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INFORMATION MANAGEMENT

AccuWeather SkyGuard Online

<http://www.accuweather.com/>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Pennsylvania	N/A	2012-2013	2	2	4	4	4	3
Average rating			2 - not very helpful	2 - not very easy	4 - helpful	4 - maintained good condition	4 - well	3 - average

Comments

Pennsylvania DOT (2012-2013) • Overall rating: 3

• During the trial period, the web site provided the following: - All basic weather information for locations set by users. This function appeared to work well. - PA Traffic cameras. This function appeared to work well. - Current website is best run using T1 lines, and could not be used effectively with Internet Explorer 8 browsers. - Included very detailed weather warnings for individual stockpiles, but they were created at a County level, not for specific stockpiles. This feature appeared to work well. - Users can have their own User ID and therefore can customize the website for their desired location. This function appeared to work well. - PennDOT-specific maps were updated 4 times per day; National maps were updated two times per day.

- During the trial period, the Email Alert service provided the following:
 - An unlimited number of users; but, forecasts were sent to everyone in the County, regardless of their reporting location.
 - A single email Alert containing multiple stockpile locations. The vendor did not provide forecasts for individual stockpiles.
 - An identification of a staff meteorologist available by telephone for specific weather-related issues. The meteorologist was contacted several times with excellent customer service provided.
 - Timely and accurate email Alerts for the following events: Snow, Heavy Snow, Snow Squall Warning, Heavy Rain, Heavy Snow Canceled, Heavy Rain Canceled
- Service used radar to include Squall Alerts as the alerts are occurring, but forecasting squalls in advance is not possible at this time.

High Sierra temperature sensor

<https://hsierra.com/products/mobilesurfacesentinel/>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Iowa	300 units	2016-2018	4	3	4	3	3	3
Iowa	10 units	2016-2017	4	5	4	5	4	4
Average rating			4 - helpful	4 - easy	4 - helpful	4 - maintained good condition	3.5 - well	3.5 - satisfied

Comments

Iowa DOT (2016-2018) • Overall rating: 3

During our first season of testing, the High Sierra sensors worked very well and we did not experience any unit failures. Based on this performance, we increased the number of units to 300 for the next winter season plus we outfitted all 50 of our Supervisor pickups. Once the 2017-2018 season started we experienced numerous unit failures. When we addressed this issue with High Sierra, they were willing to replace the defective units, however we continued to have unit failures. We held a meeting with High Sierra senior management about the issue we were experiencing with the high failure rates and they shared with us that they had changed a material used in the sensors plus they had changed part of their manufacturing process. High Sierra also told us they had made the decision to go back to the original materials and manufacturing process and they would continue to replace all of the units that failed. Throughout this process High Sierra has been willing to work the issues we have had with these sensors. They have been willing to replace all units that have failed at no cost to the Iowa DOT. We will be going into the 2018-2019 with 300 trucks and 50 Supervisor pickups outfitted with these units and we will be tracking their performance.

Iowa DOT (2016-2017) • Overall rating: 4

We outfitted 10 trucks each with Vaisala, Weather Cloud, and the High Sierra. The High Sierra sensors performed the best and were the most consistent. We had no sensor failures with the High Sierra sensors.

This sensor connects with our Cirrus Speedsmart controller to display the temp reading on the controller display in their truck for the operator and the temp info is fed through our GPS/AVL system that is then displayed on our internal website.

We plan to expand out testing during the 2017-2018 winter season by outfitting 350 snow plow trucks and 50 supervisor pickups.

Loadrite Loader Scale (Trimble)

<https://heavyindustry.trimble.com/en/all-products>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Maryland	5	2016-2017	3	4	3	4	4	3
Minnesota	1	2011-12	4	4	4	4	3	4
Average rating			3.5 - helpful	4 - easy	3.5 - helpful	4 - maintained good condition	3.5 - well	3.5 - satisfied

Comments on Loadrite Loader Scale

Maryland DOT (2016-2017) • Overall rating: 3

Goal: Rather than using an estimated weight per "scoop" of salt placed in each truck, SHA wanted to know the precise amount of salt placed in each truck. The hope was that this information could be matched up with the location data on the trucks whereabouts to determine the amount of salt spread in specific at risk watersheds.

Comments: Presently there is no way for a central office to control the entries in the field (i.e., storm numbers, naming convention for trucks, material types) which will cause issues with rolling up statewide data. Also, all reports had to be recreated in each Shop rather than a central office developing a common report to be used by all. The controller also seemed to use antiquated technology which didn't allow for easy selection of trucks and material type. The weights were helpful, but the individual Shops who tested had to rely exclusively on the quality of their administrative people entering data before each storm and the quality of the loader operator making good selections when loading salt. Because of this, some Shops found greater success than others.

Minnesota DOT (2011-2012) • Overall rating: 4

The product worked well to track amount of product(s) that was used out of a stockpile, could be used to help track inventory where agencies don't have funding to purchase a precision controller to measure amount of product(s) applied during a Snow and Ice event. Safety consideration: the operator can see how much weight they load, avoiding overweight and safety concerns.

Lufft USA Multi-Parameter Weather Sensors (WS601)

<https://www.lufft.com/>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Pennsylvania	2	2012-13	5	4	5	5	2	3
Average rating			5 - extremely helpful	4 - easy	5 - extremely helpful	5 - maintained excellent condition	2 - not very well	3 - average

Comments

Pennsylvania DOT (2012-2013) • Overall rating: 3

Following their installation in December (Perry) and January (Fulton), data was recorded. The snowfall data recorded was compared to Millersville University's snow totals tracking to determine the effectiveness of the weather stations. The Lufft weather station is set up to record data in meteorological formats and units, such as liquid precipitation, and does not record snowfall by accumulation. For the purposes of recording snowfall totals and comparing them to salt usage, this station does not fulfill the goal.

MacQueen Equipment Liquid Chemical Tracking Software

<https://www.macqueeneq.com/equipment/>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Minnesota	1	2011-12	3	3	2	4	4	4
Average rating			3 - average	3 - average	2 - not very helpful	4 - maintained good condition	4 - well	4 - satisfied

Comments

Minnesota DOT (2011-2012) • Overall rating: 4

Due to lighter winter, more real-life testing and assessment is required.

Maintenance Decision Support Systems (MDSS)

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Michigan	NA	2012-13	4	NA	4	NA	3	4
Pennsylvania	15 Routes	2011-13	4	5	5	4	3	3
Average rating			4 - helpful	5 - extremely easy	4.5 - extremely helpful	4 - maintained good condition	3 - average	3.5 - satisfied

Comments

Michigan DOT (2012-2013) • Overall rating: 4

MDSS seems like it can be a very useful tool if coupled with AVL technology. Our pilot did not have this, so parameters had to be entered into the system by supervisors after the storm. Viewing the weather maps, and treatment recommendations on the website seemed very beneficial. Michigan is going to forge ahead with instrumenting our trucks with AVL, and plan to utilize MDSS services statewide (Meridian or another provider).

Pennsylvania DOT (2011-2013) • Overall rating: 3

Has difficulty dealing with "Lake Effect" snow.

PreCise temperature sensors

<https://www.precisemm.com/Products/Item/ProductID/141>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Iowa	NA	2020-2021, 2019-2020	4	5	4	5	4	4
Average rating			4 - helpful	5 - extremely easy	4 - helpful	5 - maintained excellent condition	4 - well	4 - satisfied

Comments

Iowa DOT (2020-2021, 2019-2020) • Overall rating: 4

Goal: Finding a durable, accurate temp sensor to install on snowplow trucks and maintenance staff pickups.

Comments: We are in the process of transitioning from Road Watch and High Sierra to the PreCise Temp Sensor. We have found them to be very durable and accurate.

Vaisala RWIS station

<https://www.vaisala.com/en/products/systems/road-weather-information-system-rwis>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Vermont	10	2016-2018	5	5	5	5	5	4
Average rating			5 - extremely helpful	5 - extremely easy	5 - extremely helpful	5 - maintained excellent condition	5 - extremely well	4 - satisfied

Comments

Vermont AOT (2016-2018) • Overall rating: 4

We have had very good experience with the entire station. We have just started our own maintenance of the RWIS stations in the last 1½ years, so we will have more insight into the reliability, but again are very happy with the way the stations have performed.

Vaisala temperature sensor

<https://www.vaisala.com/en/products/instruments-sensors-and-other-measurement-devices>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Iowa	10 units	2016-2017	4	4	4	2	2	2
Pennsylvania	N/A	2015-2017	4	2	2	3	4	4
Average rating			4 - helpful	3 - average	3 - average	2.5 - average	3 - average	3 - average

Comments

Iowa DOT (2016-2017) • Overall rating: 2

We had 2 of 10 sensor units fail during the winter season. This sensor did not seem to provide consistent readings. We do not plan to continue any testing with this temp sensor.

WeatherCloud temperature sensor

<http://weathercloud.co/>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Iowa	10 units	2016-2017	2	2	2	2	1	1
Average rating			2 - not very helpful	2 - not very easy	2 - not very helpful	2 - not very durable	1 - Not at all well	1 - Not at all satisfied

Comments

Iowa DOT (2016-2017) • Overall rating: 1

These sensors failed miserably. Installs were difficult, tech support spotty, and the sensors did not work as advertised. Also, Weather Cloud stored the temperature data and wanted to charge an ongoing service fee for data storage. We removed all of these temp sensors and sent them back. We will not continue to test these sensors.

WeatherSentry Online (DTN)

<https://www.dtn.com/weather/transportation/weathersentry-transportation-edition/>

State	Quantity tested	Season tested	Instructions	Ease of installation	Vendor support	Durability	Addressed problem	Overall satisfaction
Illinois	NA	2009-12	5	5	5	NA	5	5
Massachusetts	NA	2008-13	5	4	5	NA	5	5
Pennsylvania	NA	2012-13	4	5	4	4	5	5
Average rating			4.7 - extremely helpful	4.7 - extremely easy	4.7 - extremely helpful	4 - maintained good condition	5 - extremely well	5 - extremely satisfied

Comments

Illinois DOT (2009-2012) • Overall rating: 5

The ability to get personal response to specific questions was helpful to our staff. The accuracy of forecasts was also very good. The product has evolved and seems to continually improve.

Massachusetts DOT (2008-2013) • Overall rating: 5

The support this company provides has proven to be the most important aspect of having a contracted weather service. They go above and beyond most service companies.

Comments on WeatherSentry Online (DTN) (continued)

Pennsylvania DOT (2012-2013) • Overall rating: 5

- The web site provided the following: - An unlimited number of users. - Ability to place color-coded Dashboards that identify important elements for up to 15 locations that will provide real-time monitoring using custom parameters. This function was used on a limited basis and appeared to function well. - A custom layer for stockpiles. - Historical weather data for anywhere pulled from nearest weather station. This feature appeared to work well. - An on-line chat with a meteorologist having a goal to address concerns within 15 minutes, but the service was not used. However, the sales staff was contacted regarding general questions with very fast response times. - "Virtual points" (even outside of state borders) could be added to represent the weather experience for another location. This feature was not used. - Available traffic camera images from multiple states including most of the snowbelt, South East Canada, and east coast states that are refreshed every 5 minutes. This function worked well. - "Custom Treatment Recommendations" for highways can display customizable treatment recommendations based on PennDOT policies and operations. This function was not used. - Create multiple treatment plans due to differing levels of service, varying route cycle times, and different chemicals. Treatment Plans can be printed. Anytime the weather scenario changes an icon will turn red to inform of the changing treatment recommendations. This function was not used. - National Weather Service Warnings, Watches and Advisories viewable as layers. This function appeared to work well. - National Weather Service Areas of Maximum Impact can show regions most likely to be impacted by a tornado, thunderstorm, or flood. This function was not used. - Help and Search features. This function was not used.

Web site features (continued): - Traffic speed data on radar map for PA and contingent states and severe weather corridor locations providing direction and speed of storm cells. This function appeared to work well. - Provides adjacent states' RWIS data. This function appeared to work well. - "Precip Monitor" shows numerous locations at a glance. This function appeared to work well. - Worked well on Internet Explorer 8

- During the trial period the email Alerts provided the following: - Precipitation Timing - Forecast of Precipitation - Forecast of Frozen Precipitation - Observed Snow - Forecast of Low Temperature - Observed Low Temperature - Timing Alerts sent out as often as the changing forecast dictated; however, the service did not issue cancellations. - Capability to accommodate individuals wanting to receive email alerts only for problem areas (not all stockpiles). This function appeared to work well. - Capability to change distribution very easily to accommodate stockpile changing from Summer to Winter and other changes to formen's reporting locations. This function worked well. - Ability to customize for each user. This function worked well. - A timer that can be set by users that will stop email alerts during certain times of the day and/or days of the week. This function appeared to work well. - An absence of forecasting precipitation intensity.

- Service used weather forecasting stations located across PA and adjacent states, and issued email "Alerts" based on customized triggers automatically generated by forecasting radar.

- Service had the ability to create virtual pin points for forecasting which will better accommodate areas with no available weather stations by setting pin points at key locations.