Severe Weather:

How to Keep Employees Safe When Every Second Counts

RAVE
MOBILE SAFETY

Introduction

Severe weather events and natural disasters, such as hurricanes, tornadoes, wildfires and heat waves, are wreaking havoc across every part of the U.S. These disasters are happening more frequently, causing tremendous amounts of damage — often in the billions — for each event.

The U.S. has sustained 246 weather and natural disasters between 1980 and 2019, and each event reached or exceeded $1 billion in overall damages, according to the National Oceanic and Atmospheric Administration's National Centers for Environmental Information (NCEI). The combined cost of all 246 events surpasses $1.6 trillion.

The number of major disasters is also increasing in frequency. Before 2014, the U.S. experienced an average of six events annually, but the number of disasters has jumped to about 13 per year over the last five years.

2018 proved to be an active year for severe weather, according to the National Oceanic and Atmospheric Administration (NOAA). The nation endured 14 separate disaster events, including two hurricanes, eight severe storms, two winter storms and a prolonged drought and wildfires, costing more than $1 billion each. The U.S. had the fourth highest total costs ($91 billion) caused by severe weather in 2018, following 2017, 2005 and 2012. Most of the losses ($73 billion) were attributed to just three events: Hurricane Michael in Florida, Hurricane Florence in North and South Carolina, and wildfires in the West.

The cost of hurricanes, flooding, tornadoes and other events is hitting the country's bottom line. Weather and natural disasters cost the U.S. economy $80 billion in 2018, while they've costed approximately $100 billion annually over the last five years, NOAA said.

The path of nature's fury

Even though each region of the country experiences a different combination of weather and natural disasters, every state has been impacted by at least one billion-dollar disaster since 1980. During this period, the South, Central and Southeast regions experienced more billion-dollar disasters than any other region. For example, Texas has experienced the highest number of events (104), enduring hurricanes, tornadoes, flooding, extreme temperatures and wildfires. For Texas, the cost of these storms totaled about $250 billion in damages over a 39-year period.

Certain parts of the country are more prone to different types of weather events and natural disasters, such as hurricanes, tornadoes, wildfires and winter storms. Inland flooding, when it's not caused by tropical cyclones, often happens in states near large rivers or the Gulf of Mexico, which fuels rainstorms. Meanwhile, winter storms typically impact the Northeast and Midwest. The impact of hurricanes and tropical storms often range from Texas up through New England, but they also impact many inland states with the after-effects of rain and wind.

Hurricanes

The most damaging form of severe weather are hurricanes. Over a 39-year period, they have caused the most destruction ($919.7 billion) and are responsible for the highest number of deaths (6,487) from severe weather and natural disasters. A hurricane costs an average of $21.9 billion in damage.

Hurricanes have become more costly and deadly. Between 2016–2018, the U.S. was hit by six separate billion-dollar hurricanes (Matthew, Harvey, Irma, Maria, Florence and Michael), totaling $329.9 billion in damages and killing 3,318 people.

A Category 4 or 5 storm can lower U.S. production and increase unemployment, while tamping down the financial markets. Coastal shoreline counties create 40% of jobs in the U.S. and are responsible for 46% of the U.S. gross domestic product.

Floods

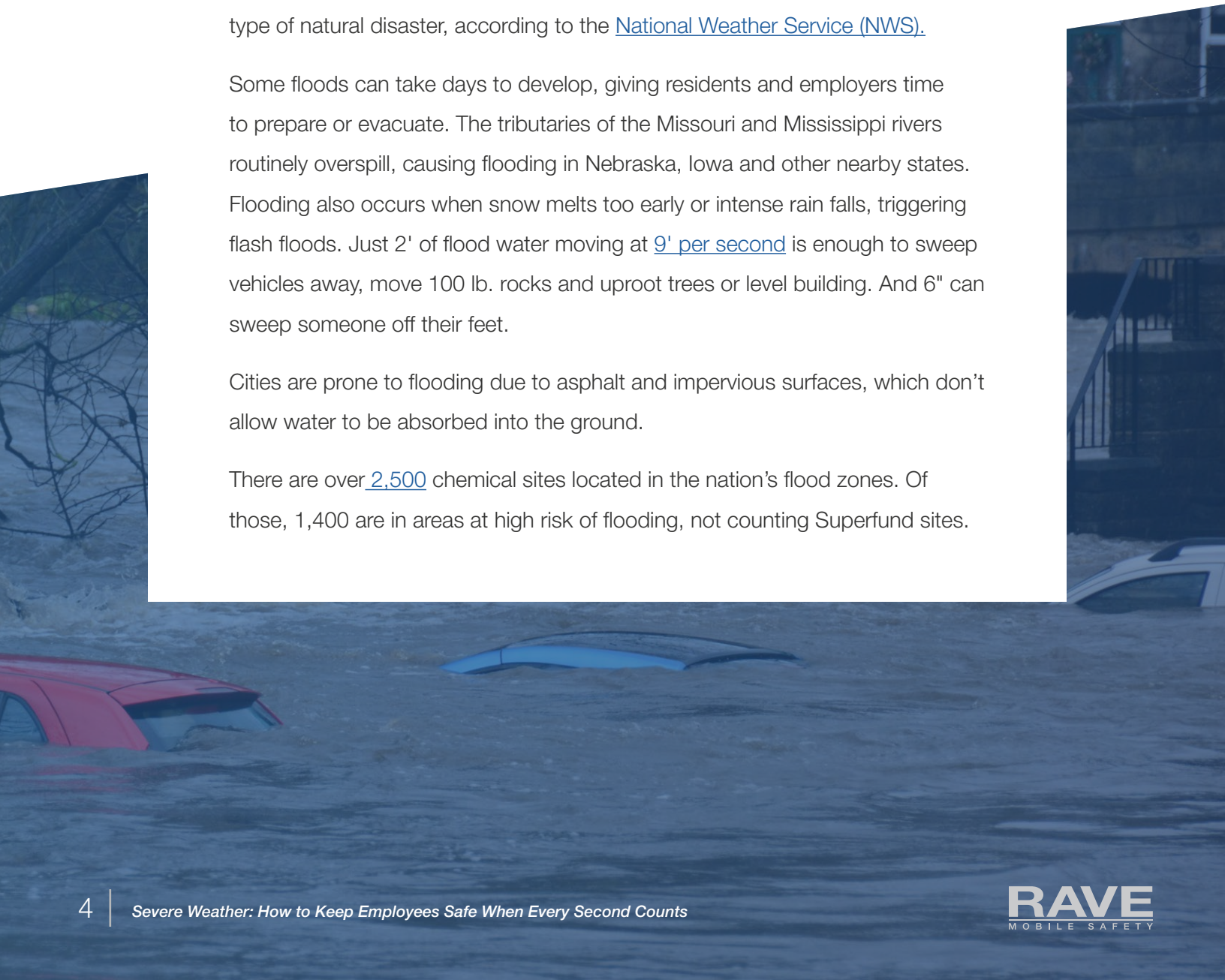
Hurricanes can also bring massive amounts of flooding. Hurricane Harvey dumped over 60" of rainfall in Houston in 2017, one of the country's largest cities. Over a 7-day period, more than 30" of rain fell on 6.9 million people, while 1.25 million experienced over 45" and 11,000 people had over 50".

Floods are the second-most widespread natural disaster after wildfires. Ninety percent of all presidential-declared U.S. natural disasters include flooding. They kill 95 people a year on average, the highest amount of any type of natural disaster, according to the National Weather Service (NWS).

Some floods can take days to develop, giving residents and employers time to prepare or evacuate. The tributaries of the Missouri and Mississippi rivers routinely overspill, causing flooding in Nebraska, Iowa and other nearby states. Flooding also occurs when snow melts too early or intense rain falls, triggering flash floods. Just 2' of flood water moving at 9' per second is enough to sweep vehicles away, move 100 lb. rocks and uproot trees or level building. And 6" can sweep someone off their feet.

Cities are prone to flooding due to asphalt and impervious surfaces, which don't allow water to be absorbed into the ground.

There are over 2,500 chemical sites located in the nation's flood zones. Of those, 1,400 are in areas at high risk of flooding, not counting Superfund sites.



Tornadoes

Tornadoes sometimes accompany hurricanes and tropical storms as they move inland. For example, Florida has more tornadoes per square mile than any other state. When a hurricane or a major storm comes across the Florida peninsula, there's a potential to spawn tornadoes in its northeast quadrant. Florida was hit by 443 tornadoes between 2005 and 2016.

Nebraska, Kansas, Oklahoma, Iowa, Missouri and parts of Texas, Colorado and South Dakota are part of Tornado Alley, a region that often has more tornadoes than other parts of the U.S. All told, the U.S. averages about 1,200 tornadoes every year — more than any country in the world. Most tornadoes happen between 4 p.m. and 9 p.m., though they can happen at any time if conditions are favorable. They usually last about 10 minutes, but can last between a few seconds to over an hour.

Just before a tornado strikes, timing is critical. The NOAA said the current average lead time for a tornado warning is 13 minutes. This means that from the time a warning is issued to the time it's predicted to hit an area, people have 13 minutes to seek shelter.

Wildfires

Wildfires happen in several Southeastern states, including Florida, Georgia and Tennessee, but they're most common in the West — Montana, Idaho, Wyoming, Colorado, Oregon and California. Though four out of five wildfires are started by people, dry weather and drought make land more prone to burn. On average, more than 100,000 wildfires clear 4 million to 5 million acres of land in the country every year.

The western wildfire seasons of the past two years were unprecedented in their size and scope in modern history. Over 18 million combined acres burned in 2017 and 2018, with costs over $40 billion. The total U.S. wildfire costs for the last two years is roughly equal to the costs of the previous 37 years combined (1980–2016). Wildfire seasons have caused damages between $1 billion to $2 billion every year.

The 2018 fire season proved to be one of the most destructive in recent history. More than 58 million wildfires burned 8.8 million acres of land.

In 2018, California experienced its costliest, deadliest and largest wildfires to date going back to 1933. The Camp Fire in Northern California was the most destructive in state history, decimating more than 18,733 buildings and killing 85 people. It burned 153,336 acres and wiped out the town of Paradise in one day. It was the world's costliest natural disaster that year, costing $16.5 billion in damage.

California also had the largest wildfire on record, the Mendocino Complex Fire, which burned more than 450,000 acres. All told, the wildfires in California with minor ones in other Western states totaled about $24 billion in 2018, a new U.S. record.

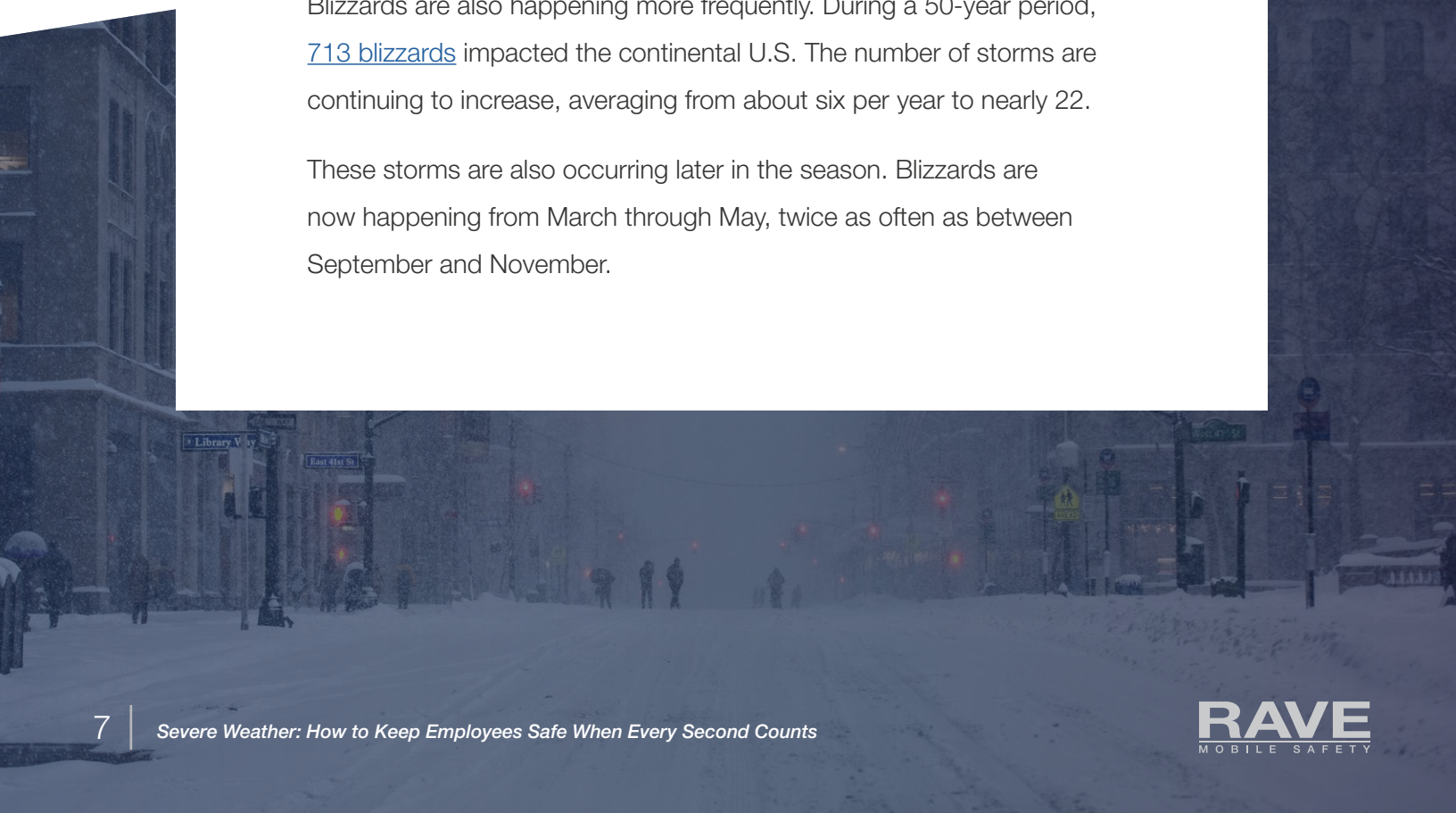
Winter Storms

Winter storms are becoming more common in parts of the U.S., specifically in the northern Great Plains states and eastern New England. The Dakotas, Minnesota, Iowa, Nebraska, New Hampshire, Massachusetts and Rhode Island are some of the states that are hit with winter storms.

These storms bring heavy snow, along with wind and flooding sometimes prior, during and afterwards. They also can cause major damage and force cities and states to shut down. Ten winter storms since 1980 have cost over $2 billion. A March 2018 blizzard cost $2.2 billion in damage, striking parts of the Mid-Atlantic and Northeast, including Virginia, Maryland, New York and Massachusetts. Major airports were closed, over 4,000 flights were canceled, Amtrak and other rail service was suspended, and highways were shut down because of flooding.

Blizzards are also happening more frequently. During a 50-year period, 713 blizzards impacted the continental U.S. The number of storms are continuing to increase, averaging from about six per year to nearly 22.

These storms are also occurring later in the season. Blizzards are now happening from March through May, twice as often as between September and November.



Extreme Temperatures

Recent extreme temperatures have taken a toll on most of the U.S. About 220 million people (or 75% of the continental U.S. population) endured below-freezing temperatures in early 2019. At one point, temperatures plunged 20°–40° below zero in the Upper Midwest and Great Lakes. Wind chills plummeted to 35° and 60° below zero.

Businesses and schools were closed, the U.S. Postal Service suspended service, and over 8,000 flights were canceled. Amtrak also stopped some train service.

The U.S. has also seen extremes in higher temperatures.

2018 proved to be the fourth warmest year in U.S. history. At one point, 120 million Americans were under some type of heat warning, watch or advisory. Denver tied its all-time record of 105°F, New York City had a rare 7-day record of 90°F, and downtown Los Angeles reached 108°F, breaking a 92°F record set in 1992. The extreme heat caused a week-long power outage in Los Angeles, impacting tens of thousands, and triggered wildfires in California.

Drastic temperature changes can take a toll on infrastructure, halting transportation and knocking out electricity. Heat and humidity kills an average of 1,300 people every year.

The high cost of **severe weather**

The frequency and severity of hurricanes, wildfires and other events are impacting daily business operations. These devastating storms can effect everything from destroying businesses and homes to impacting productivity and slowing down transportation.

During Hurricane Harvey, the storm forced 5% of the nation's oil and gas production to shut down. At one point, gas prices hit a 2-year high, jumping from $2.36 a gallon to $2.54 a gallon nationally, an 18 cent increase in one week.

Agriculture damage from hurricanes is costly. For example, when Hurricane Michael went through Georgia, Alabama and Florida, the damage to pecan and cotton farms and the region's poultry operations topped $1.3 billion. 2018 was the third straight year Georgia pecan growers suffered damage due to hurricanes.

And the losses from hurricanes isn't expected to abate anytime soon. A recent report from the Congressional Budget Office projects annual costs from hurricane winds and storm-flooding alone will total as much as $54 billion under current policies, including $34 billion in losses to residents, $12 billion for the public sector, and $9 billion for commercial businesses, such as transportation, professional services and hospitality.

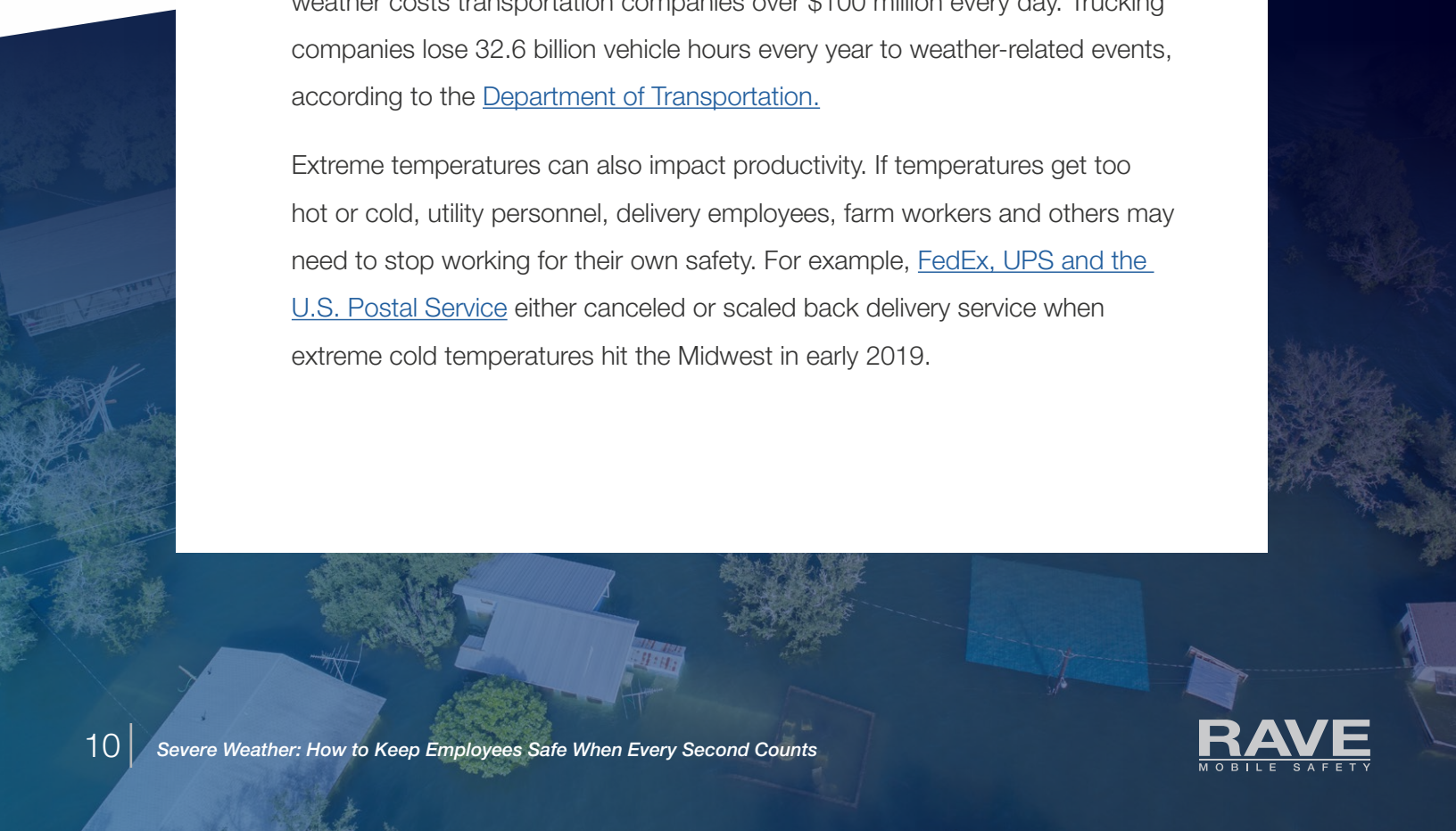
For residents, the costs are associated to repair their homes and obtain temporary housing. The public sector will need funds to repair public property and make recovery efforts, such as removing debris. Meanwhile, commercial businesses will need financial assistance to repair buildings and find temporary space, as well as support any revenue losses due to business disruption.

Even if the losses are insured, the costs are still staggering. The insured losses from the 2018 California's major fires is $9.05 billion, and it's expected to climb. The losses include 17,955 partial residential losses, 10,564 total residential losses, 1,648 partial commercial losses, 350 total commercial losses and 9,457 auto and nonresidential losses, including commercial vehicles, boilers and machinery.

These weather events can also cause streets to become impassable, transit service canceled, and lost productivity for employees as they spend more time to travel to work.

Blizzards, high winds and other severe weather cause about 23% of all trucking delays, costing the transportation industry up to $3.5 billion every year. Severe weather costs transportation companies over $100 million every day. Trucking companies lose 32.6 billion vehicle hours every year to weather-related events, according to the Department of Transportation.

Extreme temperatures can also impact productivity. If temperatures get too hot or cold, utility personnel, delivery employees, farm workers and others may need to stop working for their own safety. For example, FedEx, UPS and the U.S. Postal Service either canceled or scaled back delivery service when extreme cold temperatures hit the Midwest in early 2019.



A business' safety obligation

Keeping employees safe before, during and after a severe weather event is a company's responsibility. They're obligated to ensure their employees are protected during working hours, making business continuity and disaster preparation critical.

Employers must take measures to protect employees from hazards that can be anticipated during severe weather. Under the General Duty Clause of the Occupational Safety and Health Act of 1970, every employer "shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees."

Once employees travel a certain distance from where their business is located, the company still has obligations under Occupational Safety and Health Administration (OSHA) to provide a safe environment.

OSHA also requires companies to develop a written Emergency Action Plan (EAP) to identify and coordinate necessary employer and employee actions during an emergency. For example, businesses will instruct employees which steps to take when a tornado happens during work. These actions will include seeking shelter, such as a basement or a designated emergency site. The EAP may also outline what instructions traveling workers need to follow during a weather emergency.

An employer could be held liable if a victim or a victim's family can prove the employer knew or should have known the situation was likely to cause serious bodily harm or death, as well as prove there a feasible way to eliminate the situation. OSHA penalties start at $13,260 per violation and increases to $132,598 for willful and repeat violations.

Communication during dangerous weather conditions is vital to maintain organization and prevent panic, confusion, fear and injuries. Some of the first questions people ask is, "What do I need to do?," "Where should I go?," and "Is it safe now?". Companies and employees need to know they'll have several ways to keep in touch during these situations. Next we will discuss how timely warnings for employee protection and a critical employee safety net are some key ways to stay connected during severe weather events.

Timely Warnings for Employee Protection

Warnings for some weather events, such as winter storms and hurricanes, are sent out well in advance, enabling businesses to prepare their employees for next steps. But some other events, such as wildfires, tornadoes and flash flooding, can happen in just a few minutes. It's critical for businesses to inform and protect their employees.

Some businesses may use intercom or public address systems to alert employees during an incident, while others may use email, instant messaging or a social network. But the problem becomes getting all of their employees' attention. For example, an intercom would only alert employees about a tornado if they're on-site, but not workers who are driving in for the next shift. Employees may miss the email or social media alert because they receive these types of messages so often. Plus, a server or network outage may occur during a storm or natural disaster, shutting down a company's operations and email.

Other employees may use a phone or call tree to reach out to employees. Though they have minimal costs, the success of a phone or call tree depends on key callers being available to call the next person in the chain. If not, the message will fail to reach targeted employees immediately. Companies also need to constantly update these systems to accommodate changes in staff and phone numbers.

Businesses may also use multiple channels to alert their workers, but these channels work independently of each other. Getting insufficient or delayed information about a weather emergency can put employees at risk, and can likely have a negative impact on business operations and increase organizational risk and liability.

The key to communicating is using methods that employees prefer during these emergency situations. While most employees feel safe at work, they believe there's still a gap when it comes to receiving communications during an emergency and preparing for severe weather, according to Rave Mobile Safety's Workplace Safety and Preparedness Survey (Workplace Survey).

- **Mass text messaging (50%) was the top preferred method of communication, followed by intercom for in offices only (35%) and email (11%)**
- **70% of professional service employees prefer receiving emergency alerts through mass text message**
- **58% of survey respondents prefer emergency communications through text messages while they're working off-site**
- **47% said their employer has hardly tested or never held severe weather drills**

Having a system that enables employers and their employees to communicate with each other before a tornado, flood or another weather event strikes or seconds after is important to ensure everyone's safety and security. A mass notification system would allow crisis managers and other administrators to send notifications over any internet-connected device wherever they're located. They would be able to send emergency notifications through text, email, voice, desktop alerts, sirens and digital signage simultaneously, and in the method that fits the emergency. The system would allow crisis personnel and employees to have two-way communication during a storm or even discuss what steps to take before it occurs.

In addition to multimodal messages, a mass notification system offers companies the ability to scale with unlimited administrators, lists or messages. Administrators can be set with role-based access control, so they can send specific messages to targeted groups to avoid any confusion. As a result, there's no delay or gap notifying employees.

Prior to an adverse weather event, there's a lot going on as crisis managers, administrators and others are collecting information and preparing for the storm. It's important to get the right message out to employees to keep them safe, secure and informed. In preparation, administrators can create preset templates, including the type of emergency, date, location and what actions to take.

It's imperative employee contact data is accurate and up-to-date, especially during a weather emergency. Ensuring this information is correct can be one of the most challenging aspects companies have when communicating with their employees. Contact information may be spread across multiple systems or out-of-date. A mass notification system that not only automatically syncs with a company's database of record, but also performs ongoing freshness checks will allow companies to send only current employees alerts at the right time. If a company needs to supplement that database, it's easy to send employees to an app or landing page to add additional information like personal cell phone numbers or emergency contacts.

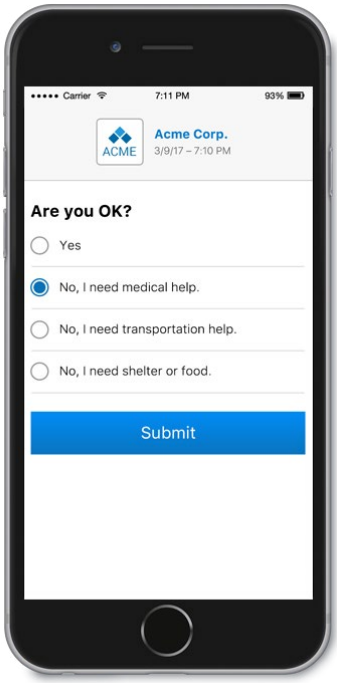
It can also be challenging to ensure that contractors, visiting employees and other temporary visitors learn about emergency incidents. A text to opt-in feature, which integrates with a mass notification system, would inform these visitors about any weather announcements and what actions to take. This feature would allow temporary visitors to receive alerts by texting a keyword to a short code without

being added to the database of record. The company can set up alerts for a specific timeframe and when the event or period of time expires, these temporary visitors would no longer receive notifications.

Meanwhile, a mass notification system that ties into the National Weather Service would automatically send out customized alerts based on the weather in the area, including the type, location and severity. For example, alerts can be tied around tornado warnings. If a business is located within NWS' tornado polygon, crisis managers or other administrators will automatically receive alerts through geo-fencing. Through geo-fencing, companies can set up a virtual perimeter around a point location or have a predefined set of boundaries.

Bringing key individuals together is often one of the first steps during severe weather events. Even if there's an early warning, the situation can change rapidly and decisions need to be made quickly. Sometimes it's difficult and time-consuming for staff to organize dial-ins and call lists. Having a mass notification system that provides a one-click conference bridge that allow decision-makers to get on the phone instantly will help a business execute any actions as soon as possible.

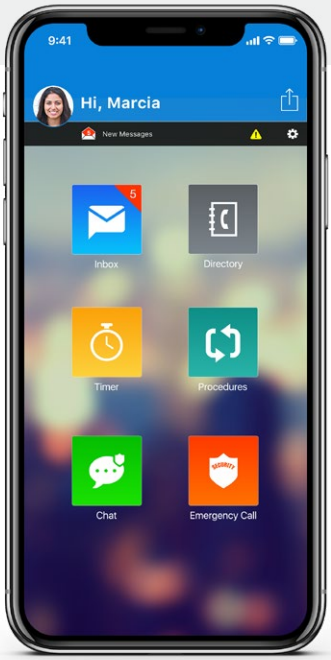
Push notifications can immediately get a message out to employees during adverse weather conditions. Workers get a lot of emails and push notifications can promptly get a message to employees. The notifications can be segmented and tailored with relevant information, as well as targeted for employees located in specific areas.



Sending a geo-targeted push notification allows a business to send information to certain employees, based on their real-time locations. These messages help to prevent alert fatigue and ensure they pay attention to the emergency relevant to them. They will still receive push notifications over Wi-Fi if the messaging data is in a dead zone, down or maxed out.

Crisis managers and others can check in with employees who are on the road or at a specific location when a storm or natural disaster happens by sending out a geo-poll. Employees can answer a question through email or SMS text and automatically share their real-time locations without the use of an app. Automatic follow-up alerts can be sent out based on an employee's response and outline the necessary next steps employees need to take to ensure their safety.

A Critical Employee Safety Net



The safety and security of employees during hurricanes, tornadoes, wildfires and other weather emergencies is a vital part of a company's business operations. Staying connected and engaged with employees becomes even more critical. Crisis managers and other administrators need to inform their employees, wherever they're located, about what's happening as soon as possible, what actions they need to take, and find out if any personnel need additional resources and assistance.

Due to the nature of their work, some employees need to travel. Americans take about 1.3 million business trips each day in the U.S. alone, and that number is expected to rise. The number of women traveling for business has steadily increased in recent years. Women now account for nearly 40% of business travelers based in the U.S., according to a report from Global Business Travel Association. Corporate travelers take over 480 million business trips every year.

Some employees work almost exclusively outdoors or are exposed to weather conditions throughout their day. More than 15 million people have jobs that require them to work outside, according to the Bureau of Labor Statistics. Some of the industries include utilities, construction, farming, manufacturing and transportation. There are almost 5 million transportation and logistics employees, more than 1.3 million farm workers, and over 7 million construction employees.

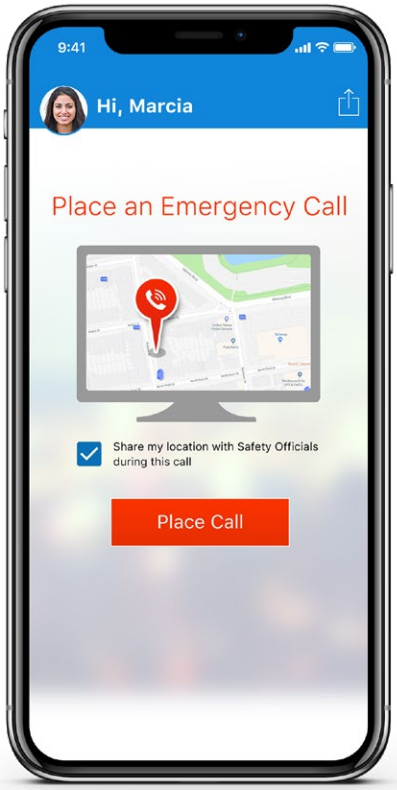
The weather impacts their daily working conditions, as well as exposes them to life-threatening situations. For example, high temperatures can cause heat exhaustion and other medical issues. From 2002 to 2009, healthcare costs related to heat waves totaled $5.3 billion. Heat waves are expected to impact labor productivity, costing $2 trillion in losses by 2030.

Businesses need to be prepared and react quickly to inform their employees wherever they are, as well as let them know they take their workers' safety and well-being seriously. One way companies and their employees can communicate with each other is through a mobile safety app. The app, which is an extension of a mass notification system, enables employers to instantly contact their workers about a dangerous weather situation, inform them about what actions to take, check in on their status, and find out if they need any assistance. A mobile safety app also allows employees to contact crisis managers and others about the weather incident, even before it happens.

One aspect of these mobile safety apps is a safety profile, which would include employees' personal contact information and relevant personal information that would display to crisis managers and others during an emergency situation. Employees could also include alternative contact information so their employer would know how to reach them in other ways. For example, if security personnel had difficulty locating or contacting an employee away from work, they could use the employee's emergency contact information when a situation arises.

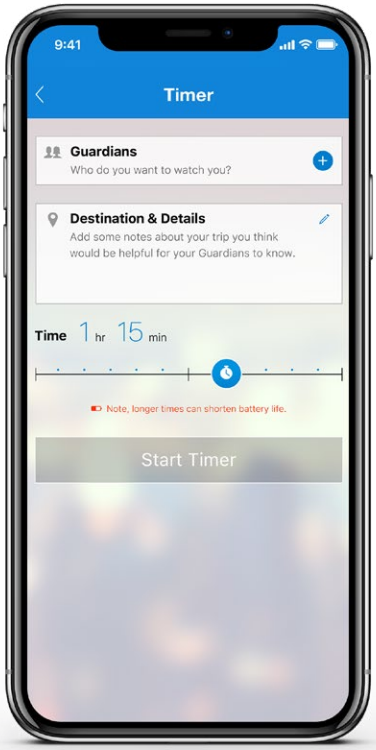
A weather event can happen in a matter of minutes and employees need to reach help as soon as possible. The average response time for police to respond to 9-1-1 calls is about 11 minutes, and about eight minutes for emergency medical services. In a mobile safety app, you can configure emergency call buttons to directly connect employees to 9-1-1 and the company's crisis managers, security staff or others.

During this panic call, security staff receive the GPS coordinates of the caller's exact location. The immediate notification helps companies dispatch help, coordinate a faster response, and keep them informed about what's happening. If it's unsafe to speak, employees can send a text message to security with a click of a button, informing them of the location of the emergency. Employees can send a picture and share or stream their locations in real time as the situation unfolds.



Two-way texting allows employees to directly communicate with their employer's crisis managers, security staff or relevant personnel. The messaging feature helps them report what's happening, along with text and images, through their smartphones. These sessions can be routed to a specific department, so only the designated team will receive these real-time chats. The assigned team can respond instantly to employees with two-way messages.

A safety timer is another way for employers to protect their employees, especially those working outdoors or traveling. Employees set a fixed time for their departure and arrival, which is tracked by GPS. When employees reach their destination, their company's security team or other relevant colleagues are notified that they arrived safely. If the safety timer expires, the GPS feature can be used by emergency services to locate an unresponsive employee.



Security staff or other personnel may want to get an overview of weather conditions and other incidents. An incident management dashboard would help a company's security staff view all incidents and activities happening, including emergency calls, text messages, user locations and 9-1-1 calls. Any texts would be routed based on defined categories, so only security staff, HR and other personnel would receive notifications that would require their response. For security personnel, these routed tips and texts would help them immediately attend to emergencies.

The incident management dashboard offers detailed real-time and historical reporting with key metrics showing past tips and events, as well as audit trails. These reports establish a record that supports incident management and after-action procedures. They provide security, crisis management and other personnel with insight into areas with repeated activity, so they can develop proactive programs to respond to these locations or situations.

Conclusion

With the incredible forces they wield, severe weather and natural disasters are capable of impacting thousands of lives. Sometimes in just minutes. Though certain parts of the country are more prone to hurricanes, tornadoes, wildfires, winter storms and other events, companies across the U.S. need to be prepared for these situations so they can protect and communicate with their employees when the time comes. Employees need to know their company will reach out to them when their safety and well-being is at risk.

A mass notification system would enable crisis managers, security personnel and others to quickly and efficiently alert employees about an impending weather event, as well as let them know what steps to take so their employees will be safe and secure. The system's mobile app extension would allow employees to reach out for assistance and guidance wherever they're located. A mobile safety app provides workers two-way communication with crisis managers and others. This comprehensive communication solution should be an integral part of every organization's emergency preparedness plan. This solution would help employers strengthen their relationship with their staff, as well as show employees their company cares about their well-being.

Find out how you can prepare for severe weather and natural disasters, and protect your employees.

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