

# DELIVERY OF CALIBRATION WORKSHOPS COVERING HERBICIDE APPLICATION EQUIPMENT

**ANNUAL REPORT FOR FY 2010**  
ODOT SPR ITEM NUMBER 2156

**Submitted to:**

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# Metric Conversion Page

## SI (METRIC) CONVERSION FACTORS

<i>Approximate Conversions to SI Units</i>					<i>Approximate Conversions from SI Units</i>				
Symbol	When you know	Multiply by	To Find	Symbol	Symbol	When you know	Multiply by	To Find	Symbol
LENGTH					LENGTH				
in	inches	25.40	millimeters	mm	mm	millimeters	0.0394	inches	in
ft	feet	0.3048	meters	m	m	meters	3.281	feet	ft
yd	yards	0.9144	meters	m	m	meters	1.094	yards	yds
mi	miles	1.609	kilometers	km	km	kilometers	0.6214	miles	mi
AREA					AREA				
in <sup>2</sup>	square inches	645.2	square millimeters	mm <sup>2</sup>	mm <sup>2</sup>	square millimeters	0.00155	square inches	in <sup>2</sup>
ft <sup>2</sup>	square feet	0.0929	square meters	m <sup>2</sup>	m <sup>2</sup>	square meters	10.764	square feet	ft <sup>2</sup>
yd <sup>2</sup>	square yards	0.8361	square meters	m <sup>2</sup>	m <sup>2</sup>	square meters	1.196	square yards	yd <sup>2</sup>
ac	acres	0.4047	hectares	ha	ha	hectares	2.471	acres	ac
mi <sup>2</sup>	square miles	2.590	square kilometers	km <sup>2</sup>	km <sup>2</sup>	square kilometers	0.3861	square miles	mi <sup>2</sup>
VOLUME					VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL	mL	milliliters	0.0338	fluid ounces	fl oz
gal	gallon	3.785	liters	L	L	liters	0.2642	gallon	gal
ft <sup>3</sup>	cubic feet	0.0283	cubic meters	m <sup>3</sup>	m <sup>3</sup>	cubic meters	35.315	cubic feet	ft <sup>3</sup>
yd <sup>3</sup>	cubic yards	0.7645	cubic meters	m <sup>3</sup>	m <sup>3</sup>	cubic meters	1.308	cubic yards	yd <sup>3</sup>
MASS					MASS				
oz	ounces	28.35	grams	g	g	grams	0.0353	ounces	oz
lb	pounds	0.4536	kilograms	kg	kg	kilograms	2.205	pounds	lb
T	short tons (2000 lb)	0.907	megagrams	Mg	Mg	megagrams	1.1023	short tons (2000 lb)	T
TEMPERATURE (exact)					TEMPERATURE (exact)				
°F	degrees Fahrenheit	(°F-32)/1.8	degrees Celsius	°C	°C	degrees Fahrenheit	9/5(°C)+32	degrees Celsius	°F
FORCE and PRESSURE or STRESS					FORCE and PRESSURE or STRESS				
lbf	poundforce	4.448	Newtons	N	N	Newtons	0.2248	poundforce	lbf
lbf/in <sup>2</sup>	poundforce per square inch	6.895	kilopascals	kPa	kPa	kilopascals	0.1450	poundforce per square inch	lbf/in <sup>2</sup>

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## **1.0 INTRODUCTION**

Proper herbicide sprayer set-up and calibration are critical components in the ODOT herbicide program. Sprayer set-up and calibration training is covered in annual continuing education herbicide workshops offered by Oklahoma State University to ODOT employees. These continuing education (CEU) workshops are offered as a part of Joint Project 2156. However, equipment calibration is not discussed in CEU workshops in the depth of detail that can be undertaken with on-site training with individual ODOT herbicide spray crews. During 2004 through 2009 we provided 10 hands-on equipment calibration and training workshops per year around the state. However, new ODOT employees are hired each year and newly certified employees are assigned to ODOT spray crews. These individuals did not participate in prior equipment calibration workshops and they need “hands-on” orientation in system calibration and problem diagnosis.

## **2.0 OBJECTIVE**

To conduct three calibration workshops in 2010 for newly Certified Pesticide Applicators assigned to ODOT herbicide spray crews.

## **3.0 BACKGROUND AND SIGNIFICANCE OF TRAINING**

ODOT field staff are responsible for a number of activities from laying asphalt to managing roadsides for weeds. They must be “jacks-of-all-trades” and in so doing may not be a master of each type of activity. This training need has been addressed in over 60 hands-on equipment calibration workshops to approximately 30 spray crews per year over the last 6 years. Most herbicide application crews are now well trained and their equipment is generally in good working order. However, new hires or newly Certified ODOT herbicide applicators have not yet had this hands-on calibration or equipment troubleshooting training. OSU RVM personnel work with weed control issues and use application equipment on a daily basis.

While overviews of weed control programs can be taught in a classroom setting, spray equipment calibration can be more effectively taught to the new individual ODOT applicator during a hands-on demonstration. During past consultation visits to some maintenance facilities, our RVM staff have witnessed some pieces of equipment in need of small but important adjustments to make equipment more effective in the herbicide application process. Problems have been resolved but new hires and newly certified applicators did not have the benefit of this training and trouble shooting experience.

We conducted three (3) one-half day sprayer calibration workshop sessions in 2010. Each workshop taught newly certified applicators the proper methods of sprayer calibration and how to “troubleshoot” the application equipment. These workshops

prepared the ODOT herbicide applicators for more specific training and assignments to be provided by experienced ODOT herbicide applicators that can serve as “mentors” to the new trainees.

## **4.0 IMPLEMENTATION OF TRAINING**

### **4.1 Training Dates, Locations and Attendance**

Three sprayer equipment calibration workshops were held in 2010 for newly certified ODOT herbicide applicators. The workshops were conducted by Mr. Craig Evans, OSU-RVM Training Lead and Mr. Doug Montgomery, OSU-RVM Research Lead. The training dates, training locations and Divisions from which personnel were trained were: April 13 at Division 5 Headquarters (Clinton) for Division 5, 6 and 7; April 21<sup>st</sup> at Division 1 Headquarters (Muskogee) for Divisions 1, 2 and 8; and April 27<sup>th</sup> at Division 3 Headquarters (Ada) for Division 3. A total of 50 ODOT personnel were trained in the three workshops. The number of trainees attending each session were 16 on April 13, 17 on April 21 and 17 on April 27<sup>th</sup>. The specific trainee numbers from each Division were: Div 1 (11), Div 2 (3), Div 3 (17), Div 4 (0), Div 5 (10), Div 6 (4), Div 7 (2), and Div 8 (3).

### **4.2 Educational Content of the Sprayer Calibration Workshops**

The agenda for the training sessions is shown in Table 1. Each trainee received educational support materials at the beginning of each workshop. Support materials included 1. a laminated version of the Oklahoma Cooperative Extension Service publication L-322: *Boomless Roadside Herbicide Sprayer Assessment Guide* (1), 2. a paper copy of the handout *Directions on Using the Calibration/Speed Adjustment Charts*, and 3. a paper copy of the *ODOT Sprayer Calibration & Tank Mix Calculation Worksheet*. Copies of those handouts are available upon request from our program.

Each workshop was an open forum lab and the attendees were encouraged to ask questions and interact with OSU-RVM professional staff. ODOT participants in the workshops were first trained on the sprayer components and functions listed in the publication L-322 that was provided. The components on which the attendees were trained consisted of the sprayer tank and lid, spray tank shut-off valve, in-line screen, drift control injector, water pump, hoses/plumbing, agitation system, pressure gauges, pressure regulators, spray nozzles, control arms, nozzle shut-off valves, in-cab switches, handgun & hoses, and calc-an-acre controllers. Discussions included the need for components and the consequences to applicators, the roadside, the herbicide weed control program and the environment that might result if the components failed.

Table 1. Herbicide applicator sprayer calibration workshop training agenda utilized in 2010.

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<b>Time</b>	<b>Topics<sup>2</sup></b>
09:00 – 09:45 am (45min)	Equipment and Component Training/Explanation Review of system troubleshooting guide.  Support Material: Handout-L-322 Boomless Roadside Herbicide Sprayer Assessment Guide
09:45 – 10:00am (15min)	Break
10:00 – 10:45 am (45min)	Broadcast Sprayer setup. Demonstrate proper calibration variable collection-GPM, GPA & SW  Support Material: Handout- Directions on Using the Calibration/Speed Adjustment Charts
10:45 – 11:45 am (60min)	Broadcast Sprayer Calibration. Demonstrate –ODOT Sprayer Calibration & Use of Tank Mix Calculation Worksheet
11:45 am – 12:45 pm	Lunch
12:45 – 1:15pm (30min)	Pump up sprayers setup & calculation. Back Pack setup & use. Demonstrate –ODOT Sprayer Calibration & Tank Mix Calculation Worksheet
1:15 – 1:45pm (30min)	Handgun Sprayer sprayers setup & calculation. Craig Evans & Doug Montgomery provide group demonstration on setup and use of handgun sprayer using OSU-RVM trailer mounted sprayer.

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<sup>1</sup>Trainings were conducted in Clinton on April 13, Muskogee on April 21 and Ada on April 27, 2010. The Clinton site hosted Div. 5, Div. 6 and Div.7. The Muskogee site hosted Div. 1, Div.2, and Div.8. The Ada site hosted Div. 3 Tuesday, April 27 Div.3.

<sup>2</sup>Participants were assigned to one of two groups. Group 1 was assigned to Truck number one with Trainer Craig Evans. Group 2 was assigned to Truck number two with Trainer Doug Montgomery. Groups one and two ran concurrently until the 1:15 pm session.

Applicators were taught how to diagnose and confirm component proper operation and component failure. Basic preventative maintenance was also discussed regarding each component.

After the introduction to the basic broadcast sprayer system and its components, OSU-RVM staff demonstrated the use of calibration measurement tools to measure pattern widths and graduated collection barrels to properly measure spray system and tip output in gallons per minute (GPM). After variables of carrier rate in gallons per acre (GPA) and pattern spray widths (SW) were collected, the *ODOT Sprayer Calibration & Tank Mix Calculation Worksheet* was utilized in both handout and poster form. The worksheet was used to show how calculations were used to ascertain the necessary truck speeds to make an accurate broadcast applications. At this point participants were then introduced to the *Directions on Using the Calibration/Speed Adjustment Charts*.

The next portion of the program involved the OSU-RVM staff introducing participants to basic hand pump-up sprayers. Demonstration of the various “spray-to-wet” techniques for weeds such as Musk Thistle and brush species such as Willow were conducted. Attendees were trained upon the need to use Viton® seals to avoid the corrosive effect of commonly used broadleaf and brush herbicides. After demonstration and calculations with hand pressurized spray equipment, trailer mounted gasoline engine sprayers with powered guns (Hypro®) were demonstrated. Spray-to-wet techniques for foliar application and spot treatments were examined and discussed using the hand gun equipment.

Although 3 hours 45 minutes of contact time were planned each training session lasted approximately 4 hours or more. At the conclusion of each session, OSU-RVM staff encouraged questions regarding any aspect of the training program.

While OSU-RVM staff worked in a “hands-on” setting with attendees, continued training of these newly certified herbicide applicators will be necessary. This training should be provided ***at the county unit level by seasoned spray crew leaders whom supervisors trust to properly mentor new spray crew members.***

#### **4.3 Documentation of Training to Division and Maintenance Engineers**

A letter containing the names, ODOT employee numbers, and Oklahoma Certified Pesticide Applicator Numbers of the applicators trained in each Division was provided to the employees’ respective Division or Maintenance Engineer. Letters verifying applicator participation were sent to Division and/or Maintenance Engineers on 20 May for Divisions 5, 6 and 7; June 7 for Divisions 1, 2 and 8 and June 18 for Division 3. The names of participants are not provided in this report but that information is



available to qualified ODOT Supervisors or ODOT Human Resource Personnel upon request.

## 5.0 SUMMARY AND CONCLUSIONS

Three ODOT herbicide applicator sprayer calibration workshops were conducted for ODOT in 2010. Fifty newly certified ODOT pesticide applicators received in-depth and thorough training concerning sprayer equipment calibration and available calibration resources.

The final decision regarding the capabilities of ODOT employees assigned to specific spray duties should continue to be made by supervisors that are familiar with each individual's strengths and weaknesses. The OSU-RVM professional staff also encourages supervisors and spray crews to thoroughly review spray system setup, annual spray application goals, specific target weed complexes, herbicides to be utilized and sensitive crop or sensitive area locations ***immediately prior to the beginning of each spray season***. Participants of our joint project training effort are encouraged to attend annual pesticide applicator continuing education (CEU) workshops presented by the OSU-RVM Program. OSU-RVM staff made each attendee aware that we are available to assist them and their respective counties and divisions in their vegetation management effort.

We would like to express our appreciation and gratitude to Division 5 for supplying spray trucks from Tillman County, Kiowa County and the trailer mounted sprayer from Beckham County and for hosting the workshop at their Division headquarters. We would also like to express our appreciation and gratitude to Division 1 for supplying the Washington County spray truck and making available the trailer mounted sprayer from Muskogee County and for hosting the workshop at their Division headquarters. Finally, we would like to express our appreciation and gratitude to Division 3 for supplying the two truck-mounted, VeriTech Industries, Inc., spray rigs and for hosting the workshop at their Division headquarters.

## 6.0 LITERATURE CITED

Evans, C.C., D.P. Montgomery, and D.L. Martin. 2007. Boomless Roadside Herbicide Sprayer Assessment Guide. OSU Publication L-322. Oklahoma Cooperative Extension Service. Stillwater, OK. 2 pages. Available on-line at: <http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-4531/Herbicide%20Guide.pdf>) and ([http://www.okladot.state.ok.us/hqdiv/p-r-div/spr-rip/library/2156-2157/sprayer-assessment\\_guide.pdf](http://www.okladot.state.ok.us/hqdiv/p-r-div/spr-rip/library/2156-2157/sprayer-assessment_guide.pdf)). (Verified 23 December 2010).