



Weather Preparedness Best Practices & Procedures for Manufacturing Facilities

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PREFACE: THE SUPER TUESDAY TORNADO OUTBREAK

On the evening of Feb. 5, 2008, a tornado outbreak was well underway in the lower Mississippi Valley.



A strong cold front ignited a line of fast-moving, discrete supercell thunderstorms that produced large and deadly tornadoes as it tracked northeast. As one storm approached Memphis, Tennessee, it began to obscure doppler radar images being used to monitor a separate storm to the south targeting Oxford, Mississippi. Meteorologists at AccuWeather for Business were monitoring a Caterpillar high-pressure coupling factory in Oxford and noticed the radar image distortion. Using an intuitive interpretation of other available data, they identified the potential for a tornado to strike the Caterpillar facility and issued a SkyGuard® Tornado Warning. The warning was received by the site safety coordinator who then evacuated her 80 employees into designated storm shelters. The tornado struck 22 minutes later, resulting in no major injuries and no fatalities. There was no other warning, no clear radar image, and no room for error.

Damage is seen to the Caterpillar plant in Oxford, Miss., Wednesday Feb. 6, 2008, following a tornado that left scattered damage across several Mississippi counties. (AP Photo/Bruce Newman)

EXECUTIVE SUMMARY

Severe weather is a threat to safety, a risk to business continuity and an interference to a facility's productivity.

Site safety managers and business continuity leaders are tasked with maintaining a safe working environment while not compromising the operations and efficiency of their business. In an industry where one-minute in a storm shelter could cost hundreds of thousands of dollars in lost productivity, a site's severe weather response must delicately balance safety with solvency.

Weather readiness begins with a thorough analysis of possible hazards, operational gaps, and physical vulnerabilities. This analysis is best performed through historical research and collaborative discussions to identify a site's severe weather exposure. Every facility, operation and team has a unique vulnerability to weather that should be discovered and discussed.

Armed with a thorough understanding of their facility's weather vulnerability, safety managers should evaluate their ability to quickly enact protective actions for a weather threat. Managers should identify the team that will be responsible for receiving severe weather notifications, acknowledging their receipt of them, and triggering the appropriate protective action. This team should have triple-redundancy in the methods that they receive and disseminate warnings issued by AccuWeather For Business to ensure that the warning will be received.

Site leadership and safety teams are encouraged to work together to identify safe shelter locations, prepare those shelters with appropriate first aid equipment, and then properly train their staff to follow the site's emergency action plan. This plan should be simple, accessible, and include the specific instructions that they should follow during an emergency.

Lastly, a site's emergency preparedness program should be revisited frequently, tested annually, and trained-on regularly. Once an event occurs, forensic meteorologists can support your insurance claims and your review of the event. Record the success of your emergency action plan in an after-action report following an incident so that your plan can continually be improved.



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WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Introduction to Best Practices

This guide will provide you with the best practices gathered by AccuWeather for Business in our decades of experience working with manufacturing facilities. Our team of over one hundred meteorologists have provided 24/7 monitoring services and proprietary site-specific SkyGuard® Warning services during every tornado outbreak, every hurricane, and every blizzard and ice storm since the late 1980s. The information we present to you here represents the best practices of our clients, our interpretation of relevant preparedness and business continuity standards, and the perspective of meteorologists who live and breathe severe weather and business safety every single day.



AFB Mission Statement

Save lives, protect property, and help businesses prosper by becoming safer, and more efficient and profitable. We are a committed partner of the American Climate, Weather, and Water Enterprise and are dedicated to helping build a Weather-Ready Nation.

Our Motivation – The Threats Posed by Severe Weather

The Oxford, MS Caterpillar story described in the preface highlights one of many impacts that severe weather has on manufacturing facility safety & security. Although tornadoes remain the focus of a facility’s weather emergency plan, below are additional impacts that we encourage our manufacturing clients to prepare for:

- Wind gusts (as low as 25mph) jeopardizing work on elevated platforms
- Large distances across the jobsite to tornado or lightning refuges
- Mass communications in loud environments
- Lead time needed for hazardous operations, such as confined space work
- Production deadlines that discourage sheltering from storms
- Machinery that requires lengthy shutdown precautions before employees can shelter

While it is impossible to prevent severe weather from impacting your facility, it is possible to significantly mitigate the risk of severe weather injury, damage, and disruption. Your ability to anticipate all possible disruptions, mitigate impacts, and properly prepare your staff will define the lasting significance of a weather event impacting your site. Take time now to ensure confidence that your organization’s ability to weather any storm.




INTRODUCTION TO BEST PRACTICES

Purpose and Scope of Document

This document describes the best practices associated with emergency preparedness, crisis communication, and emergency response to severe weather. These practices were developed through federal policy research, lessons learned from existing AFB clients, and emerging trends in emergency management and business continuity. The content presented in this document was written by subject-matter experts in emergency management, guided by our team of expert Storm Warning Meteorologists, and with decades of experience working with manufacturing facilities across the world.

This document is intended to be used by those persons charged with weather-related safety, preparedness, and business continuity at manufacturing facilities. It is not intended to be prescriptive guide to emergency management, but instead to provide you with information about best practices used by manufacturing facilities across the world to maintain weather-readiness. No element of this guide is intended to serve as a standalone template for your unique emergency preparedness needs as we firmly believe that your facility's unique vulnerability to severe weather can only be addressed by a plan developed by your own safety team with help available from our emergency preparedness professionals. For more information or for assistance with your site's specific plans, contact our AccuWeather For Business' emergency management professionals.



WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Best Practices for Hazard Identification

BEST PRACTICES FOR HAZARD IDENTIFICATION

All site safety plans share one common element, the clear listing of all relevant weather threats and hazards. This step is foundational to every site safety plan and is recommended by the Federal Emergency Management Administration (FEMA) in their Comprehensive Preparedness Guide (CPG) 201. The goal of the threat identification process is simply to identify what threats and hazards are possible, informing later discussions on vulnerability, business impact, and protective actions.

Checklist:

01 —

Include tornadoes and high wind (even if you are outside of 'Tornado Alley'!)

02 —

List all past events and those that remain possible

03 —

Review your selection with internal stakeholders and subject-matter experts for confirmation

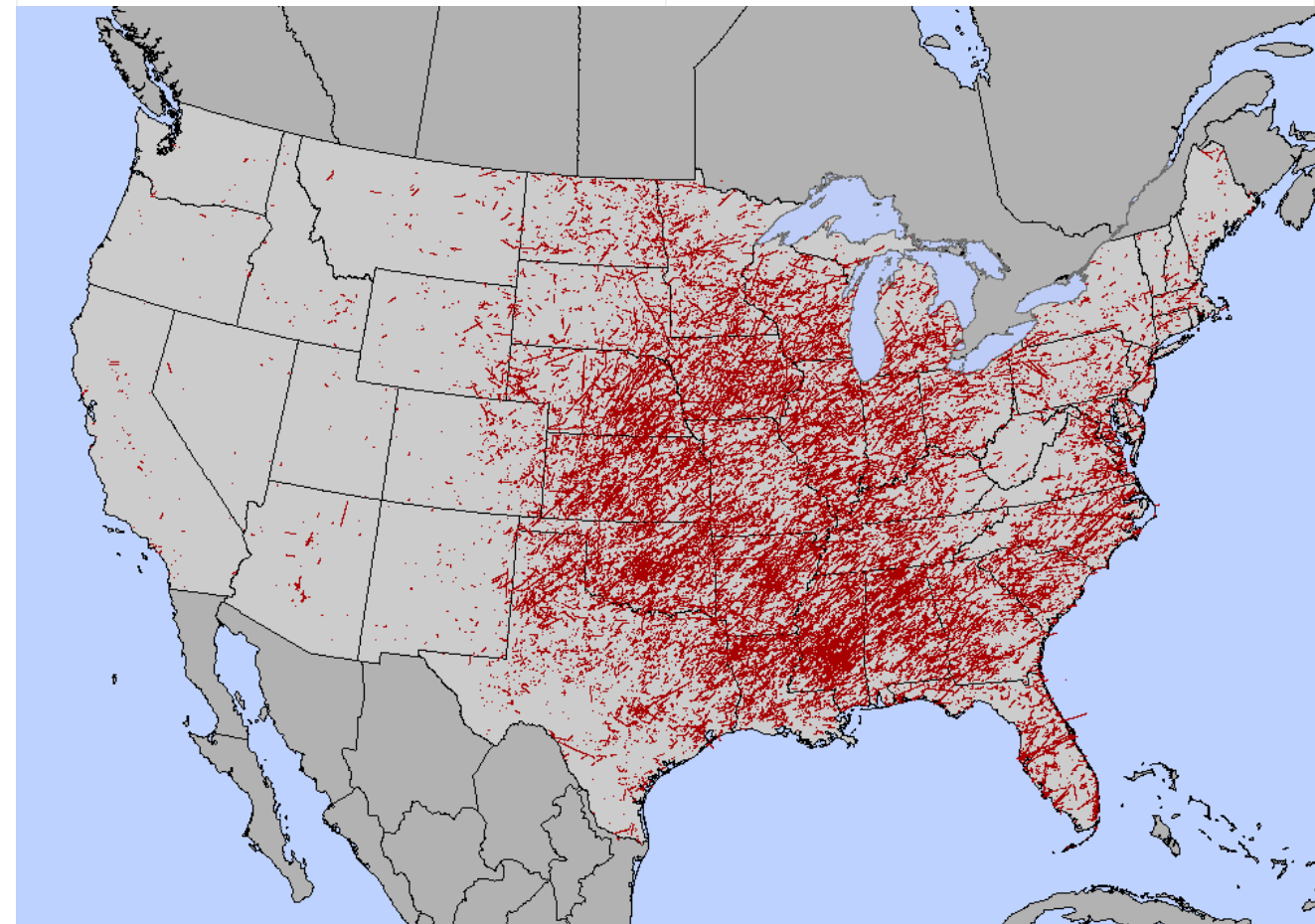
BEST PRACTICES FOR HAZARD IDENTIFICATION

Tornadoes and the Misconception of Tornado Alley

The best safety programs account for the threat of tornadoes, regardless of their location. Tornadoes cross rivers, tear through mountain sides, strike Pacific Northwest communities, hit late at night, and obey few geographical rules. Below are a few examples of damaging tornadoes that occurred outside of the area traditionally referred to as 'Tornado Alley':

- EF2 Tornado in Port Orchard, Washington, on Dec. 18, 2018, at 1:50 p.m. PT
- EF1 Tornado in Baltimore, Maryland, on Nov. 3, 2018, at 9:42 p.m. ET
- EF1 Tornado in New Haven, Connecticut, on Aug. 27, 2020, at 3:53 p.m. ET

Although tornadoes are most likely in the Great Plains, Midwest, and Southeast regions of the United States during the spring and early summer months, they frequently occur outside of that geography and time-of-year. This risk should motivate every safety manager to list tornadoes as a potential hazard and plan accordingly, even if their local area has never seen a tornado.





BEST PRACTICES FOR HAZARD IDENTIFICATION

Catalogue of Weather Threats

This list of weather phenomena should be used when identifying what hazards your site has experienced in the past or what hazards you would like to prepare for. While longer than the lists of weather hazards present within FEMA's CPG201 or NFPA 1600, it includes the hazards that safety managers must consider when planning for weather-based interruptions and impacts.

Refining Your List

Using the list, identify which hazards have occurred in the past and which are possible at your facility. Research the frequency and severity of these hazards in your area using available online databases. Although your list should note which hazards have occurred in recent memory, it should not discount a hazard simply because it has not occurred recently.

While the data to perform this analysis is publicly available, AccuWeather for Business can offer you an expedited historical report of the hazards above. For more information ask your AFB Account Executive.

- Tornadoes
- Damaging Straight-Line Winds (includes microbursts, gust fronts, downdrafts, etc.)
- Lightning
- Hail
- Flash Flooding (includes urban street flooding)
- River Flooding
- Extreme Heat
- Extreme Cold
- Heavy Snow
- Ice (includes 'black ice' & freezing rain)
- Snow
- Blizzards
- Tropical Cyclones (includes tropical rainstorms, depressions, storms, and hurricanes)
- Coastal Storm Surge
- Wildfires*
- Avalanche*
- Earthquakes*
- Geomagnetic Storms*
- Droughts*

*Items denoted by an asterisk are not meteorological hazards, but should be included in relevant plans and assessments.

A person wearing a blue jacket is holding a white hard hat and a tablet. The background shows an industrial facility with tall chimneys or smokestacks, silhouetted against a bright, hazy sky at sunset or sunrise. The scene is dimly lit, with the primary light source being the low sun, creating a warm, orange glow.

WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Best Practices for Vulnerability Assessments and Gap Identification

BEST PRACTICES FOR VULNERABILITY ASSESSMENTS

The best emergency action plans are simple, easy-to-follow, and are built to directly address an organization's unique vulnerabilities. These plans should be reviewed and exercised annually so that new gaps or process shortcomings can be identified and quickly addressed in the plan. This section will enable you to better identify the vulnerabilities that weather hazards may expose.

Checklist:

01 —

Create a site safety team (if one does not already exist)

02 —

Develop and deliver a discussion-based exercise of your current emergency weather plan

03 —

Perform a vulnerability assessment of all equipment, processes, and operations

BEST PRACTICES FOR VULNERABILITY ASSESSMENTS

The Need for Thorough and Trusted Vulnerability Assessments

The best weather safety plans account for the specific weather-related limitations of the equipment, processes, and operations occurring on-site. For example, a worksite's vulnerability to wind typically begins much lower than 58mph, the threshold used by local National Weather Service offices to issue Severe Thunderstorm Warnings. If the facility makes use of a crane or any elevated platform, risk of equipment failure can begin as low as 20mph. The image below depicts a crane that was not properly laid-down when weather forecasts indicated that winds would exceed its 20mph manufacturer-stated wind limit on the February 5th, 2016 in New York City. The OSHA investigation following this incident revealed that crane operators were aware of the forecast and vulnerability, but did not follow the stated safety precautions for the risk. This incident highlights the need for all facility vulnerabilities to be documented and acted-up when forecasts indicate potential hazards.



Key thresholds to consider:

What is the maximum windspeed that certain equipment can be operated in?

Are there high and low temperature thresholds for any operations or equipment?

How much time is needed for employees to get to a lightning shelter?

BEST PRACTICES FOR VULNERABILITY ASSESSMENTS

Create a Safety Team

Many organizations have established safety & security or emergency preparedness coordinators while many others activate an ad-hoc group of leaders during emergencies. Regardless of how your organization is structured, those charged with safety-related decision-making should have a strong knowledge of the facility and a willingness to lead in times of emergency. These individuals should be able to speak for all teams within your facility and have a working knowledge of operations floor and administrative operations. If your organization has not yet appointed a designated safety team, you can start by engaging your facilities, operations, production, and human resources leadership.

Inventory Your Equipment and Process Weather Thresholds

Weather emergency plans at manufacturing sites often focus on tornadoes without an equal focus on high winds, lightning, winter weather, or dangerous temperatures. While high-impact hazards have an important place in your plan, the impact of all the weather hazards on your equipment, processes, and personnel should be considered. This is especially crucial for manufacturing facilities that make use of warehouse-style construction that may be especially vulnerable to straight-line wind gusts from downbursts and powerful thunderstorm downdrafts, such as those found in derechos.

An accurate weather vulnerability assessment will evaluate the safe operating conditions of all apparatus, outdoor equipment, buildings, and temporary structures. It will also evaluate the time that it will take for equipment to be safely shut down and the time that it will take staff to reach acceptable shelter. An assessment of these vulnerabilities will provide you with the wind speed, temperature, and other weather-related thresholds that will trigger your operational and emergency weather plans.

To aid in the performance of your vulnerability assessment, ask your site safety team to perform a walkthrough of their work areas during normal business operations and identify materials that could become hazards during a weather event. Keep in mind that small objects, like construction tools on a roof, could become life-threatening objects during a high wind event!

Key questions to consider:

How long will it take elevated platforms to be secured before wind gusts arrive?

How much loss will occur if we must perform an emergency shutdown of equipment?

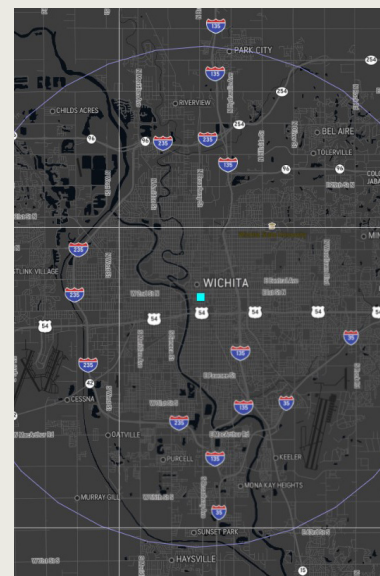
What level of uncertainty are we willing to accept with advance early warning?

BEST PRACTICES FOR VULNERABILITY ASSESSMENTS

Planning for Equipment Shutdowns and Shelter Travel Times

Shutting equipment and processes down for severe weather can be expensive and cumbersome, but it may be necessary to protect your facility and staff from additional damage during severe weather. If your operations floor processes require additional time to perform a “soft” shutdown, you must specify that shutdown process and its trigger in your emergency action and operations plans. While it may not always be possible to perform a soft shutdown if storms form with little lead time, you may be able to reduce loss by initiating the process before sheltering staff. Many AccuWeather For Business manufacturing clients enact a different process on days where severe weather is expected or during a Tornado Watch, that will allow them to be more prepared to shut down safely and efficiently.

While planning for equipment and process shutdowns, do not forget to account for the time that it will take your staff to seek shelter. Employees working at off-site locations, outdoors, or in complicated personal protective equipment may need additional time to shelter from approaching weather threats. If they require more than 10 minutes to reach a shelter, you may need to trigger their response earlier than you would otherwise.



A Caveat: Minutes Versus Miles

AccuWeather for Business often interacts with manufacturing sites that have set large distance-based buffers around their facility as a workaround for lead time for lightning, tornadoes, and high wind. The meteorological community does not recommend using distance as a proxy for lead-time, primarily because of differences in storm motion and development. Example: Triggering a wind safety action when any anemometer within 20-miles reaches 30mph will result in frequent false alarms and will often miss smaller wind events, like microbursts. Meteorologist-issued warnings can provide reliable lead-time, which cannot be replicated by automated sensors based on an arbitrary distance!

BEST PRACTICES FOR VULNERABILITY ASSESSMENTS

Exercise Your Current Plan

Emergency weather plans should be exercised (or tested) at least once annually, evaluated for effectiveness, and improved as needed. While the activation of your plan during a real weather emergency will provide you with invaluable feedback, a discussion-based ‘tabletop exercise’ is a safer and more predictable test of your plan. A ‘tabletop exercise’ is a discussion-based activity that will test your organization’s emergency weather plan. This type of exercise requires minimal resources, presents minimal risk, and will enable you to safely identify health and safety gaps without the threat of a live event.

Tabletop exercises are an excellent way to identify any new gaps that have grown out of new plant processes, new products, or new operations present at the site. You should evaluate your participant’s ability to accurately execute the plan while also taking note of improvements that need to be made to it. Once you have completed the exercise, compile an after-action report (AAR) of your findings.

To create a tabletop exercise of your emergency weather plan:

Identify the individuals who you would like to test the plan with

Identify specific aspects of the plan or specific capabilities that you would like to test

Develop a simple weather-related scenario

Set a 2-3 hour meeting for the individuals to participate in the exercise and ask them to participate in the scenario using the current emergency weather plan

Invite staff members to participate as note-takers during the exercise and document any plan gaps, shortcomings, or needs that were identified during the exercise

The background image shows two workers in bright orange safety suits and red helmets walking away from the camera on a metal walkway or staircase of an industrial facility. The walkway is made of metal grating and has railings. In the background, there are large industrial structures, including a yellow crane or conveyor system. The sky is overcast and grey. The overall tone is industrial and safety-oriented.

WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Best Practices for Selecting Services and Communicating Warnings

BEST PRACTICES FOR SERVICES AND COMMUNICATING WARNINGS

Your organization and each of your facilities are unique. You know what weather threats you are most prone to, you know what thresholds your equipment can be operated under, and now you need to find a way to receive a warning when those thresholds are met. This section will guide you to select the appropriate type of warning and how to communicate it.

Checklist:

01 —

Select a warning service that aligns with your thresholds

02 —

Consider 'Null Notifications' for Public Warnings

03 —

Designate a communication strategy that includes three layers of redundancies

BEST PRACTICES FOR SERVICES AND COMMUNICATING WARNINGS

At 10:40p in the evening of January 25th, 2021, a supercell thunderstorm produced an EF-3 tornado north of Birmingham, AL.

The tornado remained on the ground for over 10-miles, crossing through populated neighborhoods, a high school, and through several commercial businesses. The tornado was well-warned by the local National Weather Service Weather Forecast Office, but that warning could have very well have gone unheard by residents who were very likely be sleeping at time. Where free consumer applications, calls from friends, and outdoor warning sirens could have failed, NOAA Weather Radios did not. Many residents of Fultondale reported that they were awoken by their weather radio just in time to seek shelter from the imminent tornado. Although these radios do not provide businesses with the warning customization needed to protect unique processes, this story highlights that redundant warning systems can and will save lives.



A Hampton Inn damaged by the tornado, photo courtesy of NWS BMX

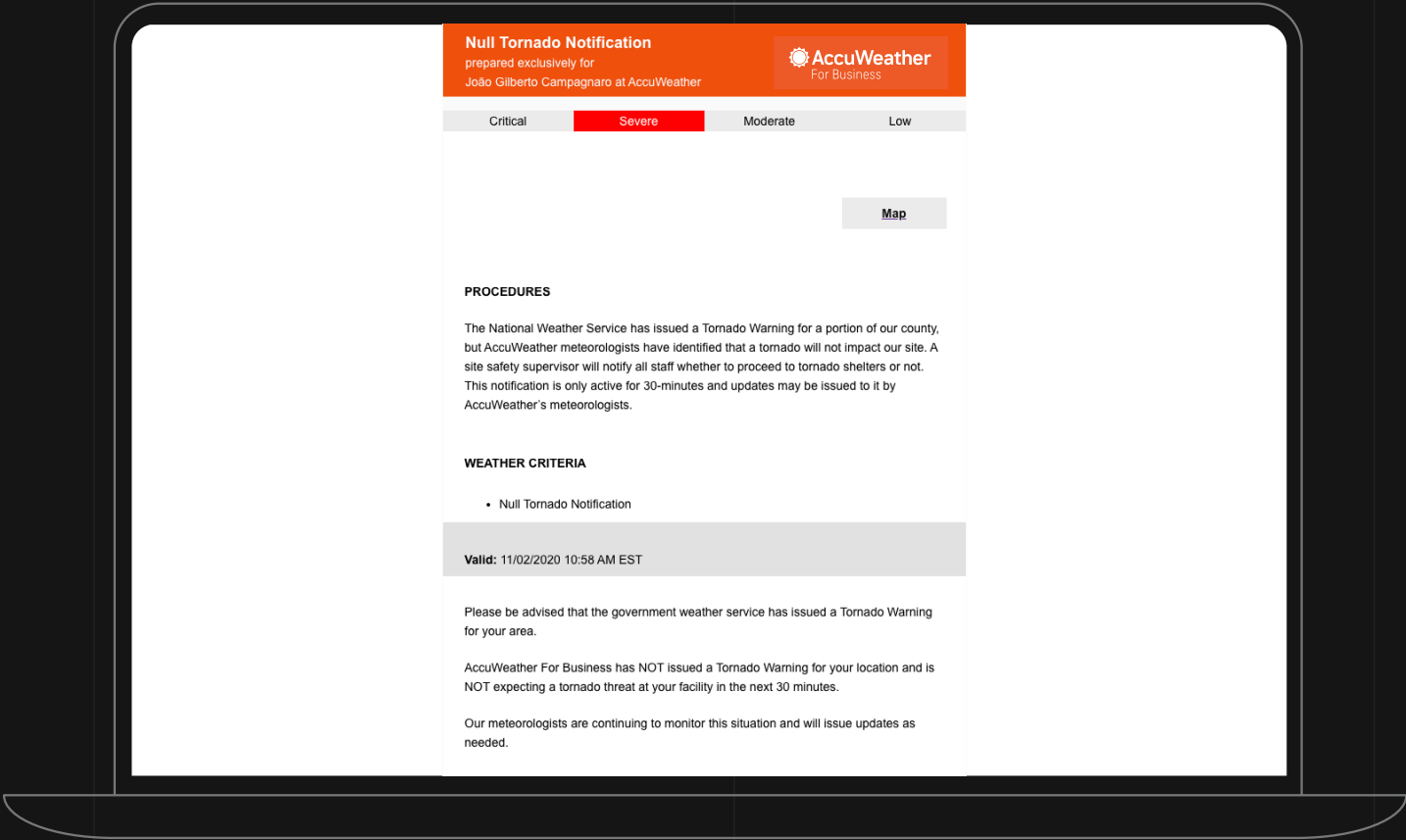
Differentiating Between Government and SkyGuard Weather Warnings

America's Weather Enterprise offers countless, but critically different ways for businesses and the public to receive weather hazard notifications. Larger polygon- or county-based National Weather Service warnings offer the public a way to identify areas where hazards are likely, allowing them to avoid the area or shelter if they are within it. These warnings are communicated via free applications like the AccuWeather smartphone app, via FEMA Wireless Emergency Alerts (WEA) on modern smartphones, NOAA weather radio, and through broadcast news channels. These warnings should be considered a reliable backstop for a business weather emergency plan, but only a private weather monitoring service, such as AccuWeather for Business' SkyGuard® Warning service, offers the lead time and customization needed to completely align with a business' unique weather vulnerabilities.

	Government Warnings	SkyGuard® Warnings
Fee	No cost	Cost per facility monitored
Warning Types	Not customizable	Completely customizable
Issued by Meteorologist	Yes	Yes
Lead-Time Offered	Not customizable	Completely customizable
24/7 Consultation & Briefing Services	Only for public safety partners	Yes

Null Notifications

The National Weather Service supports public safety through the issuance of weather watches, warnings, and advisories, but those notifications are not specific to your exact location or business operations. Null notifications are issued by a meteorologist to inform you that a local National Weather Service warning does not pertain to your exact location at that time, which may enable you to reduce your time in shelter and save unnecessary down time when a meteorologist has identified that a threat is not present. Reducing time spent in shelter is especially important given the necessity of maintaining distance due to COVID-19. AccuWeather for Business pairs these notifications with live meteorologist consultation, enabling your site safety team to contact our meteorologists at any time for more information.



Keys to effective
warning communication:

Identify one primary and two
back-up ways to receive warnings

Empower your 24/7 security
or related group to receive and
view warnings

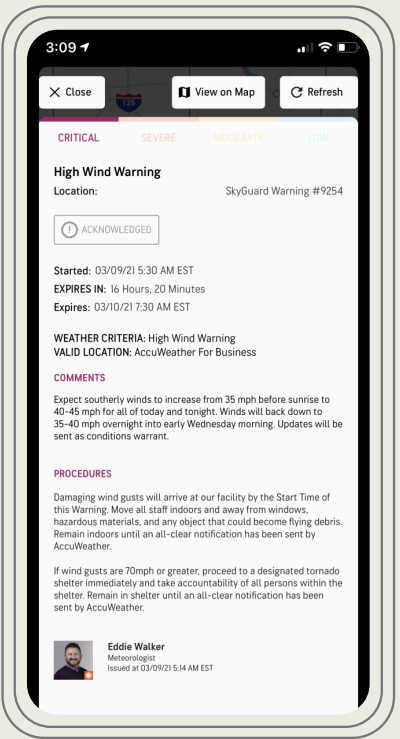
Establish a system of logging
who received and confirming
the warning

BEST PRACTICES FOR SERVICES AND COMMUNICATING WARNINGS

Communicating & Distributing Warnings

Once you have selected the types of warnings that you would like to receive, identify a group that will receive those notifications during all operational hours. This will most often be your on-site security team or staff that work in a guard shack. If you do not have on-site security, consider using your rotating shift supervisors.

Hazardous weather events may damage the systems that support the way you primarily receive weather warnings. The group that you have charged with warning reception should have at least three ways of receiving weather warnings and a method that logs their acknowledgment of the warning. Many groups will rely on text message, email, and a mobile phone application to receive weather notifications. Our AccuWeather for Business Portal and mass notification systems add additional value in providing you with notifications not tied to a mobile phone.



Confirming Warning Receipt

The most effective warning services offer an accountability system for critical warnings, like those for tornadoes and high wind. This system operates by requiring specific users within a site to press an 'Acknowledge' or 'Confirm' button on critical SkyGuard® Warnings, which notifies AFB meteorologists that the warning has been received. If this button is not pressed within two to three minutes of warning issuance, a phone call is made to a preset list of emergency contacts until verbal confirmation of warning receipt is made or the list is exhausted.

Use of Outdoor Warning Sirens

Caution should be used if you are primarily relying on local emergency management, fire, or police to activate outdoor warning sirens to activate your emergency response plan for weather threats. These sirens are highly effective at notifying outdoor populations to imminent threats, but they are not intended to be heard indoors. Safety managers can additionally benefit from being in control of the maintenance and updates of warning dissemination equipment used on-site.

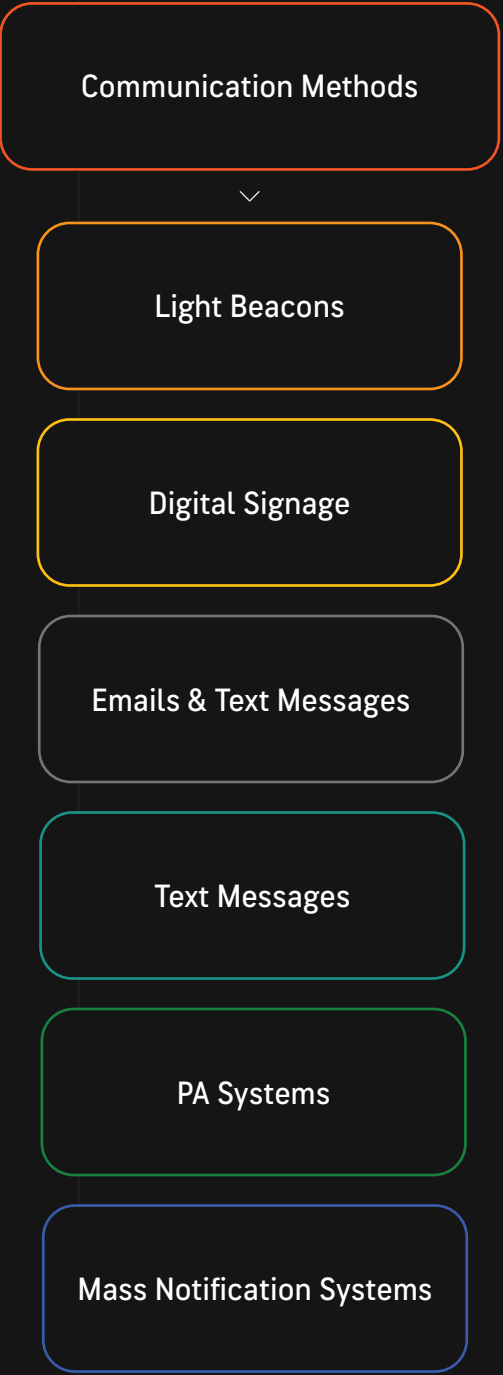
Lastly, document the ways that you expect your designated group to receive warnings. If a weather incident occurs at your site, you should expect your staff to follow your plan exactly as it’s written. Be specific, be simple, and test frequently. Emergency procedures can be added to your AccuWeather For Business Portal account and be displayed within the warning, providing your employees with actionable information during severe weather.

Redundancies in Warning Communication

Once a warning is received, you must quickly notify all affected personnel, which may be a complicated process at your facility. Loud environments, delicate operations floor processes, and restrictive cell phone policies are among the many mass communication challenges that you may need to overcome. To the right are a few examples of processes that our clients use to communicate warnings.

You should select at least three methods to disseminate warnings throughout your facility and document that those are the official methods that will be used. Those systems should be tested regularly and used during quarterly emergency drills. They should also be documented in your emergency action plan.

Triple-redundancy in warning reception and dissemination is key to ensuring that no warning will go unheard!



WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Best Practices for Weather Emergency Planning



BEST PRACTICES FOR EMERGENCY WEATHER PLANNING

Weather will likely your facility's most common hazard, driving most of your emergency responses and major protective actions. Your plan for these responses does not need to be complicated, but it should at the very least identify the protective actions that all staff should follow when a warning is issued. The best practices included in this section pertain to the basic tenants of planning for weather emergencies.

Checklist:

01 —

Select the best locations for storm refuges and shelters

02 —

Implement an accountability system for your storm refuges and shelters

03 —

Integrate emergency instructions into your warning communications

BEST PRACTICES FOR EMERGENCY WEATHER PLANNING

The 2008 Oxford Tornado

The preface of this guide highlighted the excellent radar analysis that our Storm Warning Meteorologists performed during the 2008 Super Tuesday Outbreak, but the outcome of this story would have been much different without the heroic actions of the well-prepared Caterpillar site safety coordinator. Her staff survived the event because she trusted the warning, trusted her plan, and quickly responded. We return to this story in this final section as it serves as a reminder of the importance of well-defined shelters, well-rehearsed sheltering drills, and a well-trained staff.

This section will discuss the best practices that our clients used to identify shelters, create accountability systems, and train their employees regularly on the execution of their plan. With these basic tenants of emergency preparedness in place, you will be ready for your next weather emergency.



Characteristics of a Better Shelter:

NSSA/ICC 500 Compliant

Underground or an interior room

Contains first-aid equipment and
other supplies

Characteristics of a Bad Shelter:

Has exterior-facing walls
or windows

In the middle of a building with
a wide-span roof

Has hazardous chemicals nearby

BEST PRACTICES FOR EMERGENCY WEATHER PLANNING

Identify Storm Shelter and Refuge Locations

Your facility should have pre-identified storm refuge areas or ICC 500-compliant storm shelters no matter where it is located. While there is a higher likelihood of tornadoes within “Tornado Alley,” tornadoes can hit anywhere, so it’s important to have a plan and practice it even if your location lies outside of Tornado Alley or has not been hit before. While any area designated as a shelter must comply with the International Code Council’s (ICC) 500 Standard for the Design and Construction of Storm Shelters, areas of refuge from severe weather can be easily identified and labeled.

Shelter and refuge areas should be reviewed and revised as necessary to ensure all employees and site visitors are able to reach shelter in advance notice given and fit with proper social distancing. Shelter and refuge locations for each area should be clearly listed and be equipped with a disaster supply kit. Shelters and refuge area should also be clearly marked and evaluated for exposure to hazardous material, debris, projectiles, or other dangerous material that could be transported in the instance of high winds. A structural engineer, your local fire department, or your local public safety agency may be helpful in identifying the best location

Preparing Storm Shelter and Refuge Locations

Employees, contractors, and visitors should be able to find a nearby storm shelter or refuge as easily as they are able to find the nearest fire exit. Short lead-time threats, like tornadoes embedded within squall lines, may leave them with a very short window to shelter before the facility is struck. Power loss may also occur ahead of the storm’s arrival, so shelter signage should be reflective and emergency lightning should be readily available once in the shelter. After you have identified and marked your shelter locations, stock them with the supplies that would be needed during an emergency. These supplies should include several bleeding control kits, which can also be used in the case of an active shooter. Store these kits in a brightly colored bag and secure the bag’s contents with a breakable lock so that you can be sure that the contents haven’t been used for day-to-day cuts and scrapes.

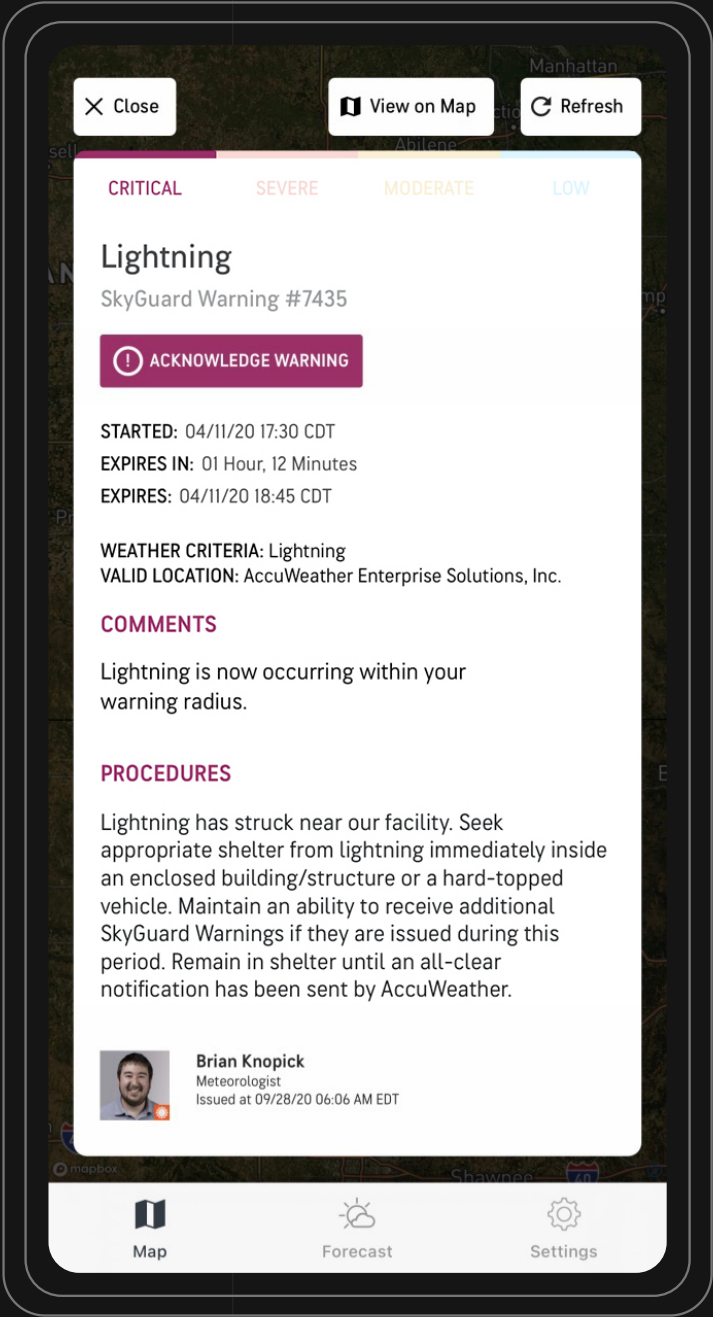
Accountability Systems

When you activate your Emergency Action Plan for a severe weather event and instruct persons to seek a place of refuge, you should maintain an ability to take accountability of all persons. Whether the threat arrives with little or ample warning, you must have a procedure to account for each of your employees. This procedure will allow you to take accountability of the employees who reached a designated shelter, which will be invaluable for first responders if your facility is damaged by the storm. Advanced accountability systems are available through third-party vendors, but tag-in/tag-out and paper logs can also be used in lieu of more technologically advanced methods.

Integrating Protective Action Instructions into Warnings

The best warning messages will clearly identify the hazard, the impacted location, and the action that employees at that action should take. Although your staff will be familiar with your site's emergency plan, integrating emergency response instructions into the warning message will add redundancy that may make their response more efficient.

The image on the right shows ‘Procedures’ configured within AFB's Portal website that allow our clients to specify the message included into each of their notifications. This lightning Procedure is configured for all staff within AccuWeather’s Wichita, Kansas office only and other Procedures are written for AccuWeather’s other offices. This function ensures that all employees who receive this SkyGuard® Mobile app notification know exactly how to respond! See Annex B for a sample list of emergency procedure messages.



Hazard-Specific Emergency Action Plan Annexes

Weather hazards are likely to be the most frequent cause of shelter-in-place and emergency response actions at your facility. While your staff may be seasoned and experienced with severe weather, your response plan should still be documented and included as part of your facility's emergency action plan. Many AFB clients choose to build a separate annex at the end of their facility emergency action plan to address each of the weather hazards they identified.

Any changes to your emergency operations plan should be communicated to your staff and many AFB clients have posted copies of their plans around their facility. This practice ensures that employees are always able to access the plan and that visitors can reference it should an emergency arrive while they are onsite.

Your facility's emergency operations plan should at the very least include the following three sections:

01 —

The weather hazards you identified as threatening for your operations

02 —

The source of your weather warnings and communication pathways

03 —

The protective actions that staff should follow when weather warnings are issued



Deliver Annual Training and Testing

Businesses across the Midwest, Great Plains, South, and Southeast U.S. are familiar with annual severe weather training. Whether focused on tornadoes or inclusive of other thunderstorm threats, companies that have historically been at-risk for weather disasters see the value in annually training their employees to safely navigate severe weather.

AccuWeather for Business regularly develops and participates in its clients' annual severe weather training sessions. The sessions provide an opportunity for your staff to ask questions directly to a meteorologist and it allows your site leadership to develop relationships with the meteorologists who may one day be guiding your site through a severe weather emergency.

When developing training courses for your facility, consider the three recommendations below:

01 —

Develop content based on your weather plans and on the weather hazard itself


02 —

Offer simple tests before and after course delivery to gauge retention

03 —

Involve your weather monitoring service and ask for their assistance





WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Summary



SUMMARY

Severe weather is a known and certain threat.

Whether you're prone to severe thunderstorms, heavy snow, hurricanes, dust storms, or flooding rainfall, businesses across the world should expect to be impacted by severe weather. Severe weather is among the few types of hazards that cannot be prevented, but you can greatly reduce your facility's vulnerability to severe weather by identifying how your site will be impacted, developing a response plan to mitigate that impact, and continually improving your plan.

This guide was written with the intent of informing its readers about the best practices used by AccuWeather for Business' most prepared and resilient clients. With our decades of experience protecting manufacturing facilities, outdoor events, critical transportation, and countless other business verticals, we felt a duty to document and share what has worked well for so many businesses across North America.

AccuWeather for Business is dedicated to the protection of the life and safety of our clients. Our services enable safety managers to know when they need to act to protect their facility and our meteorologists remain only a phone call away to walk them through the storm. We hope that this guide has given you information to help you improve your safety program and we hope to have the opportunity to continue to serve you in the future.

WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Appendix A: Condensed Guide to Weather Safety



APPENDIX A: CONDENSED GUIDE TO WEATHER SAFETY

Step 1: Hazard Identification

- Create a list of all weather hazards (like the one in this guide)
- Analyze the frequency, severity, and last occurrence of hazards at your location
- Create a refined list of weather hazards based on this analysis
- Do not discount hazards simply if they have not occurred in recent history
- Review this list with safety team stakeholders

Step 2: Vulnerability Assessment and Gap Identification

- Create a safety team if one is not already in place
- Inventory weather-prone equipment
- Inventory weather thresholds of processes and facilities
- Identify time needed for equipment shutdowns and travel times to shelter
- Exercise current plan with safety team and stakeholders
- Identify vulnerabilities and gaps not addressed in current plan

Step 3: Selecting Services and Communicating Warnings

- Identify if private weather warnings will provide better support for your facility
- Discuss the use of professional Null Notifications for government warnings
- Identify one primary and two backup systems to receive warnings
- Train 24/7 security team or similar group to receive and use warnings
- Establish a system to log receive or confirmation of warning

Step 4: Weather Emergency Planning

- Identify the best location for storm shelters, using experts when available
- Prepare storm shelters and refuges with necessary response equipment
- Create an accountability system for shelter responses
- Integrate protective actions/procedures into warning messages
- Add severe weather annexes to your emergency action plan
- Regularly train and exercise staff in relevant protective actions



WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Appendix B: Discussion-based Response Exercises

APPENDIX B: DISCUSSION-BASED RESPONSE EXERCISES

The Federal Emergency Management Agency (FEMA) recommends the use of their Homeland Security Exercise and Evaluation Program (HSEEP) methodology when designing, delivering, and evaluating exercises. The condensed guide below was informed by the HSEEP methodology and can be used in exercising your emergency action plan. AccuWeather For Business Emergency Management Professionals can help facilitate these exercises.

Exercise Design

In designing a tabletop exercise, keep in mind that you are testing your plan to identify any gaps in the plan and to improve it wherever possible. Consider the steps below:

- Identify the persons who will participate, ideally line-of-business or team leaders, as well as on-site security personnel who will be responsible for warning dissemination
- Identify the core capability that you would like to test with the execution of your plan in the exercise; a list is available at <https://www.fema.gov/core-capabilities>
- Create a simple scenario with no more than three to five scenario events or incidents

Exercise After-Action Report

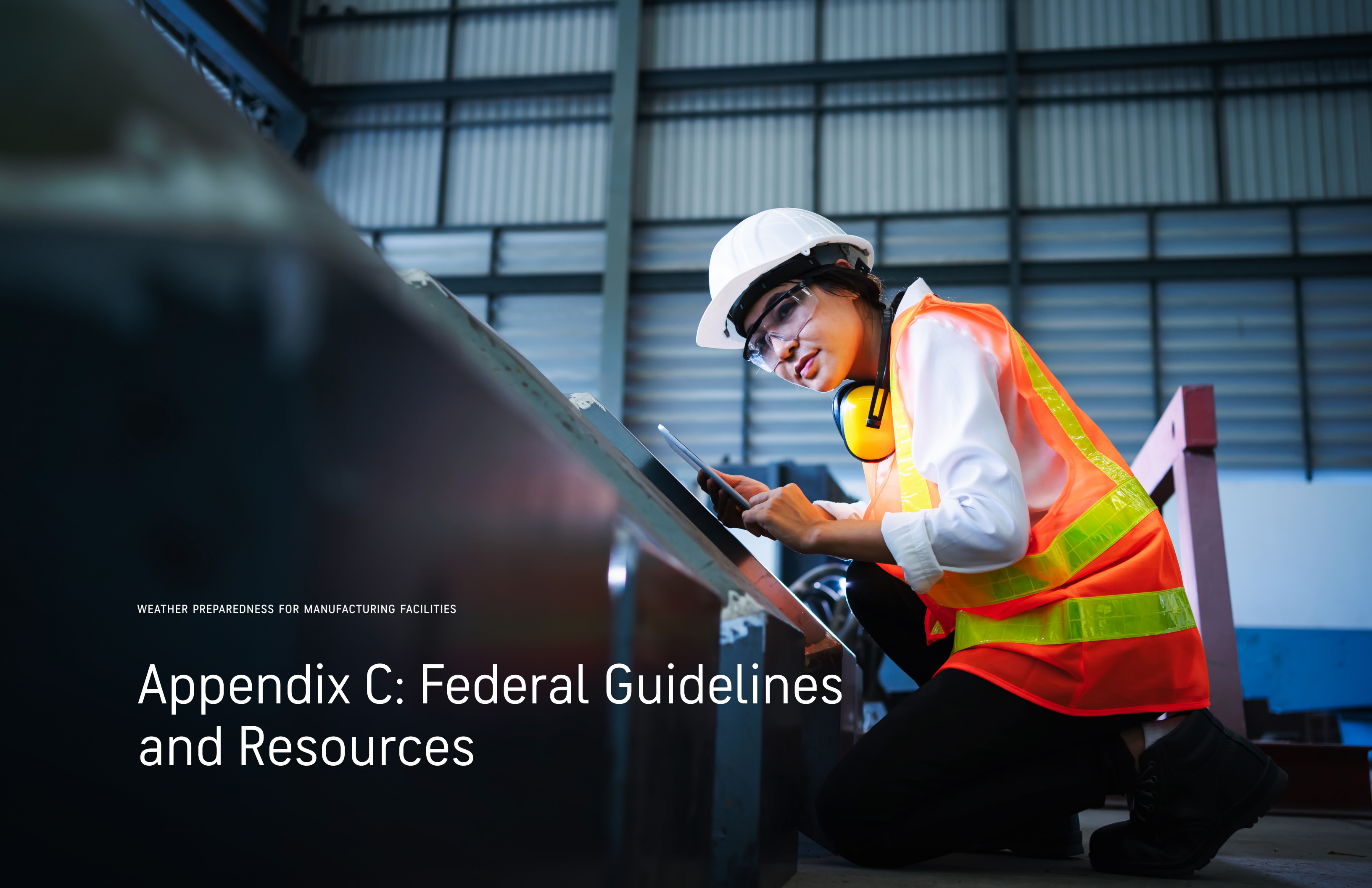
Once you have delivered your tabletop exercise, summarize all the discussions, issues, and questions that were raised into a report. Create an after-action report that includes this summary and proposes changes to any issues that need to be addressed. Once your report is completed, meet with the exercise participants one last time to address your report and then disseminate any changes to your emergency action plan to all employees.

Exercise Delivery

Your exercise is a no-risk, no-fault opportunity for team leaders to talk through your emergency action plan. Here are some tips for delivering your tabletop:

- Ask your participants to remain on topic, but to ask questions when a process is unclear
- Encourage participants to highlight any potential gap, vulnerability, or error in the plan
- Record the session or appoint several employees to take notes of the discussion

If you would like assistance in delivering your exercise, consider using one of our expert facilitators!



WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Appendix C: Federal Guidelines and Resources

APPENDIX C: FEDERAL GUIDELINES AND RESOURCES

The Occupational Safety and Health Administration (OSHA)

The OSHA Standard for Emergency Action Plans (1910.38) requires that all organizations have an emergency action plan. This plan must exist as a written plan for organizations with more than 10 staff members and it must outline procedures for emergency evacuation, reporting emergencies, and for performing accountability checks following evacuation. This standard is referred to in this document. Although OSHA does not offer specific standards related to the definition of a tornado shelter or refuge, it does offer guidelines for tornado preparedness that was used for the development of this document.

In addition to its general emergency action plan standard, OSHA offers guidance related to lightning safety that was co-authored with the National Weather Service. This guidance gives information related to lightning injury statistics, lightning monitoring systems, and lightning safety processes. The information related to lightning safety processes were used in developing this document.

The National Weather Service (NWS)

The National Weather Service offers recommendations and preparedness best practices for every type of weather threat and hazard. These recommendations are oriented for the general public, but they hold relevance for business operations as they focus on essential preparedness for weather threats. The following recommendations and best practices were used in development of this document:

- Avoiding flood waters and moving to higher ground during floods
- Seeking shelter inside of sturdy structures during severe thunderstorms, which are those thunderstorms that produce +58-mph wind gusts, ≥1-inch hailstones, and/or a tornado
- Seeking shelter inside of a tornado shelter or interior, windowless room for tornado threats

The National Institute of Standards and Technology (NIST)

The NIST provides recommendations related to science, standards, and technology that improve quality of life and promote safety. The NIST works closely with other organizations and agencies, such as NOAA and the International Code Council. Recommendations from NIST regarding revised standards for storm shelters are listed in this document.

The Federal Emergency Management Agency (FEMA)

FEMA offers best practices for weather preparedness, response, and recovery alongside formal standards for incident command, disaster response, and disaster mitigation. For the purposes of general preparedness communications, their best practices for weather response were used. These best practices align closely with those of the other bodies mentioned within this appendix and they are referenced below:

- Sheltering in a safe room within a sturdy building during tornado threats
- Sheltering in sturdy buildings during severe thunderstorms and doing so immediately when lightning is nearby
- Avoiding contact with flood waters

APPENDIX C: FEDERAL GUIDELINES AND RESOURCES, CONTINUED

The Red Cross

The Red Cross is a non-government organization that provides disaster preparedness information and operates as a disaster relief/recovery response agency. Their guidance is also generally focused on the general public, but it is applicable to all persons operating in an environment of standard weather risk. The following recommendations and best practices were used in development of this document:

- Proceeding to a storm shelter during tornado threats
- Seeking shelter indoors when lightning is visible or thunder is audible
- Seeking shelter from wind threats in sturdy buildings and away from windows

The Centers for Disease Control and Prevention (CDC)

The CDC is a United States public health agency that, among many purposes, provides disaster preparedness information for the U.S. public. Like the Red Cross, FEMA, and NWS, this information is intended for use by the general public, but the guidance is applicable to safety and security operations at businesses. The following recommendations and best practices were used in development of this document:

- Sheltering in interior rooms from tornadoes
- Sheltering in pre-designated safe locations during lightning storms
- Avoiding contact with flood waters

The National Fire Protection Association (NFPA)

The NFPA's 1600 Standard on Continuity, Emergency, and Crisis Management provides a comprehensive framework for site safety and related topics. This standard is free to access and provides detail on all processes involved with risk assessments, emergency preparedness, training, and much more. The following recommendations and best practices were used in development of this document:

- The list of weather hazards referenced to include in risk assessments
- Performing a detailed vulnerability/business impact analysis after completion of risk assessment
- Warning and communication best practices, including triple redundancy and the regular testing of communication systems.

The International Organization for Standardization (ISO)

The ISO 22301 Standard on 'Security and resilience – Business continuity management systems – Requirements' provides more condensed guidance on hazard planning when compared to NFPA 1600. This serves as the standard for many of the most successful business continuity management teams across the nation while remaining simple enough to guide early business continuity plans. The following recommendations and best practices were used in development of this document:

- Risk assessments should be performed regularly
- Warning notifications should be tied to 'pre-defined thresholds'
- Emergency procedures and business continuity plans should be regularly exercised



WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Appendix D: Best Practices for Protective Actions and Procedures

APPENDIX D: BEST PRACTICES FOR PROTECTIVE ACTIONS AND PROCEDURES

The appendix below outlines best practices to follow during tornado, wind, and lightning notifications. These best practices were developed using nationally accepted guidelines.

SkyGuard® Tornado Warning

A tornado will pass within our 3-mile warning radius by the Start Time of this Warning.

- Tornado Warning is received and acknowledged by designated safety team
- Safety Team activates Emergency Action Plan for Tornado, initiates shutdown of high-risk equipment, and initiates storm shelter plan
- Safety Team disseminates warning and instructs all persons to proceed to pre-designated tornado refuge locations via radio all-call and phone-based public announcing system three times, then forwards warning via email to all employees
- Shelter Warden Teams take accountability of all persons inside pre-designated tornado refuge locations
- All employees shall stay in the shelter locations until the Tornado Warning expiration or cancellation is received
- Once the Tornado Warning expiration or cancellation notification has been received, Shelter Warden Teams would provide a report to the Safety Team of any injuries, damage, or safety issues.

SkyGuard® Wind Warning

Damaging wind gusts will arrive at our facility by the start time of this warning.

- Wind Warning is received and acknowledged by designated safety team
- If winds exceed 70 mph, Safety Team follows procedure for Tornado Warning as wind speed will exceed that of E0 tornado
- If winds exceed 50 mph, Safety Team follows procedure for High Wind and initiates suspension of outdoor work
- Safety Team disseminates warning to outdoor staff via radio all-call, outdoor public announcing system three times, and then forwards warning to all outdoor employees
- Safety Team instruct all employees working outdoors to immediately seek refuge from wind-borne debris and high wind speeds
- Safety Team updates employees if the Wind Warning is extended or upgraded
- Safety Team communicates “All-Clear” message once the Wind Warning has been canceled or expires

APPENDIX D: BEST PRACTICES FOR PROTECTIVE ACTIONS AND PROCEDURES, CONTINUED

The appendix below outlines best practices to follow during tornado, wind, and lightning notifications. These best practices were developed using nationally accepted guidelines.

SkyGuard® Lightning Advisory

Lightning is expected to strike near our facility by the start time of this Advisory.

- Lightning Advisory is received by designated Safety Team
- Safety Team disseminates advisory to outdoor staff via radio all-call, outdoor public announcing system three times, and then forwards warning to all outdoor employees
- Safety Team instructs outdoor working teams to prepare to suspend work if a Lightning Warning is issued unless it will take them more than 20 minutes to seek refuge, in which case they should seek lightning refuge immediately
- Safety Team initiates energy supply interruption preparedness for all electrically vulnerable equipment
- Safety Team updates employees if the Lightning Advisory is extended
- Safety Team communicates “All-Clear” message once the Lightning Advisory has been canceled or expires

SkyGuard® Lightning Warning

Lightning has struck within a specific radius around our facility, representing an immediate lightning threat.

- Lightning Warning is received and acknowledged by designated Safety Team
- Safety Team activates Emergency Action Plan for Lightning and initiates suspension of all outdoor work
- Safety Team disseminates warning to outdoor staff via radio all-call, outdoor public announcing system three times and then forwards warning to all outdoor employees
- Safety Team instruct all employees working outdoors to immediately seek refuge from lightning
- Safety Team updates employees if the Lightning Warning is extended
- Safety Team communicates “All-Clear” message once the Lightning Warning has been canceled or expires

A dramatic landscape featuring a dark, swirling storm cloud formation over a desert road at sunset. The sun is low on the horizon, casting a warm, golden glow across the sky and the desert floor. A long, straight road with yellow dashed lines stretches from the foreground into the distance, leading towards the horizon. The storm cloud is a massive, dark, and turbulent column of smoke or dust, rising from the ground and reaching high into the sky. The overall mood is ominous and powerful.

WEATHER PREPAREDNESS FOR MANUFACTURING FACILITIES

Appendix E: Forensic Meteorology and After-Action Reports

APPENDIX E: FORENSIC METEOROLOGY AND AFTER-ACTION REPORTS

Incident Recovery and Plan Improvement

After severe weather passes and you have completed any necessary emergency response, you may be asked to compile a report about the weather incident and your actions. That process will require you to create a summary of the weather events, including radar imagery and nearby observations, and evaluate the performance of your emergency action plan. This section will enable you to efficiently research the weather event and write an after-action report.

AccuWeather For Business clients will often contact our in-house forensic meteorologists for reports prior to issuing insurance claims after a weather event. Forensic meteorologists are treated as expert witnesses in legal proceedings and are an indispensable resource in the insurance industry.

Forensic Meteorology

If you are investigating past weather conditions to inform an insurance claim or an official report, you should consider the use of a forensic meteorologist.

Forensic meteorologists are experts in performing analysis of past weather events and interpolating nearby weather observations to provide you with a recreation of the weather conditions at your site. These meteorologists use public safety storm reports, archived radar data, and atmospheric analysis to provide you with an expert report on the weather conditions at the time of any incident that occurred.

Writing After-Action Reports (AARs)

Live execution of your emergency action plan will provide you with the best evaluation of the plan's effectiveness. A comprehensive review of your response will allow you to improve your plan for future threats, even if the plan was executed without error. To complete an after-action report on your response, follow the steps below:

- Write a summary of the weather event that initiated your response
- Evaluate the communications that occurred during your response, including how the warning was received, and how it was disseminated
- Evaluate the shelter-in-place, evacuation, and/or other protective actions that occurred during your response and make note of any issues that occurred
- Evaluate any other actions that occurred as part of your response, like early shutdown of machinery
- Analyze your response to identify what actions worked well and which should be improved prior to the next emergency
- Present your findings to stakeholders within your organization and consider improving your existing emergency action plan based on feedback

After-action reports are crucial to the ongoing improvement of your plan and they provide company leadership with information needed to improve business continuity. Gaps identified during emergency response can be identified and resolved with your findings, potentially saving lives during the next emergency, so performing a thorough evaluation of the event is highly recommended.

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