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THE SKYWARN® WEATHER SPOTTER PROGRAM

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The SKYWARN Weather Spotter Program

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1. The SKYWARN® Weather Spotter Program Objective

SKYWARN® is a National Weather Service (NWS) program that was formally established in the late 1960s. It consists of over 300,000 trained spotters who provide reports of weather and flooding to help meteorologists and hydrologists make life-saving warning decisions. Spotters are concerned citizens, amateur radio operators, emergency managers, public safety officials, truck drivers, mariners, pilots, and other individuals who volunteer their time and energy to report on hazardous weather and flooding impacting their communities. Although NWS uses data from radar, satellite and other observing systems, technology cannot detect every instance of hazardous weather and flooding. SKYWARN spotter reports provide vital "ground truth" that helps NWS meteorologists issue timely, accurate and detailed warnings. Their reports can confirm hazardous weather and flooding detected by NWS technologies and enhance the situational awareness of the entire Integrated Warning Team – emergency managers, NWS and America's Weather and Climate Industry. Spotters also provide critical verification information that supports our Nation's Disaster Declarations process and improves warning services. An effective SKYWARN Weather Spotter program is essential for NWS to fulfill its mission of protecting life and property and enhancing our Nation's economy.

2. Authorities and Responsibilities

2.1 Weather Forecast Offices

2.1.1 Warning Coordination Meteorologists

It is the responsibility of each Weather Forecast Office's (WFO) Warning Coordination Meteorologist (WCM) or designee, as overseen by the Meteorologist-in-Charge (MIC), to implement, manage and administer the SKYWARN Weather Spotter program within his or her County Warning and Forecast Area (CWFA). WCMs are encouraged to enlist the support of other WFO staff in the execution of the SKYWARN program. Responsibilities include:

- Conducting SKYWARN Weather Spotter training for each of their counties, parishes or county-equivalent areas
- Ensuring that SKYWARN Weather Spotter reporting effectively supports local warning operations including the Integrated Warning Team's situational awareness and the NWS verification and Storm Data programs
- Mentoring and training WFO staff in the local SKYWARN Weather Spotter program
- Promoting the SKYWARN Weather Spotter program including maintaining a local web site presence
- Implementing service improvements to the SKYWARN Weather Spotter program
- Overseeing local Amateur Radio Service activities in relation to the SKYWARN Weather Spotter program and section 7.2 of NWSI 10-1704
- Reporting SKYWARN Weather Spotter activities through the NWS Outreach and Education Event System as per NWSI 10-1804

2.1.2 SKYWARN Weather Spotter Training

There is currently no national training standard. Until that time, WCMs/WFOs should use various means to provide SKYWARN Weather Spotter training. These can include:

- Classroom training: The local WCM or designee can personally organize and conduct SKYWARN Weather Spotter classes.
- Train-the-trainer: The local WCM has the authority to designate willing and knowledgeable WFO staff, emergency managers, public safety officials, training professionals or SKYWARN Weather Spotters to serve as proxy.
- Web-site based training: The local WCM has the authority to create and utilize a web-site based training solution.
- Virtual training: The local WCM has the authority to conduct SKYWARN Weather Spotter training remotely through a virtual means such as video conferencing or webinars.
- Cooperative Program for Operational Meteorology, Education, and Training (COMET®) modules: The local WCM has the authority to accept the existing COMET modules (www.meted.ucar.edu/training_course.php?id=23), the "Role of the SKYWARN Spotter" and "SKYWARN Convective Basics" alone, in combination with local training, or as optional, pre-study material for local training. *Note: it is important for WCMs to clarify their local approach to the COMET modules on the SKYWARN Weather Spotter section of the WFO web site.*

Mixed training solutions are encouraged to maximize participation in the SKYWARN Weather Spotter program. The goal should be to make the local SKYWARN Weather Spotter Program training as useful as possible to the local WFO warning program and to the local Integrated Warning Team's situational awareness.

The local WCMs have the authority to determine the appropriate training curriculum, methods and recognition process used in their CWFA. A unified standard SKYWARN Weather Spotter training approach is permissible on a state or even regional basis at the discretion of the Regional Headquarters. This is usually done in partnership with state and local emergency management (Nebraska example provided in APPENDIX A).

2.1.3 SKYWARN Weather Spotter Reporting

The local WCM has the authority to determine the appropriate SKYWARN Weather Spotter reporting criteria and methods that are utilized in their CWFA, except as directed and supported by the Regional Headquarters (i.e. to standardize reporting methods and software). Consistent and current reporting instructions should be provided to all certified SKYWARN Weather Spotters. Multiple reporting methods are encouraged to maximize participation in the SKYWARN Weather Spotter program. The goal should be to make the local SKYWARN Weather Spotter Program reporting as useful as possible to the local WFO warning program and

to the local Integrated Warning Team's situational awareness.

APPENDIX C outlines the advantages and disadvantages of most SKYWARN Weather Spotter program reporting methods.

2.1.4 WFO Operational Shift Leader

It is the responsibility of the WFO's operational shift leader, typically the Lead Forecaster, to maintain a subjective measure of quality control of SKYWARN Weather Spotter reports to the benefit of the NWS' warning and verification programs, and the local Integrated Warning Team's situational awareness. The WFO's operational shift leader, or designee, has the authority to determine if SKYWARN Weather Spotter reports are utilized.

2.2 Regional Headquarters

Each Regional Director will designate a person on his or her staff, usually the Regional WCM, to manage the SKYWARN Weather Spotter program within the region. The duties performed by the Regional SKYWARN Weather Spotter program managers include the following:

- Coordinating SKYWARN Weather Spotter programmatic, budgetary and policy issues with NWS Headquarters on behalf of their region's WFOs/WCMs
- Directing and overseeing service improvements to the SKYWARN Weather Spotter program
- When available, managing the regional budget and other resources for the SKYWARN Weather Spotter program
- Promoting the SKYWARN Weather Spotter program
- As necessary, developing and maintaining regional supplements to this directive
- Supporting their region's local WFOs/WCMs in administering the program

SKYWARN Weather Spotter reports are often used in the Significant Event Reporting conducted by Regional Operations Centers to the NWS Operations Center. Other regional headquarters' functions support the SKYWARN Weather Spotter program in areas such as training, observation/data collection, verification, procurement, and system operations.

2.3 National Weather Service Headquarters - Office of Climate, Water, and Weather Services

The National Weather Service Headquarters' (NWSH) Office of Climate, Water, and Weather Services (OCWWS) is responsible for a variety of activities supporting the SKYWARN Weather Spotter program. The OCWWS Director assigns SKYWARN Weather Spotter program management responsibilities within OCWWS.

2.3.1 OCWWS Awareness Branch

It is the responsibility of the National WCM to manage the SKYWARN Weather Spotter program on a national basis. This includes the following:

- Coordinating SKYWARN Weather Spotter programmatic, budgetary and policy issues within National Headquarters on behalf of our Regional Headquarters and our local WFOs/WCMs
- Directing and overseeing service improvements to the SKYWARN Weather Spotter program
- When available, managing the national budget and other resources for the SKYWARN Weather Spotter program
- Promoting the SKYWARN Weather Spotter program
- Serving as the Office of Primary Responsibility (OPR) for this procedural directive
- As necessary, developing and maintaining memorandums of understanding or memorandums of agreement with national partners

The OCWWS Awareness Branch manages national resources such as the "Weather Spotter's Field Guide" and works to ensure this and other tools are available for use by the Regional Headquarters and our local WFOs/WCMs. Other NWSH functions support the SKYWARN Weather Spotter program in areas such as training, observation/data collection, verification, procurement and system operations.

2.3.2 OCWWS Training Division

The Training Division supports the SKYWARN Weather Spotter program by overseeing the annual process of allocating training resources for NWS science, operations, and services. The Training Division's branches (NWS Training Center, Warning Decision Training Branch, and the Forecast Decision Training Branch) provide instructional resources covering the SKYWARN Weather Spotter program. The Training Division also manages the grant supporting the COMET, which provides instructional resources focused on the SKYWARN Weather Spotter program. Coordination occurs with COMET to ensure the development and provision of SKYWARN Weather Spotter training materials meet the needs and requirements of the Regional Headquarters and local WFOs/WCMs.

2.4 SKYWARN Weather Spotter Safety

Safety is the top priority for the SKYWARN Weather Spotter program. The NWS does not encourage its SKYWARN weather spotters to engage in storm chasing. However, the NWS does recognize that SKYWARN spotters, engaged in mobile activities, may encounter severe weather and should be alert to rapidly changing weather conditions that could impact personal safety. With copyright permission from Randy Denzer and Joshua Jans of the *Spotter Network.org*, the NWS has adopted the ACES safety concept. **ACES stands for Awareness, Communication, Escape Routes, and Safe Zones.** It is an adaptation from the National Wildfire Coordinating Group's LCES safety standard (**L**ookouts, **C**ommunications, **E**scape **R**outes, and **S**afety Zones). All NWS SKYWARN Weather Spotter training should cover the following safety guidelines:

- Personal safety is the primary objective of every spotter. Never put yourself in harm's way. This includes attempting to walk or drive over obstructions such as flooded roadways and downed power lines, and positioning yourself under objects that have a potential to fall or be blown over due to severe weather.
- Always obey federal, state, and local laws and directives from public safety officials.
- Adhere to the concept of **ACES** at all times:
  - **Awareness** means spotters are constantly observing the situation around you. This type of observation is sometimes referred to as situational awareness. Continuously monitoring the risks around you can save your life, especially in rapidly changing weather conditions. Knowing that there is a river crossing, or observing the street is lined with power poles and trees, can prepare you for the hazards of severe weather. When you are aware of the imminent threats, and you are thinking ahead about possible outcomes, you can position yourself better to minimize these threats.
  - **Communicating** your whereabouts to others on a regular basis and having multiple lines of communication available can keep you and others safe from hazards.
  - **Escape Routes** are vital when you are entering a potentially dangerous area. As part of awareness, note the escape routes available to you, making sure you always have more than one and the safest way to get to that escape route.
  - In the event you cannot get to escape routes due to rapidly changing conditions, find your closest **safe zones or shelters**. Safe zones are the areas where you will be safest if you need to get to immediate shelter. Knowing these locations will limit your risk.
  - Remembering **ACES:** to remain aware of your surroundings, have open lines of communication, know your escape routes, and know your safe zones wherever you are, can increase your safety.

APPENDIX B contains the complete ACES Weather Spotter Safety program that outlines the "10 Golden Spotter Safety Rules".

Note: A non-paid volunteer observer engaged in observation work may be considered as having employee coverage under the Federal Employees Compensation Act (FECA). Final determination as to eligibility and extent of coverage rests with the Office of Workers Compensation Programs, which administers FECA. Any spotter injured while providing observational duties should notify their local NWS office. The local NWS office and their regional headquarters should work with the Office of Workers Compensation Programs for resolution. Refer to NWSI 10-1310 for more detail.

2.5 Reporting of False Weather Spotter Reports

Instances of false weather spotter reports that *significantly impact a WFO's life saving warning operations* should be reported by the local WCM/MIC to Regional Headquarters and onto the National WCM. It is the responsibility of the National WCM to archive these instances. When

appropriate, OCWWS can coordinate potential legal support from the Department of Commerce's Office of General Counsel.

2.6 American Radio Relay League

The American Radio Relay League (ARRL - www.arrl.org) is a noncommercial membership organization of radio amateurs, organized for the promotion of interest in Amateur Radio. The NWS works with ARRL Section Amateur Radio Emergency Service volunteers at the local level to establish SKYWARN radio networks, and/or other specialized weather emergency alert and relief systems. These local SKYWARN radio organizations act as communicators and spotters when severe weather and other disasters strike. The working partnership between NWS and ARRL is formally documented through a Memorandum of Understanding (APPENDIX D). NWS WCMs, or their designees, are responsible for maintaining this working partnership with the local Amateur Radio SKYWARN volunteers.

2.6.1 SKYWARN Recognition Day

SKYWARN Recognition Day (hamradio.noaa.gov) was developed in 1999 by the NWS and ARRL. It celebrates the contributions that volunteer SKYWARN amateur radio operators make to our nation's severe weather warning system. During the day, SKYWARN operators visit NWS offices and contact other radio operators across the world. NWS WCMs or their designees are responsible for conducting SKYWARN Recognition Day in their CWFA.

2.7 Spotter Network.org

As appropriate, local WCMs are encouraged to integrate Spotter Network reports into their WFO operations. Reporting Spotter Network (www.spotternetwork.org/) members have completed training and provide WFOs with invaluable data for warning decision-making. The working partnership between NWS and the Spotter Network is formally documented through a Memorandum of Understanding (APPENDIX E).

2.8 Community Collaborative Rain, Hail and Snow Network

As appropriate, local WCMs are encouraged to integrate the Community Collaborative Rain, Hail and Snow Network (CoCoRaHS) into their local SKYWARN Weather Spotter program. CoCoRaHS (www.cocorahs.org) is a unique non-profit, community-based network that works to accurately measure and map precipitation: rain, hail and snow. NOAA is one of the sponsors of the CoCoRaHS program.

2.9 SKYWARN Branding Terms of Use

Appendix E provides DOC General Counsels' terms of use for NWS' SKYWARN Weather Spotter program branding.

APPENDIX A – Example of State Partnered SKYWARN Weather Spotter Training Policy

Nebraska Revised Statute
81-829.67. Storm spotter or emergency management worker; training, identification, and credentialing.
(1) The Nebraska Emergency Management Agency shall develop training, identification, and credentialing standards for a storm spotter or emergency management worker.
(2) For purposes of this section, storm spotter means an individual who performs weather spotting services as an employee or a volunteer of a local emergency management organization and who has been credentialed by the Nebraska Emergency Management Agency under this section.

NEBRASKA EMERGENCY MANAGEMENT AGENCY
Topic: Storm Spotting Credentialing Policy

I. POLICY
It shall be the policy of the Nebraska Emergency Management Agency (NEMA) to establish and sustain a program for training, identification and credentialing of storm spotters in the State of Nebraska.

II. AUTHORITY:

A. Nebraska Emergency Management Act Section §81-829.76(1)(2)

1. The Nebraska Emergency Management Agency shall develop training, identification, and credentialing standards for storm spotter or emergency management worker.

2. For purposes of this section, storm spotter means an individual who performs weather spotting services as an employee or a volunteer of a local emergency management organization and who has been credentialed by the Nebraska emergency Management Agency under this section.

B. Nebraska Emergency Management Act Section §81-829.39
Emergency Management worker includes any full time or part-time paid, volunteer, or auxiliary employee of this state or other states, territories' or possessions of the federal government or any neighboring country or of any political subdivision thereof, of the District of Columbia, or agency or organization performing emergency management

services at any place in this state subject to order or control of or pursuant to a request of the state government or any political subdivision thereof and also includes instructors and students in emergency management educational programs approved by the Nebraska Emergency Management agency or otherwise under the provisions of the Emergency Management Act.

III. PROCEDURE

A. Required Training: An individual who performs weather spotting services as an employee or a volunteer of a local emergency management agency and who wants to be credentialed by the Nebraska Emergency Management Agency must have completed the following coursework:

1. On-line courses found at www.meted.ucar.edu/training_course.php?id=23
   a. Role of SKYWARN Spotters
   b. SKYWARN Spotter Convective Basics

2. Attend a Weather Spotting Class provided by a National Weather Service (NWS) Warning Coordination Meteorologist.

3. Pass a knowledge assessment established by the NWS Warning Coordination Meteorologist and administered by a county or regional Emergency Management Agency.

B. Credentialing Procedure

1. The individual seeking to be credentialed as a storm spotter under a local emergency management program, shall apply to their local EM.

2. The application shall include a copy of certificates for required training courses.

3. The local EM will award Certification as a Weather Spotter based on the completion of the required training and passing the NWS knowledge assessment.

1. The local EM shall take a digital photo of the individual to send to NEMA along with a copy of training certificates and a cover letter on agency letterhead identifying the certified spotter.

2. The local EM shall keep a certificate on file for each Certified Weather Spotter that includes the photo and a copy of all required training certificates.

3. NEMA Training and Exercise staff shall review the individual's packet for completeness and if complete, issue the storm spotter credentials in the

form of an identity badge and Certificate to the local EM for delivery to the individual.

C. Storm Spotter Credentials shall be issued for a period of three years. To renew the credentials the local EM shall:

1. Ensure the individual has attended a Weather Spotter Class provided by a NWS Warning Coordination Meteorologist and passed the knowledge assessment during the last year of their previous certification. Or taken a Weather Spotter Class provided by a NWS Warning Coordination Meteorologist and passed the knowledge assessment for at least two of the three year of their certification.

2. Keep in the individual's file the most current picture and additional training certifications.

3. Take and submit a new digital picture of the individual along with updated required training certificates to NEMA. NEMA Training and Exercise staff shall review the individual's packet for completeness and if complete, issue the new storm spotter credentials in the form of an identity badge and certificate to the local EM for delivery to the individual.

D. Should an individual not renew their credentials for storm spotting, it is the responsibility of the local EM to retrieve and destroy the expired badge, and keep the file as inactive for at least three years.

APPENDIX B - ACES Weather Spotter Safety Program

ACES Weather Spotter Safety Program

10 Golden Spotter Safety Rules

The following rules should be strictly adhered to and followed while actively "All Hazards" spotting. These rules were designed to address the safety of private citizens that volunteer to be weather spotters. Obviously public safety officials can also benefit from following most of these safety rules. The majority of spotters will be reporting from a stationary location such as their residence or workplace. Spotting can also involve reporting observations while mobile. These rules address both situations. Competent all hazards spotters follow these Golden Rules every time they are "actively" spotting.

Rule Number 1.
ALWAYS operate with your safety as the number one priority
A. The spotter's personal safety is the primary objective of every spotter.

- The information provided by the spotter is critical for public safety and the spotter should maintain the ability to provide that information.
- The spotter should not perform any act that would jeopardize their own personal safety or that of any other person.

B. Timely and **accurate** reports aid in the personal safety of self and others which is the overall goal of the spotter program.

Rule Number 2.
ALWAYS follow any and all directives from public safety officials.

- If asked by an emergency official to leave an area, this should be followed.
- Spotters are a vital public safety function and operate within this system.
- Spotters are not public safety officials and should obey all applicable laws and directives.

Rule Number 3.
ALWAYS adhere to the concept of **ACES** at all times. **ACES** = Awareness, Communication, Escape routes, Safety Zones

Awareness
The spotter should maintain ***situational awareness*** at all times.

- Spotting severe weather places spotters in possible hazardous areas. Situational awareness is the mental process of being vigilantly and keenly aware of their surroundings at all times while spotting.

- This will require the spotter to use all media (weather radio, Internet connection, HAM radio) available to continually monitor forecasted and current weather conditions as well as keeping an eye in all directions, at all times.
- Never become complacent, keep monitoring weather **in all directions** before, during, and after a weather event.
- It is recommended that mobile spotters travel in teams of two. This allows for an increase in awareness of current conditions while providing for safer driving.
- Spotter Awareness includes continued mental evaluation of escape routes and safety zones.
- The spotter should practice the **"Sterile Cockpit"** method while actively spotting under hazardous situations. This practice has long been used by Airline pilots and involves only concentrating on the task of flying while in the cockpit. Adapting this to an All Hazards spotter during active spotting involves strict discipline of only performing spotter activities and safety practices during escalating hazards. If you're in a hazardous environment, perform no other tasks except to ensure your safety and reporting.

Communication

The spotter should maintain communication through cell phone, radio, or other means at all times.

- It is imperative that someone knows the spotter's location when monitoring severe weather.
- Never operate as a mobile spotter without someone knowing your location and estimated time of return.

Escape Routes

The spotter should maintain escape routes at all times.

- For the mobile spotter, this means having the ability to move to a safe zone when necessary.
- If possible, back into dead end roadways and have a thorough knowledge of the roadways in the immediate area.
    - Do not get trapped between severe weather and a dead end.
    - Be aware of **traffic congestion** in metro areas, especially avoid roadways with overpasses since civilians tend to wrongfully congregate under them to protect their vehicles.
    - Remember that low water crossings can trap you and that gravel roads can become impassable after heavy rains
    - Be aware of construction areas.
    - Don't rely solely on GPS or Internet maps as they may be outdated.
- For the stationary spotter, ensure you have a clear route to a safety zone in time if needed. Locked basement doors or obstructed pathways will do you no good in the event that you need to get to these areas for safety.

Safety Zones

A safety zone is a place in which you will be safe from the oncoming severe weather event.

- For stationary spotters this could be a basement or storm shelter.
- For mobile spotters, this could be a solid building with a basement (not a mobile home) or an area away from the storm.
- Know your safety zones and how long it will take to get to them when you need them.
- Remember that the safest place in your home will be a basement or storm shelter. If one is not available, go to the center-most portion of your home on the lowest floor, ideally in a windowless room or closet.
- Be aware of your escape routes to your safe zone at all times.

Rule Number 4.
ALWAYS activate emergency services
Mobile and stationary spotters should activate emergency services BEFORE making a weather report when faced with incidents that cause injuries to civilians. Spotters should notify emergency officials (911, local dispatch, law enforcement) by phone, HAM radio or other means, prior to making a weather report when possible. Note that it is unsafe to use a corded phone during a thunderstorm. Once help has been notified then a weather report can be submitted.

Rule Number 5.
NEVER place yourself in a position to be overrun by, or unprotected from, a storm.
- Maintain situational awareness and avoid problem areas of the storm.
- Driving in large hail increases the relative speed of the hail and the potential to lose a windshield.
- If no other hazards exist, it may be better to stop your vehicle off of a roadway and wait until the large hail passes.
    - Driving will only increase the damage to the vehicle.
- It is strongly recommended that spotters wear protective eyewear during large hail events to protect their eyes from breaking glass.
- This includes hurricanes and other large events.

Rule Number 6.
ALWAYS be aware of overhead obstructions or objects that could become a safety issue during a storm.
- Spotters should not park beneath power lines, trees, or other overhanging structures.
- Stationary observers should not stand in front of windows during high wind or hail events.
- Be aware of items that could be carried towards you during high wind events.

Rule Number 7.
NEVER enter a flooded roadway or area for any reason, whether on foot or in a vehicle.
- Practice “Turn around, don’t drown” while in your vehicle.
    - Less than 6 inches of water can wipe pedestrians off their feet.
    - 6 inches of swiftly flowing water will reach the bottom of most passenger cars causing loss of control and possible stalling.

- A foot of water will float many vehicles.
- Two feet of rushing water can carry away most vehicles including sport utility vehicles (SUV's) and pick-ups.
- Washed out roadways, missing manhole covers, and other obstacles can be hidden under high water.
- Many jurisdictions are now issuing tickets, fines, and charging for rescue operations when vehicles become stranded in high waters on roadways which have been barricaded.

Rule Number 8.

ALWAYS treat all downed power lines as energized at all times.

- Downed power lines can re-energize at any time from automated systems at remote substations. The system will automatically try to re-energize the circuit multiple times before it completely shuts the line down.
- Electricity can travel through both wet and dry ground. Maintain a safe distance at all times and be aware that you can be electrocuted by electricity that travels through the ground.
- Do not use ANY item to attempt to move a power line. Even dry boards or fiberglass tools can conduct electricity due to carbon content and inherent moisture.
- A good rule of thumb is to stay back a full span of poles (Two Poles) from any downed line.
- Be aware that many power lines have "spool memory" which will cause recoil when they arc, burn through and break.
- Report downed power lines to 911.
- If your vehicle is in contact with live power lines, stay in your vehicle and do not touch anything metal. Summon emergency services.
- DO NOT DRIVE OVER downed power lines. If they are energized they can arc if the weight of your vehicle breaks the insulation. This could cause your tire to instantly blow out and your vehicle to become energized.

Rule Number 9.

ALWAYS obey all state, federal, and local traffic laws and regulations. AND practice defensive and safe driving techniques, especially during inclement and night-time driving conditions

- Driving during inclement weather is hazardous and extreme caution should prevail at all times. Match your driving speed and following distances to existing roadway conditions. Rain and standing water will cause vehicles to hydroplane. Hail will create icy conditions on roadways.
- When driving on icy or wet roads, drivers should avoid using cruise control.
- Be cautious of debris on roadways, including power lines.
- Spotting and reporting of severe weather for ANY agency does not supersede state, local or federal laws or regulations.
- Ensure your vehicle is up to safety standards and capable of properly operating during hazardous weather.

Rule Number 10.

ALWAYS Operate safely when operating alongside of roadways.

A "Hot Zone" or hazardous working area is to be established within 25 feet of any operating roadway. This Hot Zone is a very hazardous area due to moving vehicles. Many people are severely injured and killed every year by being struck by moving vehicles alongside of America's roadways. Especially during hazardous events, vehicle operators are less attentive on driving and may be distracted by severe weather or other distractions. Try to avoid operating within the Roadway Hot Zone if at all possible. Pull vehicles outside of this Zone if you need to pull over for any reason. If this is not possible, attempt to find areas in different locations outside the Hot Zone (rest stops, convenience stores, pullovers, etc.). Whenever operating within the Roadway "Hot Zone" the following should be done:

- Wear ANSI approved reflective traffic vests or outerwear while operating outside of a vehicle. Increased visibility is key for your safety in this hazardous environment.
- Never have your back to moving traffic. Always face traffic while in the Hot Zone. This may give you the ability to dodge an approaching out of control vehicle.
- If assisting at a collision, NEVER enter the roadway until traffic in the area has come to a stop. The first priority of Emergency crews is to establish a "Safe Work Zone" using fire apparatus and police vehicles.

APPENDIX C – SKYWARN Weather Spotter Program Reporting

Method	Advantages	Limitations
NWS Chat	• Real-time two-way communication • Great situational awareness tool	• Need an account • Participation limited by Terms of Use -- see www.nws.noaa.gov/directives/sym/pd01017022curr.pdf • Requires internet connection
Telephone	• Direct communication • Immediate contact with NWS	• Phone traffic due to numerous reports • Have to find the local NWS WFO phone number
Amateur Radio	• Direct communication • Immediate contact with NWS	• Must be licensed • A severe weather net may not be in progress during smaller severe weather events
Internet - Local WFO Web-based Form	• Report received by NWS within a minute	• Requires internet connection

Internet - Spotter Network.org	• Report received by NWS within a minute	• Requires internet connection • Must take online training • Not all WFOs have their AWIPS systems set up to receive these reports
Internet - email	• Allows for web links, photos, and videos to be sent • Allows for detailed description	• During events, the NWS may not be monitoring email • Better for sending photos, web links, and videos after an event occurs • Not all offices support this capability
Internet - eSpotter	• Automatically alerts in the NWSChat program so forecasters can see it quickly • Alerts can also be set up on AWIPS workstations to receive these reports	• Requires an account, username and password • Requires internet connection • Will likely be transitioning to another program in the future • Computer only, no mobile phone app • Not all offices support this capability

Internet - Twitter (www.weather.gov/stormreports/)	• Social Networking so followers quickly know what is occurring • Mobile phone apps or computer • Allows for web links, photos, and videos to be sent • NWS offices can receive data by searching for commonly used hashtags (e.g., #snow, #wind, #orwx)	• Mobile phone app requires a data phone • Have to use the proper format to have the data seen by NWS • Requires internet connection • May not be monitored in real-time • Not all offices support this capability
Facebook	• Allows for web links, photos, and videos to be sent • Open to anyone to view • Mobile phone apps or computer based	• Need Facebook account to post reports • May not be monitored in real-time • Requires Internet connections
CoCoRaHS - Community Collaborative Rain, Hail and Snow program (www.cocorahs.org)	• Snow, hail and heavy rainfall information is automatically sent to the NWS	• Have to be a CoCoRaHS observer

table credit: COMET®

APPENDIX D – ARRL-NWS Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING BETWEEN THE NATIONAL WEATHER SERVICE AND THE AMERICAN RADIO RELAY LEAGUE, INC.

I. PURPOSE

The purpose of this document is to state the terms of a mutual agreement (Memorandum of Understanding) between National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) and the American Radio Relay League, Inc. (ARRL), that will serve as a framework within which volunteers of the ARRL may coordinate their services, facilities, and equipment with NWS in support of nationwide, state, and local early weather warning and emergency communications functions. It is intended, through joint coordination and exercise of the resources of ARRL, NWS, and Federal, State and local governments, to enhance the nationwide posture of early weather warning and readiness for any conceivable weather emergency.

II. RECOGNITION

The National Weather Service recognizes that the ARRL is the principal organization representing the interests of more than 690,000 U.S. radio amateurs. Because of its field organization of trained and experienced communications experts, Amateur Radio Service volunteers can be of valuable assistance in early severe weather warning and tornado spotting.

ARRL recognizes the National Weather Service's statutory responsibility to provide the following meteorological services for the people of the United States:

1. NOAA's National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy; and,

2. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.

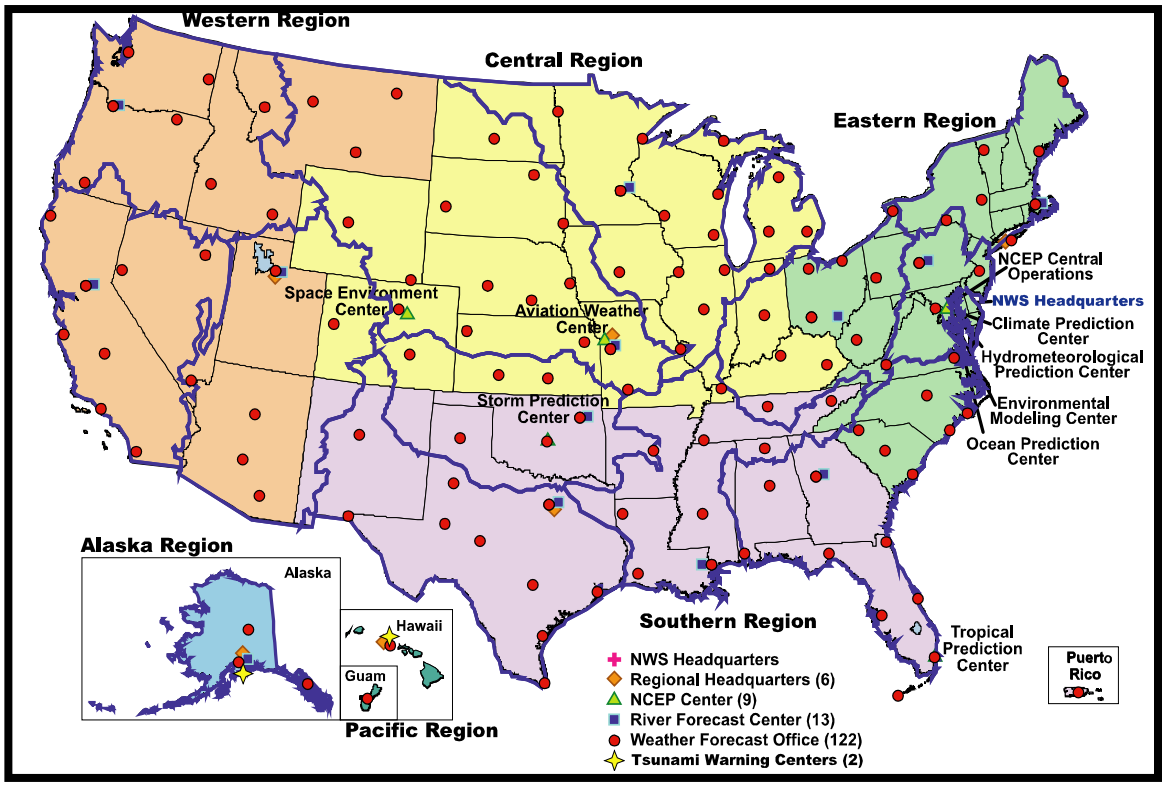
III. ORGANIZATION OF THE AMERICAN RADIO RELAY LEAGUE

ARRL is a noncommercial membership organization of radio amateurs, organized for the promotion of interest in Amateur Radio communication and experimentation, for the establishment of networks to provide communications in the event of disasters or other emergencies, for the advancement of the radio art and of the public welfare, for the

representation of the radio amateur in legislative matters, and the maintenance of fraternalism and a high standard of conduct. A primary responsibility of the Amateur Radio Service, as established by the Federal Communications Commission, is the rendering of public service communications for the general public, particularly in times of emergency. Using Amateur Radio operators in the amateur frequency bands, the ARRL has been serving the public, both directly and through government and relief agencies, for more than ninety years. To that end, the League created the Amateur Radio Emergency Service ® (ARES) ® and the National Traffic System (NTS). The League's Field Organization consists of seventy-one administrative sections managed by elected Section Managers. A Section is a League-created political boundary roughly equivalent to states (or portions thereof). The Section Manager appoints expert assistants to administer the various emergency communications and public service programs in the section. Each section has a vast cadre of volunteer appointees to perform the work of Amateur Radio at the local level, under the supervision of the Section Manager and his/her assistants.

IV. ORGANIZATION OF THE NATIONAL WEATHER SERVICE

National Oceanic and Atmospheric Administration's (NOAA) National Weather Service consists of 122 weather forecast offices, 13 river forecast centers, 9 national centers, and other support offices. NWS scientists provide weather, water, and climate forecasts and warnings for the United States for the protection of life and property, and the enhancement of the national economy. The NWS' national headquarters is located in Washington, D.C., and there are six regional headquarters: Eastern, Southern, Central, Western, Alaska, and Pacific.



SKYWARN® is the National Weather Service's severe weather spotting program. Radio amateurs have assisted as communicators and spotters since the program's inception in the late 1960s. In areas where tornadoes and other severe weather have been known to threaten, NWS recruits volunteers, and trains them in proper weather spotting procedures. These dedicated citizens help keep their local community safe by conveying severe weather reports to their local NWS Forecast Office. SKYWARN spotters are integral to the success of our Nation's severe weather warning system.

Warning Coordination Meteorologists (WCMs) serve as the NWS' principal liaison with its customers and partners in the evaluation and improvement of its products and services. WCMs are responsible for maintaining the working partnership with the local ARRL SKYWARN organizations. There are 132 NWS Warning Coordination Meteorologists (WCMs) located throughout the country: 122 Weather Forecast Offices, 6 Regional Headquarters, National Headquarters, the Storm Prediction Center, the National Hurricane Center, and the National Aviation Weather Center.

V. PRINCIPLES OF COOPERATION

A. ARRL agrees to encourage its volunteer Field Organization appointees, especially the Amateur Radio Emergency Service, to contact and cooperate with National Weather Service Warning Coordination Meteorologists for the purpose of establishing organized SKYWARN networks with radio amateurs serving as communicators and spotters, consistent with rules and regulations of the Federal Communications Commission.

B. ARRL further agrees to encourage its Section management teams to provide specialized communications and observation support on an as-needed basis for NWS offices in other weather emergencies such as hurricanes, snow and heavy rain storms, and other severe weather situations.

C. The National Weather Service agrees to work with ARRL Section Amateur Radio Emergency Service volunteers to establish SKYWARN networks, and/or other weather emergency alert and relief systems. The principal point of contact between the ARRL Section and local NWS offices are the Warning Coordination Meteorologists. Local Warning Coordination Meteorologist contact information is available at: www.stormready.noaa.gov/contact.htm. Contact information for ARRL Section volunteer leaders is available at www.arrl.org/sections. The national contact for ARRL is the Emergency Preparedness Manager at ARRL Headquarters, Newington, CT 06111. The national contact for NWS Warning Coordination Meteorologists is the Office of Climate, Weather and Water Services, WCM Program, 1325 East-West Highway, Silver Spring, MD 20910.

Kay Craigie, N3KN

Date May 12, 2011

Kay Craigie, N3KN
President, American Radio Relay League, inc.

David B. Caldwell

Date 6/9/2011

Printed Name David B. Caldwell

Title OCWWS Director

NOAA National Weather Service

APPENDIX E – NWS-Spotter Network, Inc. Memorandum of Understanding

MEMORANDUM OF UNDERSTANDING

ESTABLISHING A JOINT UNDERSTANDING

BETWEEN THE

NATIONAL WEATHER SERVICE
SKYWARN WEATHER SPOTTER PROGRAM

AND

SPOTTER NETWORK, INC.

I. PREFACE

The purpose of this ***Memorandum of Understanding*** (MOU) is to:

- Acknowledge the similarities of missions that exist between the **National Weather Service (NWS) SKYWARN® Weather Spotter Program** *(PARTY 1)* and **Spotter Network™, Inc**. *(PARTY 2)*.
- Recognize that it would be beneficial to each party to work towards a sharing of resources and technologies for enhancing the safety and warning capabilities of both parties in times of severe and hazardous weather.

II. BACKGROUND HISTORY

PARTY 1 – NWS SKYWARN WEATHER SPOTTER PROGRAM

The **NWS SKYWARN® Weather Spotter Program** was formally established in the late 1960s. It now comprises over 300,000 spotters who provide reports of severe weather and flooding to help meteorologists and hydrologists make life-saving warning decisions. Spotters are concerned citizens, amateur radio operators, emergency managers, public safety officials, truck drivers, mariners, pilots, etc., who volunteer their time and energy to report on hazardous weather and flooding impacting their community. Although the NWS has access to data from radar, satellite and other observing systems, the technology alone cannot detect every instance of hazardous weather and flooding. SKYWARN spotter reports provide vital "ground truth" that help the NWS meteorologists issue timely, accurate and detailed warnings by confirming hazardous weather and flooding detected by NWS technologies. Spotter reports enhance the situational awareness of the entire Integrated Warning Team. Spotters also provide critical verification information that supports the Nation's Disaster Declarations process and improves warning services. An effective SKYWARN Weather Spotter program provides a valuable service for NWS to fulfill its mission of protecting life and property and enhancing the national economy.

While SKYWARN is recognized as a national organization, it receives minimal federal funding and operates at its best potential under the circumstances. To compensate for this shortfall, SKYWARN de-centralizes and effectively operates under the direction of the Warning

Coordination Meteorologists (WCMs) at each of the 122 NWS Weather Forecast Offices (WFO) in the US (Figure 1) or independently as non-regulated individual chapters or groups. This presents a number of challenges to streamlining and standardizing the reporting and training of weather spotters across the country.

Figure 1: The National Weather Service operates 122 Weather Forecast Offices in six regions. Each Weather Forecast Office has a geographic area of responsibility, also known as County Warning Forecast Area, for issuing local public, wildfire, marine, hydrologic and aviation forecasts and warnings.

PARTY 2 – SPOTTER NETWORK

SPOTTER NETWORK started as a hobby of a technologically innovative storm spotter. Using emerging technology including real-time global position satellite (GPS) position data and locally installed software, an individual storm spotter's position and in the field observations could be captured and integrated easily into virtual globe, mapping and/or weather tracking software by providing real-time data feed available in XML, TXT, and KML files. This data feed provides a real-time picture of mobile and stationary spotter position along with personal contact information made available by the individual. Storm reports submitted through Spotter Network are already directly fed to the NWS via the NWSChat & eSpotter systems (Figure 2). The Spotter Network platform has provided a significant technological enhancement in bringing together storm spotters, storm chasers, coordinators and public safety officials in a seamless network of real time information. Furthermore it provides ground truth to public safety officials engaged in the protection of life and property. Since 2006, Spotter Network has been operating as a registered *not-for-profit corporation* in Illinois. In progress, and pending, is an application for a *503c Non-Profit Organization* reclassification.

Spotter Network operates through a nationwide advisory committee of 21 individuals representing all parties interested in severe weather. The advisory committee functions with four complimentary groups:

- **NWS** - Six Warning Coordination Meteorologists (WCMs)
- **Emergency Operations** – Five representatives from Fire & Rescue, and Emergency Management.
- **Meteorology & Training** – Three meteorologists from private, education, and research organizations.
- **Storm Spotter & Chasers** – Four field-experienced spotters and chasers.

Spotter Network has enlarged its outreach to a national coverage with over 30,000 registered volunteers that now utilize the Spotter Training, Tracking, and Reporting System (STTARS) (Figure 2). Each participant is required to undertake its online training and pass the tests before they are allowed onto the network. The identification and certification of each participant is logged into a database and each report submitted by Spotter Network spotters is identifiable to that spotter and reviewed for quality by a Quality Review Committee (QRC) process. The need for qualified reporting in the public domain is recognized.

Figure 2: Spotter Network is national community supplementing SKYWARN and has boosted its capabilities and outreach with STTARS, a complete Spotter Training, Tracking and Reporting System

Any 'online' Spotter Network member is viewable within a virtual globe or web mapping service and identified by clicking on his/her icon if they choose to make themselves available. The user voluntarily supplies their contact information, which can be viewed by any NWS WFO. Any member can be queried for specific information about a given observation. Furthermore, spotters can see each other on the network with their locations against a backdrop of live radar imagery (Figure 3).

The Spotter Network position and storm reports can be transmitted though the Spotter Network native windows client and online web forms or through third party applications such as:

- Automatic Packet Reporting System (APRS)
- RadarScope for iOS & Android
- ChaserLocation for Android
- PYKL3 Radar for Android

Spotter Network is a volunteer organization funded through donations from volunteers and charitable businesses that utilize the Spotter Network data feed for commercial and public safety purposes. It has reached a stage of requiring recognition and the opportunity of applying for funding to expand and operate with public purpose.

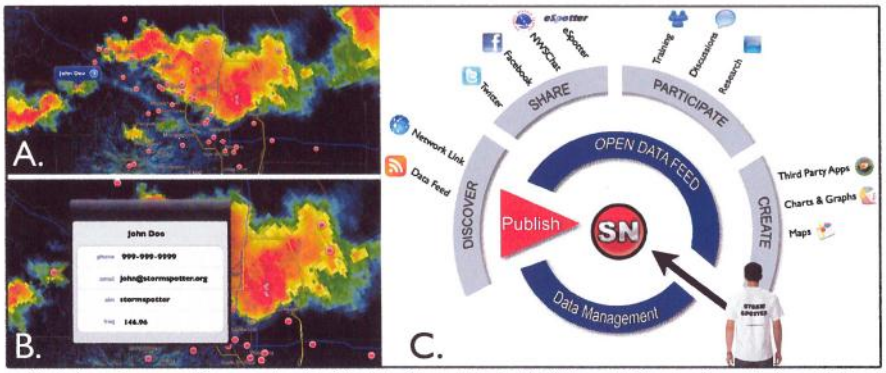


Figure 3: Active storm spotters can be identified by the red dots (A). When clicking on the dot, the details of that spotter are shown including their name and contact information (B). An overview of the Spotter Network depicted as a complete open data feed and management system for storm spotter training, reporting, and position monitoring. In the field spotter data can be easily mapped and viewed in real-time by the NWS and public safety officials in support of our nation's warning program(C).

III. PURPOSE

This agreement is intended to strengthen and broaden that existing partnership between the **SPOTTER NETWORK** and the NWS. This MOU formally recognizes the value the Spotter Network provides to the NWS' SKYWARN Weather Spotter Program. It will enable further cooperative ventures between the two organizations.

IV. PRINCIPLES OF COOPERATION

A. The **NWS SKYWARN** Weather Spotter Program agrees to work with Spotter Network to:

- Acknowledge **Spotter Network** as a valued partner of the **NWS SKYWARN Weather Spotter Program** in fulfilling their similar missions;
- Accept that the Spotter Network online ***Awareness Level*** training may be used by NWS WCMs to certify **SKYWARN** weather spotters in their CWFA. NWS WCMs have the authority to accept the Spotter Network online ***Awareness Level*** training alone, in combination with local training, or as optional, pre-study material for local training, for their local Skywarn weather spotter training certification.
- Permit **Spotter Network** to use and share the **SKYWARN** logo alongside **Spotter Network** educational and marketing materials in accordance with NOAA's SKYWARN branding terms of use: www.nws.noaa.gov/skywarn/.

B. **Spotter Network** agrees to work with the **NWS SKYWARN** Weather Spotter Program to:

- Provide unrestricted access to the **Spotter Network** data feed for both the storm report and spotter position data officered in a KML, XLM, or TXT file.
- Work with each NWS WFO to setup their own Member Network for spotters in their CWFA.
- Allow any certified **SKYWARN** weather spotter to complete the **Spotter Network** ***Awareness Level*** training and thereby have access to the network.

V. Communication and Contact Information

The principal point of contact between **Spotter Network** and the **NWS** are identified below.

Spotter Network

President/Developer
Tyler Allison
2206 N. Main
Suite 166
Wheaton, IL 60187

Director of Training
Joshua Jans
2206 N. Main
Suite 166
Wheaton, IL 60187

NWS

National Warning Coordination Meteorologist
Chris Maier
Office of Climate, Weather and Water Services
1325 East-West Highway, Silver Spring, MD 20910

VI. Conditions and Obligations

Nothing in this memorandum should be construed to contractually bind either party or any agency to specific responsibilities and actions. This MOU is meant as a cooperative agreement to enhance the safety and warnings involved with severe weather.

The Spotter Network assumes no responsibility for, and shall not be liable for, any damages or expenses incurred as a result of any inaccuracy, incompleteness or obsolescence of any data contained on Spotter Network. The services of the site are provided 'as is' with no warranties. Spotter Network disclaims all warranties regarding the accuracy, completeness, currency or reliability of the data in the site, including, without limitation, any implied warranties of merchantability, fitness for a particular purpose, non-infringement or otherwise arising by law or statute. It is agreed that use of, or reliance upon, all data obtained through Spotter Network is to be used with discretion with the understanding that Spotter Network will make all reasonable efforts to keep the network online.

Either party with a 60-day written notification may terminate this MOU.

VII. EFFECTIVE DATE AND SIGNATURES

This MOU will remain in effect for three years from the effective date unless terminated sooner by a 60-day written notice of termination by any party. By agreement of the parties, the MOU may be renewed.

IN WITNESS WHEREOF, the parties hereto execute this agreement, which becomes effective as of the 14th day of JUNE 2012.

Signatures and dates

David B Caldwell	
[*Authorized signature from Party A*]	[*Authorized signature from Party B*]
DAVID B. CALDWELL	Tyler Allison
[Insert name of Party A signatory]	[Insert name of Party B signatory]
6/14/2012	June 5, 2012
Date	Date

APPENDIX F – SKYWARN Branding Terms of Use

The SKYWARN® Service Marks

The SKYWARN® program is nationally known through its two primary service marks (hereinafter the 'marks') which are the word mark SKYWARN®, and the logo, which depicts a tornado within an orange, eye-shaped design, shown to the right. The term "SKYWARN" may or may not appear within the lower portion of the logo. NOAA has filed federal service mark applications to protect its exclusive rights in these marks with the United States Patent and Trademark Office. These marks represent the cumulative goodwill earned through the valiant and dedicated efforts of SKYWARN® volunteer spotters since the late 1960s.

Use of the SKYWARN® Service Marks by Third Parties

NOAA/NWS retain the exclusive right to determine how and where these valuable SKYWARN® marks are used, and reserves the right to control the quality of their use. All use of the marks shall inure to the sole and exclusive benefit of NOAA/NWS. Generally, permission is granted for the use of these marks, without further written agreement, when used in direct connection with, or in direct support of, the volunteer SKYWARN® programs in each of the NOAA/NWS' Forecast offices.

NOAA requests that any prominent use of the term SKYWARN®, or the SKYWARN® logo, be accompanied by the ® symbol to the upper right of the mark, or in the lower right of the logo, along with a notice at the bottom of the page, reading as follows:

> **"SKYWARN® and the SKYWARN® logo are registered trademarks of the National Oceanic and Atmospheric Administration, used with permission."**

Each WCM is granted the authority to determine the appropriate usage of the marks by Local Volunteer Organizations in connection with each respective program, subject to reasonable oversight from the NOAA/NWS chain of command.

The marks may be used on clothing, hats, badges, decals, signs, and other paraphernalia used by SKYWARN® spotters to identify them as affiliated with the NOAA/NWS SKYWARN® program. NOAA will permit text being added to the SKYWARN® logo to brand local Volunteer SKYWARN Programs. For example, a particular vendor might want to create hats and t-shirts with the text "Wakefield SKYWARN Spotter Network" or "SKYWARN NWS Wakefield" on or around the logo. NOAA reserves the right to contest any branding use of the "SKYWARN" name and logo, should it be done in bad faith.

This limited permission is conditioned on all elements and entities involved in the use of the marks being of a high quality and acting in lawful and professional manners, and are subject to the quality review by NOAA/NWS. Any person or entity using the marks hereby agrees to immediately stop using the marks should NOAA/NWS, in their sole discretion, determine for

any reason that the use of the marks is not in the best interests of the SKYWARN® program. NOAA will permit limited use of the term SKYWARN® within Internet domain names to be registered and used by Volunteer SKYWARN Programs. For example, a particular town or county might register "JohnsonCountySKYWARN.org" or "GreenvilleSKYWARN.org," and maintain an online presence/community that furthers the mission of the respective program, as well as the SKYWARN® program. However, NOAA reserves the right to contest any such domain name containing the name “SKYWARN,” should the registrant use the domain in bad faith.

NOAA does not permit the registration of any trademarks, trade names, or other attempts to "own" any name in which "SKYWARN" is a component. NOAA considers any attempt to do so as an infringement of its trademark rights, and will contest the effort in the appropriate venue. The marks may not be used in any manner that is inconsistent with the purposes and goals of the SKYWARN® program. These rules are subject to change at any time for any reason in the sole and exclusive discretion of NOAA/NWS.