

# 6 REASONS INCIDENT RESPONSE NEEDS A WEATHER STATION



## Professional Weather Monitoring for Incident Response

With severe wildfires last summer and storms this winter, we see that weather conditions directly impact response risk and fire behavior. The ability to access real-time, location-specific met data is imperative for safe and effective incident response.

Weather monitoring assists in multiple areas such as Risk Management, Prediction, Safety, Plume Modeling, and Reporting.

Additionally, to keep up with constantly-changing technology, the increasing use of drones is one more reason to keep informed of environmental conditions.

*“Being aware of the weather conditions before, during, and after an incident is imperative.”<sup>1</sup>*

- Chuck Sallade,  
Firefighter Nation





# RISK MANAGEMENT

Weather data is a key component of RISK MANAGEMENT and assessment from the planning/preparation stages, PPE and resource management, to decisions regarding public safety such as shelter-in-place or evacuate.

Utilize weather data in these phases:

1. Evaluate historic weather conditions for planning/preparation
2. Assess current response conditions (normal and/or severe weather for transport and approach
3. Monitor for changing meteorological conditions throughout an incident

An example cited by Battalion Chief Henry Costo in Fire Rescue Magazine:

“No PPE risk assessment would be complete without adequate consideration of a jurisdiction’s prevailing climate and weather conditions, as well as the potential for extremes of temperature, humidity, wind, rain, storms, flooding, snow accumulations, ice, etc. Keep in mind that many jurisdictions experience significant weather variations even within their own boundaries—such as the beaches vs. inland areas of San Diego and Los Angeles counties.”<sup>2</sup>

Weather stations from Columbia Weather Systems are a force multiplier – offering automated met data collection and archiving in addition to monitoring current conditions.

Whether from a fixed-base system at the Fire Station or Dispatch Center, a vehicle-mount weather station on the Incident Command Vehicle, or a portable weather station for HazMat, met data can be a key piece of the risk management puzzle.

**“No PPE risk assessment would be complete without adequate consideration of a jurisdiction’s prevailing climate and weather conditions.”**

-Battalion Chief  
Henry Costo,  
PA Fire Department



# #2

# PREDICTION

**“The importance of monitoring weather and predicting the resultant fire behavior cannot be over-stressed.”**

- National Wildfire Coordinating Group Training Manual

“The risk involved in fire suppression can be reduced if firefighters and fire managers pay attention and understand weather conditions that impact fire behavior;”<sup>3</sup> states the Introduction to Wildland Fire Behavior, a training manual developed in conjunction with the National Interagency Fire Center. This principle applies to hazmat as well as urban and wildland-urban interface fire response.

Weather monitoring is a cornerstone for PREDICTING FIRE BEHAVIOR. Government agencies partner with the National Weather Service to provide forecasts with local offices including Fire Analysts and Meteorologists.

Additionally, on-site monitoring provides the edge in real-time decision-making. For example, a Fire Behavior Outlook concludes: “Be alert to the potential influence of thunderstorms on your fire – outflow winds, even miles from a storm, can dramatically increase fire behavior very quickly.”<sup>4</sup>

Here are a few examples of how weather parameters affect fire behavior:<sup>5</sup>

- Above average **temperatures** are common on large fires. Many firefighter fatalities have occurred on fires where record high temperatures were set.
- Small changes in **relative humidity** that cannot be felt or seen can have a significant impact on fire behavior.
- **Wind** impacts the fire environment by 1) increasing the supply of oxygen to the fire, 2) determining the direction of fire spread, 3) increasing the drying of the fuels and 4) carrying sparks and firebrands ahead of the main fire causing new spot fires.

Starting with the forecast, local met data is combined with fuel conditions to determine the intensity and path of a fire, and the ideal location for fighting it.

Apparatus rigged with automated weather stations take meteorological monitoring to the incident, helping predict fire behavior in real time and in strategic locations.



# SAFETY



## #3

**“How you respond to incidents when the weather is a factor requires extra consideration to ensure your safety as well as those who’ve called for our help.”**

- Chief Ronald Siarnicki,  
*Fire Engineering Magazine*

Extreme summer heat, winter freeze, weather-related disasters. Professional weather monitoring improves the SAFETY of incident response with calculated parameters for perceived temperature and alarm notifications for extreme conditions and operational safety. “One of the most overlooked elements that affect firefighting operations and the health of firefighters themselves is the weather conditions we operate in,” said Tom Warren, retired assistant chief, Providence RI, in a Fire Engineering article.<sup>6</sup> Besides having a direct impact on firefighter health, weather impacts the severity of fires, increasing risk and safety hazards.

**Summer** months bring danger of heat-related disorders and fire due to dry fuel conditions. High heat and humidity can lead to heat exhaustion or heat stroke. The variability of wind can pose safety and fire control problems, which can result in fatalities.

In **winter**, on-scene operational considerations include the impact of cold temperatures and wind when operating from elevated positions such as aerial ladders or platforms. Ladders can freeze up, impacting their ability to extend or retract. Hand tools may be slippery and difficult to hold. Ice and slippery conditions may further impede operations.

*“We also have to be attuned to what’s happening as a result of snow, ice, freezing rain or wind ... Maintaining situational awareness is imperative.” ~Chief Ronald Siarnicki<sup>7</sup>*

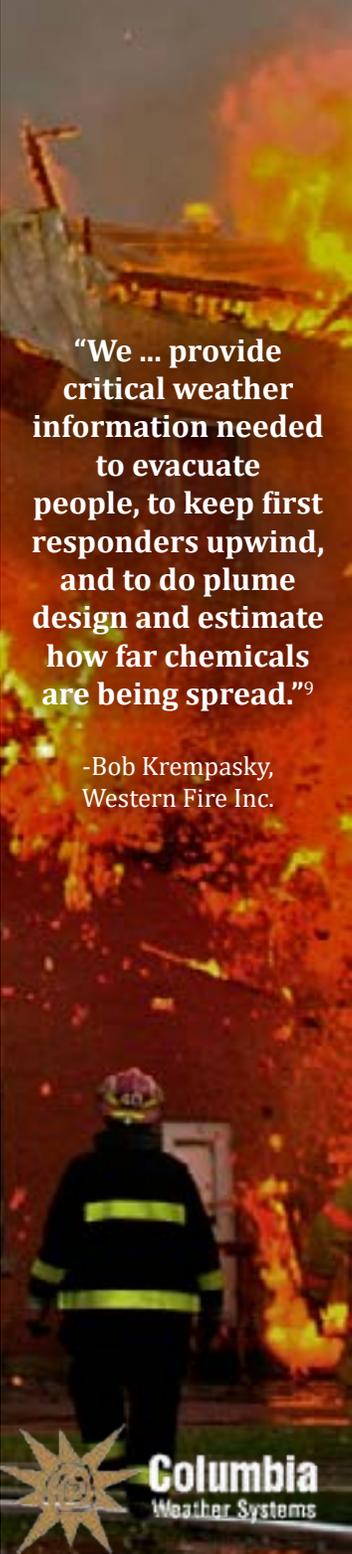
**Extreme weather** emergencies and weather-related disasters such as hurricanes bring inherent risks of their own. In such circumstances, the role of Safety Officer can include monitoring and evaluating weather conditions keeping in mind crew fatigue, hydration, and PPE; with authority to suspend operations if conditions present too high a risk for personnel.

Weather monitoring, especially for working conditions, is not just actual meteorological parameters, but also perceived, for example, wind chill in the winter and heat index in the summer. Professional weather monitoring equipment can calculate these **factors for more informed decision-making**. Accurate met data with on-site or vehicle-mounted weather stations can improve the safety of emergency responders and help mitigate hazards. Alarms can be set for risk conditions such as high wind speed, or extreme temperatures, automatically notifying appropriate personnel. Reliable weather data provides critical information for responders to be prepared and take appropriate action.

# PLUME MODELING



## #4



**“We ... provide critical weather information needed to evacuate people, to keep first responders upwind, and to do plume design and estimate how far chemicals are being spread.”<sup>9</sup>**

-Bob Krempasky,  
Western Fire Inc.

Fire departments are frequently tasked with responding when hazardous chemicals are accidentally released into the environment, especially in an inhabited area. Many crucial decisions such as approach, staging, and potential evacuation, rely on accurate, up-to-the minute local weather data. One key tool is toxic PLUME MODELING which combines information about the chemical release with meteorological data overlaid on a map.

Weather conditions greatly impact toxic cloud movement. Up-to-date meteorological data is imperative for monitoring cloud movement to ensure responders and local inhabitants stay out of harm's way.

*“Depending upon meteorology, the toxic cloud could be several miles long, but only a few blocks wide. Changing wind patterns could cause the plume to shift or meander in another direction.” ~ John S. Nordin, Ph.D.<sup>8</sup>*

Plume modeling software can often accept met data from Internet sources and or directly from a weather station. While weather data is generally available on the Internet, many Internet applications upload data hourly or at 15-minute intervals, and the nearest data point may be miles away. On-site weather stations upload data in a matter of seconds.

A weather station is standard gear for hazmat response teams. When the State of Oregon Fire Marshal established a state-wide Regional HazMat Emergency Response program, the teams were outfitted with weather stations from Columbia Weather Systems. In use for over 10 years, the systems recently underwent testing, upgrades and battery replacement. New hazmat vehicles include vehicle-mount weather stations with GPS.

On-site weather data can greatly increase the accuracy of plume modeling. Weather stations from Columbia Weather systems can automatically integrate with the plume modeling component of software such as MarPlot/CAMEO, Safer Systems, and PEAC by Aristatek. Additionally, vector wind measurements from WeatherMaster™ Software can be used to project an initial plume corridor before the modeling software can gather sufficient data.



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# REPORTING



#5

**“Weather conditions played a role in this incident with frozen hydrants, wind affecting the fire conditions, and a slightly delayed response time due to road conditions.”<sup>10</sup>**

- Fire Investigation Report, National Institute for Occupational Safety & Health

Accurate weather data leads to more accurate incident reporting, which can lead to better outcomes.

Successful management of emergency incidents increasingly depends on reliable on-scene data and communication technologies.

For incident command, planning and personnel accountability can include weather monitoring technology with seamless inclusion of met data in incident reporting for documentation and analysis.

Weather data is one piece that leads to a fuller and more detailed big picture. Weather data is a component of several NFIRS modules. Incident reports can include conditions during the incident such as wind and humidity, as well as weather conditions that contributed to the incident such as freezing temperatures. Analysis includes how weather conditions impacted the incident itself and response such as tactics and personnel – what was effective, what can improve, how to be prepared for next time.

With rapid deployment, on-scene portable or vehicle-mounted weather stations can quickly and automatically transmit met data and integrate seamlessly into reporting software such as Adashi, SAFER systems, and PEAC.



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# #6

# DRONES (BONUS)

With their ability to improve situational awareness, DRONES are becoming increasingly valuable to incident response. Also known as Unmanned Aerial Vehicles (UAVs), drones are used for package delivery such as defibrillators, search and rescue, and communications.

During Hurricane Harvey's aftermath in 2017, drones were deployed to assess the extent of damage, presence of hazardous materials, and search for survivors. Last month, two teens stranded off the coast of Australia were rescued by a drone, which was able to launch a self-inflating raft into the water in under two minutes.

Fire Chief Jonathan McMahan of College Station, TX reported a recent incident: "Fast moving urban interface wildland fire in south College Station yesterday ... 10 exposed houses protected, and fire stopped close to an apartment complex. 2 fire department drones in the air providing immediate situational awareness to the incident command team."<sup>11</sup>

Weather conditions are a critical factor in drone operation. Access to current meteorological data can help prevent damage to the UAV and its surroundings. These are some important parameters to monitor for safe drone operation:

- Temperature: UAVs are designed to fly within certain temperature ranges. Extremes can cause damage, overheating, and shorter flight times due to battery drain.
- Wind Speed/Gusts: High wind speed and strong gusts cause difficulty in maneuvering and steady positioning.
- Precipitation, Humidity: UAVs do not function well in moisture.

As emergency response departments incorporate drone technology, access to current met data can be a key factor in the plan of action.

Response vehicles utilizing weather stations take **automatic meteorological monitoring** to the incident, creating crucial situational awareness for incident command and helping to **achieve success** in drone-incorporated missions.

**"Drone technology provides a great tool for any public safety agency looking to make its operations more effective and efficient."**<sup>12</sup>

- Joshua Larson,  
*Fire Engineering Magazine*



# CONCLUSION



Extreme weather, hazmat, wildland, whatever the situation, weather stations can provide meteorological information on-scene and up-to-the-minute to help you make the right decisions.

One final quote: “As fire service leaders, it is essential that we assure our personnel have the right information, and that it goes to all the right people at exactly the right time so everyone is empowered to make the right decisions,” says Todd J. LeDuc in a Fire Engineering article. He continues, “This goal becomes challenging given the wide breadth of available data ...”<sup>13</sup>

At Columbia Weather Systems, we recognize that met data is a small but critical segment of the data available to incident response. Weather monitoring systems can provide that information on-scene automatically and up-to-the-minute to help you make the right decisions.

Our job is to make weather monitoring easy so you can do your job better. Contact us to help you select the best weather station for your requirements. Visit [ColumbiaWeather.com](http://ColumbiaWeather.com) or call 503-629-0887 or toll free 888-508-7375.

## Notes

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