

MOSQUITO CONTROL SPRAY POLICY

Delaware Mosquito Control Section

January, 2019

This Spray Policy presents the Mosquito Control Section's standard operating procedures for several select aspects of our control program, to help bring to life our statutory mandate under Delaware Code Title 16, Chapter 19 (1901-1905) to provide mosquito control services for the public good. What follows below are not formal regulations, but rather the Section's working protocols and procedures as we go about our necessary business, which are shared here with the public in part for better understanding and appreciation of what we have to do.

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I. CONTROL METHOD PRACTICES AND PRIORITIES

The Delaware Mosquito Control Section (Division of Fish and Wildlife, Department of Natural Resources and Environmental Control) utilizes an Integrated Pest Management (IPM) program to control mosquitoes in Delaware.

The Department's (DNREC's) first preference for control is to use environmentally-sound source reduction techniques such as Open Marsh Water Management (OMWM) for saltmarsh mosquito control, managing or manipulating water levels in high-level coastal impoundments so as to disrupt the mosquito's life cycle, or stocking of larvivoracious fishes in stormwater basins, backyard ornamental ponds, beaver ponds, etc. Such biological controls are effective in

controlling an estimated 95 percent of mosquitoes breeding in areas treated with source reduction. The Department has a long-term program for implementing such approaches and is carrying out this program as time and resources permit.

Another important source reduction practice is for property owners to practice good water sanitation on their properties, by either dumping or draining any unneeded standing water that could exist for 4 or more consecutive days, or better yet prevent such standing water from forming or accumulating, with a focus here on suppressing populations of peri-domestic mosquito species that deposit their eggs in man-made or natural container habitats. Examples of man-made containers that can be problematic habitats include uncovered or discarded cans, pots, pails or buckets; uncovered trash or garbage cans and their upturned lids on the ground; unprotected cisterns; discarded or used tires; clogged rain gutters; corrugated downspout extenders; upright wheel barrows; stagnant or unchanged bird baths; abandoned belowground or aboveground swimming pools and untended kiddie wading pools; children's toys; flower pot liners; boats collecting water; ATVs; depressions in tarps covering boats or swimming pools; etc. Unfortunately, source reduction techniques are not suitable for many mosquito producing habitats, and in some cases landowners will not permit the Department to undertake the activities needed for source reduction purposes, or in many cases property owners won't undertake needed water sanitation measures themselves. In such circumstances, other control measures must then be employed typically involving insecticides.

The second preference to achieve satisfactory mosquito control beyond utilization of source reduction methods is selective application of environmentally-compatible, EPA-registered larvicides (products designed to kill mosquitoes while they are still in the concentrated aquatic life stage) applied to the areas where mosquitoes breed. Aerial larviciding by fixed-wing aircraft or helicopters is usually not practiced directly over residential or developed areas, but ground-applied larvicides are frequently used to treat roadside ditches, flooded fields, used tire piles, abandoned swimming pools, woodland pools, median strip swales, lawn puddles, etc. in urban areas or suburban communities. Aerial larviciding by fixed-winged aircraft or helicopter is primarily used to treat freshwater wetlands, flooded woodlands, or coastal salt marshes or tidal wetlands, and is done only as warranted based upon intensive field surveys of larval occurrence, distribution and abundance. To be effective, larvicides must be applied during a very restricted period in the mosquito's aquatic phase of development. However, unfavorable weather or tidal conditions may prevent effective larvicide applications during this period. Larvicides routinely used, with temephos no longer in use, include juvenile growth hormone mimics such as methoprene (Altosid, Metalarv), bacterial insecticides such as Bti (VectoBac, Aquabac, Teknar) or *Bacillus sphaericus* (VectoLex), or spinosad (Natular). We also make some local use of larvicidal oils (CocoBear, BVA 2). These products may be either liquid or granular formulations. All larvicide products are applied according to federal, EPA-approved label specifications, as required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

When unfavorable larviciding conditions occur or larviciding has been unsuccessful, it might be necessary to resort to adulticiding (the term used to describe spraying practices to control adult mosquitoes). This type of spraying always occurs via a liquid formulation which ultimately becomes a fog or vapor. This is not to be confused with larviciding, which is often done via a dry/granular formulation. The adulticides used for the control of pestiferous mosquito

species (e.g. organophosphates such as naled, or synthetic pyrethroids such as sumithrin, or etofenprox) are EPA-registered insecticides, which (like the larvicides) have demonstrated minimal human health or environmental risks, and as such can be sprayed over or within populated areas. Older chlorinated hydrocarbon or organochloride pesticides (DDT) are no longer used by our program, nor are carbamates. The EPA has determined that all the modern mosquito control insecticides applied by the Mosquito Control Section can be used to kill mosquitoes without posing unreasonable risks to human health, wildlife or the environment (but this is not to say that there are no risks at all). Once again, all adulticide products are applied according to federally, EPA-approved label specifications, as required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The Department will keep abreast of any EPA announcements that would suggest that a pesticide of choice (larvicide or adulticide) might present greater risks to human health or the environment than previously thought, and certainly comply with any new EPA requirements affecting the use of individual pesticide products.

When adulticides have to be used, our first choice is to apply them aerially by fixed-wing aircraft or helicopter within or immediately adjacent to mosquito-breeding areas, immediately after the adult mosquitoes have emerged. This tactic is more effective and less expensive than spraying adulticides over widespread areas after the adults have dispersed. However, before newly-emerged adults migrate to upland zones, the time period available to achieve satisfactory control on or near their breeding habitats is even shorter than for larviciding.

In some cases, however, all of the above controls are inadequate to control mosquito populations prior to their movements into developed areas. In such cases, adulticiding in populated areas might have to be done, particularly if nuisance problems become intolerable or there is the chance of spreading mosquito-borne diseases. These adulticides might be applied aerially (by fixed-wing aircraft or helicopter) or by ground using truck-mounted sprayers.

This spray policy primarily addresses the issues of insecticide applications in populated areas, with an emphasis on adulticide use whether by aerial or ground applications. The best available scientific information from the EPA and product manufacturers, plus independent research by the University of Delaware and other sources, leads us to conclude that the products we use, and the manner in which we use them, pose no unreasonable risks to the public (human health), wildlife or the environment. The EPA's product-labeling process reflects the permitted use and safety precautions that pesticide applicators must adhere to. The EPA, in order to designate a product's approved use, has to complete a risk assessment, and has to determine using best available science that the final end use possesses extremely low human health or environmental risks when applied in accordance with federally-approved label instructions, as required by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

It should be noted that in modern times there are many other types of mosquito control methods now under development to help augment source reduction measures or as possible alternatives someday to chemical insecticides. These new approaches run quite a gamut, including use of pathogenic fungi, introduction of predatory copepods, autodissemination techniques for mosquitoes themselves to disseminate lethal agents, use of spatial repellents, use of lethal ovitraps and other types of mosquito population reduction traps, use of attractive sugar bait stations (ATSB) having toxic food components, massive releases of sterilized males and

other sterile insect techniques (SIT), introduction of *Wolbachia* bacteria causing various lethal or disruptive cellular impacts for mosquitoes themselves or in the pathogens they carry, use of genetically-modified mosquitoes encompassing release of insects carrying dominant lethals (RIDL) or exhibiting “gene drive” mortality mechanisms, etc. While many of these novel control approaches show promise in the lab or in various types of theoretical models, for the most part to date they are still impracticable for operational use in the field, due to problems with their production, scalability, control efficacies, the labor involved for adequate deployment, their maintenance needs, other economic considerations, getting regulatory approval, public acceptability, etc. However, the Mosquito Control Section will continue to closely follow many of these possible alternative control methods, and whenever one might become truly promising for operational use then give it due consideration for possible adoption, and depending upon our working resources and other factors perhaps deploy on a trial basis.

II. ADULTICIDING IN POPULATED AREAS

The decision to spray for mosquitoes in populated areas depends upon two forms of evidence indicating that mosquito populations are unacceptably high. The first form is physical evidence obtained in populated areas from professional analyses of adult mosquito light-trap data (where available) for population abundance and species composition, or upon adult mosquito landing rate counts. Light-trap counts in populated areas exceeding 25 adult females per night of pestiferous species, or landing rate counts averaging three (3) or more adults per minute in populated areas, indicate a nuisance condition substantially lowering the quality-of-life, as well as an enhanced possibility for mosquito-borne disease transmission. Except when there are additional reasons to believe that some mosquito species may be presenting a significant public health risk, no spraying will be conducted unless physical or complaint evidence suggests that spraying is warranted.

The second form of evidence is public complaints in populated areas, resulting in requests for spraying coming from either individuals, civic or homeowners associations, or local city or town officials within incorporated municipalities. To the extent practicable the Section will investigate in the field the need for a spray response based on the physical evidence previously described, collected in manner as can be practicably obtained in the field in consideration of mosquito species-specific diurnal/nocturnal activity patterns, sampling limitations, and staff or equipment logistical constraints. The Mosquito Control Section will decide whether spraying is warranted on the basis of physical evidence alone; or by the merit, as determined by the Section, of a municipal request; or by the number, merit and pattern, as determined by the Section, of citizen complaints directly received by the Section. **[In regard to public requests for adulticide spraying coming from incorporated areas, the Section requires that citizen requests for spraying during an infestation be coordinated and conveyed to the Section by phone through a designated municipal official.]**

III. PROTOCOLS FOR ADULTICIDING INCORPORATED MUNICIPALITIES

1. Mosquito Control Municipality Spray Endorsement

On an annual basis, each incorporated municipality (city or town) desiring aerial adulticiding or aerial larviciding will prepare and sign a waiver on official municipal letterhead permitting spray application of insecticides by low-flying aircraft for treatments to be done by the Delaware Mosquito Control Section or its contractors, in order to comply with Federal Aviation Administration (FAA) regulations.

Before the start of the pest season (by early or mid-March), the municipality will also acknowledge and agree to through a signed endorsement the Mosquito Control Spray Policy's provisions, in order to allow and request the Mosquito Control Section to spray as warranted either all or portions of areas within the municipality's jurisdiction in accordance with this Spray Policy. Return of the signed endorsement requesting spraying will be needed for the Section to spray by fixed-wing aircraft, helicopter, or truck-mounted sprayer or fogger any adulticides or larvicides within a municipality's borders, with exception of aerial spraying of larvicides over coastal tidal wetlands and ground applications of larvicides to tidal or non-tidal wetlands or other aquatic breeding sites by truck-mounted sprayers or hand application methods. [In regard to these last two situations, approval from municipalities is *not* necessary for the Section to aerially treat coastal tidal wetlands with larvicides, nor to make ground applications of larvicides in tidal or non-tidal wetlands or other aquatic breeding sites.] Without receipt of this signed endorsement, the Section will assume that the municipality does not want any aerial adulticiding or non-tidal wetland aerial larviciding, nor any truck-mounted spraying of adulticides, within their jurisdiction during the current pest season (mid-March through mid-November). If a municipality does not sign and return the endorsement before start of the pest season, it must be kept in mind that any change of thought resulting in a municipality to then request spraying later in the season cannot be honored until the endorsement is signed and returned to the Section, which in many cases might slow down or even prohibit the Section's ability to provide timely treatment, even in response to severe nuisance problems or potential disease outbreaks.

2. Adulticide No-Spray Requests and No-Spray Zones

The Mosquito Control Section might entertain and possibly grant requests for creation of No-Spray Zones for situations or circumstances where a resident might have substantial medical complications or adverse impacts from exposure or contact with our adulticide sprays. Please note that the possible creation of No-Spray Zones will not apply for domestic honeybee-keeping, organic gardens or crops, endangered or threatened species or other wildlife species of special concern, etc. These other possible concerns or issues have other approaches or mechanisms to try to deal with such possible conflicts and spray exposures. Possible creation and use of No-Spray Zones is for human health purposes only, and also requires some appropriate medical documentation (from a board-certified M.D. or D.O.), submitted by a person requesting an adulticide spray exclusion that substantiates such a request.

The Mosquito Control Section will not spray those municipality areas delineated by the municipality, and agreed to by the Section, to be zones where: 1) no aerial adulticide can be applied; or 2) areas where no ground adulticide can be applied; or 3) areas where neither method of adulticiding can be done. *Residents/property owners within an incorporated municipality desiring not to be included in the aerial or ground adulticide program must make such requests known by contacting their local municipal government officials.* The decision to request or

authorize a No-spray Zone within a municipality, and the consequences for doing such, are entirely the responsibility of a municipality's officials. It is anticipated that such No-spray Zones will not be sought by municipalities for non-residents or non-property owners (i.e. not applicable to casual visitors or tourists). The municipality, after accounting for factors given in Section 3 below (for sizes of No-spray Zones), will prepare maps of No-spray Zones that were requested by their citizens and approved by the municipality, and submit these maps to the Mosquito Control Section for review and concurrence. Please note that it is important that the locations and sizes of each No-spray zone within a municipality be identified each and every year, as there will be no automatic carryover of No-spray Zone designations from previous years. The Section will review the submitted maps and inform the municipality in writing (by U.S. Mail or e-mail) of its concurrence. If concurrence cannot be given by the Section for the proposed No-Spray Zones because of technical or logistical problems, the Section will then meet with municipal officials to resolve these problems. If a municipality wishes to modify the No-spray Zone designations after the pest season has started (i.e. after mid-March), the municipality may request such modification from the Section, but should understand that the Section will need at least two weeks advance notice in order to comply with the requested modification.

With exception of a declared public health emergency by appropriate State-level agencies, it must be understood that within a municipality the decision to adulticide for mosquito control purposes or not to spray is totally up to municipal officials, who have to weigh several factors in making this decision, to then possibly be followed by requesting the Mosquito Control Section's treatment services. These officials have to consider the impacts of intolerably high mosquito populations on quality-of-life factors and local economies, along with the possibility of mosquito-borne disease transmission, weighed against very negligible risks to human health or the environment when using EPA-registered adulticides in manner prescribed by the EPA, plus perhaps aircraft noise issues occasionally associated with aerial applications. If a resident or visitor to an incorporated city or town has a problem with this municipal decision, their complaint or grievance should be taken up with the municipality, not with the Mosquito Control Section. If a resident's or visitor's complaint or problem involves aircraft noise or other operational issues for how spraying was done, exclusive of concerns or issues dealing with pesticide exposure, the municipality should, in consultation with the Mosquito Control Section, attempt to directly address these issues with the resident or visitor making such complaint. If the complaint or problem concerns pesticide exposure, which in many cases is quite unavoidable in responding to a municipality's request for adulticiding over or within populated areas, the Mosquito Control Section will assist a municipality in technically addressing a complaint or issue raised by a resident or visitor. However, it must be kept in mind that the Section applied the adulticide at the municipality's request, in conjunction with the Section also independently investigating to the extent practicable that the adulticiding was warranted.

3. Sizes of No-Spray Zones

Because of technical constraints often associated with the nature and distances of adulticide spray drift (which is actually both a beneficial and unavoidable aspect of mosquito control adulticiding), a No-spray Zone for aerial adulticiding could involve an area having a radius of about 1500 feet outward from or around the residence in question (amounting to about 162.5 acres in size), and a No-spray Zone for ground spraying could involve an area having a

radius of about 500 feet outward from or around the residence in question (amounting to about 18.1 acres in size). In almost all cases it will probably **not** be necessary for the No-spray Zone to be much larger than these minimums (which are created to avoid treating a residence where no spraying has been requested), but the final determination of the size of the No-spray Zone will be made by the Section on a case-by-case basis. In some or even many cases depending upon wind speed, wind direction, and other factors, it might still be possible at Mosquito Control's sole discretion to adulticide at distances less than what's described above.

It must also be recognized by the local municipalities that certain configurations or densities of No-spray Zones might also prohibit adulticide spraying to an extent greater than the mere summation of individual No-spray Zones. It must also be kept in mind that in many locations the creation of a No-spray Zone for an individual residence will preclude adulticide treatment for many neighbors or nearby residences who desire pest relief -- this situation is a dilemma that the local municipality must resolve.

4. Requests for Adulticide Spraying within Municipalities

A city or town each year signing and returning an annual endorsement form does **not** mean that a municipality then automatically receives **all** of our mosquito control services whenever needed without any further actions on the city's or town's part. Converse to this and as a specific exception (and exclusive of a public health emergency that Mosquito Control might recognize), **each and every time** that a municipality wants Mosquito Control to undertake any **adulticide** spraying (to control adult mosquitoes), done by Mosquito Control either via ground-based or aerial applications within or over areas under a municipality's jurisdiction, **then the municipality's designated Mosquito Control contact person** (as indicated by the city or town on the endorsement form), or some other appropriate city or town official, **must first contact the Mosquito Control Section and request such adulticiding**. Please note that there can be occasions when Mosquito Control might recommend to a city or town that such type of spraying be undertaken (based on technical information that our program collects) and whereby we advise that the municipality then officially requests that we take such spray actions, but in many instances it will be more a matter of the city or town first contacting us on an **event-by-event** basis to request that Mosquito Control performs some adulticide spraying (which could be determined by a city or town as being necessary or desirable for Mosquito Control to undertake via a municipality hearing from its citizens or constituents about intolerable local mosquito infestations, or by other means or devices that a city or town might have at its disposal).

For cities or towns in New Castle County and the northern half of Kent County, with the latter to involve all areas north of Camden-Wyoming on an east-west line that essentially includes all areas from south Dover north, extending on the west side from north of Marydel essentially along Rt. 8 into Dover and then eastward out to Kitts Hummock, the number to call is our **Glasgow office at 302-836-2555**. For cities or towns in all of the remainder of Kent County in its southern portions, including all of Camden-Wyoming, plus Marydel on the west and south of Kitts Hummock on the east, along with all of Sussex County too, the number to call is our **Milford office at 302-422-1512**. Please refer to Mosquito Control's webpage on the DNREC website for more detailed delineations of the geographic jurisdictions for our Glasgow and Milford offices, at <http://www.dnrec.delaware.gov/fw/Services/Pages/MosquitoSection.aspx>.

It should be emphasized that any requests for mosquito control spraying coming from residents or visitors in municipalities should *not* be made directly to the Mosquito Control Section, but rather should first go to the appropriate municipal official, such that the city or town can then decide based upon several types of possible inputs as to whether the city or town will then request our Section's control services. The Mosquito Control Section will not respond to such requests if coming to us directly from a resident or visitor in a municipality (although via various means we might still receive such requests), but rather will tell the caller upon hearing of their problem to now contact their appropriate municipal official. A resident or visitor experiencing mosquito problems in unincorporated areas of the counties can directly call the Mosquito Control Section or utilize the on-line service request portal, done both for our awareness and possible follow-up control actions.

5. Advance Notification of Spraying

When there is a good probability that adulticiding operations are imminent within a municipality, to the extent practicable for sake of public notification the Mosquito Control Section will, for each adulticiding event (whether done by air or truck), do the following:

1) Offer advance spray notifications via Mosquito Control's **Spray Zone Notification System (SZNS)**, which was started in 2015 and has now also replaced our former listserver e-mail method. The SZNS is probably now our most effective and comprehensive method to provide the public with advance spray notifications. This system is used to convey to the general public where and when *aerial* spraying (for adulticides or larvicides) and truck-mounted fogging (for ground-applied adulticides) is planned. To accomplish this, Mosquito Control has partitioned the state into numerical spray zones which are geographic blocks roughly 4.3 miles x 3.4 miles in dimension, or about 14.6 square miles in size (essentially about one-quarter of a USGS 7.5-minute quad map).

The SZNS consists of two key components. First, an integrative, on-line statewide map assists the public in identifying their particular zones of interest. Additionally, this statewide map is updated on a daily basis to display those zones where mosquito control spraying is planned for that day. Second, for good communication purposes, the SZNS integrates the Delaware Notification Service (DNS) application in order to then broadcast via text, e-mail or phone message when spray activity is scheduled for or within a particular zone (the mode or modes of communication are up to the subscriber's choice). If the subscriber prefers to also receive a daily statewide spray announcement summary of all spray events planned for any given day by Mosquito Control, this can be requested too.

The goal of the SZNS is to provide a tool where the public can identify their spray zone(s) of interest, and then be quickly notified when spray activity is planned within that zone(s). Individuals interested in signing up for this service or viewing the map can do so by visiting <http://www.dnrec.delaware.gov/fw/mosquito/Pages/MC-Spray-Info.aspx>. Additionally, if a city or town has provided a municipal contact person(s), possibly achieved via return of the Municipality Spray Endorsement form they're asked to complete and return each year

to Mosquito Control, then that appropriate municipal official so identified will be entered into the SZNS, and will receive our e-mailed daily spray announcements sent in advance for our planned spray events.

2) Place a phone spray announcement on a Mosquito Control Section voice message that citizens can call toll-free at 1-800-338-8181 to find out about the status of spraying.

3) On a statewide basis, contact about 15 local radio stations by e-mail (via the SZNS described above) to provide a daily spray announcement, which the radio stations may or may not choose to broadcast at their discretion.

4) Post a similar spray announcement on the Mosquito Control Section's (Division of Fish and Wildlife's) DNREC webpage, which the public can access via the Internet at <http://www.dnrec.delaware.gov/fw/Lists/Mosquito%20Spraying%20Announcements/calendar.aspx>.

Any additional notification of intent to spray is up to the participating municipalities to perform or offer, but it is probable that giving additional public notice going beyond what the Mosquito Control Section presently performs would not be very feasible or practicable to do.

To the extent feasible and practicable, with exceptions for public health emergencies or when contending with unsettled weather conditions for spraying, such advance notification will be issued by the Mosquito Control Section at least two (2) hours before any adulticide spraying begins, and be done for every adulticiding effort within a municipality's jurisdiction.

The advance notification procedure for spraying described above will now also be followed for every *aerial* larviciding effort within a municipality's jurisdiction (in the past, such notice was routinely provided for spring woodland control aerial larviciding and other aerial treatments of freshwater wetlands, but was not done for aerial larviciding of coastal marshes). While aerial larviciding operations in treating wetland breeding sites usually do not involve spraying directly over people, the unfortunate terrorism events of September 11, 2001 have now greatly increased the public's concern and anxiety about possible bioterrorism incidents, which could occur (at least in theory) via pesticide spray delivery systems, so it is now prudent to ensure that municipal officials are fully aware in advance of any-and-all adulticiding (whether done by air or truck) or aerial larviciding within their jurisdictions. What will not be publicly announced will be truck-based spraying of larvicides (e.g. along roadside ditches) or hand-applied or back-pack larviciding done on foot (e.g. when treating localized breeding sites in small pocket marshes or in residential areas), since these types of activities are: 1) sometimes numerous and scattered; 2) are often not determined to be necessary until actually on-site; and 3) because of their carefully targeted applications to localized surface water (as opposed to the widespread spraying of adulticide aerosols over uplands or marshes by aircraft or truck, or the relatively widespread aerial spraying of larvicides over wetlands), such applications hardly generate any public awareness, concern or comment.

For sake of good communications, and to help other agencies respond to possible public inquiries about mosquito control spraying activities, advance notifications of spraying are also provided by the Mosquito Control Section by e-mail via the SZNS to the Delaware Emergency

Management Agency (DEMA), to each county's 911 Emergency Call Center, to Dover Air Force Base, and to the Delaware Department of Agriculture's (DDA) Pesticide Compliance Section and to the DDA's State Apiarist.

Additionally, by a working agreement adopted in 2003 among the Mosquito Control Section, the DDA's State Apiarist, and the Delaware Beekeeping Association (DBA), for all aerial adulticide spray announcements the Mosquito Control Section now indicates via coded grid-block numbers (for a special map of Delaware) where aerial adulticide spraying activities are intended to occur. By the tri-party working agreement, it is incumbent upon domestic honeybee keepers to assume responsibility for their keeping up-to-date and for their being aware about locations where aerial adulticiding is soon intended, achieved by the beekeepers taking advantage of the various spray announcement devices mentioned above (i.e. Spray Zone Notification System subscription, toll-free phone calls, radio announcements, webpage postings). If a domestic honeybee keeper has a problem with where some spraying will soon occur, the beekeeper should then inform the Mosquito Control Section in timely manner about such concerns, so that appropriate spray measures can be taken by Mosquito Control to avoid or minimize any adverse impacts to beekeeping operations. Since domestic honeybee keepers frequently move their bee colonies around in addressing crop pollination needs, and since the need for mosquito control spraying can be quite geographically variable and occur with relatively short notice, it is important that good two-way communications be maintained between Mosquito Control and domestic honeybee keepers, which adherence to the working agreement's protocols is intended to provide.

The 2003 mosquito control/ beekeeper working agreement has now been significantly updated, and starting in 2015 the protocols or standard operating procedures between the Mosquito Control Section and Delaware's beekeepers, which now address both aerial and ground adulticiding, are now described in 2 new documents, essentially replacing the 2003 agreement. These 2 documents should now be consulted for anything concerning mosquito control adulticiding relative to domestic beekeeping.

“Adult Mosquito Control and Domestic Honeybees – Standard Operating Procedures,” accessible at www.dnrec.delaware.gov/fw/mosquito/Documents/MC-Honeybees-SOP.pdf.

“Adult Mosquito Control and Domestic Honeybees – Standard Operating Procedures, Background and Rationale,” accessible at www.dnrec.delaware.gov/fw/mosquito/Documents/MC-Honeybees-Rationale.pdf.

6. Time of Spraying

To the extent feasible and practicable and in consideration of product label requirements, adulticide spraying will be conducted at times which minimize direct human exposure (preferably early morning or late evening for aerial applications). During the summer peak “tourist season” from the Friday evening immediately before the Memorial Day weekend through the Monday evening of Labor Day weekend, aerial adulticide applications in the “coastal resort strip” from Lewes to Fenwick Island may be made on weekdays in the morning from 5:30 to 8:30 a.m. and in the evenings from 6:00 to 9:00 p.m., excluding the weekend that is

defined here as Friday evenings through Monday mornings (and through Monday evenings on holiday Mondays of 3-day “weekends”). The “coastal resort strip” itself may be viewed as extending landward of the Atlantic Ocean coastline from Lewes to Fenwick Island a distance of up to about 5 miles inland, as well as about 2 miles landward of the primary bayshores composing the Inland Bays. Exceptions to not aerially adulticiding the coastal resort strip between Friday evening and Monday morning can occur at special request (in writing) from a municipality, or in event that inclement weather or other circumstances prevent timely, effective adulticiding at other times, whereby only the Friday evening to Monday morning weekend period is left for timely, effective spray application. Aerial adulticide applications will only be made when weather conditions comply with product-label spraying requirements (e.g. clear visibility and winds no more than 10 mph). Outside the coastal resort strip area, the weekend exclusion for adulticide spraying will not apply, but the daily time slots for spraying will still apply. An exception to the desired early morning and evening times for aerial spraying can occur when unusual weather conditions (e.g. fog, excessive wind, temperature inversions) preclude applications at the desired times, and yet the mosquito situation is so bad that spraying must still be performed that day, in which case adulticide spraying might occur during the day between early morning and late evening if not in violation of any product label conditions. Ground applications of adulticides statewide may generally be done from early evening through the night into early morning on weekdays or weekends, except that municipalities within the coastal resort strip from Lewes to Fenwick Island during the summer peak “tourist season” will generally not receive ground adulticide applications on the weekends (defined as above); municipalities within the coastal resort strip still might be ground-sprayed on weekends at special request (in writing) of a municipality, or if inclement weather or other circumstances prevent timely, effective ground applications at other times. Ground applications will only be done when weather conditions comply with product-label spraying requirements.

7. Possible Precautions for Exposures to Mosquito Control Sprays?

The U.S. Environmental Protection Agency has determined via its scientific pesticide product registration process that infrequent, incidental exposures to mosquito control insecticides during operational spray applications do not pose any unreasonable risks to human health. EPA has gone out of its way to ensure via product label requirements and use conditions that any adverse health effects from such exposures are minute, allowing a product to be safely applied around people when done in accordance with all label requirement and conditions as federal law requires, which typically for many products is permissible to do in pretty widespread or broadcast manner. However, a small percentage of people might be particularly chemo-sensitive to such exposures and possibly experience some temporary ill effects. On EPA’s website (<https://www.epa.gov/pesticides>), the agency has identified some precautions that some people might want to take to help lower their spray exposures (with such precautions more applicable to adulticide use versus larvicide use):

- Stay indoors with the windows closed during spraying and possibly turn off air conditioners, and possibly remain indoors for about 30 minutes after spraying is completed; or temporarily leave the area where spraying is conducted.
- If you are outdoors when spraying takes place and come in contact with the chemical, rinse your skin and eyes with water.

- Wash fruits and vegetables from your garden before storing, cooking, or eating.
- Cover outside items like furniture and grills before the spraying takes place. Bring pets and items like pet food dishes and children's toys indoors. Rinse any uncovered items left outside before using.

Please note that *EPA feels that none of these precautions are necessary to take*, but could be some measures that some people might want to take. If so, then it's even more important that such people pay careful attention to our Advance Spray Notifications described in Section III-5 above, to then be able to take some precautions in timely manner if they so choose. Furthermore, EPA does not feel or require that it's necessary for pesticide applicators to announce or publicize to the public these types of possible precautions, but we choose to do this here as a courtesy for those people who might want to avail themselves of such measures. But if EPA felt any of these precautions were truly needed, they would have never approved the registration of these products for how they're now permissible to use.

8. Adulcides Used

The Mosquito Control Section may aerially apply by twin-engine aircraft or helicopter at application rates up to those indicated below one or more of the following adulcides, with the choice of which product to use per spray event dependent upon the problem species to treat and other technical factors or local considerations:

- 1) Dibrom Concentrate (naled) applied at 0.10 lbs. AI/A, applied in ULV concentrated formulation of 1.0 oz./A, or
- 2) Trumpet EC (naled) applied at 0.10 lbs. AI/A, applied in ULV concentrated formulation of 1.2 oz./A, or
- 3) Anvil 10+10 (sumithrin + PBO) applied at 0.0036 lbs. AI/A, applied in ULV concentrated formulation of 0.62 oz./A, or
- 4) Duet HD (prallethrin + sumithrin + PBO) applied up to 0.00072 lbs. AI/A for prallethrin component, and up to 0.0036 lbs. AI/A for sumithrin component, both applied as a packaged mix in heavy duty formulation for aerial spraying.
- 5) DeltAGard (deltamethrin) applied at 0.00089 – 0.00134 lbs. AI/A applied ULV in undiluted concentrated formulation; or mixed with water and also applied ULV.

The following adulcides may be ground applied at application rates up to those indicated by truck-mounted London Fog ULV (Ultra Low Volume) ground foggers:

- 1) Anvil 10+10 (sumithrin + PBO) applied at 0.0036 lbs. AI/A, mixed with mineral oil, applied at a total volume of 1.24 oz./A (0.62 oz./A Anvil 10+10 plus 0.62 oz. mineral oil/A), or

- 2) Duet (prallethrin + sumithrin + PBO) applied at 0.00024-0.00072 lbs. AI/A for prallethrin component, plus 0.0012-0.0036 lbs. AI/A for sumithrin component, both applied as a packaged mix in ULV concentrated formulation, or
- 3) Zenivex E4 – RTU (etofenprox) applied at 0.00175-0.0070 lbs. AI/A applied in undiluted concentrated formulation, or
- 4) Zenivex E20 (etofenprox) applied at 0.00175-0.0070 lbs. AI/A applied ULV in undiluted concentrated formulation; or mixed with mineral oil and also applied ULV, or
- 5) DeltAGard (deltamethrin) applied at 0.00045 – 0.00134 lbs. AI/A applied ULV in undiluted concentrated formulation; or mixed with water and also applied ULV, or
- 6) Talstar P (bifenthrin) applied at 0.07 – 0.22 lbs. AI/A at a one gallon of solution/1000 sq. ft. rate. Note this product would be used for backyard type barrier spraying use only.

The Mosquito Control Section will make accessible via CD to each incorporated municipality a copy of each adulticide's product label and its accompanying Safety Data Sheet (SDS), provided for their informational purposes as part of annual Spray Policy packets sent to each municipality.

9. Larvicides Used

The Mosquito Control Section may apply at application rates up to those indicated one or more of the following larvicides aerially by twin-engine aircraft or helicopter, or from the ground using truck-mounted sprayers or hand application methods, with the choice of which product to use per spray event dependent upon the problem species to treat and other technical factors or local considerations:

- 1) VectoBac 12AS (Bti) applied at 32 oz./A, or
- 2) VectoBac GS or G (Bti) applied in granular formulation at 10 lbs./A, or
- 3) Aquabac XT (Bti) applied at 32 oz./A, or
- 4) Aquabac 200G (Bti) applied in granular formulation at 10 lbs./A, or
- 5) Aquabac 400G (Bti) applied in granular formulation at 8 lbs./A, or
- 6) Teknar SC (Bti) applied at 32 oz./A, or
- 7) Teknar G (Bti) applied in granular formulation at 10 lbs./A, or
- 8) Altosid Liquid Larvicide (5% methoprene) applied at 0.013 lbs. AI/A, applied at 4 oz./A mixed with water to achieve a final application volume of 32 oz./A, or

- 9) Altosid Liquid Concentrate (20% methoprene) applied at 0.013 lbs. AI/A, applied at 1 oz./A mixed with water to achieve a final application volume of 32 oz./A, or
- 10) Altosid P35 (methoprene) applied in granular formulation at 2.5-20 lbs./A, or
- 11) Altosid SBG II (methoprene) applied in granular formulation at 10-20 lbs./A, or
- 12) Altosid Briquets (methoprene) applied at one briquet/100 sq. ft., or
- 13) Altosid XR Extended Residual Briquets (methoprene) applied at one briquet/200 sq. ft., or
- 14) Altosid XR-G (methoprene) applied in granular formulation up to 20 lbs./A, or
- 15) Metalarv S-PT (methoprene) applied in pellet formulation at 2.5-10 lbs./A, or
- 16) Natular 2EC (spinosad) applied at up to 2.8 oz/A, or
- 17) Natular G (spinosad) applied up to 9 lbs./A, or
- 18) Natular G30 (spinosad) applied in granular formulation up to 20 lbs./A, or
- 19) Natular T30 (spinosad) applied at one tablet/100 sq. ft., or

The Mosquito Control Section will make accessible via CD to each incorporated municipality a copy of each larvicide's product label and its accompanying Safety Data Sheet (SDS), provided for their informational purposes as part of annual Spray Policy packets sent to each municipality.

10. Public Health Emergencies

In the event of an Eastern Equine Encephalitis (EEE), St. Louis Encephalitis (SLE), West Nile Encephalitis (WNE), La Crosse Encephalitis (LACV), dengue fever, chikungunya, Zika or any other existing or possibly newly emerging mosquito-transmitted disease public health emergency, jointly recognized by DNREC and the Delaware Division of Public Health, aerial or ground adulticiding might be carried out over municipalities that have not signed the Spray Policy endorsement agreeing to permit such activities, as well as spraying also possibly occurring in designated No-spray zones, ceasing when the public health emergency is terminated. In event of a public health emergency, general public health considerations to prevent or lessen serious disease problems must take precedent over individual desires to avoid a short-term exposure to an insecticide that is registered by the EPA for application over populated areas, with knowledge that such exposures will of course take place but which are of minimum risk to human health and safety. The Section will try to continue to observe to the extent feasible and practicable its policies on advance notification, timing of spraying, and type of insecticides

used, but public health concerns during emergencies may necessitate deviations from these protocols, such as for application timing, or for treating No-spray Zones, etc.

IV. PROTOCOLS FOR ADULTICIDING UNINCORPORATED AREAS

The spraying of adulticides by aerial or ground application in unincorporated areas does not require a signed Mosquito Control Spray Policy endorsement such as is needed prior to spraying incorporated municipalities. Because of insurmountable practical and logistical problems in communicating with individual citizens or civic associations in unincorporated areas, the Mosquito Control Section must assume that timely and safe adulticiding is allowable and desired whenever pest populations become excessive or mosquito-borne disease potentially threatens. The Section will determine when and where adulticiding is necessary, based on physical evidence and in conjunction with complaints from individual citizens or civic or homeowners associations. Similarly, the Section's ability to use larvicides, whether applied aerially or by ground, will not require any signed endorsements for when spraying is done in unincorporated areas.

Requests for human-health-related purposes for no spraying of ground or aerially-applied adulticides in unincorporated areas can be made by individual residents or property owners by directly contacting the Mosquito Control Section, to request a form for applying for No-spray Zone consideration, which after completion should then be returned to the Mosquito Control Section at the address indicated on the form (note: to request the application form, contact the Mosquito Control Section at 302-739-9917; or write to Delaware Mosquito Control Section, Division of Fish and Wildlife, DNREC, 89 Kings Highway, Dover, DE. 19901; or you can download a copy of the form over the Internet, by accessing at <http://www.dnrec.delaware.gov/fw/mosquito/Pages/MC-No-Spray-Request.aspx>). Please note that as with incorporated areas, the possible creation of No-Spray Zones will not apply for domestic honeybee-keeping, organic gardens or crops, endangered or threatened species or other wildlife species of special concern, etc. These other possible concerns or issues have other approaches or mechanisms to try to deal with such possible conflicts and spray exposures. Possible creation and use of No-Spray Zones is for human health purposes only, and also requires some appropriate medical documentation (from a board-certified M.D. or D.O.), submitted by a person requesting adulticide spray exclusion that substantiates such a request.

Please note that in situations in unincorporated areas where a local civic or homeowners association (HOA) exists that encompasses a residence for which a No-spray Zone designation is sought, the Mosquito Control Section will then strongly encourage and expect the No-spray Zone request form to be submitted by an appropriate official or representative of the local civic or homeowners association, done on behalf of the resident making the No-spray Zone request, with the resident helping to provide the appropriate official or representative for purposes of form completion the human health-related reason(s) or rationale behind the No-spray Zone request and other pertinent personal information. Adhering wherever possible to this protocol will help ensure that the residents in a neighborhood or development represented by a local civic or homeowners association will then be aware of the No-spray Zone request and its possible ramifications; and via the request form's submission by an appropriate official or representative, that the local civic or homeowners association is then in agreement or concurrence with a

resident's request for a No-spray Zone. This should then also assist a local civic or homeowners association to provide notice and explanations to their association's members who might then not receive pest relief services, resulting from a neighbor of theirs requesting and being granted a No-spray Zone designation.

All such requests for No-spray Zones must be made prior to March 1 for each pest season and must be made in writing using the approved form, which will request information such as name, address, and telephone number of the resident or property owner requesting no spraying, a map indicating the location of the property not to be adulticided, and the human health-related reason(s) for requesting the No-spray Zone. The names, addresses and phone numbers of all residents or property owners that adjacently border a property where no spraying is requested must also be submitted by a person requesting a No-spray Zone. This will assist the Mosquito Control Section in evaluating the No-spray Zone request and in providing explanations to at least some of the people who might then not receive pest relief services, resulting from their neighbor possibly being granted a No-spray Zone designation. Individuals must indicate whether they are requesting no aerially-applied adulticides, no ground-applied adulticides, or both. Similar as with No-spray Zones established within incorporated municipalities, and because of the nature and distances of adulticide spray drift (which is actually both a beneficial and unavoidable aspect of mosquito control adulticiding), the size of such zones for aerial adulticiding must involve an area having a radius of about 1500 feet outward from or around the residence in question (amounting to about 162.5 acres in size), and a No-spray zone for ground spraying must involve an area having a radius of about 500 feet outward from or around the residence in question (amounting to about 18.1 acres in size). In some cases depending upon wind speed, wind direction, and other factors, it might still be possible to adulticide at distances less than what's described above. If the entire requested No-spray Zone all fits inside the property of the person requesting such designation, then submitting information about neighboring residents or property owners will not be required.

This request for no spraying must be submitted each and every year using the approved form, as there will be no automatic carryover of No-spray Zone requests from year to year. If an individual citizen or a local civic or homeowners association in an unincorporated area wishes to request a No-spray Zone after the pest season has started (i.e. after mid-March), such requests may be submitted in writing to the Section similar to requests made prior to mid-March. However, due to the logistical problems in changing operational spraying procedures and advising contractors of revisions, the requester should understand that the Section will need at least two weeks advance notice in order to consider and review the request and to initiate procedural changes (if any).

Based upon the written requests for no spraying of adulticides, the Section will determine the need for and boundaries of No-spray Zones and will notify the individual or a local civic or homeowners association of the Section's decision. When possible, the Section strongly prefers that individual requests for no spraying in areas or neighborhoods that have local civic or homeowners associations be coordinated and conveyed in writing to the Section by the association prior to mid-March; however, individual requests can still be presented to the Section.

The application of adulticides in unincorporated areas will be similar to what is done in incorporated municipalities regarding times of spraying, insecticides used, and public health emergencies. However, in regard to providing advance notification of each spraying event, and because of insurmountable logistical problems, telephone calls or other personal contacts by the Section to individual citizens or local civic or homeowners associations will *not* be made. Nonetheless, concerned citizens can still inquire about the Section's intentions to spray by contacting, on a daily basis, the toll-free phone recording at 1-800-338-8181 or the Section's webpage posting of daily spray announcements at <http://www.dnrec.delaware.gov/fw/Lists/Mosquito%20Spraying%20Announcements/calendar.aspx>, or they can subscribe to the Section's Spray Zone Notification System (SZNS) to automatically receive such spray announcements via the Internet at <http://www.dnrec.delaware.gov/fw/mosquito/Pages/MC-Spray-Info.aspx>, and they can also be aware of pending spray operations by listening to any spray announcements that may be broadcast by local radio stations.

V. RESOLVING CONFLICTS IN UNINCORPORATED AREAS BETWEEN PERSONS REQUESTING NO SPRAYING vs. PERSONS WANTING PEST RELIEF VIA ADULTICIDING

Whenever possible, persons living in unincorporated areas who do not desire adulticiding will try to be accommodated by the Mosquito Control Section. However, conflicts sometimes arise when one or more nearby neighbors demand adulticiding for pest relief. Such conflict can arise either during the consideration or designation process for a human health-related No-spray Zone or after a human health-related No-spray Zone has been designated. When such conflict arises, the Section will attempt to resolve the disputes on a case-by-case basis, resulting in either continuation or resumption of adulticiding measures, modification of adulticiding measures, or stopping or continued cessation of adulticiding measures. Wherever local civic or homeowners associations exist that encompass a residence for which a No-spray Zone might be sought, the Mosquito Control Section will then also look to an appropriate association governing board or an association official to help make the determination whether to grant a No-spray Zone designation. Having a local civic or homeowners association actually submit the human health-related No-spray Zone request form on a resident's behalf also then indicates to the Mosquito Control Section that the ramifications of possibly not treating anywhere from about 18.1- 162.5 acres within a neighborhood or development have been examined by the local association, and that the association is in agreement or concurrence to go forward in accommodating a human health-related No-spray Zone. Value judgments of public health, safety, comfort and quality-of-life must be weighed against the health or other concerns of an individual requesting no spraying, with such judgments made either by the Mosquito Control Section, or by a local civic or homeowners association wherever such exist that pertinently apply. Individuals with special medical problems possibly attributed to pesticide exposure can obtain a physician's written opinion acknowledging pesticide sensitivity, coming from a board-certified M.D. or D.O., and such people might be given special consideration by the Section to the extent feasible and practicable, with hopefully similar consideration also extended by a local civic or homeowners association wherever such exist that pertinently apply.

The Section will try to resolve all conflicts in a manner acceptable to all parties, including if requested helping a local civic or homeowners association also resolve such conflicts, but public health concerns possibly affecting many people (e.g. arbovirus encephalitis outbreaks) must take precedence over other considerations. For most individuals having health-related concerns involving adulticide exposures, such people can satisfactorily minimize their concerns by paying attention to the advance spray notification process, followed by their taking common-sense measures to minimize or avoid exposure (e.g. temporarily leave the spraying area, temporarily moving inside, temporarily closing windows and doors, etc.). However, please note that given the safety of the types of EPA-registered adulticides or larvicides that the Section uses, and how these products are then applied with very minimal human health risks, then for a vast majority of people no special precautions need to be taken to avoid exposure to the Section's operational spraying

VI. POLICY APPLICABILITY – TYPES OF SPRAY APPLICATIONS

This policy's requirements to request participation of incorporated cities or towns, and to give advance notice of intention to spray in incorporated cities or towns, is applicable to aerial applications of adulticides, as well as for ground application of adulticides when delivered by truck-mounted sprayers. Participatory consent by cities or towns is also needed for aerial applications of larvicides during the spring woodland control program or for aerial larviciding of other freshwater wetlands; but such participatory consent from municipalities is not needed for aerial larviciding over coastal tidal wetlands, nor for the ground application of larvicides by truck-mounted sprayers or hand or back-pack application methods. However, advance spraying notice of all aerial larviciding within municipalities will be given. This policy's requirements for the Mosquito Control Section to give advance notice to cities or towns of intention to spray is not applicable to ground applications of larvicides when delivered by truck-mounted sprayers or on-foot by back-pack sprayer, hand-held sprayer, or hand toss. [It must be noted that if a municipality desires only on-foot applications of insecticides that are done by hand or back-pack, and does not agree to aerial applications of insecticides nor to adulticide applications by truck-mounted sprayers, in many cases and locations it will then not be possible to provide satisfactory nuisance control or disease prevention.]

The spray policy is also applicable to insecticide applications that are made for mosquito control in unincorporated areas, in regard to many needs, matters or practices that are similar to what occurs in cities or towns; as well as providing some protocols that are specific or unique for adulticiding in unincorporated areas, where municipal government interactions are not possible nor applicable. Finally, requirements to follow this spray policy can be waived by DNREC during a declared public health emergency (see Section III-9).

VII. GENERAL EMERGENCY WAIVERS

The Department, for exceptional circumstances or during emergencies, may modify this policy at any time on a case-by-case basis.

VIII. POLICY ADOPTION

This "Mosquito Control Spray Policy" is adopted as the Mosquito Control Section's (Delaware Department of Natural Resources and Environmental Control) management policy, and supersedes any previous written or unwritten policies.

First formulated and adopted in February, 1990.

Latest review/update – January 29, 2019