System Assessment and Validation for Emergency Responders (SAVER)

Environmental (Weather) Surveillance Equipment Market Survey Report

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Homeland Security
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SAVER
System Assessment and Validation for Emergency Responders

Prepared by the National Urban Security Technology Laboratory

FOREWORD

The U.S. Department of Homeland Security (DHS) established the System Assessment and Validation for Emergency Responders (SAVER) Program to assist emergency responders making procurement decisions. Located within the Science and Technology Directorate (S&T) of DHS, the SAVER Program conducts objective assessments and validations on commercial equipment and systems and provides those results along with other relevant equipment information to the emergency response community in an operationally useful form. SAVER provides information on equipment that falls within the categories listed in the DHS Authorized Equipment List (AEL). The SAVER Program mission includes:

- Conducting impartial, practitioner-relevant, operationally oriented assessments and validations of emergency responder equipment; and
- Providing information, in the form of knowledge products, that enables decision-makers and responders to better select, procure, use, and maintain emergency responder equipment.

Information provided by the SAVER Program will be shared nationally with the responder community, providing a life- and cost-saving asset to DHS, as well as to Federal, state, and local responders.

The SAVER Program is supported by a network of Technical Agents who perform assessment and validation activities. Further, SAVER focuses primarily on two main questions for the emergency responder community: "What equipment is available?" and "How does it perform?"

As a SAVER Program Technical Agent, the National Urban Security Technology Laboratory (NUSTL) has been tasked to provide expertise and analysis on key subject areas, including chemical, biological, radiological, nuclear, and explosive (CBRNE) weapons detection; emergency response and recovery; and related equipment, instrumentation, and technologies. In support of this tasking, NUSTL conducted a market survey of commercially available equipment for environmental (weather) surveillance, which falls under AEL reference number 07SE-03-ENVS titled Equipment, Environmental (Weather) Surveillance.

Visit the SAVER website at www.firstresponder.gov/SAVER for more information on the SAVER Program or to view additional reports on environmental (weather) surveillance equipment.

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1. INTRODUCTION

Environmental (weather) surveillance equipment is used by emergency responders to determine local atmospheric and environmental conditions during chemical, biological, radiological, nuclear, or explosive (CBRNE) emergencies. To provide responders with information helpful in making purchasing decisions about this equipment, the System Assessment and Validation for Emergency Responders (SAVER) Program conducted a market survey on commercially available environmental (weather) surveillance equipment.

This market survey report, which focuses on fixed-station weather surveillance equipment, is based on information gathered between June 2013 and August 2013 from government reports, trade and technical journals, product literature obtained from equipment manufacturer websites, correspondence with equipment manufacturers, and responses to a government-issued Request for Information posted on the Federal Business Opportunities (FedBizOpps) website (https://www.fbo.gov). Portable and mobile (vehicle-mounted) weather stations were addressed in a previous (November 2010) SAVER market survey report.

For inclusion in this report, products had to meet the following criteria:

- Measures environmental (weather) conditions, e.g., wind velocity, temperature, relative humidity, barometric pressure;
- Transmits information over the Internet;
- Uses wireless technology for data communications;
- Has minimum maintenance and calibration requirements;
- Can interface directly with atmospheric plume dispersion models, or data is available in digital form so that it can be used with plume models; and
- Is intended primarily for use by responders, not home use.

Due diligence was performed to develop a report that is representative of products in the marketplace.

2. ENVIRONMENTAL (WEATHER) SURVEILLANCE EQUIPMENT OVERVIEW

Environmental (weather) surveillance equipment is used to measure weather conditions at and around incident sites; this is particularly important for incidents involving the release of hazardous materials into the atmosphere in or near population centers. Weather stations provide users with information about wind speed and direction, temperature, relative humidity, barometric pressure, and precipitation. Knowledge of weather conditions is needed to assess risks, establish exclusion zones, protect downwind areas (e.g., evacuate or shelter-in-place), position incident command posts, and develop plans of action. Weather surveillance equipment can also be linked with atmospheric plume dispersion models, which predict the path a hazardous plume may take in the atmosphere.

Fixed weather stations may be located some distance away from the incident site, but the weather information obtained may still be useful, e.g., for plume model predictions. Fixed weather stations located on building rooftops are useful for plume modeling in urban areas, where buildings significantly affect ground-level wind velocities and make them hard to accurately measure. If there are no fixed weather stations near the incident site, portable and vehicle mounted weather stations can be used to complement fixed-site information. Thus, weather data from all available weather equipment, fixed, portable, and vehicle-mounted, both near the incident site and in surrounding areas, can be utilized to obtain accurate predictions of the hazardous plume path, and give responders guidance to develop evacuation and shelter-in-place plans during a CBRNE event.

Weather can affect first responder activities if there is heavy rain, flooding, high winds, low visibility, or temperature extremes. First responders also need to consider traffic congestion and environmental conditions on roads, both of which may be impacted by weather, when they respond to a CBRNE or other emergency in order to determine safe routes to the incident site. Information about weather events (e.g., location, severity, start and end time) and their impacts on road networks are critical to first responders.

Information provided by fixed weather stations at airports supports safe and efficient aviation operations, which is particularly important in the aftermath of a CBRNE event. In addition to serving aviation needs, fixed weather stations are also used by firefighting agencies to collect local weather data for monitoring wildfire behavior and spread. There are nearly 2,200 fixed Remote Automated Weather Stations (RAWS) strategically located throughout the United States that form a RAWS network to monitor environmental conditions to predict fire danger and behavior. Weather data collected from RAWS are also used by fire behavior analysts, in conjunction with plume models, to predict the spread of smoke plumes and the impacts on surrounding areas.

It is important that the information obtained from environmental weather surveillance equipment is usable in an emergency situation. Data from weather stations should be accessible by first responders for analyses of weather and environmental conditions at the incident site. Data obtained from weather stations, when linked to with atmospheric plume dispersion models, can be used to predict plume trajectories and provide guidance for evacuation and shelter-in-place decisions. Emergency responders can also utilize a local, regional, or a national weather forecasting service, e.g., the National Weather Service (NWS), for possible adverse changes in weather, such as the imminent arrival of a violent thunderstorm.

2.1 Current Technologies

Weather stations provide local weather information that allows responders to conduct more accurate hazard analyses, determine safe response actions, and enhance public safety. Each weather station contains, at a minimum, an anemometer for determining wind speed and wind direction; sensors for measuring atmospheric temperature, barometric pressure, and relative humidity; a system for determining inclination and orientation of the station; and a power supply for keeping the system in operation. Some stations may also measure precipitation, cloud height,

solar radiation, and turbulence. Because fixed weather stations need to operate reliably for long periods under adverse weather conditions, this equipment often uses rugged sensors that have no moving parts and require little or no maintenance. Examples are ultrasonic anemometers for measuring wind velocity, and solid-state sensors for measuring temperature, barometric pressure, and humidity. Ultrasonic anemometers (Figure 2-1) measure the time-of-flight of sonic pulses between three pairs of transducers on nonorthogonal axes, from which wind velocity, and also temperature, can be accurately computed. Weather stations often utilize sensor modules that comprise several sensors integrated in a single unit.

Figure 2-1.Ultrasonic anemometer
Photo courtesy of R. M. Young Company

Most weather stations intended for use by first responders automatically collect and record data. Data transmission from the weather station to a computer can be hard wired or wireless. Software is available that can display or store weather data, calculate parameters, provide alarms, and interface with computer-based atmospheric plume dispersion models.

2.2 Applications

Weather information plays a critical role in CBRNE incidents in which hazardous materials are released into the environment. Firefighters, police, emergency management officials, and other responders use weather information to assess and analyze hazards and risks, make decisions concerning evacuating and sheltering-in-place, and protect themselves and the public.

After an accidental or intentional release of a hazardous material, information about prevailing weather conditions at the release site can be used to predict how the material might disperse in the atmosphere. For example, just knowing the prevailing wind velocity (i.e., wind speed and wind direction) can help responders establish the relative risks in geographic areas surrounding the incident site. Atmospheric plume dispersion models can provide much more detailed and accurate predictions. However, plume models need information about the nature, quantity, and release location of the hazardous material, as well as local meteorological information, especially wind velocity and temperature. As noted above, although fixed weather stations may be located at some distance away from the incident site, fixed stations can provide the local weather data needed to run an atmospheric plume dispersion model.

Many weather stations in this survey can interface directly with the widely used ALOHA (Areal Locations of Hazardous Atmospheres) model for atmospheric plume dispersion and CAMEO (Computer Aided Management for Emergency Operations), a software suite and database used to acquire chemical information and locations about potentially hazardous agents. ALOHA is a subprogram of CAMEO. MARPLOT (Mapping Application for Response, Planning, and Local Operational Tasks), another CAMEO subprogram, imports the ALOHA plume modeling results and provides a visual reference on a map. ALOHA requires fairly basic meteorological data (i.e., wind speed and direction, elevation above ground level of the wind measurement, temperature, and relative humidity), which can be obtained from a fixed, portable, or vehicle-mounted weather station, as well as a visual determination of the degree of cloud cover. Based

on these data, and on the properties of the hazardous compounds released, the model computes the probable movement of the contaminated air and displays the results using MARPLOT. Emergency responders can use these displays to determine safe zones and implement evacuation plans, if necessary.

Another application of weather surveillance equipment is to establish landing areas for emergency response aircraft. Weather stations are installed at nearly every airport, large and small, to provide weather information for take-offs and landings.

The NWS uses fixed weather stations, including Sodars (Sonic Detection and Ranging), wind profilers, Doppler radar, and weather satellite images to make specialized forecasts, such as the approach of severe weather that may impact first responder activities and emergency planning. The NWS is an excellent source of weather information for first responders.

The Federal Highway Administration (FHWA) of the U.S. Department of Transportation has installed nationwide fixed weather stations (Figure 2-2a) along highways in 40 states. A station contains a suite of sensors (Figure 2-2b) to measure local weather and environmental conditions (i.e., wet, iced, or flooded roads), as well as road temperature and level of water on the roads. A camera is usually included to view site conditions. These stations enable maintenance and operations personnel to monitor changing weather conditions in real time and make informed and timely decisions. Knowledge about iced or flooded roads during a CBRNE emergency is important to the safety of first responders. Real-time road weather information is available from the FHWA at http://ops.fhwa.dot.gov/weather/resources/links.htm. Data are provided in a format that can be easily used and interpreted by responders.

(a)

(b)

Figure 2-2. (a) Road weather station, and (b) Suite of sensors

Photos courtesy of Department of Transportation, Lansing, Michigan

2.3 Standards/Regulations

Vendors of some commercial instruments claim calibration and testing against standards traceable to the National Institute of Standards and Technology (NIST). NIST develops and maintains standards for weather instruments, and provides calibrations, standard reference materials and data, and laboratory accreditation services that assist a customer in establishing traceability of measurement results. NIST traceability is typically required by public agencies monitoring weather conditions, certain private organizations with strict tolerances for accurate weather instrumentation, and companies providing goods or services to the government. Each NIST-traceable sensor includes a certificate showing that the unit has been compared against a NIST-traceable reference standard and that it performs within its stated specifications. The certificate also shows the range of conditions under which the instrument was tested, the date the test was performed, and the expiration date of the certification. NIST traceability provides an extra level of documentation that certifies the accuracy of a weather station.

Some weather stations are manufactured in accordance with U.S. Department of Defense MIL-STD-461E for electromagnetic interference or the MIL-STD-810F standards. MIL-STD-810F is a series of test methods for determining the ability of an instrument to operate under various types of environmental conditions, such as exposure to rain, sand and dust, and vibration or shock. Purchasers may wish to discuss with the instrument vendor how a product's compliance to NIST traceability, MIL-STD-461E, or MIL-STD-810F was established, i.e., whether the product was tested by the manufacturer or by an independent testing agency.

3. PRODUCT DATA

This market survey report includes 10 fixed weather surveillance instruments from 8 vendors. Products are listed in alphabetical order by vendor name. Tables 3-1 and 3-2 compare key features and specifications, respectively. The products are described in sections 3.1 through 3.10.

Features listed in Table 3-1 are defined as follows:

Company & Product	The name of the product manufacturer or distributor and the name of the product
Length, Width, Height	Length, width, and height of the product in inches (in.)
Diameter	Diameter of the product in inches (in.)
Weight	Weight of the product in pounds (lbs)
Power Sources	Power sources that can be used for the product
Corrosion	Whether or not the product is corrosion resistant
Water	Whether or not the product is water resistant
Shock/Vibration	Whether or not the product is resistant to shock and vibration
Compass	Whether or not the product includes a self-aligning compass

Clock	Whether or not the product includes a real-time clock
Calibration	Whether or not the product requires calibration
Data Transferred	Whether or not data collected can be transferred to a personal computer (PC)
ALOHA	Whether or not the product interfaces directly with the ALOHA atmospheric plume dispersion model
Memory	The amount of computer memory in megabytes (MB) required for the product
Interface/Display	Type of interface/display, e.g., liquid crystal display (LCD)
Data Logger	Whether or not data is automatically stored in a data logger
GPS	Whether or not the product includes a Global Positioning System (GPS)
***Pric*e**	Unit cost of the product in dollars

Additional features listed in Table 3-2 are defined as follows:

Wind Speed	Measured speed of atmospheric wind in meters per second (m/s)
Wind Direction	Measured direction of atmospheric wind in degrees (0 to 360°)
***Temperatur*e**	Measured atmospheric temperature in degrees Celsius (°C)
Relative Humidity	Measured atmospheric relative humidity in percent (%)
Barometric Pressure	Measured barometric pressure in millibars (mbar)
Precipitation	Measured precipitation (e.g., drizzle, rain, sleet, snow, graupel, and hail) in millimeters per hour (mm/hr)
Electronic	Whether or not the product uses only electronic sensors

Range, accuracy, and resolution listed in Table 3-2 are defined as follows:

Range	Largest and smallest values of the measured parameter
Accuracy	Degree of closeness of measured parameter to the parameter's actual value, expressed as a percentage (%)
Res	Resolution, the smallest change of the measured parameter that the sensor can detect

Information on the products in this report was provided by vendors or manufacturers and has not been independently verified by the SAVER Program.

Table 3-1. Product Comparison Matrix–Product Features

Company Product	Length, Width, Height (in.)	Diameter (in.)	Weight (lbs)	Power Sources	Corrosion	Water	Shock/ Vibration	Compass	Clock	Calibration	Data Transferred	ALOHA	Memory (MB)	Interface/ Display	Data Logger	GPS	Price ($)
Anything Weather Communications, Inc. AW5100	N/A	N/A	Var	Power grid, solar panel	N/A	Yes	N/A	No	Yes	Yes	Yes	Yes	N/A	LCD	Yes	No	15,000 (including camera)
Climatronics Corporation Automatic Weather Station-SRDT	N/A	N/A	Var	Rechargeable battery, power grid, solar panel	Yes	Yes	N/A	No	Yes	Yes	Yes	Yes	4	Digital numeric; LCD	Yes	Yes	10,000
Coastal Environmental Systems, Inc. WEATHERPAK EOC	N/A, N/A, 60	4	15	N/A	Yes	Yes	Yes	Yes	Yes	No	N/A	Yes	1	N/A	Yes	Yes	N/A
Columbia Weather Systems, Inc. Orion Weather Station	N/A, N/A, 9.4	4.5	1.5	Power grid, solar panel	Yes	Yes	No	No	N/A	Yes	Yes	Yes	2,000	No display, field readable with additional equipment	Yes	No	2,906
Met One Instruments, Inc. F460 10M	Var	Var	Var	Rechargeable battery, off-the-shelf battery, power grid, solar panel	Yes	Yes	No	No	Yes	Yes	Yes	Yes	2	Digital numeric, LCD	Yes	Yes	7,620
Met One Instruments, Inc. Industrial Weather Station	N/A	N/A	Var	Rechargeable battery, off-the-shelf battery, power grid, solar panel	Yes	Yes	No	No	No	Yes	Yes	N/A	2	No display, field readable with additional equipment	Yes	No	7,030
Optical Scientific, Inc. 2100-303	6, 6, 11	N/A	2.2	Rechargeable battery, off-the-shelf battery, power grid, solar panel	Yes	Yes	Yes	No	No	Yes	Yes	N/A	N/A	No display, field readable with additional equipment	No	No	2,650
Texas Weather Instruments, Inc. Network Weather Station™	5, 3, 3	N/A	19	Power grid	Yes	Yes	N/A	No	Yes	Yes	Yes	N/A	N/A	No display, field readable with additional equipment	No	No	1,599-1,899
Vaisala, Inc. AWS520	N/A	N/A	400	Rechargeable battery, off-the-shelf battery, power grid, solar panel	Yes	Yes	Yes	Yes	Yes	Yes	Yes	N/A	N/A	Digital numeric, analog, LCD, LED	Yes	N/A	Less than 10,000
Vaisala, Inc. MAWS	Var	N/A	Var	Rechargeable battery, power grid, solar panel	Yes	Yes	Yes	Yes	Yes	Par-tial	Yes	Yes	2,000	Digital numeric, analog, LCD	Yes	Yes	Var

Notes: N/A: Information not available. Var: Varies, depends on selection of sensors and accessories. Partial: Some sensors do require calibration. LCD: Liquid crystal display. LED: light-emitting diode.

Table 3-2. Product Comparison Matrix–Product Specifications

Company Product	Wind Speed			Wind Direction			Temperature			Relative Humidity			Barometric Pressure			Precipitation			Elec-tronic
	Range m/s	Accuracy %	Res m/s	Range degrees	Accuracy %	Res degrees	Range °C	Accuracy %	Res °C	Range %	Accuracy %	Res %	Range mbar	Accuracy %	Res mbar	Range mm/hr	Accuracy %	Res mm/hr	
Anything Weather Communications, Inc. AW5100	0-60	0.3	1	0-360	2	1	-51-+60	0.5	0.1	0-100	3	1	600-1100	0.5	0.1	Cum	5	0.25	Yes
Climatronics Corporation Automatic Weather Station–SRDT	0-60	0.07	0.04	0-360	2	0.1	-30-+50	0.15	0.1	0-100	2	1	800-1100	0.35	0.1	Cum	0.5	0.25	N/A
Coastal Environmental Systems, Inc. WEATHERPAK EOC	0-60	0.5	0.01	0-360	3	1	-50-+100	0.1	0.1	0-100	1	1	500-1200	1	1	N/A	N/A	N/A	N/A
Columbia Weather Systems, Inc. Orion Weather Station	0-60	3	0.1	0-360	3	1	-51-+60	0.5	0.1	0-100	3	1	600-1100	0.1	1	0-200	5	0.01	Yes
Met One Instruments, Inc. F460 10M	0-65	1	0.1	0-360	2	1	-32-+52	0.15	0.1	1-100	2	1	600-1100	0.35	0.1	Cum	0.5	0.25	Yes
Met One Instruments, Inc. Industrial Weather Station	0-125	1.5	0.1	0-360	3	1	-30-+50	0.15	0.1	1-100	3	1	600-1100	0.35	0.1	Cum	1	0.25	N/A
Optical Scientific, Inc. 2100-303	0-60	2	0.01	0-360	3	1	-35-+70	0.1	0.1	0-100	0.8	0.01	600- N/A	0.5	0.5	N/A	N/A	N/A	N/A
Texas Weather Instruments, Inc. Network Weather Station™	0-199	5	0.1	0-360	5	N/A	-40-+60	0.5	0.1	0-100	3	0.1	948-1151	0.03	0.3	N/A	2	0.25	N/A
Vaisala, Inc. AWS520	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Vaisala, Inc. MAWS	0-75	0.1	0.01	0-360	2	1	-80-+60	Acy	N/A	0-100	Var	Var	500-1100	0.1	0.01	0-100	N/A	0.05	Yes

Notes: N/A: Information not available. Cum (Cumulative): 0.01-inch increments. Var (Varies): Depends on temperature. Acy (Accuracy): 0.07 + (0.0025 X Temperature).

3.1 Anything Weather Communications, Inc.: AW5100

The AW5100 includes standard weather sensors and a live web camera. Optional sensors are available, including visibility, soil temperature, soil moisture, solar radiation, and road sensors. Data can be collected via local area network (LAN), cellular, or WiFi connectivity. The system is customizable based on the client's needs.

AW5100
Photo courtesy of Anything Weather Communications, Inc.

3.2 Climatronics Corporation: Automatic Weather Station–SRDT

The Solar Radiation and Delta-T (SRDT) system measures wind speed (0 to 60 m/s), wind direction (0 to 360°), air temperature (-30°C to +50°C), temperature difference between 2 and 10 meters above the ground, solar radiation (0 to 1500 watts/m²), relative humidity (0 to 100 percent), barometric pressure (800 to 1100 mbar), and precipitation accumulation (in 0.01-inch increments). These data are recorded with a data logger. The SRDT also has a serial output that can be connected to a PC. Data retrieval options include direct connection to a PC using a dedicated cable and short-haul modem, a dial-up telephone modem, or one of several radio-telemetry systems. This system allows the user to measure atmospheric stability using the SRDT method, as recommended by the U.S. Environmental Protection Agency (EPA).

Automatic Weather Station–SRDT
Photo courtesy of Climatronics Corporation

3.3 Coastal Environmental Systems, Inc.: WEATHERPAK EOC

The WEATHERPAK EOC measures wind speed, wind direction, barometric pressure, temperature, gamma radiation, and relative humidity (optional); computes a 5-minute average of the accumulated weather data; and calculates "wind stability" needed for atmospheric plume dispersion models. The sensors and other electronics are integrated and sealed inside the aluminum housing, which is constructed of marine-grade aluminum. The electronics are hermetically sealed to resist harsh environments. The WEATHERPAK EOC has been tested and meets the MIL-STD-461E specification for electromagnetic interference and the MIL-STD-810F specification for extreme environmental conditions. The vendor claims installation to be simple; one cable provides power to the system and retrieves the data using

WEATHERPAK EOC
Photo courtesy of Coastal Enviromental Systems, Inc.

Power over Ethernet (PoE). A weather station network can be created using the Ethernet access provided.

3.4 Columbia Weather Systems, Inc.: Orion Weather Station

The Orion Weather Station includes an all-in-one sensor that measures wind speed, wind direction, temperature, relative humidity, barometric pressure, and rainfall. The wind sensor is an ultrasonic type with no moving parts. The rainfall sensor is an impact type, which measures rainfall by detecting the impacts of individual rain drops on a sensor plate. The following optional features are available:

- Display console with color touch screen;
- Micro-server for network and Internet operations;
- Weather-master software for Windows computers;
- Wireless communication; and
- Solar power operation.

Orion Weather Station
Photo courtesy of Columbia Weather Systems, Inc.

3.5 Met One Instruments, Inc.: F460 10M

The F460 10M weather station comprises weather sensors; a low power, microprocessor-based data logger; interconnecting cables; and accessories. The sensors monitor meteorological conditions and are connected to the IMP-950 data logger, which is housed in a weatherproof enclosure mounted on a 10-meter tower. The IMP-950 data logger can function as a single station or as part of a multi-station weather network. It is self-contained and battery powered to allow unattended operation in remote locations. The IMP-950 data logger can be programmed to acquire, average, process, and store data from up to three differential or six single-ended, individually-configured analog channels, and two pulse-counting input channels. All required excitation signals are provided by the IMP-950. Each channel can be independently programmed for calculation of averages, standard deviations, and maximum/minimum measurements, and the resulting data is stored in the internal battery-backed memory. Data retrieval is performed by communication through a pair of spread-spectrum radio modems.

F460 10M
Photo courtesy of Met One Instruments, Inc.

3.6 Met One Instruments, Inc.: Industrial Weather Station

The Industrial Weather Station is designed to send real-time data to a facility's distributed control system as either analog current loop signals or as a serial digital message. It comprises weather sensors; a low power, microprocessor-based Universal Interface Module (UIM); interconnecting cables for connecting the sensors to the UIM; and accessories. The Industrial Weather Station is housed in a weatherproof enclosure, which mounts to the side of a tower, post, or other nearby fixture. The UIM supplies excitation signals to the sensors and converts the sensor output signals to proportional linear voltages or a serial, RS-232C message. Up to 11 sensors can be connected to the UIM, with the data refreshed once per second.

Industrial Weather Station
Photo courtesy of
Met One Instruments, Inc.

3.7 Optical Scientific, Inc.: 2100-303

The 2100-303 is a compact, lightweight, multi-sensor instrument that measures a wide range of weather parameters. Ultrasonic technology is used in the wind sensor, which measures wind speed and direction. Temperature and humidity are measured using industry-standard probes housed in a naturally-aspirated radiation shield. Barometric pressure is measured within a vented enclosure. A serial data output is provided.

2100-303
Photo courtesy of
Optical Scientific, Inc.

3.8 Texas Weather Instruments, Inc.: Network Weather Station™

The Network Weather Station (NWS™) is an Internet-based wireless weather station that allows the user to post local weather information directly on the web. Weather data is gathered by the outdoor sensors and fed into the Texas Weather Instruments, Inc., outdoor controller, which transmits data via a wireless signal to an indoor webserver. Current and historical data can be viewed on the webserver by any computer, tablet, or smartphone attached to the local network. The included weather application, WeatherView32 Edition, can gather, display, and log the weather data on a Windows computer.

Network Weather Station™
Photo courtesy of
Texas Weather Instruments, Inc.

The Network Weather Station includes:

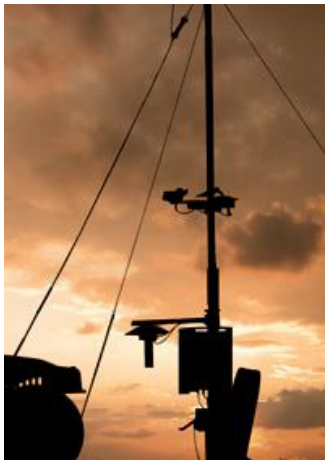
- Outdoor controller with external power;
- Wind sensor for measuring wind speed and direction;
- Outdoor temperature and humidity sensors;

- Rain collector;
- Barometric pressure sensor;
- Indoor webserver with power supply; and
- WeatherView32 Home Edition.

3.9 Vaisala, Inc.: AWS520

The AWS520 is a cost-effective, stand-alone, fixed-site weather observation and reporting system for real-time aviation applications. The weather data and reports are specifically made available to airport personnel including terminal operators and pilots. Key features include:

- All significant aviation weather parameters are measured by one compact unit installed on a 10-meter pole;
- Measures all of the meteorological parameters needed in aviation, including wind speed and direction (e.g., for gusts and squalls), barometric pressure, air temperature and humidity (dew point), accumulated precipitation, cloud height and coverage, visibility, precipitation type, and presence of lightning;
- Capable of reporting the prevailing weather conditions to pilots and other users;
- Data reports can be sent via LAN, hardwired modem, or UHF/VHF radio modems to a standard laptop PC provided with software to display data in numerical and graphical form; and
- A weather-resistant pocket PC with graphical display software is available as a local display and maintenance terminal.



AWS520
Photo courtesy of Vaisala,

3.10 Vaisala, Inc.: MAWS

The MAWS is an automatic weather station for collecting weather data. Key features include:

- Easy to use automatic weather station for meteorological, hydrological, and aviation applications;
- Easy and economical to install, maintain, and upgrade;
- Field-proven reliability and accuracy in harsh environments;
- Low power consumption for extended remote operation;
- Wide selection of sensors and telemetry options including built-in Transmission Control Protocol/Internet Protocol (TCP/IP) connectivity;
- Extensive calculation and data logging capacity;
- Low total life-cycle cost; and
- One-year warranty (extended warranty option available).

MAWS
Photo courtesy of Vaisala, Inc.

4. VENDOR CONTACT INFORMATION

Table 4-1. Product and Vendor List

Company	Product	Contact Information	Web Site
Anything Weather Communications, Inc.	AW5100	77851 Las Montanas Rd., Suite C Palm Desert, CA 92211	www.weatherdataservices.com
Climatronics Corporation	Automatic Weather Station–SRDT	606 Johnson Avenue, Suite 28 Bohemia, NY 11716-2688	www.climatronics.com
Coastal Environmental Systems, Inc.	WEATHERPAK EOC	820 First Avenue South Seattle, WA 98134	www.coastalenvironmental.com
Columbia Weather Systems, Inc.	Orion Weather Station	2240 NE Griffin Oaks Street, Suite 100 Hillsboro, OR 97124	www.columbiaweather.com
Met One Instruments, Inc.	F460 10M, Industrial Weather Station	1600 Washington Blvd. Grants Pass, OR 97526	www.metone.com
Optical Scientific, Inc.	2100-303	2 Metropolitan Court, Suite 6 Gaithersburg, MD 20878	www.opticalscientific.com
Texas Weather Instruments, Inc.	Network Weather Station™	9766 Skillman Street Dallas, TX 75243	www.txwx.com
Vaisala, Inc.	AWS520, MAWS	194 South Taylor Avenue Louisville, CO 80027	www.vaisala.com

5. CONCLUSION

This market survey report includes 10 environmental (weather) surveillance systems offered by 8 vendors. Product features and purchase prices are listed in Table 3-1. Vendor-provided information about the range, accuracy, and resolution of their instruments' meteorological measurements (i.e., wind speed and direction, temperature, relative humidity, barometric pressure, and precipitation) are provided in Table 3-2. Careful assessment of the features of the various commercially available products will allow agencies to acquire the equipment best suited for their particular needs. Prices, features, and capabilities may change with time; therefore, agencies should contact equipment manufacturers or vendors to obtain the most up-to-date information before choosing to purchase specific equipment.

The product price depends on the type of weather sensors and features included, e.g., whether the product has GPS, cable or RF telemetry, and automatically interfaces with an atmospheric plume dispersion model. Five of the included products are GPS capable, and six products can be linked directly with an atmospheric plume dispersion model (see Table 3-1).

6. REFERENCES AND RESOURCES

Portable Weather Stations Market Survey Report, U.S. Department of Homeland Security, SAVER, November 2010.

Atmospheric Plume Dispersion Models and Applications for Emergency Response and Recovery Handbook, U.S. Department of Homeland Security, SAVER, March 2013.