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1.0 Introduction

The objective of this report is to provide Oklahoma Department of Transportation (ODOT) personnel with recommendations concerning the utilization of new technologies and/or adaptations of existing technology that will enable vegetation managers to comply with ODOT’s need to provide safe travel corridors for Oklahoma’s motoring public. The year 2007 was a banner one for Oklahoma in that the state celebrated its one-hundredth year of statehood. ODOT was heavily involved in an “elevated level of service” that increased the level of maintenance on both rural roadides and heavily traveled corridors funneling visitors into Oklahoma. The term “elevated level of service” was introduced by the Director of The Department of Transportation, Mr. Gary Ridley. The centennial celebration involved increases in the number of roadside acres treated with herbicides (see 2007 Annual ODOT Herbicide Program Report) so as to improve the aesthetic appearance of travel corridors and staging areas for major celebration events.

In meetings across the state, several divisions with high populations and state highways traversing major Oklahoma metropolitan areas (Tulsa Co. and Oklahoma Co.) expressed interest in making herbicide applications from “fence to fence”. This would mean a broadcast herbicide application extending from the hard highway surface edge to the adjoining non-ODOT property (covering both the safety zone and transition zone). Traditionally, ODOT has counted on the untreated transition zone as a buffer to catch any herbicide particle drift before it reaches and is deposited on adjacent property. Additionally, the transition zone has served as a repository for herbicide-sensitive native forbs that do not have a good fit in the safety zone but are considered suitable and desirable outside of the safety zone. Forbs are annual or perennial non-woody broadleaf plants that are not sedges, grasses or rushes. Many of these forbs including what the public would call “native Oklahoma wildflowers.” While this broadcast herbicide treatment approach to the transition zone may be viewed as a way to increase aesthetic appearances and decrease the amount of weed pressure, the close proximity to adjacent property means that applicators need to pay special attention to wind speed and temperature inversion conditions. On-site and instantaneous measurement of wind speed, wind direction and air temperature can serve as a means of dispelling claims against ODOT if complainants argue that ODOT’s application drifted onto their property. Currently, the Oklahoma Department of Agriculture, Food and Forestry (ODAFF) does not require that records reflect wind speeds at the time of herbicide application. However, it has been the practice of ODOT to keep these records so as to provide confirmation that wind conditions were within spray application parameters set by the herbicide manufacturer.

Currently, most ODOT’s spray crews utilize a hand-held Dwyer wind meter (Dwyer Instrument, Inc., Michigan City, Ind. 46360, Pat. No. 2993374) that is very economical (Forestry Supply, Inc.) costing approximately $14.00 per unit (Figure 1). While this device is accurate, they require the spray rig operator to manually measure wind speeds
by exiting the vehicle and exposing the device to wind currents, then physically recording
the measured wind speed on hand-written spray record sheets (Figure 2.). One of the
drawbacks to the hand-held unit is that the spray rig operator may not be aware of wind
speed changes as well as wind direction changes.

As part of ODOT’s contract with the Oklahoma State University Roadside Vegetation
Management (OSU RVM) program, OSU personnel are contracted to attend the annual
National Roadside Vegetation Management Association (NRVMA) meetings to gather
information on technology that may have application to ODOT’s IRVM (Integrated
Roadside Vegetation Management) program. This year (October 2-4, 2007) the meetings
were held in Charlotte, N.C., and contact was made with Nathan Cross, Technology
Representative for Spectrum Technologies, Inc. This company manufactures and
distributes leading-edge measurement information technology to the agricultural markets
worldwide.

One of Spectrum Technologies, Inc. products that may have application to ODOT’s spray
program is the WatchDog Sprayer Station (Figure 3.).

2.0 Spectrum Technologies, Inc., WatchDog Sprayer Station

The WatchDog Sprayer Station is a compact, removable weather station that affixes to
the top of the metal truck cab by means of a heavy duty magnet. It is has a UV stabilized
housing, no moving parts and is chemical resistant. When connected to a PDA (Personal
Digital Assistant, handheld computer) it has the capability to measure wind speed and
direction, air temperature, humidity, dew point, wind chill, barometric pressure, vehicle
speed and direction, wind gusts, and vehicle GPS longitude and latitude location. It has
the ability to continuously log weather parameters at a user selectable rate. Data collected
on the PDA can be stored on the PDA itself, on Secure Digital memory cards (SD card)
or Compact Flash memory cards (CF card) that can both be removed from the PDA and
data (files) can be transferred to personal computers (PC’s).

Data is displayed on the PDA screen and is updated every 5 seconds. With GPS position
fixes, records collected will include true wind direction, true wind speed, true wind gust,
satellite count (at least three satellite positions are required to function accurately),
latitude, longitude, course and speed. At the time of this writing, Spectrum Technologies
lists purchase price as $1395 per unit. This cost does not include a PDA that is required to
store data. Spectrum Technologies indicates several Hewlett Packard PDAs will work
with the WatchDog Sprayer Station. These PDA’s can cost up to $600 per unit. Spectrum
Technologies, Inc., representatives (Nathan Cross, Oct. 2007) encouraged inquires to be
directed to them regarding PDA model selection before purchasing any PDA units.

3.0 Spectrum Technologies, Inc., WatchDog Sprayer Station Summary with
Recommendations

ODOT maintenance programs should continue to utilize herbicide applications in its
IRVM program to reduce maintenance costs through suppression of undesirable
vegetation. With increasing regulation and ODOT’s desire to minimize damages claims, technologies that give ODOT roadside managers a tool to support their contention of proper herbicide application, according to herbicide manufactures labeled instructions regarding “application windows”, may be enhanced by utilizing Spectrum Technologies WatchDog Sprayer Station. This technology can provide quantitative proof of environmental conditions at the time of herbicide application. Utilization of this technology would have increased importance in areas where there are large areas of herbicide sensitive crop production and in those areas where ODOT wants to explore “fence-to-fence” herbicide applications. The OSU RVM program would willingly work with select ODOT units to implement installation and evaluation of this technology if ODOT maintenance administrators wish to study the feasibility and integration of this technology into their spray programs. Additional information regarding the Spectrum Technologies, Inc. WatchDog Sprayer Station can be accessed by contacting:

Spectrum Technologies, Inc.
12360 South Industrial Dr., East - Plainfield, Illinois 60585
(800) 248-8873 / (815) 436-4440 Fax: (815) 436-4460
info@specmeters.com
Figure 1. Dwyer Hand-held Wind Speed Meter Images.
Figure 2. Image of ODOT Spray Application Records Form.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Beg. Time:</th>
<th>End Time:</th>
</tr>
</thead>
</table>

County/Location:

Acres Treated / Tankload: | Gallons of Mixture / Tankload: |

Pesticide(s) Applied (Trade Name):

Total Amount of Pesticide(s) / Tankload:

Pesticide(s) Rate / Acre (Volume or Weight):

Manufacturer(s):

Application Equipment:

<table>
<thead>
<tr>
<th>(Task Size)</th>
<th>(Boomless, Boom-type, Handgun, etc.)</th>
<th>(Nozzle Type)</th>
</tr>
</thead>
</table>

Calibrated Spray Pattern Width (Feet): | Rate of Carrier (GPA):

Drift Control Used and Amount / Tankload:

Weather: | Air Temperature: |

Wind Velocity: | Wind Direction: |

Target Specie(s):

EPA Reg. No.(s):

Restricted Entry Interval (REI):

Applicator (Printed name and Signature) | Date

Supervisor (Printed name and Signature) | Date

ODOT Address:

Notes:
Figure 3. Spectrum Technologies, Inc. *WatchDog Sprayer Station.*

**COMPONENTS**

Your WatchDog Sprayer Station package should contain the following components:

- Sensor Unit
- Mounting Post
- Cable Assembly
- Vehicle Power Adapter
- Hook & Loop Fastener Strips (2)
- SpecWare Mobile CD
- User Guide