Mosquito Control Pesticide Discharge Management Plan

City of Hampton Mosquito Control
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Hampton, VA 23669
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A. Pesticide Discharge Management Team. All persons may be contacted at:

1. Person(s) responsible for managing pests in relation to the pest management area.

   a. Environmental Services Team Manager

      Chris DeHart
      Office: 757-727-2807
      Emergency Contact: 757-506-4226

   b. Biologist

      Mike Bowry
      Office: 757-727-2808
      Emergency Contact: 757-751-5108

2. Person(s) responsible for developing and revising the PDMP.

   a. Environmental Services Team Manager

      Chris DeHart
      Office: 757-727-2807
      Emergency Contact: 757-506-4226

   b. Biologist

      Mike Bowry
      Office: 757-727-2808
      Emergency Contact: 757-751-5108

3. Person(s) responsible for developing, revising, and implementing corrective actions and other effluent limitation requirements as it pertains to Stormwater Management.

   a. Environmental Services Team Manager

      Chris DeHart
      Office: 757-727-2807
      Emergency Contact: 757-506-4226

   b. Biologist

      Mike Bowry
      Office: 757-727-2808
      Emergency Contact: 757-751-5108

4. Person(s) responsible for pesticide applications (mix, load, apply).

a. Environmental Services Team Manager

Chris DeHart
Office: 757-727-2807
Emergency Contact: 757-506-4226
VDACS Certificate #: 55456-G

b. Biologist

Mike Bowry
Office: 757-727-2808
Emergency Contact: 757-751-5108
VDACS Certificate #: 136256-T/G

c. Pest Control Technicians

Joshua Snyder
VDACS Certificate #: 124454 -G

Edward Bishop
VDACS Certificate #: 41486-G

Michael Bowry
VDACS Certificate #: 136256-T/G

John Miller
VDACS Certificate #: 95563-G/T

Caitlin Sciulli
VDACS Certificate #: 148337-T

Amber Rymer
VDACS Certificate #: 152411-T

Pest Management Area Description

5. *Pest Problem Area Description*: The City of Hampton is located in the Tidewater Region along the east coast of Virginia. Hampton is located on the southeastern tip of the Lower Peninsula in the Hampton Roads area, and shares borders with the City of Newport News, York County and the City of Poquoson. Hampton consists of 54.8 square miles of land and 84.4 square miles of water. Pest problem areas can best be separated into 4 broad types within our service area that can be further divided into more specific groups based on micro-habitats.

    a. *Artificial Containers* – Although calls are taken year-round, artificial containers comprise of over 75% of adult mosquito complaints after July 1. Hampton's first line of defense is through education to the public and source reduction through routine area inspections and neighborhood surveys. Most container species are managed by the "tip and toss" method, but pesticides may be used when source reduction is not an option.

    b. *Freshwater Storm Systems* – The city of Hampton storm system consists of various inlets, ditches, swales, and culverts. These systems are routinely cleaned to ensure flow of storm water. Unfortunately, these systems also hold water for any given time before noticed or cleaned, creating a habitat for many freshwater species including the primary mosquito responsible for carrying West Nile Virus. There are currently 10,000+ catch drop inlets and over 194 miles of open ditch line in the city of Hampton. Through working closely with the Stormwater Operations division to clean and clear drainage conveyances as well as the use of cultural and chemical controls to help reduce or eliminate mosquito breeding.

    c. *Salt Marshes* – The northeast corner of Hampton is primarily salt marsh encompassing almost 1,800 acres that are perfect habitat for a number of aggressive nuisance mosquitoes. This area generally produces half of all mosquitoes caught in surveillance equipment throughout each season.

    d. *Temporary Woodland Pools* – The City of Hampton averages about 45 inches of rain per year which produces suitable habitats for woodland floodwater mosquito species. An example of these areas is a woodland lot located behind Thomas Nelson Community College spanning 600+ acres. During the spring, Hampton's pest control technicians will pre-treat the tree lines to reduce the amount of mosquitoes coming from in the wooded area. During the season, woodland pools and ground depressions temporarily holding water are monitored and treated in accordance to environmental conditions i.e. precipitation quantities and frequencies, seasons, deciduous tree stages etc.

6. Pest Problem Description

a. There are approximately 35 different species of mosquito that are found with the City of Hampton. Certain species, such as the *Culex pipiens* and *Aedes albopictus* require particular control methods.

b. Below is a few mosquito species that are common problems in the area, along with a short description.

i. *Aedes albopictus*, (Asian Tiger mosquito), is an introduced species of mosquito that was first found in our service area since 1993. This species is a container breeding mosquito, and is commonly associated with the more urbanized areas in our city. However, it can also be an abundant species in the more rural regions of the city, especially in the vicinity of trash piles or tire dumps; species is considered peridomestic. It is a fierce daytime biter and a major nuisance mosquito within our service area.

ii. *Anopheles crucians/bradleyi, (Anopheline*-permanent water mosquito*)* a complex of species that thrive in the region. *Anopheles bradleyi* thrives in the salt marsh or brackish areas while the *Anopheles crucians* breeds in freshwater permanent or semi-permanent acidic pools, preferably with vegetation. Both species are competent vectors for both EEE and WNV and can be a persistent biter when entering their habitats.

iii. *Anopheles quadrimaculatus,* (Malaria mosquito or “Quad’s)) is historically the most important species on the east coast for centuries before declaration of eradication from the United States (US) in the 1950’s. Despite this claim there are still occasional autochthonous (local) transmission cases in the US vectored by the Anopheles quadrimaculatus. At this time Quad’s are just considered nuisance mosquitoes biting mammals, including humans.

iv. *Aedes vexans*, (Floodwater mosquito) is a common woodland mosquito that has the potential to fly up to 5 miles. It is generally encountered year-round, but is entirely rainfall dependent. This species has been implicated as a vector of eastern equine encephalitis (EEE), West Nile virus (WNV), and dog heartworm.

v. *Coquillettidia perturbans*, (Cattail mosquito) is a fairly large mosquito that is often associated with aquatic habitats containing cattails, *Typha* spp. and because they breathe through submersed plants are difficult to track. It is generally considered a bridge vector of EEE to mammals, but has also tested positive for WNV in the United States. It commonly takes blood meals from both bird and mammal species (including humans).

vi. *Culex pipiens*, (Northern house mosquito), is our region's primary WNV vector. It prefers somewhat stagnant or polluted water conditions as larval habitat, and can be a common species in storm drain systems, especially in drainage lines equipped with sumps in the catch basins that tend to hold water on a permanent basis.

vii. *Culiseta melanura*, (Black-tailed mosquito) is a swamp mosquito that occurs in cypress – hardwood floodplains and other aquatic habitats characterized by low pH. The larvae often are found within subterranean pockets that are difficult to treat with conventional larvicide agents. This species almost exclusively obtains its blood meals from birds, and therefore is our primary vector in the amplification of EEE in our area. It has also been found to carry WNV.

vii. *Ochlerotatus sollicitans*, the brown salt-marsh mosquito is a fairly large mosquito that can be a serious pest along the immediate coast. It is active during both daytime and nighttime periods, and can fly great distances from its original source. It has been reported to carry EEE in the northeastern US.

viii. *Ochlerotatus taeniorhynchus*, the black salt-marsh mosquito is a serious nuisance mosquito species that is capable producing tremendous numbers of adults after coastal flooding events caused by rains or extreme high tides. Such emergences may curtail outdoor activity of residents, and can wreak havoc on the local economy, especially during outdoor events or for businesses located in or near our coastal region. This species has been found be a competent vector in both WNV and EEE.

ix. *Psorophora columbiae*, the rice field mosquito is often associated with flooded open grassy areas in our area. It is a strong flyer that prefers feeding on mammals, and can be a serious nuisance mosquito during the summer and fall.

x. *Psorophora ferox*, a flood-water mosquito species common in many of our hardwood/cypress areas and other freshwater habitats. It can be a serious pest in many subdivisions that border these areas. It has also been reported to carry EEE and WNV.

7. Action Threshold

a. Action thresholds are set based on historical data within the region. Hampton Roads, including the City of Hampton, is an area endemic to EEE and Dog Heartworm, and also has annual cases of WNV. Thresholds are in place that is concurrent with other localities to reduce the possibility of human or animal infection and reduce the nuisance mosquitoes to a tolera nt level. Threshold levels are discussed by a regional committee called Tidewater Regional Arboviral Surveillance Team (TRAST). While individual cities or counties have various thresholds, all are in place to minimize disease and nuisance mosquitoes. Species specific thresholds are in place due to their ability to carry or transmit disease. Means of surveillance include multiple types of surveillance traps.

b. Current thresholds for directing adulticide applications are as follows:

   i. ≥ 150 *Culex pipiens* from any control zone prior to detection of WNV in the city.

   ii. ≥ 100 *Culex pipiens* from any control zone after detection of WNV in the city.

   iii. ≥ 50 *Culex pipiens* from any trap site in any control zone after detection of WNV in the city.

   iv. ≥ 10 complaint calls from a single control zone not involving *Aedes albopictus* during a 1-week period.

   v. ≥ 25 complaint calls across the single control area during a 1-week period.

   vi. ≥ 50 nuisance mosquito species in a single CDC trap.

   vii. ≥ 50 bridge vector species after August 1 in a single CDC trap.

   viii. Based on a service request, limited area treatments may be conducted prior to special events or community functions.

Threshold levels can vary throughout the mosquito season based on overall trap count numbers, 311 requests, or field data collected by technicians in the field. Regional disease numbers may also influence the decision to act upon any threshold.

c. Current thresholds for larviciding applications are as follows:

i. Treatments of larval mosquito habitat may be conducted in areas that are found to contain an average of at least 1 larva per dip (using a standard 12 oz. dipper). Actual treatments will be based on local demographics, mosquito species present, and other historic and current conditions.

ii. The storm water system may be treated in selected areas of the city dependent on levels of mosquitoes, complaints, or active arbovirus within the city.

iii. A limited number of known breeding sites may be treated prior to the mosquito control season. These sites historically show high numbers of nuisance species coming from wooded areas, which are too dense to effectively treat during the season due to extremely dense vegetation.

8. Water Quality Standards – There are no waterways in the City of Hampton that are impaired with any pesticides used by our agency.

B. Control Measure Description.

1. Below is a description of the control measures to demonstrate how the pest control technicians specifically plan to meet the applicable technology-based limitations.

    a. No action or at least delayed action may be taken by the City of Hampton pest control technicians at times when a major portion of the city has been inundated with water. In rare cases, when a city wide flooding event takes place it is difficult and generally more economical and environmental friendly to allow mosquito larvae to emerge and treat for adults at a later time if necessary. This is because not all larval habitats can be treated in a timely manner to prevent adult emergence, and adult mosquitoes will migrate into our service area from the surrounding regions that have no or reduced mosquito control resources. Conversely, no action may also be taken when sites containing larvae are shallow, and extended weather forecasts indicate dry conditions. Such situations allow larval habitats to dry before mosquitoes can complete their aquatic larval stages.

    b. Prevention – The City of Hampton approaches prevention through education and source reduction. Both methods involve technicians to approach a 311 request or area of concern with the purpose of preventing further occurrences. Education involves many aspects to include but not limited to informing residences to eliminate standing water around their properties or speaking about control at public gatherings such as a neighborhood meetings or city fairs. Also under education is our career day program, talking to elementary through high school children about our program and what can be done around the house to help. Source reduction involves technicians to identify breeding habitats that water can be emptied or the container, natural or artificial can be eliminated altogether.

    c. Mechanical Control – No mechanical form of control has been found to be effective or economically feasible. Hampton's pest control technicians routinely go to training seminars and monthly meetings which serve as a platform for new technology or forms of control.

    d. Ecological Control (Cultural) – The City of Hampton utilizes ecological control through its close relationship with the drainage division of Hampton Public Works department. The drainage division routinely cleans and maintains the waterways within the city which would otherwise clog and become stagnant. Pest control technicians also use hand tools when confronted with a small blockage that is either breeding mosquito larvae or could potentially breed mosquitoes.

e. **Biological Control** - The City of Hampton utilizes bio-pesticides for the control of larval stages of mosquitoes. Formulations containing *Bacillus sphaericus* and/or *Bacillus thuringiensis israelensis* are used to treat fresh and floodwater mosquito species. Residents requesting mosquito fish (*Gambusia)* are given contact information that will assist them.

f. **Chemical Control** – Along with source reduction, the use of pesticides is the most cost-effective solution to reduce a mosquito population. Due to public perception and ecological concerns, pesticides are used as a last resort to control mosquitoes. Pesticides used within the city of Hampton are heavily tested and researched by federal and state agencies to ensure to have the lowest impact on non-target organisms. Pesticides used are very mosquito specific and are used at the lowest effective rate depending on environmental conditions and pest populations.

Operators must consider impact to non-target organisms, impact to water quality, pest resistance, feasibility, and cost effectiveness when evaluating and selecting the most efficient and effective means of pest management to minimize pesticide discharge to waters of the U.S.

2. Control measures are evaluated separately on the basis of mosquito life stage as follows:

a. Adult Control efficacy is determined from pre and post treatment trap counts when a trap site is located within the spray block. In addition, landing rates taken by staff are used to supplement this data when trap sites are not located near a treatment area.

b. Larval control efficacy is more difficult to assess. Due to a smaller budget and limited personnel, any larval application made will be monitored on-site directly after application as well as a routine checkup in the following days. It is not feasible to do a post-treatment checkup after *every* application, but each area is monitored multiple times in a season.

C. Schedules and Procedures.

1. Pertaining to Control Measures Used to Comply with the Effluent Limitations in Part 2.

a. Application Rate and Frequency Procedures.

i. Application Rate Determination

1. Determine species and age of target mosquito(es)
2. Evaluate environmental conditions
3. Consider target area flora and fauna
4. Determine appropriate application rate based on product label recommendations, previous experience and efficacy tests.

ii. Frequency Determination

1. Determine target site treatment history with selected pesticide
2. Evaluate effect of selected pesticide use on frequency and quantity thresholds for active ingredient.
3. Consider alternate treatment options

iii. Resistance Considerations

1. Consider documented resistance of target species to selected pesticide and/or any other compounds that are in the same class or exhibit similar modes of action. Also consider the possibility of cross resistance.
2. Consider the use of alternate control options.

b. Spill Prevention Procedures.

i. Perform daily and weekly inspections of chemical storage buildings.

1. Refer to City of Hampton Public Works Operations Policy Manual:

Section: PW-SAFE-0007 : Hazardous & Non-Hazardous Material Cleanup & Plan; Procedures.

Environmental Services Team Pesticide Spill Procedures Checklist located in all vehicles containing pesticides.

c. Pesticide Application Equipment Procedures.

i. Ground Adulticiding

1. Operations:

a. Application equipment must be calibrated annually to confirm the Volume Median Diameter is according to the label of the pesticide being used.

b. A visual inspection of spray equipment for leaks or wear in the lines, tanks and nozzle is done prior to the start-up of spray equipment.

c. Routine cleaning and maintenance of the spray system must be performed to ensure system is operating properly.

2. Maintenance:

a. Daily Checks - Visually check the adulticiding equipment before every use and make any necessary adjustments and /or repairs. Before making any repairs ensure that required PPE is worn.

i. Check all gasoline hoses, insecticide lines and fittings for cracks, leaks or wear. Replace if needed.

ii. Check all bolts and fasteners and tighten as necessary.

iii. Ensure that pesticide tanks have sufficient chemicals for assigned spray mission.

iv. Check all nozzle parts for wear or physical damage. Replace damaged parts.

v. Inspect blower air filter for cleanliness and serviceability.

vi. Check engine oil. Add oil as needed.

vii. Check fuel level.

viii. Start engine, listen for any unusual noises and watch for excessive smoke or any engine oil leaks.

b. Annual/Biannual Inspection

i. Check the flow rate calibration.

ii. Check all gasoline hoses, insecticide lines and fittings for cracks, leaks or wear. Replace if needed.

iii. Check all nozzle parts for wear or physical damage. Replace damaged parts as required.

iv. Replace blower filter element and wing nut washer.

v. Change blower oil.

vi. Grease blower.

vii. Change Briggs and Stratton engine oil and filter.

viii. Clean insecticide filter.

ix. Check the battery for serviceability. Test the battery with a volt-ohmmeter. (Volt reading must be between 11.5 and 12 VDC.)

x. Replace the in-line gasoline filter.

xi. Clean blower air vent.

c. Repairs and Services - Repairs and services on ULV equipment will be performed by an appointed mechanic only.

ii. Aerial Adulticiding

1. See Dynamic Aviation Contract

iii. Ground Larviciding is conducted by the Hampton Environmental Services Division in a number of situations using various products throughout the season.

1. Hand treatments are conducted within the City of Hampton by licensed personnel using their best professional judgment. These treatments generally take place on a weekly basis dependent on standing water found in a given route as well as after rain or extreme tidal events; although some sites are pretreated where historic data justifies such actions. Equipment used during hand treatment work include small 1 gallon or 1 quart sized hand sprayers and a 10 gallon backpack sprayer fit for both liquid and solid formulations.

2. Catch Basins within an area are routinely checked for the breeding of *Culex pipiens*, our primary vector for WNV. Areas with multiple breeding basins may be treated with a *Mozzie*, a truck-mounted piece of equipment which is designed to treat catch basins with a set amount of pesticide.

d. Pest Surveillance Procedures. i.

Adult Surveillance

1. Service Requests are taken by the 311 call center and forwarded to the office immediately afterward. The City of Hampton Environmental Services Division holds a 48 hour window to contact and/or start the investigation.

2. Gravid Trap collections are paramount to our WNV surveillance. This trap type is particularly effective in catching gravid *Culex pipiens,* which is our primary WNV vector. Nine gravid traps are deployed throughout the city each week during the mosquito season.

3. CDC Light Trap collections are used for both nuisance mosquito census and disease surveillance. Currently, 18 CDC light traps are deployed on a weekly basis.

4. BG Sentinel Traps are an experimental trap that is deployed when a complaint is investigated and container mosquitoes are suspected. Utilizing two attractants to mimic human skin and sweat, the trap is particularly effective in catching *Aedes albopictus.*

ii. Larval Surveillance

1. Service request inspections performed by pest control technicians will monitor mosquito larvae populations and determine if adult populations warrant treatment during these inspections from observed densities. Generally, these requests for service stem from localized, container-breeding species of mosquitoes that are easily remedied by simply dumping water from articles such as buckets, birdbaths, tarps, and other items that are holding water. Occasionally, service requests investigations uncover larger scale problems, like blocked drainage systems, woodland pools, breeding catch basin systems, etc. that may require further action by either the land owner or other city departments to correct.

2. Breeding site inspections are conducted by pest control technicians on a weekly basis as well as following flooding events caused by heavy rains or high tidal phases. Larval surveillance entails locating the larval source (if not already known), sampling for larvae and estimating larval density, determining larval developmental stage(s), and collecting larvae for identification purposes.

iii. Disease Surveillance

1. Due to the closing of the State Lab in Norfolk, Hampton Environmental Services uses the VecTest field kits to test for mosquito-borne diseases. Positive results are directed to the Pennsylvania Department of Environmental Protection, or another state accredited lab for confirmation by RT-PCR.

e. Assessing Environmental Conditions Procedures.

i. General Considerations. Climatic conditions are always checked prior to any ground applications. Wind speed, wind direction, and the possibility of impending rain must be taken into consideration whether applying liquid or solid products because of drift, dilution, or chemical breakdown depending on the product being used. Temperature also plays a role in our application methods, especially the timing of application and the choice of products used. No applications are made when temperatures fall below 55°F.

ii. Adult mosquito treatments. Treatments for adult mosquitoes occur in both urban and rural areas of the city. Applicators are always aware of nearby pesticide sensitive locations, and turn spray equipment off when necessary to avoid drift into such areas. Similarly, equipment is also turned off when approaching large bodies of water, such as lakes and ponds to avoid any adverse reactions to non-target organisms in these environments.

1. Aerial Adulticiding Procedures a.

   See Dynamic Aviation agreement.

2. Truck-Mounted ULV Adulticiding Procedures

   a. Apply when insects are most active and weather conditions are conducive to keeping the spray cloud in the air column close to the ground.

   b. Apply during the cooler hours of the night or early morning when thermal activity is low. Do not apply when ambient temperature is less than 55° F.

   c. Apply when ground wind speeds are equal to or greater than 1 mph but no greater than 10 mph.

   d. Do not apply over bodies of water (lakes, rivers, permanent streams, natural ponds, commercial fish ponds, swamps, marshes or estuaries), except when necessary to target areas where adult mosquitoes are present, and weather conditions will facilitate movement of applied material away from the water in order to minimize incidental deposition into the water body.

   e. Pesticides can be highly toxic to bees exposed to direct treatment. Do not apply product or allow drift when bees are actively visiting the treatment area, except when applications are made to prevent or control a threat to public and/or animal health determined by a state, local health or vector control agency on the basis of documented evidence of disease causing agents in vector mosquitoes, or the occurrence of mosquito-borne disease in animal or human populations, or if specifically approved by the state during a natural disaster recovery effort.

   f. Beekeepers, environmentalists, and citizens with allergies are kept on a no-spray list designed to minimize effect on specific areas within the city.

g. Residents who request notification of spraying due to allergic reactions or personal preference are notified and/or not sprayed, except when applications are made to prevent or control a threat to public and/or animal health determined by a state, local health or vector control agency on the basis of documented evidence of disease causing agents in vector mosquitoes, or the occurrence of mosquito-borne disease in animal or human populations, or if specifically approved by the state during a natural disaster recovery effort.

iii. Larval mosquito treatments. One major environmental consideration is the amount of aquatic vegetation present within the treatment site. Vegetation may deflect or otherwise prevent the penetration of pesticide from reaching the target area, as well as interfere with the migration of the larviciding agent through the water column.

2. Pertaining to Other Actions Necessary to Minimize Discharges.

a. Spill Response Procedures.

i. Chemical Spill Response OSHA Level II training is required for staff handling, loading or applying pesticides.

ii. Refer to City of Hampton Public Works Operations Policy Manual:

Section: PW-SAFE-0007 : Hazardous & Non-Hazardous Material Cleanup & Plan; Procedures.

Environmental Services Team Pesticide Spill Procedures Checklist located in all vehicles containing pesticides.

b. Adverse Incident Response Procedures.

i. NPDES Regulations require any adverse incidents to be reported annually to the Virginia DEQ office. Pesticide applicators are given annual recertification courses which inform applicators of any rules and regulations that may have changed.

ii. To help avoid or at least minimize adverse incidents, Hampton applicators turn off spray equipment when approaching areas with high human activity, such as outdoor sport practices, games, or other events. We also maintain a proactive courtesy call list for individuals that have informed us of any sensitivity to the products we use, enabling these individuals to avoid contact from these products all together. In addition, our courtesy call list extends to backyard organic gardeners and beekeepers to insure the integrity of their crop and the safety of their apiary, respectively. Prior to aerial spraying local media outlets such as newspapers and news stations are informed to notify and prepare the public. A mosquito spray hotline is running with updates on areas that are on schedule to be adulticided.

c. Pesticide Monitoring Schedules and Procedures.

i. For application by, or under the supervision of, personnel certified/trained in public health pest control or mosquito control. For each application, a record must be kept of:

1. Date and Time where application occurred.

2. Outline of area where application occurred.

3. Dilution and application rate Speed of application vehicle (ground adulticiding).

4. Environmental factors (i.e. wind speed, temperature, humidity, etc.)

5. These records must be kept by the responsible public agency or their designee for a minimum of five years using storage methods that will allow the records to be easily retrieved.

* Revised 8/13/19