortage of groups (drugs and alcohol are often involved) whose primary objective is to disrupt normal activities and perhaps even cause injury and property damage. People at risk are mainly the willing

participants and law enforcement officials. Innocent bystanders and their property can be at risk as well.

There have been no known violent incidents of public disorder in the City of Lisbon.

The impact of public disorder on the City would be hard to predict. The affects would be based on the reason for the disorder and the size of the crowd. At the least, each resident could be impacted by the disorder and the after effects.

28. Fixed Radiological Incident

A fixed radiological incident is an incident resulting in a release of radiological material at a fixed facility to include power plants, hospitals, and laboratories. Although the term "nuclear accident" has no strict technical definition, it generally refers to events involving the release of significant levels of radiation. Most commercial nuclear reactors in the United States were developed in the mid-1960s and are designed to withstand aircraft attack. Therefore, they should withstand most natural hazards even though they may not have been specifically designed for those forces.

Historically there have been zero significant releases of radiation from fixed facilities in the United States. In 50 years of nuclear power production in the U.S., no deaths or injuries from radiation have been recorded among the general public.

The City of Lisbon is located approximately 23 miles southeast DAEC so it is outside the 10 mile EPZ. Operators of facilities that use radioactive materials and transporters of radioactive waste are trained in the packaging, handling, and shipment of the radioactive waste, and, since they are closely regulated by State and Federal regulations, the likelihood of an incident is remote.

Hazard Prioritization

The Priority Group I hazards are candidates for immediate focus in the emergency plans because of their high risk. Priority Group II hazards are those hazards that should be addressed, but are longer-term in focus. These are low-risk hazards that can affect the community, but will not be addressed immediately. Priority Group III hazards are those that have an acceptable level of risk.

Hazard Analysis Ranking	Hazard	Scoring Total	Priority
1	Thunderstorm and Lightning	27	I
2	Roadway Transportation Incident	25	
3	Flash Flood	24	
4	Tornadoes	24	
5	Transportation Hazardous Materials Incident	24	
6	Energy Failure	24	
7	Severe Winter Storms	23	II
8	Pipeline Transportation Incident	23	

9	Hailstorms	**22**	
10	Communications Failure	**22**	
11	Rail Transportation	**21**	
12	Radiological Transportation	**21**	
13	Drought	**21**	
14	Windstorms	**20**	
15	Structural Failure	**20**	
16	Public Disorder	**20**	
17	Conventional Terrorism	**17**	
18	Human Disease Incident	**17**	
19	Structural Fire	**17**	
20	Fixed Hazardous Materials	**17**	
21	Extreme Heat	**16**	
22	Chemical Terrorism	**15**	
23	Animal/Plant/Crop Disease	**15**	**III**
24	Human Disease Pandemic	**14**	
25	Bioterrorism	**14**	
26	Fixed Radiological Incident	**12**	
27	Cyber Terrorism	**11**	
28	Agro-Terrorism	**11**	
29	Radiological Terrorism	**10**	
30	Dam Failure	**n/a**	
31	Earthquakes	**n/a**	
32	Waterway Incident	**n/a**	
33	Grass or Wild Land Fire	**n/a**	
34	Landslides	**n/a**	
35	Levee Failure	**n/a**	
36	Expansive Soils	**n/a**	
37	Sink Holes	**n/a**	
38	River Flooding	**n/a**	
39	Air Transportation	**n/a**	
40	Enemy Attack	**n/a**	

Implementation of measures to reduce the risk of these hazards is based on social acceptability, technical feasibility, administrative capacity, political willingness, legal authority, economic benefits, and environmental compatibility. While these factors are addressed more specifically in the response, mitigation, and recovery plans, it was important to consider them here when deciding in which priority group the hazard belonged.

Current and Historic Mitigation Efforts

1. Linn County Emergency Management Agency

The Linn County EMA is located at 6301 Kirkwood Boulevard SW in Cedar Rapids. It is a joint undertaking of Linn County and all its incorporated municipalities as authorized by the Federal Civil Defense Act of 1950 as amended, Federal Rule 44 CFR part 302, Presidential Executive Order 12656 of November 18, 1988, National Security Directive #259 of 1988, by the administrative rule of the Iowa Homeland Security and Emergency Management Division, and by the Code of Iowa, Chapter 29C. Linn County EMA is governed by the Linn County Emergency Management Commission, which is composed of one member of the County Board of Supervisors or its appointed representative, the Mayor or his/her representative from each of the incorporated municipalities of the county, and the Sherriff of the county or his/her representative. Linn County EMA is staffed by five full time employees: Coordinator, Administrative Officer, Logistics Officer, Operations Officer, and Plans Officer. The Linn County Emergency Operations Center (EOC) is co-located with the Linn County EMA, can support 80 personnel during disaster operations, and is equipped with a 120KW generator, wireless and fixed internet, amateur radio, satellite communications, and backup communications center. The Linn County EMA communications center has backup communications capabilities for the Linn County Sherriff's Office, Marion Police Department, and Cedar Rapids Police Department. During the 2008 flood, the EOC was activated and surged to accommodate the operations of 120 personnel from federal, state, county, local, and non-governmental organizations. The Linn County EMA oversees the Medical Reserve Corps which has a 50 bed mobile hospital setup and the Community Emergency Response Team. Linn County EMA also has a mobile shelter trailer that can be used to establish a 50 bed shelter and is complete with a portable generator. Linn County EMA and the Linn County Regional HAZMAT Team co-operate a Mobile Command Center which is equipped with emergency communications and portable generator. See appendix 1 for a list of available resources.

2. Fire Service

In addition to the Lisbon Fire Department, all fire departments in Linn County participate in a 28E agreement to provide mutual aid. See appendix 1 for a list of available resources.

3. Medical Services

Medical services for the City of Lisbon are provided by two hospitals located in Cedar Rapids, Iowa, Mercy Medical Center and St Luke's Hospital. Mercy Medical Center is a 250 bed hospital located 14.41 miles from the City of Lisbon. St Luke's Hospital currently has 369 beds available and can deploy additional beds in advent of a community event and surge. St Luke's Hospital is located 14.85 miles from the City of Lisbon and has one air ambulance.

4. Emergency Medical Services

The Lisbon Mount Vernon Ambulance Service provides emergency medical services over a 150 square mile area, serving a population of more than 6,000 including more than

1,000 students of Cornell College. The Service operates two fully equipped ambulances and is licensed by the State of Iowa at the EMT-P level, minimal staffing. The Lisbon Mount Vernon Ambulance Service has been in operation since July 1974, transporting about 350 patients annually. The Lisbon Mount Vernon Ambulance Service has four paramedics, two EMT-Is and 12 EMT-Bs. EMT training is made available to new volunteers yearly. See appendix 6 for a list of available resources.

5. Law Enforcement

In addition to the Lisbon Police Department, the Mt Vernon Police Department and the Linn County Sherriff's Office is available to provide additional law enforcement resources. See appendix 6 for a list of available resources.

6. Hazardous Materials

The Linn County Regional HAZMAT Team is based out of Hiawatha and provides Technician Level Hazardous Materials Response for the counties of Fayette, Clayton, Buchanan, Delaware, Benton, Jones, and Cedar. Linn County Regional HAZMAT Team responds to an average of 30 calls a year. See appendix 1 for a list of available resources. In addition to the Linn County Regional HAZMAT Team there are 28E agreements in place with all of the 20 Regional HAZMAT Teams in the State of Iowa for HAZMAT response.

All facilities filing Environmental Protection Agency (EPA) Tier II reports have been mapped and facilities identified as having EPA Extremely Hazardous Substances (EHS) have been mapped to identify critical facilities in their respective vulnerability zones. Mapping is linked to other hazards. This is contained in ESF-10 of the Linn Country Comprehensive Emergency Management Plan and is updated yearly.

7. Community Warning Systems

The City of Lisbon has established an outdoor warning system that covers 100% of the City. The warning system can be activated by the Lisbon Emergency Management Agency or the Lisbon Fire Department. The NOAA Weather Radio System covers all of Linn County and there is an ongoing public education program on using weather radios for homes and businesses. The Linn County EMA has two-way radio communications with major media outlets, all schools, certain fire and law enforcement agencies, and dispatch centers to better inform the public of local emergencies.

Property Protection Actions That Have Occurred

The trend for development in the City of Lisbon has been to avoid areas of increased hazard risk and to encourage actions that have been identified to mitigate the affects from potential hazards.

The City of Lisbon enrolled in the National Flood Insurance Program (NFIP) on March 19, 1976 (NFIP# 190607). The Flood Insurance Rate Map for the City of Lisbon is contained on Community Panel Number 190607 0470 D and was effective April 5, 2010. The City of Lisbon currently is not enrolled in the Community Rating System.

Flood Plain Management

The City of Lisbon has a Flood Plain Management Program which is included in Chapter 38 Code of Ordnances of the City of Lisbon, Iowa. It is the purpose of this Ordinance to protect and preserve the rights, privileges and property of the City of Lisbon and its residents and to preserve and improve the peace, safety, health, welfare, and comfort and convenience of its residents by minimizing those flood losses with provisions designed to:

1. Restrict or prohibit uses which are dangerous to health, safety or property in times of flood or which cause excessive increases in flood heights or velocities.

2. Require that uses vulnerable to floods, including public facilities which serve such uses, be protected against flood damage at the time of initial construction or substantial improvement.

3. Protect individuals from buying lands which may not be suited for intended purposes because of flood hazard.

4. Assure that eligibility is maintained for property owners in the community to purchase flood insurance through the National Flood Insurance Program.

The Zoning Administrator is appointed to implement and administer the provisions of the Floodplain Ordinance. The City of Lisbon is in good standing with the National Flood Insurance Program.

Other Mitigation Actions

1. Health

The Linn County Health Department provides public health services to all jurisdictions to include air, water, food, and solid waste monitoring.

A radon public information program is ongoing.

Terrorism use of Chemical, Biological, Radiological, Nuclear, and High Explosive (CBRNE) as well as introduction of Foreign Animal Disease preparation, response, and mitigation has been addressed in the Linn County Multi-Hazard Emergency Operations Plan.

Linn County has an extensive Special Needs Registration Program as part of the Radiological Emergency Response Plan for the Duane Arnold Energy Center. This program has been expanded to include the entire County and is linked to other hazard mapping.

2. Emergency Shelter

Emergency shelters are currently coordinated between the Linn County EMA and the Red Cross. During the 2008 flooding the Red Cross operated two shelters for the general and special needs/medically fragile population. These shelters were operated for 27 days and accommodated a daily average of 150 people.

There has been a Special Needs Medically Fragile Shelter Program established to meet the needs of persons with medical problems or who are dependant on electrically powered medical assist devices.

3. Communications

The Linn County Sherriff's Office handles 911 calls from the City of Lisbon. In the event of a loss of the Linn County Sherriff's Office dispatch center, the Cedar Rapids Police dispatch center would take over 911 actions. If there were a further loss, then the Marion Police Department dispatch center would assume the duties. In the 2008 flood the Sherriff's dispatch center and the Cedar Rapids Police dispatch center were lost and the Marion Police dispatch center handled all 911 calls for the entire county.

4. Multi Hazard Plan

Linn County has a comprehensive multi-hazards plan which was developed in 2002 and was continuously updated until 2008 finishing the five year planning cycle required by the State of Iowa. . During the devastating flood of 2008, many sections of the plan were put into use. The floods affected over 7,000 parcels and caused $4.5 billion in damage in Linn County. Yet due to the constant review and exercising of the all hazards plan, no lives were lost.

The current plan is currently undergoing a total rewrite to comply with the National Response Framework and older sections of the plan will be phased out within the next five years as new Emergency Support Functions (ESF) are added. The plan has met the State's requirements and Linn County has been found to be compliant.
Below is a description of how the new Linn County Comprehensive Emergency Management Plan will incorporate the annexes of the 2008 Linn County Multi-Hazard Emergency Plan:

New Emergency Support Function Format	Older Annex Sections
Basic Plan	Basic Plan
Hazard Mitigation Plan	Annex W Hazard Mitigation
ESF-1 Transportation	Annex U Transportation
ESF-2 Communications	Annex B Communications and Warnings
ESF-3 Public Works	Annex K Public Works/Utilities
ESF-4 Fire Services	Annex F Fire Services
ESF-5 Emergency Management	Annex A Command and Control

	Annex Z Continuity of Operations
	Annex EE Linn County EOC Operations
ESF-6 Mass Care, Emergency Assistance, and Human Services	Annex E Evacuation
	Annex I Mass Care
	Annex J Protective Shelters
	Annex N Human Services
ESF-7 Resource Management	Annex M Resource Management
	Annex T Logistics Support
ESF-8 Health and Medical Services	Annex G Health and Medical
	Annex L Radiological Protection
	Annex S Mass Casualty Operations
ESF-9 Search and Rescue	Annex O Search and Rescue
ESF-10 Hazardous Materials	Annex P Hazardous Materials Emergency Response Plan
ESF-11 Agriculture	Annex CC Infections Animals Disease Emergencies
ESF-12 Energy	Annex K Public Works/Utilities
ESF-13 Public Safety	Annex H Law Enforcement
	Annex Y Urban Terrorism/Civil Disobedience Operations
ESF-14 Long Term Recovery	Annex C Damage Assessment
	Annex R Recovery Operations
ESF-15 External Affairs	Annex D Emergency Public Information
Incident Specific Annex: Duane Arnold Energy Center Radiological Emergency Response Plan	Annex W Radiological Emergency Response Plan

5. Linn County Zoning Code

Linn County has a Unified Development Code which has been updated in April 2007. The purposes of this Ordinance are to:

1. Implement Rural Land Use Plan. Implement the goals and objectives of the Linn County Rural Land Use Plan adopted May 3, 2000, by the Linn County Board of Supervisors, including:
   (a) Encourage the long-term viability of agriculture
   (b) Protect private property rights
   (c) Discourage sprawl and promote smart growth
   (d) Provide a choice of housing alternatives
   (e) Protect and conserve natural resources

(f) Provide for adequate public facilities and services
(g) Provide for a safe, effective transportation system

2. Incorporate IDO. Incorporate the Interim Development Ordinance adopted July 1, 2002, and as amended August 5, 2002.

3. Update ordinances. Unify and update all land development ordinances existing prior to the adoption of this Ordinance, including the Zoning Ordinance, Interim Development Ordinance, Subdivision Regulations, Tower Ordinance, Flood Plain Management Ordinance, and Mobile Home Park Ordinance.

4. Police powers. Promote and protect the health, safety and general welfare of the County and its residents.

5. Order and consistency. Establish orderly and consistent procedures to plan and oversee development.

HAZARD MITIGATION PLAN GOALS

The hazard mitigation plan goals were identified by the Lisbon and Mount Vernon Hazard Mitigation Planning Committee at their December 8, 2010 committee meeting. The committee set as a priority the development of broad based goals that would address a multitude of hazards and encompass a variety of mitigation actions. The priority of the Lisbon and Mount Vernon Hazard Mitigation Plan is to develop mitigation actions that:

1. can affect multiple hazards;
2. improve the quality of life for the residents of the Cities;
3. take steps to mitigate the consequences of hazards;
4. identify funding sources for mitigation actions;
5. protect the health of the residents of the Cities;
6. ensure a return to pre-disaster conditions as soon as possible; and
7. ensure compliance in the NFIP.

Each of the mitigation actions identified as a "Future Hazard Mitigation Action" in the section below can be related to at least one of the hazard mitigation plan goals.

Priority I	
RANKING 1	Thunderstorm and Lightning
Action Description	
Require Storm Shelters in Mobile/Manufactured Home Developments if possible.	
Request the Iowa Legislature revise Iowa Code to allow shelter space in mobile/manufactured home developments to meet National Performance Standards.	
Encourage storm safe rooms be offered by developers in new residential construction (single and multi-family) in existing homes as a retrofit.	
Encourage community storm shelters and refuge areas in daycare center and public recreation areas, to include construction of reinforced shower/dressing rooms in pool facilities for use as storm shelters.	
Encourage projects to make schools, day care, adult care, and other facilities to protect from wind damage, such as window protection.	
Develop education programs on safe rooms and other steps to mitigate the effects of tornadoes and high winds.	
Encourage developers/contractors to offer and market wind resistant material for residential and commercial construction.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies.	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Educate residents on the importance of flood, renters, and homeowners insurance.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.	

Develop community shelter.

Priority I	
RANKING 2	Roadway Transportation Incident
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Maintain and improve the snow emergency route and evacuation plan.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority I	
RANKING 3	Flash Flooding
Action Description	
The City will continue to participate in the NFIP.	
The City should ensure that there continues to be at least one person appointed as flood plain manager in accordance with the Flood Plain Management Ordinance. The designee should attend training to ensure knowledge of federal and state regulations and county compliance with the local ordinances and NFIP.	
The City will consider entering the Community Rating System (CRS) and raise the flood plain management standards.	
Update all Flood Hazard Maps.	
Develop and implement watershed protection plans.	
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Educate residents on the importance of flood, renters, and homeowners insurance.	
Educate homeowners about check valves.	
Develop community shelter.	
Press forward on plans for bypass and absorption field.	

Priority I	
RANKING 4	Tornadoes
Action Description	
Require Storm Shelters in Mobile/Manufactured Home Developments if possible.	
Request the Iowa Legislature revise Iowa Code to allow shelter space in mobile/manufactured home developments to meet National Performance Standards.	
Encourage storm safe rooms be offered by developers in new residential construction (single and multi-family) and in existing homes as a retrofit.	

Encourage community storm shelters and refuge areas in daycare center and public recreation areas, to include construction of reinforced shower/dressing rooms in pool facilities for use as storm shelters.
Encourage projects to make schools, day care, adult care, and other facilities to protect from wind damage, such as window protection.
Develop education programs on safe rooms and other steps to mitigate the effects of tornadoes and high winds.
Encourage developers/contractors to offer and market wind resistant material for residential and commercial construction.
Develop processes and procedures for alerting the deaf and blind population of local emergencies.
Educate residents on the importance of flood, renters, and homeowners insurance.
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.
Develop a public awareness program to inform the residents of the risk from this hazard.
Expand warning sirens in public recreation areas not covered by existing sirens.
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.
Develop community shelter.

Priority I	
RANKING 5	Transportation of Hazardous Materials Incident
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Continue with cooperation between communities and participating in training exercises.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Maintain and improve the snow emergency route and evacuation plan.	
Provide mapping of past chemical contamination in areas for historical and planning activities.	
Educate area businesses on HAZMAT mitigation techniques.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority I	
RANKING 6	Energy Failure
Action Description	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Continue with cooperation between communities and participating in training exercises.	

Develop a public awareness program to inform the residents of the risk from this hazard.

Priority II	
RANKING 7	Severe Winter Storms
Action Description	
Maintain and improve the snow emergency route and evacuation plan.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Educate residents on the importance of flood, renters, and homeowners insurance.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Develop community shelter.	

Priority II	
RANKING 8	Pipeline Transportation Incident
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Continue with cooperation between communities and participating in training exercises.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Maintain and improve the snow emergency route and evacuation plan.	
Provide mapping of past chemical contamination in areas for historical and planning activities.	
Educate area businesses on HAZMAT mitigation techniques.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Educate residents on the importance of flood, renters, and homeowners insurance.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	

Priority II	
RANKING 9	Hailstorms
Action Description	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences,	

through public awareness programs.
Develop a public awareness program to inform the residents of the risk from this hazard.
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.
Educate residents on the importance of flood, renters, and homeowners insurance.
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.
Develop community shelter.

Priority II	
RANKING 10	Communications Failure
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Continue with cooperation between communities and participating in training exercises.	

Priority II	
RANKING 11	Rail Transportation Incident
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority II	
RANKING 12	Radiological Transportation Incident
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	

Expand warning sirens in public recreation areas not covered by existing sirens.
Maintain and improve the snow emergency route and evacuation plan.
Provide mapping of past chemical contamination in areas for historical and planning activities.
Educate area businesses on HAZMAT mitigation techniques.
Develop a public awareness program to inform the residents of the risk from this hazard.
Continue with cooperation between communities and participating in training exercises.

Priority II	
RANKING 13	Drought
Action Description	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority II	
RANKING 14	Windstorms
Action Description	
Require Storm Shelters in Mobile/Manufactured Home Developments if possible.	
Request the Iowa Legislature revise Iowa Code to allow shelter space in mobile/manufactured home developments to meet National Performance Standards.	
Encourage storm safe rooms be offered by developers in new residential construction (single and multi-family) and in existing homes as a retrofit.	
Encourage community storm shelters and refuge areas in daycare center and public recreation areas, to include construction of reinforced shower/dressing rooms in pool facilities for use as storm shelters.	
Encourage projects to make schools, day care, adult care, and other facilities to protect from wind damage, such as window protection.	
Develop education programs on safe rooms and other steps to mitigate the effects of tornadoes and high winds.	
Encourage developers/contractors to offer and market wind resistant material for residential and commercial construction.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies.	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Educate residents on the importance of flood, renters, and homeowners insurance.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.	
Develop community shelter.	

Priority II	
RANKING 15	Structural Failure

Action Description
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.
Continue with cooperation between communities and participating in training exercises.
Expand a public awareness program to inform the residents of the risk from this hazard.
Educate residents on the importance of flood, renters, and homeowners insurance.
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.

Priority II	
RANKING 16	Public Disorder
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 17	Conventional Terrorism
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 18	Human Disease Incident
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 19	Structural Fire
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Coordinate incentives for developers and homeowners to install residential sprinklers as retrofits and in new construction.	
Develop a public awareness program on the benefits of home sprinkler systems.	
Educate residents on the importance of flood, renters, and homeowners insurance.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.	

Priority III	
RANKING 20	Fixed Hazardous Materials
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Provide mapping of past chemical contamination in areas for historical and planning activities.	
Encourage the Iowa Legislature to revise state code to enable local government to regulate agriculture fertilizer facilities in urban/residential.	
Encourage the Iowa Legislature to allow the assessment of fees from chemical facilities to pay for local hazardous material preparedness and response programs.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Maintain and improve the snow emergency route and evacuation plan.	
Educate area businesses on HAZMAT mitigation techniques.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Incorporate floodplain management and other hazard mitigation efforts into community development planning efforts.	

Priority III	
RANKING 21	Extreme Heat
Action Description	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies	

and encourage monitoring of the elderly as part of neighborhood watch programs.
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.
Develop community shelter.

Priority III	
RANKING 22	Chemical Terrorism
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly as part of neighborhood watch programs.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 23	Animal/Plant/Crop Disease
Action Description	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 24	Human Disease Pandemic
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly as part of neighborhood watch programs.	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 25	Bioterrorism
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities,	

equipment, staffing, budgeting.
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.
Continue with cooperation between communities and participating in training exercises.
Develop a public awareness program to inform the residents of the risk from this hazard.

Priority III	
RANKING 26	Fixed Radiological Incident
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.	
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.	
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.	
Provide mapping of past chemical contamination in areas for historical and planning activities.	
Educate area businesses on HAZMAT mitigation techniques.	
Expand warning sirens in public recreation areas not covered by existing sirens.	
Maintain and improve the snow emergency route and evacuation plan.	
Develop a public awareness program to inform the residents of the risk from this hazard.	
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.	
Continue with cooperation between communities and participating in training exercises.	

Priority III	
RANKING 27	Cyber-Terrorism
Action Description	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 28	Agro-Terrorism
Action Description	
Continue with cooperation between communities and participating in training exercises.	
Develop a public awareness program to inform the residents of the risk from this hazard.	

Priority III	
RANKING 29	Radiological Terrorism
Action Description	
Develop a public awareness program to inform the public on the need to expand police, fire, and	

EMS response capabilities as the community grows. This includes site selection, facilities, equipment, staffing, budgeting.
Continue with cooperation between communities and participating in training exercises.
Encourage homeowners to purchase NOAA Tone Alert Weather Radios for their private residences, through public awareness programs.
Maintain and improve the snow emergency route and evacuation plan.
Develop processes and procedures for alerting the deaf and blind population of local emergencies and encourage monitoring of the elderly and special needs population as part of neighborhood watch programs.
Require festival/large event organizers to develop and coordinate emergency plans and procedures as part of the permitting process.
Expand warning sirens in public recreation areas not covered by existing sirens.
Develop a public awareness program to inform the residents of the risk from this hazard.

HAZARD MITIGATION PRIORITIES:

On the following pages is a list of the projects that can be completed in the City of Lisbon to reduce loss or damages from hazards. This list of projects has been completed based on input from the Lisbon and Mount Vernon Hazard Mitigation Committee and by researching projects that would be beneficial to the community. By listing these projects in the plan, it does not mean that the City of Lisbon is required to do them. These are potential actions the City of Lisbon could do in the future should funds become available.

Mitigation alternatives or actions need to be prioritized based on certain considerations. FEMA recommends using the STAPLEE evaluation, as this process addresses all the major factors when weighing the costs to the benefits of implementing one action over another. An explanation of the STAPLEE criteria can be found in Appendix 2.

Lisbon Projects	Social	Technical	Administrative	Political	Legal	Economical	Environmental	TOTAL VALUE
Develop Public Awareness Campaign on Local Hazards	+	+	+	+	+	+	+	+
Develop Process to Notify Special Needs Population	+	+	+	+	+	+	+	+
Develop Program to Educate the Public of the Need to Expand Emergency Services as the Community Grows	+	+	+	+	+	+	+	+
Educate Residents about NOAA Radios	+	+	+	+	+	+	+	+
Continue With Cooperation Between Communities and Participating in Training Exercises	+	+	+	+	+	+	+	+
Adopt New Restrictive Permit Process for Large Activities	+	+	+	+	+	+	+	+
Expand Warning Sirens Into Public Areas Not Already Covered	+	+	+	+	+	0	0	+
Incorporate Floodplain Management and Other Hazard Mitigation Efforts Into Community Planning	+	+	+	+	+	+	+	+
Educate Residents on Importance of Flood, Renters, and Homeowners Insurance	+	+	+	+	+	+	+	+
Maintain and Improve Snow Emergency Route and Evacuation	+	+	+	+	+	+	+	+

Plan								
Encourage Storm Safe Rooms in New Developments and Retrofits in Existing Homes	+	+	+	+	+	+	+	+
Enter into the CRS	+	+	+	+	+	+	+	+
Develop Education Program on Safe Rooms	+	+	+	+	+	+	+	+
Continue to Have Trained Flood Plain Manager	+	+	+	+	+	+	+	+
Update Flood Hazard Maps	+	+	+	+	+	0	+	+
Develop and Implement Watershed Protection Plan	+	+	+	+	+	0	+	+
Continued Participation in NFIP	+	+	+	+	+	+	+	+
Lobby IA Legislature to Revise IA Code to Mandate Shelter Space in Mobile/Modular Home Developments in Accordance With NPS	+	+	0	+	+	0	+	+
Educate homeowners about check valves.	+	+	+	+	+	+	+	+
Develop community shelter.	+	+	+	+	+	+	+	+
Press forward on plans for bypass and absorption field.	+	+	+	+	+	+	+	+
Educate Area Businesses on HAZMAT Mitigation Techniques	+	+	+	+	+	+	+	+
Provide Mapping of Past HAZMAT Incidents	+	+	+	+	+	+	+	+
Encourage Community Storm Shelters and Refuge areas in Public Recreation Areas and Daycare Centers	+	+	+	+	+	+	+	+
Encourage Projects to Make Schools, Day Care, Adult Care, and Other Facilities to Protect From Wind Damage, Such as Window Protection.	+	+	+	+	+	+	+	+
Encourage Developers/Contractors to Offer and Market Wind Resistant Material for Residential and Commercial Construction.	+	+	+	+	+	+	+	+
Requiring Storm Shelters in New Mobile/Manufactured Home Developments	+	+	+	+	+	+	+	+
Educate Residents and Developers in Benefits of Sprinkler Systems	+	+	+	+	+	+	+	+
Coordinate Incentives For Developers and Homeowners to Install Residential Sprinklers as Retrofits and In New Construction	+	+	+	+	+	+	+	+
Lobby IA Legislature to Revise IA Code to Enable Local Government to Regulate Agricultural Fertilizer Facilities in Urban /Residential Areas	+	+	0	+	+	0	+	+
Lobby IA Legislature to Revise IA Code to Allow the Assessment of Fees From Chemical Facilities to pay for HAZMAT Programs	+	+	0	+	+	0	+	+

All the mitigation measures included in the list received a preponderance of positive ratings. All mitigation measures received positive ratings in the Social, Technical, Political and Legal categories. The economic category received the highest number of neutral ratings (unable to determine). For example, a funding source may be identifiable (such as Pre-disaster mitigation), but the availability of funds is often uncertain.

The following Mitigation Action Matrixes provide an analysis of the action, hazard(s) addressed, timeline for completion, estimated cost (if available), responsible party, mitigation category; identify the related goal(s); and give the priority of each measure addressed.

An explanation of the related planning goals can be found in Appendix 3.

Develop Public Awareness Campaign on Local Hazards	
Action Step	**Description**

Analysis	The education programs already exist and could be easily modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 2. Roadway Transportation Incident, 3. Flash Flood, 4. Tornadoes, 5. Transportation Hazardous Materials Incident, 6. Energy Failure, 7 Severe Winter Storm, 8. Pipeline Transportation Incident, 9. Hailstorm, 10. Communications Failure, 11. Rail Transportation, 12. Radiological Transportation, 13. Drought, 14. Windstorm, 15. Structural Failure, 16. Public Disorder, 17. Conventional Terrorism, 18. Human Disease Incident, 19. Structural Fire, 20. Fixed Hazardous Materials Incident, 21. Extreme Heat, 22. Chemical Terrorism, 23. Animal/Plant/Crop Disease, 24. Human Disease Pandemic, 25. Bioterrorism, 26. Fixed Radiological Incident, 27. Cyber Terrorism, 28. Agro-Terrorism, 29. Radiological Terrorism
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Education and Awareness
Related Goals	1,3,5
Priority	1

Develop Process to Notify Special Needs Population	
Action Step	Description
Analysis	The education programs already exist and could be easily modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 3. Flash Flood, 4. Tornadoes, 5. Transportation Hazardous Materials Incident, 7 Severe Winter Storm, 8. Pipeline Transportation Incident, 9. Hailstorm, 10. Communications Failure, 12. Radiological Transportation, 14. Windstorm, 17. Conventional Terrorism, 18. Human Disease Incident, 20. Fixed Hazardous Materials Incident, 21. Extreme Heat, 22. Chemical Terrorism, 24. Human Disease Pandemic, 25. Bioterrorism, 26. Fixed Radiological Incident, 29. Radiological Terrorism
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Public Education and Awareness
Related Goals	1,3,5
Priority	1

Develop Program to Educate the Public of the Need to Expand Emergency Services as the Community Grows	
Action Step	Description
Analysis	The education programs already exist and could be easily

	modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 5. Transportation Hazardous Materials Incident, 8. Pipeline Transportation Incident, 10. Communications Failure, 11. Rail Transportation, 12. Radiological Transportation, 14. Windstorm, 15. Structural Failure, 16. Public Disorder, 17. Conventional Terrorism, 18. Human Disease Incident, 19. Structural Fire, 20. Fixed Hazardous Materials Incident, 22. Chemical Terrorism, 24. Human Disease Pandemic, 25. Bioterrorism, 26. Fixed Radiological Incident, 29. Radiological Terrorism
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Public Education and Awareness
Related Goals	1,3,5
Priority	1

Educate Residents about NOAA Radios	
Action Step	Description
Analysis	The education programs already exist and could be easily modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 3. Flash Flood, 4. Tornadoes, 5. Transportation Hazardous Materials Incident, 7 Severe Winter Storm, 8. Pipeline Transportation Incident, 9. Hailstorm, 10. Communications Failure, 12. Radiological Transportation, 14. Windstorm, 20. Fixed Hazardous Materials Incident, 21. Extreme Heat, 22. Chemical Terrorism, 26. Fixed Radiological Incident
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Public Education and Awareness
Related Goals	1,3,5
Priority	1

Continue With Cooperation Between Communities and Participating in Training Exercises	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events and to aid in response and recovery efforts.
Hazards Addressed	4. Tornadoes, 5. Transportation Hazardous Materials Incident, 6. Energy Failure, 8. Pipeline Transportation Incident, 10. Communications Failure, 11. Rail Transportation, 12. Radiological Transportation, 15. Structural Failure, 16. Public Disorder, 17. Conventional Terrorism, 18. Human Disease Incident, 19. Structural Fire, 20. Fixed Hazardous Materials

	Incident, 22. Chemical Terrorism, 24. Human Disease Pandemic, 25. Bioterrorism, 26. Fixed Radiological Incident, 27. Cyber Terrorism, 28. Agro-Terrorism, 29. Radiological Terrorism
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Public Education and Awareness
Related Goals	1,3,5
Priority	1

Adopt New Restrictive Permit Process for Large Activities	
Action Step	Description
Analysis	This would include the revision and adoption of new permit processes. The Planning Committee is advising this action to mitigate the risk to residents and visitors from future events.
Hazards Addressed	1. Thunder and Lightning, 3. Flash Flood, 4. Tornadoes, 5. Transportation Hazardous Materials Incident, 7 Severe Winter Storm, 9. Hailstorm, 12. Radiological Transportation, 14. Windstorm, 16. Public Disorder, 17. Conventional Terrorism, 20. Fixed Hazardous Materials Incident, 21. Extreme Heat, 22. Chemical Terrorism, 26. Fixed Radiological Incident, 29. Radiological Terrorism
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Prevention
Related Goals	1,3,5
Priority	1

Expand Warning Sirens Into Public Areas Not Already Covered	
Action Step	Description
Analysis	There is currently 100% coverage of all populated areas.
Hazards Addressed	1. Thunder and Lightning, 3. Flash Flood, 4. Tornadoes, 5. Transportation Hazardous Materials Incident, 8. Pipeline Transportation Incident, 9. Hailstorm, 10. Communications Failure, 12. Radiological Transportation, 14. Windstorm, 20. Fixed Hazardous Materials Incident, 22. Chemical Terrorism, 26. Fixed Radiological Incident
Timeline	Ongoing
Estimated Cost	
Responsible Party	City
Mitigation Measure Category	Emergency Services
Related Goals	1,3,5
Priority	2

Incorporate Floodplain Management and Other Hazard Mitigation Efforts Into Community Planning

Action Step	Description
Analysis	The Planning Commission feels that by incorporating floodplain management and other hazard mitigation efforts into community planning is a cost effective way to mitigate the risk from future hazards, to include encouraging development and raising existing homes above flood levels.
Hazards Addressed	1. Thunder and Lightning, 3. Flash Flood, 4. Tornadoes, 9. Hailstorm, 14. Windstorm, 15. Structural Failure, 20. Fixed Hazardous Materials Incident
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Prevention
Related Goals	1,2,3,4,5,6,7
Priority	1

Educate Residents on Importance of Flood, Renters, and Homeowners Insurance	
Action Step	Description
Analysis	The education programs already exist and could be easily modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 3. Flash Flood, 4. Tornadoes, 7 Severe Winter Storm, 9. Hailstorm, 14. Windstorm, 15. Structural Failure, 19. Structural Fire
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Education and Awareness
Related Goals	1,3,5
Priority	1

Maintain and Improve Snow Emergency Route and Evacuation Plan	
Action Step	Description
Analysis	City employees carry out this function and the City is aware of its importance.
Hazards Addressed	5. Transportation Hazardous Materials Incident, 7 Severe Winter Storm, 11. Rail Transportation, 12. Radiological Transportation, 26. Fixed Radiological Incident
Timeline	Ongoing
Estimated Cost	Minimal to Medium
Responsible Party	City
Mitigation Measure Category	Emergency Services
Related Goals	1,2,3,5,6,
Priority	1

Encourage Storm Safe Rooms in New Developments and Retrofits in Existing Homes	
Action Step	Description

Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 14. Windstorm
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Public Education and Awareness
Related Goals	1,3,5
Priority	1

Enter into the CRS	
Action Step	Description
Analysis	Recent flooding has pushed the importance of participating in the Community Rating System (CRS). As a result of participating in the CRS flood insurance premium rates are discounted based on the rating class the community achieved. The Planning Committee has agreed that participation would benefit the City's residents and economy.
Hazards Addressed	3. Flash Flooding
Timeline	Ongoing
Estimated Cost	Medium
Responsible Party	City
Mitigation Measure Category	Property Protection
Related Goals	1,2,3,4,5,6,7
Priority	1

Develop Education Program on Safe Rooms	
Action Step	Description
Analysis	The education programs already exist and could be easily modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 14. Windstorm
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Public Education and Awareness
Related Goals	1,3
Priority	1

Continue to Have Trained Flood Plain Manager	
Action Step	Description
Analysis	In order to manage an effective flood plain program the City should continue to have a designated flood plain manager and have them attend relevant training. The Planning Committee feels that this would directly benefit the City's residents and economy.
Hazards Addressed	3. Flash Flooding
Timeline	Ongoing
Estimated Cost	Minimal

Responsible Party	City
Mitigation Measure Category	Prevention
Related Goals	1,3,4,5,7
Priority	1

Update Flood Hazard Maps	
Action Step	**Description**
Analysis	The recent unprecedented flooding has shown the need for updated flood insurance maps. According to the FEMA LOMA dated September 27, 2007, FEMA is currently working to revise the NFIP map for the community.
Hazards Addressed	3. Flash Flooding
Timeline	Ongoing
Estimated Cost	
Responsible Party	FEMA
Mitigation Action Category	Prevention
Related Goals	1,3,5,7
Priority	2

Develop and Implement Watershed Protection Plan	
Action Step	**Description**
Analysis	The recent flooding has shown the need for a watershed protection plan. The Planning Committee has agreed that developing and implementing a watershed protection plan would benefit the City's residents and economy by mitigating the risk from future events.
Hazards Addressed	3. Flash Flooding
Timeline	Long-term
Estimated Cost	
Responsible Party	USDA, CDBG, IDNR
Mitigation Measure Category	Structural
Related Goals	1,2,3,5
Priority	2

Continued Participation in NFIP	
Action Step	**Description**
Analysis	Recent flooding has pushed the importance of participating in the NFIP. The Hazard Mitigation Planning Committee feels that continued participation would benefit the City's residents and economy.
Hazards Addressed	3. Flash Flooding
Timeline	Ongoing
Estimated Cost	Medium
Responsible Party	Resident
Mitigation Action Category	Property Protection
Related Goals	1,3,5,7
Priority	1

Lobby IA Legislature to Revise IA Code to Mandate Shelter Space in Mobile/Modular Home Developments in Accordance With NPS	
Action Step	**Description**
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 14. Windstorm
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City and Residents
Mitigation Measure Category	Prevention
Related Goals	1,2,3,4,5
Priority	1

Educate Homeowners about Check Valves	
Action Step	**Description**
Analysis	The Hazard Mitigation Planning Committee feels that by educating homeowners on the benefits of check valves in home sewer lines could mitigate the risk from future damage from backflow due to flooding.
Hazards Addressed	3. Flash Flooding
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Public Education and Awareness
Related Goals	1,3,5
Priority	1

Develop Community Shelter	
Action Step	**Description**
Analysis	This would include developing a shelter outside the flood plain that is tornado rated and self sustaining. The Planning Committee feels that a shelter of this type could reduce the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 3. Flash Flood, 4. Tornadoes, 7 Severe Winter Storm, 9. Hailstorm, 14. Windstorm, 21. Extreme Heat
Timeline	Ongoing
Estimated Cost	Medium
Responsible Party	City
Mitigation Measure Category	Structural Project
Related Goals	1,2,3,5
Priority	1

Press Forward on Plans for Bypass and Absorption Field	
Action Step	**Description**
Analysis	The Planning Committee feels that the City should continue pressing forward on opening sediment from the old river channel east of town for bypass and absorption field.
Hazards Addressed	3. Flash Flooding
Timeline	Ongoing

Estimated Cost	Medium
Responsible Party	City
Mitigation Measure Category	Natural Resource Protection
Related Goals	1,3,5
Priority	1

Requiring Storm Shelters in New Mobile/Manufactured Home Developments	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 14. Windstorm
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Prevention
Related Goals	1,3,5
Priority	1

Educate Area Businesses on HAZMAT Mitigation Techniques	
Action Step	Description
Analysis	The education programs already exist and could be easily modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	5. Transportation Hazardous Materials Incident, 8. Pipeline Transportation Incident, 12. Radiological Transportation, 20. Fixed Hazardous Materials Incident, 26. Fixed Radiological Incident, 29. Radiological Terrorism
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Education and Awareness
Related Goals	1,3,5
Priority	1

Provide Mapping of Past HAZMAT Incidents	
Action Step	Description
Analysis	The company with HAZMAT materials on site has a good track record and information from transportation accidents is easily obtained.
Hazards Addressed	5. Transportation Hazardous Materials Incident, 8. Pipeline Transportation Incident, 12. Radiological Transportation, 20. Fixed Hazardous Materials Incident, 26. Fixed Radiological Incident
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Prevention

Related Goals	1,3
Priority	1

Encourage Community Storm Shelters and Refuge areas in Public Recreation Areas and Daycare Centers	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 14. Windstorm
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Action Category	Prevention
Related Goals	1,3,5
Priority	1

Encourage Projects to Make Schools, Day Care, Adult Care, and Other Facilities to Protect From Wind Damage, Such as Window Protection.	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 14. Windstorm
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Action Category	Prevention
Related Goals	1,3,5
Priority	1

Encourage Developers/Contractors to Offer and Market Wind Resistant Material for Residential and Commercial Construction.	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	1. Thunder and Lightning, 4. Tornadoes, 14. Windstorm
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Action Category	Prevention
Related Goals	1,3,5
Priority	1

Educate Residents and Developers in Benefits of Sprinkler Systems	
Action Step	Description
Analysis	The education programs already exist and could be easily modified for the City's need. The Planning Committee is advising this action to mitigate the risk to residents from future

	events.
Hazards Addressed	19. Structural Fire
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Measure Category	Education and Awareness
Related Goals	1,3,5
Priority	1

Coordinate Incentives For Developers and Homeowners to Install Residential Sprinklers as Retrofits and In New Construction	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	19. Structural Fire
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City
Mitigation Action Category	Prevention
Related Goals	1,3,5
Priority	1

Lobby IA Legislature to Revise IA Code to Enable Local Government to Regulate Agricultural Fertilizer Facilities in Urban /Residential Areas	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	20. Fixed Hazardous Materials Incident
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City and Residents
Mitigation Measure Category	Prevention
Related Goals	1,2,3,4,5
Priority	1

Lobby IA Legislature to Revise IA Code to Allow the Assessment of Fees From Chemical Facilities to pay for HAZMAT Programs	
Action Step	Description
Analysis	The Planning Committee is advising this action to mitigate the risk to residents from future events.
Hazards Addressed	20. Fixed Hazardous Materials Incident
Timeline	Ongoing
Estimated Cost	Minimal
Responsible Party	City and Residents
Mitigation Measure Category	Prevention
Related Goals	1,2,3,4,5
Priority	1

In an effort to establish a prioritization of mitigation actions, the Lisbon and Mount Vernon Hazard Mitigation Planning Committee conducted an analysis to determine which of the mitigation actions listed above were "high pay-off" actions. These "high pay-off" actions are generally actions that are technically feasible and cost-effective while also providing for multiple benefits or risk reduction related to multiple hazards. Additionally, actions that are prioritized are associated with mitigation of higher priority hazards from the hazard analysis and risk assessment process.

For this analysis, actions were weighted according to the hazard priority group classification (see pages L-94 & 95) of the hazard the action is designed to address. A measure that addresses a hazard listed in priority group I was given a score of 3, priority group II a score of 2, and priority group III a score of 1. The actions with higher total scores are higher priority actions. The highest score possible was 51, while the lowest score was 1. The mitigation actions and their respective scores are listed below:

Rating	Mitigation Action	Score
1	Develop Public Awareness Campaign on Local Hazards	51
2	Develop a process for alerting special populations of emergencies	33
3	Develop Program to Educate the Public of the Need to Expand Emergency Services as the Community Grows	32
4	Continue with Cooperation Between Communities and Participating in Training Exercises	32
5	Educate Residents about NOAA Radios	28
6	Require large event organizers to develop and coordinate emergency plans	28
7	Expand Warning Sirens Into Public Area Not Already Covered	25
8	Educate Residents on Importance of Flood, Renters, and Homeowners Insurance	18
9	Incorporate Floodplain Management and Other Hazard Mitigation Efforts Into Community Planning	16
10	Develop Community Shelter	12
11	Provide Mapping of Past HAZMAT Incidents	11
12	Maintain and Improve Snow Emergency Route and Evacuation Plan	10
13	Educate Area Businesses on HAZMAT Mitigation Techniques	9
14	Encourage Storm Safe Rooms in New Developments and Retrofits in Existing Homes	8
15	Develop Education Program on Safe Rooms	8
16	Lobby IA Legislature to revise Iowa Code to Mandate Shelter Space in Mobile/Modular Home Developments in Accordance With NPS	8
17	Require Storm Shelters in New Mobile/Manufactured Home Developments	8
18	Encourage Community Storm Shelters and Refuge Areas in Public Recreation Areas and Daycare Centers	8
19	Encourage Projects to Make Schools, Day Care, Adult Care, and Other Facilities to Protect From Wind Damage, Such as Window Protection	8
20	Encourage Developers/Contractors to Offer and Market Wind Resistant Material for Residential and Commercial Construction	8
21	Enter into the CRS	3
22	Continue to Have Trained Flood Plain Manager	3
23	Update Flood Hazard Maps	3
24	Develop and Implement Watershed Protection Plan	3

25	Continue to Participate in NFIP	3
26	Educate Homeowners about Check Valves	3
27	Press Forward on Plans for Bypass and Absorption Field	3
28	Coordinate Incentives for Developers and Homeowners to Install Residential Sprinklers as Retrofits and in New Construction	1
29	Lobby IA Legislature to Revise IA Code to Enable Local Government to Regulate Agricultural Fertilizer in Urban/Residential Areas	1
30	Lobby IA Legislature to Revise IA Code to Allow the Assessment of Fees From Chemical Facilities to Pay for HAZMAT Programs	1

The result of this analysis supports conclusions that planning actions generally are the highest priority. Generally, public education and various types of hazard or risk reduction training and education actions were also evaluated as being consistently a high priority.

While this method of comprehensively prioritizing hazard mitigation actions is effective, it is recognized that mitigation funding availability, disaster specific events and associated disaster response and recovery actions can result in the prioritization of specific mitigation actions that contribute to the disaster recovery process. In Iowa this holds true in particular for flood retrofitting projects for critical facilities and infrastructure as well as the acquisition and/or relocation of repetitive loss residential and commercial structures.

PLAN IMPLEMENTATION AND EVALUATION:

1. Plan Adoption and Amendment

This Plan and any future amendments to the Plan shall occur only after an official public notice has been posted in a local publication announcing a public hearing on the matter. After the public has had the opportunity to review the proposed amendments, the City Council may, by resolution, choose to accept any amendment to the Plan. Any and all amendments made to this Plan should be shared with the Linn County Emergency Management Agency and the Iowa Department of Homeland Security and Emergency Management Division.

2. Phasing

Phasing is a budgetary responsibility of Lisbon City Council who will review the projects annually. It is recommended that this review be incorporated into the City's annual Capital Improvements Program update procedure. For projects that require a local match commitment, the City should begin setting aside appropriate resources to meet the match liability.

3. Monitoring, Evaluation, and Review Process

In order to appropriately monitor actions prescribed in the Lisbon and Mount Vernon Hazard Mitigation Plan, the Lisbon City Council will require agencies implementing actions identified in the Plan to submit monthly progress reports to the Council. The Planning Committee will then use this data to compile an annual report to present to the City Council. The following is the criteria the Planning Committee will use in evaluating the Plan:

Procedures and Techniques

Task A. Evaluate the effectiveness of the planning process.

1. Reconvene the Planning Team.
2. Review your Planning Process.

Items to Discuss:

a. Building the Planning Team.
b. Engaging the Public.
c. Data Gathering and Analysis.
d. Coordinating with other Agencies.

Task B. Evaluate the effectiveness of your actions.

1. What were the results of the implemented action? Did the results achieve the goals/objectives outlined in the plan? Did the actions have the intended results?
2. Were the actions cost-effective? Did (or would) the project result in the reduction of potential losses?
3. Document actions which were slow to get started or not implemented.

Task C. Determine why the actions worked (or did not work).

1. Lack of available resources.

2. The political or popular support for or against the action.
3. The availability of funds.
4. The workloads of the responsible parties.
5. The actual time necessary to implement the actions.

The City Council and Hazard Mitigation Committee shall review the Plan at least every five years or in conjunction with funding requests for federal disaster funds. The Planning Committee, to be comprised of representatives from all City Departments, members of the public, and elected officials, will review and evaluate progress on the Mitigation Plan. The Planning Committee will invite a cross section of the community to participate in any future meetings regarding the update or amendment of the Plan. In addition, public notice will be posted at City Hall inviting the general public to participate as members of the Planning Committee and/or to review the Plan and provide comments. Copies of the Plan and the Committee's review will be available at City Hall. Following the Planning Committee's completion of the review process, the findings of the annual review and recommended changes, if applicable, will be presented during the City Council meeting. A public meeting will be held at that time. It is recognized that some of the programs are voluntary and participation will be encouraged. Others will be dependent on the availability of funds. Grant applications and other notices of interest will be made to assist in the accomplishment of these priorities, as they become available.

4. Incorporating into Existing Planning Mechanism

Sections of this Plan will be incorporated into the Linn County Hazard Mitigation Plan and the Code of Ordnances for the City of Lisbon.

5. Continued Public Participation

In order to ensure that the public remains involved in the future implementation of this Plan, it shall remain on hand at City Hall. This Plan shall be made available to any party who requests to see it. Furthermore, if the City intends to make amendments to the Plan, a posted public notice should be made available so that the public can be made aware. Public notice should also be posted for any meetings that deal with the amendment of this Plan. Said meetings are to remain open to the public.