

**2008 Report on  
Roadside Vegetation Management  
Equipment & Technology**

**Project 2156: Section 8**

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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 that will enable vegetation managers to provide safe travel corridors for Oklahoma's motoring public. ODOT highway easement managers continue a long term integrated roadside vegetation management (IRVM) program. This program maintains suitable vegetation to stabilize soil, allow for surface drainage and allow suitable site distance for the motorist. The integrated program is based on use of suitable vegetation types and its long-term maintenance through mowing and herbicide use. These practices are used to not only keep vegetation within the height requirements but reduce competition from undesirable weeds that compete with low growing grass vegetation. A wide range of soil types, climatic variation and plant species are present on roadsides. Consequently, ODOT personnel must utilize many different herbicidal tools for specific management goals. Regardless of which herbicidal tool is employed, the means of transferring an herbicide product between its original container and the spray tank has remained basically unchanged for many years. Two concerns have always been present for herbicide product end-users:

1. What to do with the empty container?
2. What can be done to lower handler/mixer exposure risk?

When ODOT selects a liquid herbicide product, the product has typically been packaged in non-refillable high density polyethylene (HDPE) containers of varying size by the manufacturer. Manufacturers supplied these products to distributors, whom then sold the product to their clients (ODOT).

At the 2008 National Roadside Vegetation Management Association (NRVMA) meetings, Nancy Fitz of the U.S. Environmental Protection Agency (EPA) presented information concerning current and future regulation affecting herbicide manufactures. These regulations encourage the use of refillable containers in agricultural or professional specialty herbicide markets. More specific information can be found in the US EPA Pesticide Container and Containment Rule, October 2008 at <http://www.epa.gov/pesticides/regulating/containers.htm>.

Recently a partnership has arisen between forward thinking herbicide manufactures and custom blending/repackaging services to facilitate EPA goals of reducing the number of improperly rinsed HDPE herbicide containers sent to land-fill sites. Additionally, end-users of herbicide products are actively employing new transfer technology (closed-loop systems) that minimize employee exposure. Additionally, the mechanized transfer systems that use various pumping configurations are reported by the manufacturers as saving time, labor costs and reduce heavy lifting related injury claims.

## **2.0 Closed-loop Liquid Herbicide Transfer Technology**

The closed-loop pesticide transfer system had its origins in Australia in 1994. Micro Matic Inc. (Micro Matic U.S.A. Inc., 19791 Bahama Street, Northridge, CA 91324-3397, USA. Phone: +1 818 882-8012, [www.micro-matic.com](http://www.micro-matic.com)) developed a system that isolated the handler from the actual pesticide (Figure 1). The key components are the valve and coupler (Figure 2) This system allows transfer of the pesticide from a bulk container utilizing a drop tube (Figure 3) fitted to the Micro Matic valve positioned in the head of the HDPE bulk container. Hoses and pumps can be attached to the couple depending upon the end-users needs (Figure 4). Using the Micro Matic Inc. coupler designed to fit the valve, system is sealed prior to pumping of the liquid container contents. As long as seal integrity is maintained, the system prevents the handler from being exposed to liquid. Various pumping configurations can be employed. These facilitate the transfer of the herbicide to truck mounted tanks, pickup mounted tanks or smaller containers for filling of smaller tanks. This closed-loop system has been adopted from Micro Matic Inc. by two custom blending/repackaging services, Aquimix, Inc. and Eco-Pak LLC.

## **3.0 Blending and Repackaging Businesses Using Refillable Herbicide Containers**

The blending and repackaging businesses Aquimix, Inc. and Eco-Pak LLC work collaboratively with all major pesticide manufactures (example, Dow AgroSciences) and distributors using the same basic distribution schematic show in Figure 5. Both companies order bulk quantities of herbicides from manufactures and repackage the herbicide in refillable containers that are shipped to the end user. As stocks are depleted by the end user, contact is made with the mixing partner, Aquimix or Eco-Pak LLC and they pick up empty containers. No rinsing of refillable containers by the end user is required. All rinsing is done by the mixing partner at their facilities. Labor is saved by avoiding the rinsing and handling of small containers. Bulk HDPE containers are handled more easily by the companies responsible for placing the herbicide in spray tanks (Figure 6).

Howard Peavey, State Agronomist for the Alabama Department of Transportation (ADOT) (Alabama Department of Transportation, 1409 Coliseum Boulevard., Montgomery, AL 36130-3050, phone 334-242-6282, E-mail [peaveyh@dot.state.al.us](mailto:peaveyh@dot.state.al.us)) has performed a cost analysis on the refillable herbicide container system. Following this analysis, ADOT adopted the refillable herbicide container distribution system. It should be noted here that ADOT uses chemical injection systems on their spray trucks. Direct comparison with ODOT “batch” or whole tank herbicide and carrier spray application systems may not be appropriate. Depending upon the weight of the actual herbicide in non-pump-equipped herbicide containers, the herbicide handler could avoided up to one ton of cumulative herbicide material lifting. This approximation is based upon assumptions of a 2.5 gallon container of Campaign® herbicide and that the handler mixes 12 truck loads of a 1200 gallon spray tank using Campaign herbicide at 4 pints of product per acre to treat county roadsides with the sprayer delivering 30 gallons of carrier per acre.

More accurate inventory management is also a claim of the refillable container distribution system. As empty containers are returned, computerized inventory programs track the individually bar-coded containers and make those records available to the end user for viewing of inventory status regarding their in-house supply of herbicides.

#### **4.0 Summary with Recommendations**

ODOT has always endeavored to comply with EPA and Oklahoma Department of Agriculture, Food & Forestry (ODAFF) rules and regulations regarding pesticide container handling and disposal. ODOT has also been involved in container recycling to varying degrees for multiple years. As the herbicide industry evolves and new container technologies emerge, the development of better, more efficient packaging and distribution may offer an opportunity to upgrade ODOT's methods of herbicide handling. This action will result in increased productivity, increased labor savings and improved risk mitigation concerning employee exposure to pesticides.

The collaboration between herbicide manufacturers and mix partners may offer advantages to certain ODOT divisions that use significant amounts of liquid herbicides for roadside vegetation management. We recommend that managers of those ODOT field Divisions that are using a single liquid herbicide (example-Garlon 3A®, triclopyr) or liquid mixtures consisting of multiple active ingredients (such as Campaign®, glyphosate + 2,4-D) explore the use of closed-loop, refillable bulk container systems. These systems might reduce container handling labor as well as the time during which the Division retains the empty containers. ODOT may wish to conduct a trial to evaluate these systems in divisions that use large quantities of liquid herbicides ingredients.

While OSU RVM personnel do not serve as purchasing agents for ODOT, we are always looking for ways in which we can assist ODOT in improving the herbicide application aspect of ODOT's IRVM program. We are aware of only two companies that participate in the closed-loop, refillable, returnable bulk herbicide distribution system. The contact information for these two vendors are provided below.

##### **Aqumix, Inc.**

David R. Schoonover, President  
218 Simmons Drive  
Cloverdale, VA 24077  
Phone: 540-966-3035  
E-mail: [DRS@Aqumix.com](mailto:DRS@Aqumix.com) Website: [www.Aqumix.com](http://www.Aqumix.com)

##### **Eco-Pak LLC**

Nick Hoffman, Sales/Marketing Mgr.  
9211 E. Jackson  
Selma, IN 47383  
Phone: 745-228-9243  
E-mail: [nhoffman@ecopakllc.com](mailto:nhoffman@ecopakllc.com) Website: [www.ecopakllc.com](http://www.ecopakllc.com)

Figure 1. Micro Matic, Inc. Closed-loop System.

# The Drum Valve System

- Extractor Valve can remain in place after emptying, transforming a single trip drum into a returnable/refillable container.
- Standardizes liquid containers and drums for returnable packaging.

- Flexible dip tubes.
- Tamper evident seal and closure.
- Easy to install into mild steel, stainless steel and plastic containers.

### Rinsing Socket

- Closed system rinsing of coupler, hose, pump and meter.

### Closed System Filling Offers Emission Free Vapor Recovery.

- Eliminates emissions into the environment.
- Decreases worker exposure.
- Reduces processing time and operating cost.

### Closed System Dispensing

- Connection between coupler and extractor valve is made easy through its cam-lock design.
- The coupler is self-venting during dispensing and prevents spillage.

- Coupler probe internal check valve reduces the risk of unauthorized filling and cross contamination.
- Minimal residue remains in the container.
- Flow rate of 24 gpm / 90 L/min.

### 4

- Reduces rinsate disposal into the environment.
- Reduces worker exposure.
- Improves general cleanliness standards.

- Reduces operator exposure and improves worker safety.

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Northridge, CA 91324

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Fax: +1(818) 341-9501  
e-mail: mmis@micro-matic.com  
[www.industrial.micromatic.com](http://www.industrial.micromatic.com)

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LIQUID TRANSFER VALVE SYSTEMS

**Figure 2. Micro Matic Inc. valve (L) and coupler (R).**



**Figure 3. Micro Matic cut away showing drop tube extraction system.**



**Figure 4. Micro Matic valve and couple attached to bulk container.**



**Figure 5. Aquamix® and Eco-Pak LLC distribution schematic with Dow AgroSciences.**

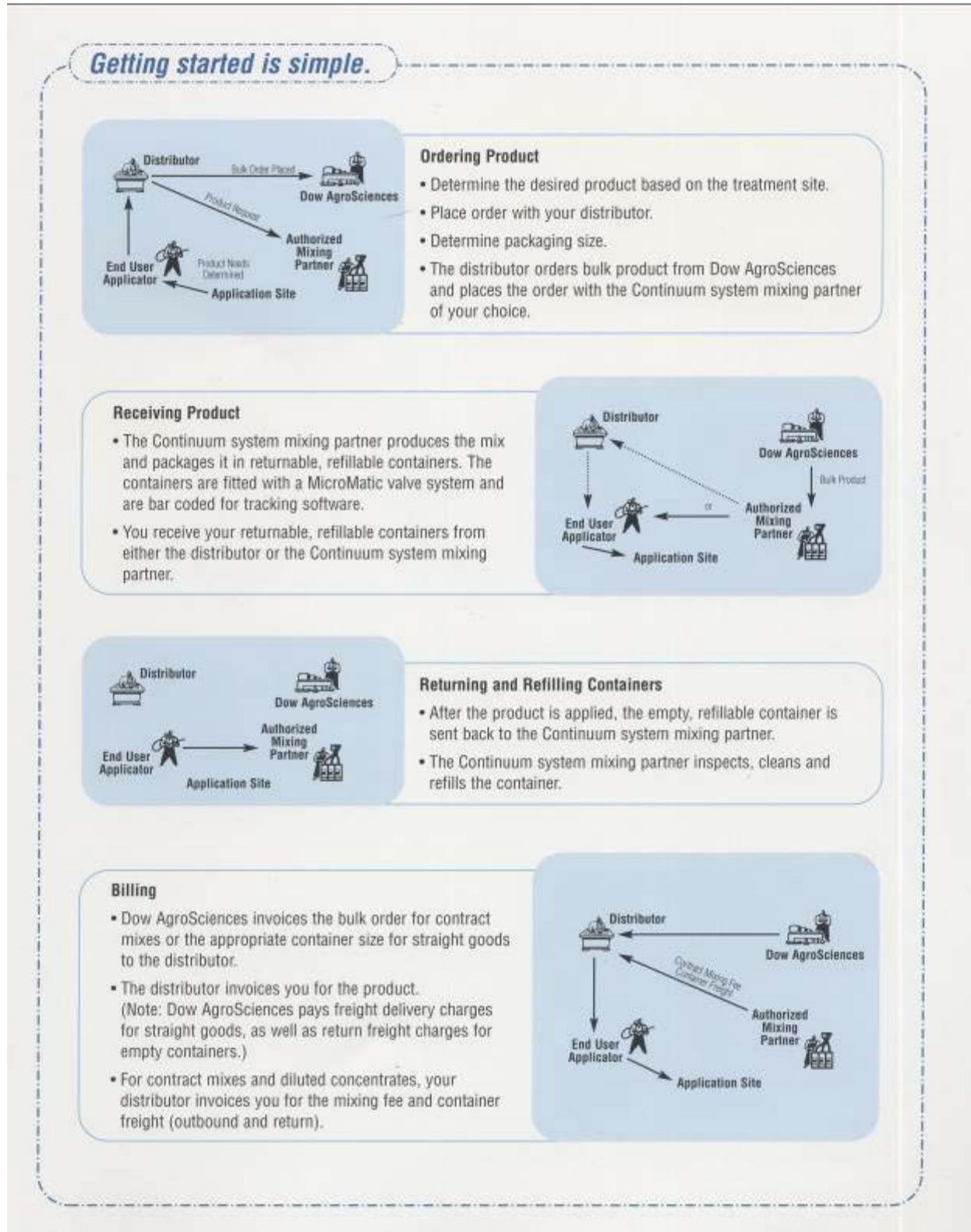


Figure 6. Bulk refillable container handling equipment for end user.

