



Title	ES-301-4.01 Management of Pesticides and Herbicides
Document Owner:	Tom Somers
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1) Activity Description: Management of Pesticides and Herbicides

This activity covers the proper storage, handling, transportation, and disposal of all pesticides, herbicides, rodenticides, insecticides, and larvicides (hereinafter referred to pesticides). For application instruction, read labeling instructions on the container and/or speak to a supervisor.

* This EG is one of several specifically identified procedures for activities/facilities that are required by the Pollution Prevention/Good Housekeeping section of CCD's MS4 permit. Related procedures not specially addressed in this EG include, but not limited to, those identified in the Reference section of this document.

2) Potential Environmental Risks

A. The following environmental concerns are associated with these activities:

- Improper or inappropriate use of pesticides and herbicides
- Contamination of soils
- Contamination of surface water
- Contamination of groundwater
- Destruction of wildlife/protected species
- Destruction of wetlands
- Improper or inappropriate disposal of pesticides and herbicides

B. Potential consequences from performing the activity incorrectly:

- Personal injury, property damage, or long-term damage to the environment
- Possible regulatory noncompliance, Notices of Violation, and related [financial & non-financial] penalties

3) Critical Requirements and Tasks

A. Prohibited Activities

- i) Disposal of any unused pesticides in the storm sewer system or anywhere on DEN property is prohibited.
 - Unused, recalled, or waste pesticides may require special handling as hazardous (universal) waste.
- ii) Disposal of pesticide containers without triple rinsing to remove residues is prohibited.
 - Triple rinse all pesticide containers prior to sending them off for disposal. Rinse water shall be applied to an area for treatment.
- iii) Application of pesticides classified as "restricted use" by an unlicensed applicator is prohibited.
 - These activities must employ an applicator licensed with the Colorado Department of Agriculture.
- iv) Washing spills into the stormwater sewer system is prohibited.
- v) Discharges to surface waters of the State without a permit are prohibited.
 - See CDPS General Permit "Discharges from Applications of Pesticides" for specific eligibility requirements.

B. General Considerations

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- i) Each operator and tenant conducting activities utilizing a pesticide or herbicide is responsible for understanding the applicable regulations and managing their activities accordingly; this Environmental Guideline is meant as guidance only and does not supersede any regulations.
- ii) Follow application instructions exactly as described on the container label.
- iii) Take care not to breathe chemicals. Wear appropriate personal protection equipment (PPE) during application and handling of materials. Prior to usage, read the container labeling for PPE requirements.
- iv) Pesticide MSDSs and product information must be made available at the facility to all employees that utilize the chemicals.
- v) Minimize use of pesticides. Seek less harmful/toxic pesticides to replace ones currently in use.
- vi) Have adequate first aid materials near application area in case of emergency. Read container label for first aid requirements.
- vii) Maintain adequate supplies of spill response equipment and materials in locations where spills are likely to occur.
- viii) If waste materials are handled as universal waste, the material can only be stored on site for one year. For more information see ES-301-6.05 Management of Universal Wastes.
- ix) Maintain inventories of pesticide materials stored on site. When possible, pesticide inventory should be minimized to amounts required for intended use.

C. Employee Training

- i) Contractors engaged in the application of restricted use pesticides must be qualified and licensed as Commercial Pesticide Applicators by the Colorado Department of Agriculture.
- ii) Employees using pesticides shall be trained by their Supervisor on proper use, handling, and disposal.
 - Training will be conducted as necessary to conduct the Activity as described herein and to inform employees of impacts associated with illegal discharges and improper disposal of waste from municipal operations.
 - Records of on-the-job training are not required. Records of formal employee training, if provided, shall be retained.

D. Storage & Material Handling Requirements

- i) Store materials per FIFRA-approved methods.
- ii) Maintain legible labels and markings on all containers and tanks.
- iii) Ensure adequate secondary containment for all bulk storage containers, and that all containers and containment are in good operating condition.

E. Emergency Response

- i) Call DEN Communications Center immediately at 303-342-4200 for all spills.
- ii) If a spill occurs, refer to Environmental Guideline ES-301-5.02 Spill Response.
- iii) Control spills to minimize property damage and eliminate imminent risk to human health and the environment.
- iv) Containerize all collected wastes and evaluate for labeling, storage and disposal.

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Expected Records / Outputs:

- Usage Records
 - For DEN applications, pursuant to XO 127A, the CCoD Department/Agency applying mosquito control larvicides shall record the location and frequency of application as well as the amount applied. This information shall be submitted to the CCoD Animal Control Division on a monthly basis during the application season. Copies are kept in ES files (09.18.03.05.01.05).
 - The department responsible for the deployment of mosquito control larvicides must complete the attached Larvicide Usage Report or similar document when larvicide is applied. Completed reports shall be submitted to DEN Environmental Services (ES). DEN ES will submit the report to the CCoD Animal Control Division (Diane Milholin) on a monthly basis during the application season.
 - Contractors applying pesticides, including larvicides, on DEN are responsible for maintaining usage records.

- Waste management records (profiles, manifests, sample results, etc.).
 - Based on the disposal profile, manifests and related forms may be required. Manifests & profile forms can be obtained from the disposal facility for off-site disposal activities (manifests are required for hazardous, special and universal waste).
 - Operator must maintain waste management records at the facility for a minimum of 3 years.

- MSDSs for pesticides and herbicides
 - Manufacturers of these products will supply MSDS documents on demand. MSDSs for all pesticides/ herbicides/larvicides should be made available to all employees engaged in application activities. MSDSs should be maintained on file at the maintenance center facility.
 - Contractors that apply herbicides and pesticides are responsible for making MSDSs available to employees and for training on proper use.

4) Inspection Requirements:

Chemical storage areas should be reviewed for proper storage and general housekeeping. Inspections of chemical storage areas are recommended weekly for correct materials management, containment, security, cleanliness, access, correct labeling, storage duration, spills, and leaks.

Expected Records / Outputs:

- MS4 related maintenance activities conducted by DEN Field Maintenance shall be recorded in the DEN Maximo system. Recorded information should include costs incurred and total hours for the activity. This information will be incorporated into the CCD MS4 Annual Report.

5) References

A. Phone Numbers

DEN Communications Center (for Spill Reporting)..... (303) 342-4200
Tom Somers (DEN Environmental Services)..... (303) 342-2733
DEN Environmental Services (Main Line)..... (303) 342-2730

B. Guidance Materials (list not limited to the following)

- Product label
- City and County of Denver Noxious and Invasive Weeds Management Guidelines
- MSDSs
- Seven Ways to a Successful Dipping Career (article attached)

C. Related Environmental Guidelines (list not limited to the following)

- ES-301-5.02 Spill Response
- ES-301-6.01 General Waste Management
- ES- 301-6.05 Management of Universal Waste
- ES-301-1.07 Storage of Vehicles and Equipment Containing Chemicals
- ES-301-4.01 Management of Pesticides and Herbicides
- ES-301-5.02 Spill Response
- ES-301-6.01 General Waste Management
- ES-301-6.05 Management of Universal Waste

D. Applicable Regulations (list not limited to the following)

- 40 CFR 117.3 Determination of Reportable Quantities for a Hazardous Substance
- 40 CFR 122-124 NPDES Regulations for Storm Water Discharges
- 40 CFR 260-262-273 Federal RCRA Regulations
- 6 CCR 1007-3, Part 261 State RCRA Regulations
- CCD MS4 Permit
- CCD Ordinances
- Denver Wastewater Management Division Rules and Regulations
- Metro Wastewater Reclamation District Rules and Regulations
- DEN Rules and Regulations
- CCD Mayor's Executive Orders

E. Other Documents

- DEN Managers Bulletins

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Vector Control - Dept Environmental Health – Environmental Quality Division

200 W 14th Ave
Denver, CO 80204
720-865-5518

PESTICIDE APPLICATION REPORT

Location of Application (Address, cross streets, park, etc.) _____
Date of Application _____ Time of Application _____
Site or Type of Structure Treated (be specific) Standing water
Target _____
Pest Mosquitoes
Pesticide Applied: _____ % Active Ingredient _____
EPA Registration Number _____ Dilution Rate (% , ratio, RTU[ready to use]) RTU
Carrier if other than water _____ Total Amount Applied _____
FOR LARVICIDE APPLICATION ONLY - AREA SIZE TREATED:
LENGTH _____ X WIDTH _____ = _____ SQUARE FEET
LENGTH _____ X WIDTH _____ = _____ SQUARE FEET
LENGTH _____ X WIDTH _____ = _____ SQUARE FEET
TOTAL SQUARE FEET PER SITE TREATED = _____ SQUARE FEET
Method of Application: Broadcast
Applicator _____

PESTICIDE APPLICATION REPORT

Location of Application (Address, cross streets, park, etc.) _____
Date of Application _____ Time of Application _____
Site or Type of Structure Treated (be specific) Standing water
Target Pest Mosquito
Pesticide Applied: _____ % Active Ingredient _____
EPA Registration Number _____ Dilution Rate (% , ratio, RTU[ready to use]) RTU
Carrier if other than water _____ Total Amount Applied _____
FOR LARVICIDE APPLICATION ONLY - AREA SIZE TREATED:
LENGTH _____ X WIDTH _____ = _____ SQUARE FEET
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LENGTH _____ X WIDTH _____ = _____ SQUARE FEET
TOTAL SQUARE FEET PER SITE TREATED = _____ SQUARE FEET
Method of Application: Broadcast
Applicator _____

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Site Number:		Site Name:		Site Location:		
DATE	TIME	ACTIVITY	CHEMICAL USED	AMOUNT USED	AREA TREATED (Sq. Ft.)	CONDITIONS

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DEFINITIONS FOR MOSQUITO BREEDING SITES REPORT

DRY: No water, mosquitoes cannot breed here.

NONE: There is water, but there are no mosquito larvae found.

VERY LT: One to five larvae found in several dips.

LT: One to 10 larvae found in most dips.

MED: 11 to 20 larvae found in most dips.

HEAVY: 21 to 30 larvae found in most dips.

VERY HEAVY: More than 30 larvae found in most dips. Your dipper is black with mosquito larvae.

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O'Malley, C. 1995. Seven ways to a successful dipping career. Wing Beats, vol. 6(4): 23-24.

Seven Ways to a Successful Dipping Career

Claudia O'Malley

Introduction: As recently as 1922, members of the New Jersey mosquito control community were debating the relative merits of "night collections" as opposed to larval collection and identification. Some of the past practices of mosquito control included treating any standing water encountered, regardless of whether or not mosquito larvae were present. Guidelines for starting a mosquito control program included the advice that directors should not spend an excessive amount of time on surveys. Even now, a few still feel that larval surveys are only necessary in the early part of the breeding season; once it is known what species are present at a site, it can be taken for granted that the species composition at that site will remain the same throughout the rest of the season. Most experts, however, feel that larval surveillance is not only an important aspect of an effective mosquito surveillance and control program, but it is an essential component.

Benefits of Larval Surveillance

Larval surveys have many important functions. They are used to determine the locations and seasons that mosquitoes use specific aquatic habitats and, when specimens are identified and counted, the information can be used to determine species composition and population densities. The information can be used to determine optimal times for application of larval control measures, including chemicals, biologicals, draining or impounding. It can also be used to help forecast the need for adult mosquito control and to help assess the effectiveness of both chemical and biological control measures.

Routine larval surveillance data can be useful in interpreting adult mosquito surveillance data. For example, if larval surveys indicate 95- 100% control by larvicides and yet the number of adults does not decline, one can suspect, in the absence of reinfestation, that an important larval concentration was missed. A system for the detection of insecticide resistance is also provided through a larval surveillance program.

Sampling Larval Mosquitoes

Because mosquito larvae are found in a wide variety of habitats, a number of different sampling techniques to determine their presence and density have been developed. Many, if not all, of the published methods are described in Mike Service's book, *Mosquito Ecology Field Sampling Methods* (Elsevier Applied Science, 1993).. Some methods are complex mechanical devices, but the most commonly used larval collection method is the "standard dipper," that plastic or metal,

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white or aluminum, solid or screen-bottomed pint to quart-sized scoop-on-a-handle, that, along with the "sweep net," defines the Ultimate Inspector. Let's take a closer look at dipping.

Dipping for mosquito larvae may, at first, seem like a very simple thing to do. After all, who hasn't dipped water from a bucket or stream to quench a thirst or cool the top of one's head? Well, think again. Dipping for mosquito larvae is not dipping to take a drink. The technique starts long before the dipper is put into the water. It begins hours or days before the actual dipping and at least 10 feet away from the water's edge.

The species of mosquitoes one is looking for and the type of habitat being sampled will, in part, determine the sampling method used. Thus, it is important that field personnel know the preferred breeding habitats and seasonal occurrence of species known or suspected to be present within an area.

When searching for mosquito larvae, proceed slowly and carefully. Approach the area with caution, not to avoid snakes, although that's a good idea too, but to avoid disturbing larvae at the water's surface. Vibrations from heavy footsteps, casting a shadow or moving vegetation that contacts the water may be enough to cause larvae to dive to the bottom. Try to approach the water while facing the sun and with quiet, slow, soft steps, gently move vegetation only as necessary.

Mosquito larvae of most genera, particularly the common *Culex*, *Aedes* and *Anopheles*, are usually found at the water's surface and frequently next to vegetation or surface debris. In larger pools and ponds, they are usually near the margins, not in open, deep water. Dipping should be concentrated around floating debris and aquatic and emergent vegetation. If there is a strong wind, dipping should be done on the windward side of the habitat where larvae and pupae will be most heavily concentrated. Look for larvae and pupae before beginning to dip, if possible. If it is raining on the water's surface, get back in the truck, go have a cup of coffee and wait until the rain stops.

Each water body may contain a number of different microhabitats which could contain different mosquito species. Microhabitats are such places as under tree roots, within clumps of emergent vegetation, under floating or overhanging vegetation and in open water. Learn to recognize different microhabitats within an area and sample as many as possible in order to obtain an accurate picture of the area's species composition.

A Choice Of Seven

Now that you've found your way safely to the edge of a marsh, pond, ditch, swamp or woodland pool, what do you do with your dipper. Just plunge it in? That's fine if you need water, but not necessarily if you want to catch mosquitoes. Believe it or not, there are seven basic ways to dip for mosquito larvae. Which one or ones you use depend, as we mentioned earlier, on the genus or genera of mosquitoes you suspect may be present and on the habitat, microhabitat and weather conditions.

The first and usually the best method to start with is the SHALLOW SKIM. The shallow skim consists of submerging the leading edge of the dipper, tipped about 45 degrees, about an inch below the surface of the water and quickly, but gently, moving the dipper along a straight line in open water or in water with small floating debris. End the stroke just before the dipper is filled to prevent overflowing. The shallow skim is particularly effective for *Anopheles* larvae that tend to remain at the surface longer than *Aedes* and *Culex*. *Anopheles* are usually associated with floating vegetation and debris.

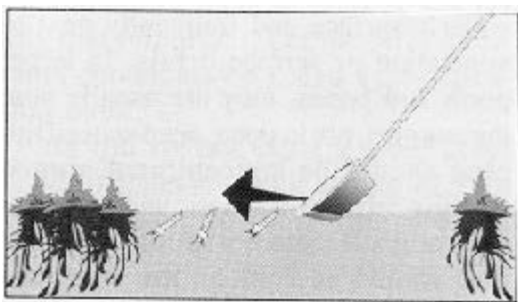


Fig 1

The second method to try in open water, with or without floating objects, is the COMPLETE SUBMERSION. Many mosquito larvae, particularly those of the genera *Aedes* and *Psorophora*, are very active and usually dive below the surface quickly if disturbed. In this case, a quick plunge of the dipper below the surface of the water is required, bringing the dipper back up through the diving larvae. Bring the dipper up carefully to avoid losing the larvae in the overflow current.

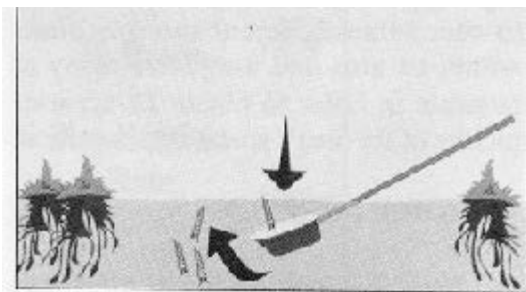


Fig. 2

When you need to sample at the edges of emergent vegetation, try the PARTIAL SUBMERSION technique. To do this, push the dipper, tilted at about 45 degrees, straight down adjacent to the vegetation. This causes the water around the vegetation to flow into the dipper, carrying the larvae with the flow. There is no need to move the dipper horizontally. Pull the dipper up before it is full.

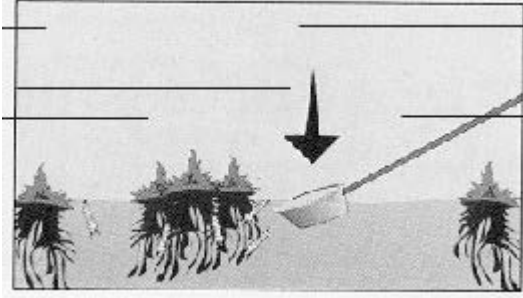


Fig. 3

In very shallow water, try the FLOW-IN method. Larvae can be collected by pushing the dipper into the substrate of the pool and letting the shallow surface water, debris and larvae flow into the dipper. Do not move the dipper horizontally.

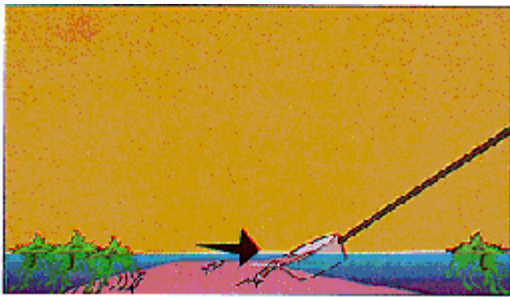


Fig. 4

To sample for larvae that may be under floating or emergent vegetation, use the SCRAPING technique. This method is used in habitats that contain clumps of vegetation such as tussocks of sedges, floating mats of cattails or water lettuce or other plants that are too large to get in the dipper, or clumps of submerged vegetation such as hydrilla or bladderwort. Dip from the water in towards the vegetation and end by using the dipper to scrape up against the base or underside of the vegetation to dislodge larvae. This method is usually more effective if the bottom of the dipper is screened and it is often used to sample for *Coquillettidia* and *Mansonia* mosquitoes.

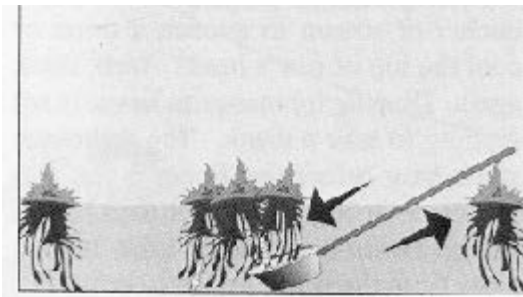


Fig. 5

The SIMPLE SCOOP is the "dipping to get water" method that was discouraged earlier. It consists of simply scooping a dipperful of water. This is probably the most commonly used method, particularly by new inspectors, and it is often the method referred to in much of the literature as "the standard dipping procedure." While it can be successfully used to collect *Culex* larvae, it is still not the method of choice.

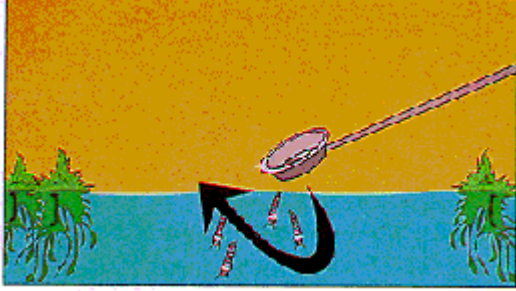


Fig. 6

The dipper can also be used as BACKGROUND. This is especially useful in woodland pools and other shallow water or when larvae are disturbed and dive to the bottom. Submerge the dipper completely to the bottom litter and slowly move it around. The darker mosquito larvae and pupae will stand out against the background of a white or aluminum dipper. Once larvae appear in the dipper, just lift it upward.

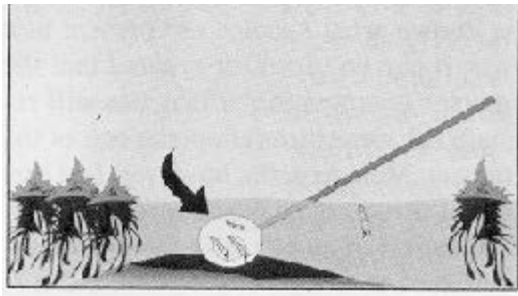


Fig. 7

One or more of these methods, properly used, can determine the mosquito species composition of most aquatic habitats, excluding those whose openings are smaller than the dipper, such as tires, rock pools, treeholes and tree root systems like those found in cedar and red maple swamps. In those cases, a smaller container, such as a vial, measuring spoon or tea strainer can be used in the same seven ways as the dipper described above. Then there is the tubular dipper, the chef's poultry baster, for those really hard to get to places like plant axils, treeholes and tree root holes.

Now that we know how to efficiently collect mosquito larvae, what do we do with the specimens and the data. That's the subject of a future article. Until then, happy dipping.

Claudia O'Malley is with the Burlington County Mosquito Extermination Commission in New Gretna, N.J.