

**REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES**



---

**Cover logo under development**

Version 1.1

**REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES**

*This page intentionally left blank*

# REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

## TABLE OF CONTENTS

| <b>Section</b> | <b>Topic</b>                          | <b>Page</b> |
|----------------|---------------------------------------|-------------|
|                | Cover Page                            | 1           |
|                | <i>Blank</i>                          | 2           |
|                | Table of Contents                     | 3           |
| Section 1.1    | Purpose of Guideline                  | 4           |
| Section 1.2    | Background                            | 4-5         |
| Section 1.3    | Document Definitions                  | 6           |
| Section 1.4    | OWS Activation Rationale and Theory   | 7           |
| Section 1.5    | OWS Activation Recommended Guidelines | 7-8         |
| Section 1.6    | Notification of OWS Activation        | 8           |
| Section 1.7    | Monthly OWS Testing                   | 8           |
| Section 1.8    | Unacceptable Practices                | 9-10        |
| Section 1.9    | NWSChat                               | 10-11       |
| Section 2.1    | NOAA-NWS StormReady Program           | 12-13       |
| Section 2.2    | Public Severe Weather Education       | 14          |
| Section 2.3    | Alternative Warning Methods           | 15-16       |
| Section 2.4    | Social Media Streams and EM           | 17          |
| Section 3.1    | Siren Infrastructure Upgrades         | 18          |
| Section 4.1    | Region H OWS Working Group Members    | 19          |
|                | Bibliography                          | 20-21       |

# **REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES**

## **SECTION 1.1: PURPOSE OF GUIDELINE**

The purpose of this standardization protocol is to establish common guidelines for the activation of outdoor warning sirens (OWS) throughout Region H. Region H is composed of 15 counties and local jurisdictions in northwest and north central Missouri.

The intent of this guideline is to enhance decision making by citizens when outdoor warning sirens are activated. It is **NOT** intended to remove a jurisdiction's obligation or responsibility to alert or warn its community if a situation falls outside of the parameters of this policy.

Outdoor warning sirens represent only one part of the public emergency notification system. Other components include: National Oceanic and Atmospheric Administration (NOAA) All-Hazards Weather Radio, National Weather Service (NWS), NWSChat, law enforcement, fire service, emergency management, text notification networks, private sector meteorologists, and the broadcast media. Sirens are used to alert citizens of an imminent hazard, prompt them to take immediate action in finding shelter, and, once there, seek additional information on the threat to life and property.

## **SECTION 1.2: BACKGROUND**

In 2011, there were over 1,600 tornadoes reported in the United States. These supercell storms spawned tornadoes in 48 of the 50 states and claimed 550 lives. In addition to the large loss of life there was over \$21.5 billion in insured property loss.

The National Weather Service (NWS), in collaboration with social scientists, conducted damage survey assessments after the southeast U.S. tornadoes in April 2011 and the Joplin tornado in May 2011. These NWS surveys indicated the average person verified the tornadic threat with three separate sources of information before taking life saving actions. This is a disturbing discovery for the emergency management community, as time saves lives and every second counts during a pending weather emergency.

Many of us have watched video of the Joplin High School graduation as it was culminating at Missouri Southern University, and witnessed several people milling about in the parking lot as the outdoor warning sirens were sounding. It appeared the persons in the video were oblivious to the threat that was approaching from the west. Unfortunately, 161 people lost their lives in the Joplin EF-5 tornado and thousands were injured. The complacency of the

## **REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES**

general public, tornado warning false alarm rates by the NWS and the desensitization of the public to outdoor warning sirens due to overuse has brought this working group together.

Research shows that confusion results in a delayed public response during emergencies. Using common guidelines for outdoor warning sirens throughout the various jurisdictions of Region H will reduce this potential confusion. Establishing a standard will also enable communities to 1) partner in an area-wide public education campaign regarding outdoor warning sirens; 2) develop alternative methods for receiving severe weather warnings/information; and 3) improve the overall public emergency notification system.

Our ultimate goal is to develop a dynamic, open source guideline that will provide a common operating picture on when to sound outdoor warning sirens and when to test them region wide. The need for standardization of outdoor warning siren protocols is paramount in our region and the state. Northwest Missouri has always been a leader in emergency management and homeland security issues and we are at the forefront on this initiative.

Our vision is to help save lives and protect property with this document. It is going to take the work of our region's citizens in developing their own situational awareness and taking appropriate personal responsibility during periods of severe weather. It is our job to provide the tools and education for our citizens to do it safely with understanding, efficiency and effectiveness.

# REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

## SECTION 1.3: DOCUMENT DEFINITIONS

**Activation:** Refers to the activation of the outdoor warning siren system in an actual severe weather event or other locally defined emergency or incident.

**Monthly Testing:** Refers to the monthly audible testing of the outdoor warning siren systems. It does not necessarily refer to other tests throughout the month or year that test the siren without sounding the audible sound for the community to hear.

**OWS:** Outdoor warning sirens.

**Severe Thunderstorm Watch:** Issued by the National Weather Service when conditions are favorable for the development of severe thunderstorms in and close to the watch area. A severe thunderstorm by definition is a thunderstorm that produces one inch hail or larger in diameter and/or winds equal or exceed 58 miles an hour. During the watch, people should review severe thunderstorm safety rules and be prepared to move a place of safety if threatening weather approaches.

**Severe Thunderstorm Warning:** Issued when either a severe thunderstorm is indicated by Doppler radar or a trained storm spotter reports a thunderstorm producing hail one inch or larger in diameter and/or winds equal or exceed 58 miles an hour; therefore, people in the affected area should seek safe shelter immediately. Severe thunderstorms can produce tornadoes with little or no advance warning. Severe thunderstorms can occur without a watch being in place.

**Tornado Watch:** Issued by the National Weather Service when conditions are favorable for the development of tornadoes in and close to the watch area. During the watch, people should review tornado safety rules and be prepared to move a place of safety if threatening weather approaches.

**Tornado Warning:** Issued when a tornado is indicated by Doppler radar or sighted by spotters; therefore, people in the affected area should seek safe shelter immediately. They can be issued without a Tornado Watch being already in effect. Tornadoes can occur without a watch being in place.

**Tornado Emergency:** An exceedingly rare tornado warning issued when there is a severe threat to human life and catastrophic damage from an imminent or ongoing tornado. This tornado warning is reserved for situations when a reliable source confirms a tornado, or there is clear radar evidence of the existence of a damaging tornado, such as the observation of debris.

# REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

## SECTION 1.4: OWS ACTIVATION RATIONALE AND THEORY

Jurisdictions develop outdoor warning systems to alert and notify citizens who are outdoors of emergency weather situations. These situations should only include tornado warnings for the jurisdictions covered in a National Weather Service warning polygon. We **strongly** encourage jurisdictions to only activate their warning sirens based on the aforementioned criteria.

However, we understand some jurisdictions will have other needs for outdoor warning system activation. This could include, but not be limited to, destructive straight line winds, hazardous materials incidents, terrorism, or other catastrophic events. If the outdoor warning systems are activated for something other than a tornado warning, there must be a strong public education component in place for the jurisdiction. Specifically, the citizens and visitors of the jurisdiction must understand the multiple reasons for the activation of outdoor warning systems. In addition, the correct message must be relayed to media partners and social media streams of the reason the outdoor warning sirens have been activated. Ultimately, the responsibility for activating and educating the public on the outdoor warning system activation rests upon the local emergency management director and/or their designee.

In addition, a NOAA All-Hazards Weather Radio (with Specific Area Message Encoding SAME), along with other third party equipment, computer software and smart phone applications, can provide advanced warning and notification for severe weather situations. An alternative and redundant method to receive time-critical severe weather information is strongly encouraged and recommended.

## SECTION 1.5: OWS ACTIVATION RECOMMENDED GUIDELINES

Communities vary in specific criteria for activating OWS systems; however, there are some commonalities in determining activation guidelines. Each community should review their activation criteria with policy makers on an annual basis in order to maintain a clear understanding of the community's OWS, as well as the capabilities and limitations of the system during emergency conditions. Furthermore, at the minimum, efforts to brief the community of the usage of the local OWS system should be conducted annually.

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

The following are factors to consider as minimum OWS activation guidelines:

- The National Weather Service issues a tornado warning and the affected community is located within the tornado warning polygon. A community existing in multiple counties will need to pay particular attention to the tornado warning polygon area;
- Trained storm spotters have reported a tornado in the jurisdiction or in a neighboring jurisdiction that has the potential to directly affect your jurisdiction. *Each jurisdiction should determine satisfactory methods of verifying tornado reports from their storm spotters;*
- Other emergency as directed by the community's designated emergency management officials.

### SECTION 1.6: NOTIFICATION OF OWS ACTIVATION

A community should make external notifications to neighboring jurisdictions as soon as possible indicating the OWS system has been activated. This can be accomplished via telephone, public safety radio, or 911 interoperable terminals. During Amateur Radio ARES® net activations, the notification should be made via the amateur radio SKYWARN net in progress or any other means available. The purpose of this notification is to allow other jurisdictions to have the knowledge of the impending tornado warning and the possibility for serious physical injuries, death, and significant property damage to your community.

### SECTION 1.7: MONTHLY OUTDOOR WARNING SIREN TESTING

This guideline recommends that all jurisdictions within Region H conduct their monthly outdoor warning system tests at 11 a.m. on the first Wednesday of each month. This test specifically refers to sounding the audible sound of the outdoor warning sirens for the community to hear, weather permitting. *Examples of weather that would not permit the testing are: thunderstorms in the area, temperatures below 32F, or other criteria that the manufacturer recommends the sirens not be sounded.* The recommended testing day and time coincides with the weekly test of the NOAA All Hazards Weather radio by the National Weather Service local weather forecast offices. This practice shall be effective on January 1, 2013.



## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

### SECTION 1.8: UNACCEPTABLE PRACTICES

Most communities in Region H have fairly similar criteria for utilizing their outdoor warning siren (OWS) system. However many “bad practices” exist, and the intent of this guideline is just as much geared towards removing the “bad practices” as it is in establishing a standardized outdoor warning siren document.

An “all-clear” tone does nothing but add confusion to the public. Outdoor warning sirens are simply notification to citizens, who are outdoors, that a hazardous severe weather event is approaching. Once the outdoor warning sirens are activated all persons should seek a place of safety and, once there, find out more information about the severe weather threat. Using the sirens to signify that there is no threat diminishes the value of the outdoor warning siren system. There are many other methods (NOAA All-Hazards Weather Radio) for the public to learn that the threat has passed, so there is no reason for sounding an all-clear.

Some communities sound their sirens for warnings in neighboring counties as an added level of protection. This unnecessary sounding adds no value and only causes confusion when people tune in for more information and find they are not under any weather warning. Other jurisdictions alert for any severe thunderstorm warning issued during a tornado watch, because “xx years ago a tornado touched down with no warning.” While that may be true, a vast majority of severe thunderstorm warnings do not produce tornadoes. Furthermore, lowering the criteria means the sirens are sounded much more often than needed; which desensitizes the public to the outdoor warning siren tone.

In addition, many communities in Region H have a deep and rich railroad history. Most railroad towns in northwest Missouri would “blow their whistle” at predetermined times during the day. Predominantly, these times were 7 a.m., 12 p.m., 1 p.m. and 6 p.m. The sounding of the sirens at these prescribed times of the day brings a desensitization to the citizens of the actual meaning of the outdoor warning siren system. Post-tornado event public surveys conclude that this causes the outdoor warning sirens to sound to frequently, lessening the urgency to seek shelter when the siren is sounding during an actual tornado warning.

The Region H Outdoor Warning Siren working group understands that these sirens belong to your jurisdiction and you can activate them at any time you deem there is an imminent threat to the public. However, when activation is done outside of a NWS warning and the reason for the alert is not communicated to the public, unexpected messages may be delivered. For

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

example, a local spotter may see a funnel cloud approaching town. However, if it is not evident on radar and there is no warning, it is likely that the television and radio stations will simply tell viewers that they do not know why the sirens are sounding. It is a true statement unless they are informed otherwise, and leads to the public not responding. This is why clear communication is critical.

### SECTION 1.9: NWSCHAT

Using NWSChat lets you notify the NWS, media outlets and neighboring jurisdictions immediately, which allows one unified message to be disseminated and provides the confirmation that the public needs to hear in order to respond. NWSChat is an instant messaging program utilized by NWS operational personnel to share critical warning decision expertise and other types of significant weather information essential to the NWS's mission of saving lives and property.

The NWSChat information exchanged in real-time with the media and emergency management community, play a key role in communicating the NWS's hazardous weather messages to the public.

NWS partners can use NWSChat as an efficient means of seeking clarifications and enhancements to the communication stream originating from the NWS during a fast-paced significant weather or hydrologic event.

In order to participate in NWSChat, you must meet at least one of the following standards:

- *Be a member of the emergency management (EM) community:* Members of the EM community include public safety officials who serve as employees or contract agents of a government agency at the federal, state, local, or tribal level and are charged with protecting the public from hazards that are influenced by weather or weather-related events. Other members of this community include: safety and emergency personnel from universities or other large entities with large populations, people whose roles are functionally equivalent to the public safety officials described above, and Skywarn Net Control Operators, such as Amateur Radio Emergency Services (ARES) and Radio Amateur Civil Emergency Services (RACES).

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

- *Be a government partner of a NWS office:* This includes government partners with missions that require close coordination with the NWS. Government partners include (but are not limited to) the FAA, and water and land management officials.
- *Be a member of the electronic media:* Members of the electronic media are parties and contract agents of parties who:
  - Have a need to actively participate in discussions with NWS Forecast Offices on imminent weather or other hazards, and
  - Operate systems that routinely and rapidly relay weather and water watches, advisories, warnings, and forecast information to a significant part of the population served by an NWS office via electronic information distribution such as radio, television, internet, cellular, and other wireless means.

The website to begin the process of gaining access to the NWSChat system is:

<https://nwschat.weather.gov/>.

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

### SECTION 2.1: STORMREADY *(Courtesy of the National Weather Service)*

Many laws and regulations exist to help local emergency managers deal with hazardous material spills, search and rescue operations, medical crises, etc., but there are relatively few uniformly recognized guidelines that address dealing with the specifics of hazardous weather response operations. The NWS recognized this need and designed StormReady – a program to help communities and counties implement procedures to reduce the potential for disastrous, weather-related consequences.

StormReady helps communities attain a new level of preparedness and mitigation awareness for extreme weather-related events. StormReady communities have a strong commitment to putting in place infrastructure and systems that will save lives and protect property when hazardous weather strikes. By participating in StormReady, local agencies can earn recognition for their jurisdiction by meeting guidelines established by the NWS in partnership with federal, state, and local emergency management professionals.

The StormReady program is intended to:

- Improve the timeliness and effectiveness of hazardous weather warnings for the public.
- Provide detailed and clear recommendations by which local emergency managers may establish or improve effective hazardous weather operations.
- Help local emergency managers justify costs and purchases related to supporting their hazardous weather-related program.
- Reward local hazardous-weather mitigation programs that have achieved a desired performance level.
- Provide a means of acquiring additional Community Rating System points assigned by the National Flood Insurance Program (NFIP).
- Provide an “image incentive” to counties, cities, and towns that can identify them as being StormReady.
- Encourage better hazardous weather preparedness programs in jurisdictions surrounding StormReady communities and counties.

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

StormReady is a voluntary program and is offered to provide guidance and incentive to officials who want to improve their respective hazardous weather operations. *NOTE: Implied or explicit references to “guidelines” are made only with regard to the voluntary participants in the StormReady program and should not be construed as being state or federal mandates.*

## **REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES**

### **SECTION 2.2: PUBLIC SEVERE WEATHER EDUCATION**

The Region H Outdoor Warning Siren Working Group has identified specific things that local emergency management personnel can do to educate the public about their outdoor warning sirens. We caution jurisdictions to take into account visitors to their communities as well as permanent residents. The following are highly recommended to be done at a minimum of two times each year.

- Encourage participation in the NWS' and state's severe weather awareness week held in the spring. This is to include public presentations by the NWS or other area emergency management personnel, presentations to local civic groups, articles in local newspapers, social media streams, as well as other electronic (television) media;
- Provide public education resources and recommendations to the public on outdoor warning siren activation and alternate methods of receiving severe weather warnings available in the local jurisdiction;
- Develop severe weather awareness flyers for local hotel/motels to provide to guests upon check-in. Provide city and county information to be placed on hotel/motel televisions so the guests will know the city and county they are in if a severe weather warning is issued;
- Provide severe weather awareness and preparedness information to area camps, such as Boy Scouts, Girl Scouts, and church camps. In addition, local EM's should develop a relationship with these organizations to be aware of activities and have a method of making direct contact with a responsible party at the camp in the event of severe weather;
- Identify any public shelters or shelter locations with flyers and have them available at all government and public buildings within the local community. This information also needs to be presented to the media and on social media streams.
- Utilize the recommended severe weather training agendas and PowerPoint presentations developed by the Region H Outdoor Warning Siren working group at specified times throughout the year;
- Make presentations to local schools and educational institutions on severe weather awareness, preparedness, and outdoor warning siren systems. Encourage school administration and staff to develop a severe weather safety response plan and exercise the plan at least twice annually.

# REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

## SECTION 2.3: ALTERNATIVE WARNING METHODS

*NOAA All Hazards Weather Radios, Code Red, Global Connect, etc.*

| <u>Title</u>  | <u>Platform</u> | <u>Price</u> |
|---|-----------------|--------------|
| <a href="#"><u>iMapWeather Radio</u></a>            | iPhone          | \$9.99       |
| <a href="#"><u>iMapRadar</u></a>                    | iPhone          | \$0.99       |
| <a href="#"><u>WeatherAlert USA</u></a>             | iPhone          | \$9.99       |
| <a href="#"><u>CodeRED Mobile Alert</u></a>         | iPhone          | \$0.00       |
| <a href="#"><u>Weather@US: Weather Alerts</u></a>   | iPhone          | \$0.99       |
| <a href="#"><u>The Weather Channel</u></a>          | multiple        | \$0.00       |
| <a href="#"><u>RadarScope</u></a>                   | iPhone          | \$9.99       |
| <a href="#"><u>WeatherAlerts</u></a>                | iPhone          | \$4.99       |
| <a href="#"><u>Simple Weather Alert</u></a>         | Android         | \$0.00       |
| <a href="#"><u>OnGuard Weather Alerts</u></a>       | Android         | \$1.99       |
| <a href="#"><u>Pro Weather Alert</u></a>            | Android         | \$1.99       |
| <a href="#"><u>Storm Chase Buddy</u></a>            | Android         | \$2.99       |
| <a href="#"><u>Emergency Alert</u></a>              | Android         | \$1.10       |
| <a href="#"><u>TorWarn Weather Alerts Pro</u></a>   | Android         | \$1.99       |
| <a href="#"><u>Active Alerts Weather Alerts</u></a> | Android         | \$1.96       |
| <a href="#"><u>The Weather Network</u></a>          | Blackberry      | \$0.00       |
| <a href="#"><u>BeWeather</u></a>                    | Blackberry      | \$6.99       |
| <a href="#"><u>StormWatch</u></a>                   | Blackberry      | \$6.99       |
| <a href="#"><u>e-Mobile Weather</u></a>             | Blackberry      | \$13.99      |
| <a href="#"><u>WeatherBug</u></a>                   | multiple        | \$0.00       |
| <a href="#"><u>AccuWeather</u></a>                  | multiple        | \$0.00       |

In addition, short message service (SMS) text, email and voice notification systems are also available to communities. These include, but are not limited to Nixle, Code Red, Global Connect, Alert Now, TextCaster, etc. Our working group does not intend for the alternative methods listed here to be all inclusive. We do encourage emergency management officials and citizens alike to keep up on alternative methods of receiving hazardous weather information as technology continues to change and other software / hardware applications become available.

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

### Functional Needs Populations

Emergency managers must take into consideration the local populations who have functional needs. These populations may include but are not limited to the blind, other visually-impaired, deaf, other hearing-impaired, non-ambulatory, and other functional needs citizens.

A functional needs weather radio for the deaf or hearing impaired may be found at the following link:

<http://www.nssl.noaa.gov/edu/safety/specialneeds.html>.

**Engage by E-View:** Receive 30-second ASL videos with news & events for the Deaf along with emergency alerts that vibrate and flash on your smart phone.

<http://www.engagebyview.com/>

The National Federation of the Blind (NFB), and its newspaper service for the blind, NFB-NEWSLINE, collaborated with AccuWeather, an online weather information service, to provide emergency weather alerts to blind and print-disabled subscribers throughout America. NFB-NEWSLINE is a free audible information access service that provides over 300 newspapers and magazines to the blind. The AccuWeather information service will be offered on NFB-NEWSLINE, giving blind and print-disabled people instant access to emergency weather alerts.

NFB-NEWSLINE is a free audible newspaper and magazine reading service that provides information to blind and print-disabled readers over the telephone, online, and on the iPhone. For more information or to register for NFB-NEWSLINE visit [www.nfbnewsline.org](http://www.nfbnewsline.org), write to [nfbnewsline@nfb.org](mailto:nfbnewsline@nfb.org), or call 1-866-504-7300.



## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

### SECTION 2.4: SOCIAL MEDIA STREAMS AND EMERGENCY MANAGEMENT

*This section of the document is under development by the Region H Social Media Working Group (SMWG). This section will cover the methods to provide timely, consistent and effective social media notification to citizens during times of hazardous weather and other disaster scenarios. This section of the document is not intended to replace a social media training session.*

# REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

## SECTION 3.1: SIREN INFRASTRUCTURE UPGRADES

*To be determined / announced at a later date.*

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

### SECTION 5.1: APPENDIX B ~ Region H OWS WORKING GROUP

**Tom Bliss**— Mo-Kan Regional Council

**Tye Parsons**— NWMO Council of Governments

**Matt Schoenfelder**— Mo-Kan Regional Council

**Joseph Reimer**— NWMO Council of Governments

**Randy Railsback**— Green Hills Regional Planning Commission

**Steve Cheavens**— Missouri State Emergency Management Agency

**Andy Bailey**— National Weather Service, Pleasant Hill, MO WCM

**Derek Deroche**— National Weather Service, Pleasant Hill, MO Sr, Forecaster

**Audra Hennecke**— National Weather Service, Topeka, KS, Forecaster

**Corey Sloan**— City of Cameron, MO, Chief of Police / EMD (Chair)

**Bill Brinton**— Buchanan County, MO, EMD

**Rhonda Wiley**— Atchison County, MO, EMD

**Darrell Wright**—City of Chillicothe, MO, Fire Chief / EMD

**Blair Shock**—Clinton County, MO, Director of Health Dept / EMD (Co-Chair)

**George Albert**—City of St. Joseph, MO, EMD

**Mike Bracciano**— KQTV 2, St. Joseph, MO, On-air meteorologist

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

### Bibliography

Agency, F. E. (1980, March 1). Outdoor Warning Sirens Guide. *CPDG1-17R*. Washington, D.C., U.S.A.: FEMA.

Blind, N. F. (2012, August 29). Emergency Weather Alerts for the Blind and Print Disabled. Atlanta, GA, USA. Retrieved October 3, 2012, from National Federation of the Blind: <http://www.wirelessrec.gatech.edu/content/newsroom/emergency-weather-alerts-blind-and-print-disabled>

Dale, C. R. (2011). *Best Practices for Outdoor Warning Sirens*. Lansing: Working Group for Warning Systems ~ State of Michigan.

Erickson, D. S. (2009). The Time Cost of Tornado Warnings and the Savings of Storm Based Warnings. *Weather and Forecasting*, 103-112.

Erickson, J. B. (2008). NWS Tornado Warnings with Zero or Negative Lead Times. *Weather and Forecasting*, 140-154.

Erickson, J. B. (2010). Tornadoes without NWS Warning. *Weather and Forecasting*, 159-172.

Group, Q. C. (2009). *Outdoor Warning Sirens, Guidance for Testing and Activation*. Quad Cities.

J. Brotzge, S. E. (2011). A 5-year Climatology of Tornado False Alarms. *Weather and Forecasting*, 534-544.

National Weather Service Assessment Team. (2008). *Mother's Day Weekend Tornado in Oklahoma and Missouri, May 10, 2008*. Silver Spring, MD: U.S. Department of Commerce, NOAA.

National Weather Service Assessment Team. (2003). *Record Tornado Outbreaks of May 4-10, 2003*. Silver Spring, MD: U.S. Department of Commerce, NOAA.

National Weather Service Assessment Team. (2008). *Super Tuesday Tornado Outbreak of February 5-6, 2008*. Silver Spring, MD: U.S. Department of Commerce, NOAA.

National Weather Service Assessment Team. (2011). *The Historic Tornadoes of April 2011*. Silver Springs, MD: U.S. Department of Commerce, NOAA.

National Weather Service, Quad Cities Weather Forecast Office. (2012). Retrieved February 2012, from Weather.gov: <http://www.crh.noaa.gov/dvn/?n=sirenfaq>

(2011). *NWS Central Region Assessment ~ Joplin, Missouri Tornado May 22, 2011*. Kansas City, MO: U.S. Department of Commerce, Central Region Headquarters.

## REGION H OUTDOOR WARNING SIREN ACTIVATION GUIDELINES

NWS Integrated Hazard Information Services Team. (2011, September 28-30). Integrated Hazard Information Services Workshop. Boulder, CO, Boulder.

NWS WFO Pleasant Hill. (2012). Impact Based Warning panel discussion. N/A (p. N/A). Kansas City: N/A.

S. Hoekstra, K. K. (2009). A Preliminary look at the Social Perspective of Warn on-forecast: Preferred Tornado Warning Lead Time and the General Public's Perceptions of Weather Risks. *Weather and Forecasting* , 128-140.

U.S. Department of Commerce ~ NOAA. (2005). *StormReady Organization and Operations Manual*. Silver Spring, MD: National Weather Service.

U.S. Department of Commerce. (2012, October). NOAA. Retrieved October 3, 2011, from NWSChat: <http://nwschat.weather.gov>

U.S. Department of Commerce, NOAA. (2012). NOAA. Retrieved October 3, 2012, from StormReady: <http://www.stormready.noaa.gov>

U.S. Department of Commerce, NOAA. (2012). NOAA. Retrieved October 3, 2012, from Functional Needs Weather Radio: <http://www.nssl.noaa.gov/edu/safety/specialneeds.html>