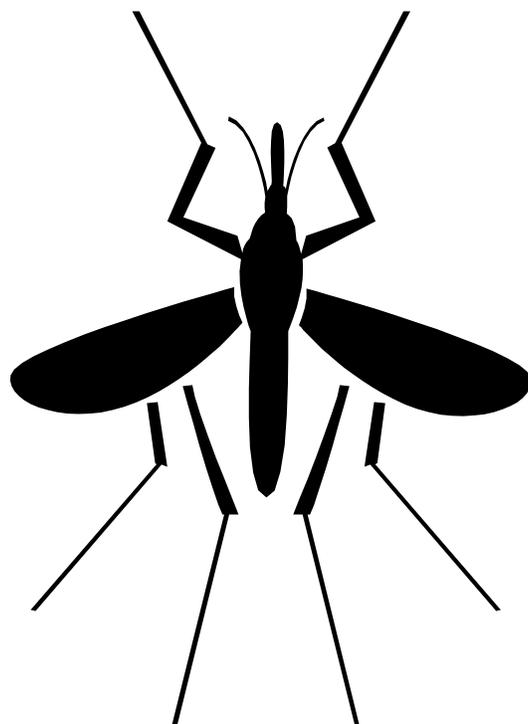


# Sevier County, Utah Mosquito Abatement Plan

Approved May 14, 2012





## Introduction

The Pesticide General Permit (PGP) for point source discharges to waters to the state of Utah from the application of pesticides covers any qualified “operator” that meets the eligibility requirements identified in Part 1.C.1 and Part 1.D.1, and if so required, submits a Notice of Intent (NOI) in accordance with Part 1.A.3.

As a Mosquito Abatement (activity covered in Part 1.C.1), the Sevier County Mosquito Abatement & Control SCMA is eligible for the coverage under the PDP. Also, as an “Operator Group 2” defined in Part 1.D.1, the SCMA has to submit an NOI regardless of the size of the area to be treated. The NOI was submitted to the Department of Environment Quality on December 14th, 2011.

The PGP requires any “operator” that is required to submit an NOI and comply with the water quality based effluent limitations to also develop a written Pesticide Discharge Management Plan (PDMP) to document measures taken to meet the effluent limits.

The PDMP requires the following to be documented:

- 1) Pesticide discharge management team information;
- 2) Pest management area description;
- 3) Control measure description; and
- 4) Schedules and procedures pertaining to control measures used to comply with the effluent limitations

The SCMA must keep the PDMP up-to-date thereafter for the duration of coverage under the PGP. The PDMP may contain other documents to describe how we will comply with the effluent limitations of the permit. A copy of any portions of any documents that we will use must be attached to the PDMP.

## **Pesticide Discharge Management Team Information**

All persons may be contacted at:  
Sevier County Mosquito Abatement & Control  
2780 S. Mulberry Lane  
Richfield, Utah, USA 84701  
Tel: (435) 896-6636  
Fax: (435) 896-5122

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

John P. Johnson, Manager  
Email : [johnjohnson@sevier.utah.gov](mailto:johnjohnson@sevier.utah.gov)  
Cell: (435) 896-7565

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

John P. Johnson Manager  
Email : [johnjohnson@sevier.utah.gov](mailto:johnjohnson@sevier.utah.gov)  
Cell: (435) 896-7565

C. Person(s) responsible for developing, revising, and implementing corrective actions and other effluent limitation requirements:

John P. Johnson Manager  
Email : [johnjohnson@sevier.utah.gov](mailto:johnjohnson@sevier.utah.gov)  
Cell: (435) 896-7565

D. Person(s) responsible for pesticide applications (mix, load, and apply):

John P. Johnson Manager  
Email: [johnjohnson@sevier.utah.gov](mailto:johnjohnson@sevier.utah.gov)  
Cell: (435)896-7565  
Mike Willes, Field Supervisor & Applicator  
Cell: (435) 201-3317  
Mark Stewart, Field Inspector & Applicator  
Cell: (435) 979-8750  
Rodney Christensen, Field Inspector & Applicator  
Cell (435) 201-0052

## Pest Management Area Description

### **A. General Description and Location**

Sevier County is located in the south central part of the State of Utah and includes the area around Richfield in the valley of the Sevier River and its tributaries. It is bordered by Wayne County, UT to the east, Sanpete County, UT to the north, Millard County, to the west and the Piute to the south.

The lowest point in the county, along Sevier River, is 5240 feet near the center of the county, while the mountains surrounding the Sevier Valley are more than 10,000 feet in elevation. The climate in Sevier County is more in common with the Ski Areas than the rest of the state, with hot summers and mild, mostly snowy winters.

Richfield is the largest city in Sevier County. It lies in one of the highest populated high mountain valleys in this region of the state. Most of the cities lie above 5,500 feet. The Sevier River mostly flows through the center of the county. Richfield lies between the Monroe Mountain region to the east with its neighboring Pahvant Mountains to the west with its broad landscapes and pine forests. Glenwood, Sigurd, Aurora, Salina and Redmond lie to the north of Richfield, while Monroe, Elsinore, Annabella, Joseph, and Central Valley to the south. Koosharem is a much higher (6914 ft) valley to the Southeast of Richfield.

Because of the city's high elevation, Richfield and Sevier County, is one the cooler parts of the state with cooler temperatures. The maximum daily July temperatures averaging about 94° F. Richfield lies in mountain valleys and averages, 8.57 inches of precipitation annually. Precipitation is fairly evenly distributed throughout the year.

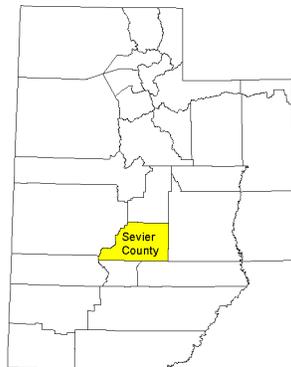


Figure 1. State of Utah and Sevier County in the center.

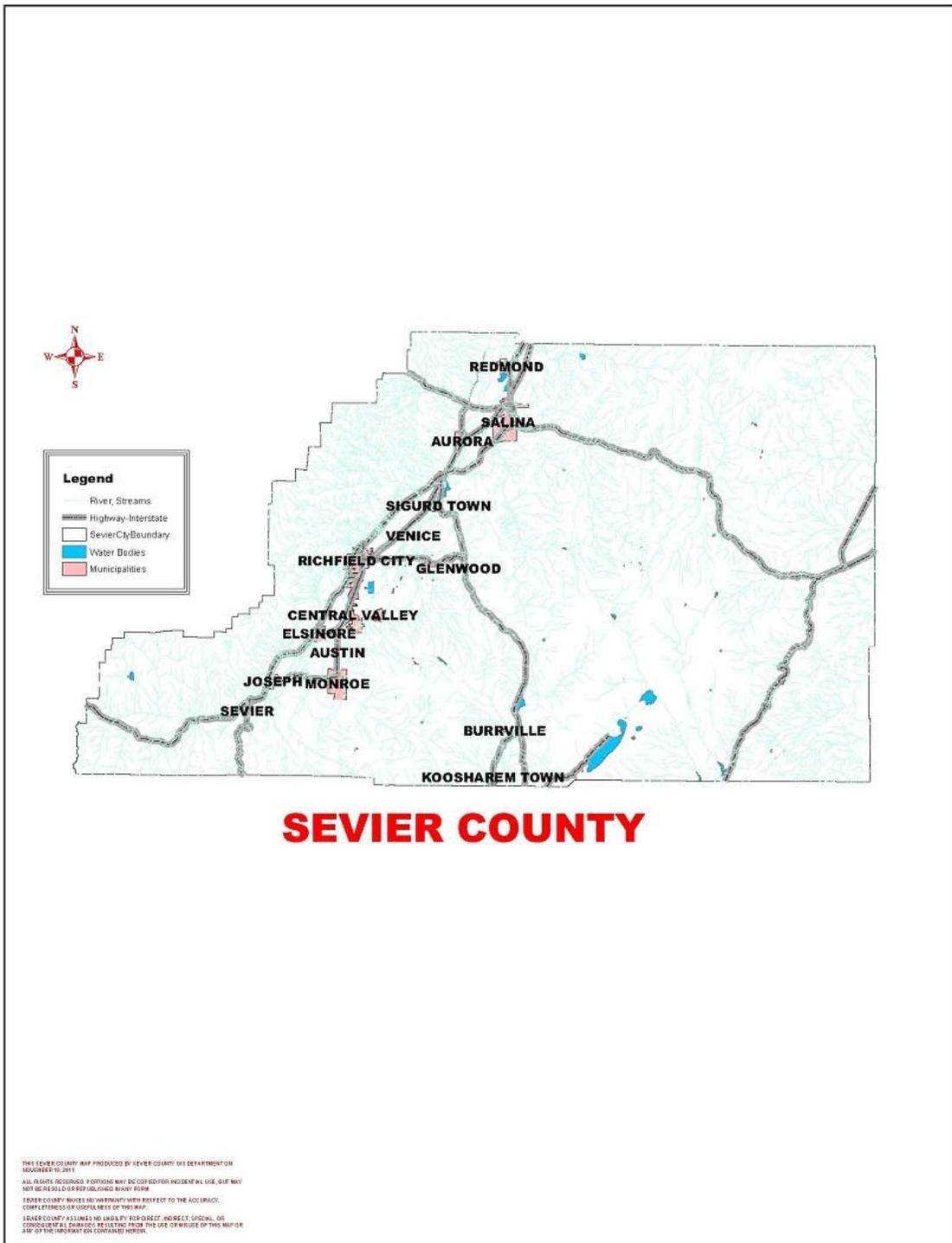


Figure 2. Geographic boundaries of Sevier County and location of the surface waters of the state.

## **B. Natural Environments**

River and creek flood plains in Sevier County are associated with one major freshwater river system (Sevier River, and the tributaries). Their flood plains are characterized by tamarisks, cottonwoods, and willows. Mosquito species commonly found in these environments include *Culex tarsalis*, *Anopheles freeborni*, *Anopheles Franciscans* and a number of flood water species of *Ochlerotatus* genus.

Woodland ponds, pools, and depressions create isolated wetlands occurring throughout the county. Examples of these habitats include ponds, sloughs, and large and small depressions in many pasture areas. Many of these sites contain water, only during the sparse rain events during the year, and serve as excellent nurseries for most species of mosquitoes found in the region. Other natural environments include springs, seeps, tree holes, tree cavities, burrows made by various species of wildlife. However, these as a whole are generally not a pressing concern to our mosquito program, although tree holes play a major role in the biology of *Ochlerotatus varipalpus* and *Orthopodomyia signifera*. *Ochlerotatus varipalpus* which could potentially be a vector of the dog heart worm but cases have never been reported in the county.

## **C. Man-made Environments**

Shallow, roadside ditches and canals are frequently suggested as sources of mosquito problems. Such sites often remain dry throughout much of the year because of temperature, but in some areas, runoffs from flooded fields can keep them wet for the major part of the year making them very attractive sites for female mosquitos to lay their eggs.

Trenches and ruts from the heavy equipment used in construction sites can generate many new mosquito development sites. These newly established "lows" can hold water for prolonged periods of time, and are productive as larval mosquito sites.

Livestock pastures can pose a serious problem to mosquito management, as the livestock not only provide a reliable blood meal for female mosquitoes, but form numerous larval habitats from their hoof prints. The presence of watering troughs on the sites also adds to the problem.

Storm drains and catch basins, although in very low numbers in Sevier County, can provide a nice environment for *Culex pippins*, a known vector of WNV in Utah (but never tested positive so far in Sevier County).

Containers of all types may be represented by something as small as a bottle top to something as large as a discarded or unkempt boat. Many items in people's backyard could be potential development sites for mosquitoes (toys, bird baths, old tires, etc.).

Other man-made sites include borrow pits, agricultural fields, retention and detention ponds. Fields flooded on purpose by farmers to water their crops are also a major issue for the mosquito abatement program.

#### **D. Pest Problem Description**

The county is known to contain 13 species of mosquitoes. The Sevier Mosquito Control program actively surveys and conducts control efforts primarily on only eight species. Two of those species (*Culet tarsalis* and *Culet erythrothorax*) are known to be carriers of the West Nile virus (WNV) in Sevier County, while another *Culet* species (*Culet pippins*) have been tested positive for WNV in the north of Utah but not yet confirmed positive in the south-central part of the state. Other mosquito species (primarily in the *Ochlerotatus* genus) found in the county are considered a nuisance.

When populations build up after farmers flood their fields or we have river flooding events, the most common species are:

##### ***Aedes vexans* (Meigen, 1830)**

*Ae. Vexans* is one of the most widespread pest mosquitoes in the world and is widely distributed throughout South-central Utah where cycles have been observed to follow the irrigation patterns of the farming in the area. Collections of adults decrease during harvest times, which happen 3-4 times a year in South-central Utah. There is also a decrease during midsummer when water pools evaporate too quickly for larval development. Alfalfa is the most likely farm crop to support *ae./aexans* larvae. Females prefer the blood of mammals for protein meals. *ae. vexans* has been implicated as a secondary vector of eastern equine encephalitis and dog heart worm. It has also been tested in laboratories to be suitable to carry West Nile Virus (WNV).

##### ***Anopheles Franciscans* (McCracken, 1904)**

In Southern Utah it is found widely distributed with the largest numbers being collected along the Sevier River drainage in areas along the Sevier River with thick willow patches, tamarisks, and cattails. *An. Franciscans* is rarely found entering dwellings. *An. Franciscans* will primarily use mammals as hosts but will bite birds and reptiles. They prefer swamps and marshy areas with suitable vegetation and algae in the water for larvae to development around. *An. Franciscans* is not currently considered to be an important vector species of malaria in the west, but may have been a factor in outbreaks of malaria in the early settlements of south-central Utah.

##### ***Anopheles freeborn* (Aitkin, 1939)**

It is the most common *Anopheles* species in Utah and is widely distributed throughout the state. In South-central Utah its largest numbers have been collected along the Sevier River drainages. Fewer numbers are collected in areas of higher elevation. Females are most active at dusk and, contrary to *An. Franciscans*, will readily enter houses in search of hosts. *A freeborni* almost exclusively uses mammals as hosts. It prefers small mammals like rabbits as hosts over large domestic animals and humans. *A freeborni* is currently considered to be the most important vector species of malaria in the west. This species has also been found to carry the Western Equine Encephalitis (WEE) and St. Louis Encephalitis (SLE) viruses.

***Culex erythrothorax*** (Dyer, 1907)

In South-central Utah, *Cx. erythrothorax* has been found developing in deeper water of ponds and lake margins with heavy vegetation like tules, cattails, willows, and grasses. Large populations have been identified in swampy areas in Annabella and Central Valley, multiple locations along the Sevier River, and in the Richfield area. This species does not migrate far (generally less than 1 mile) from its larval habitat. *Cx. Erythrothorax* will overwinter as larva and then emerge in late spring. *Cx. erythrothorax* are the last *Culex* species to be collected for the year. Multiple pools of *Cx. erythrothorax* have not tested positive for WNV in South Central Utah. These pools are usually from locations with *Culex tarsalis* that are also positive.

***Culex pipiens*** (Linnaeus, 1758)

*Cx pipiens* are found widely distributed throughout the world and are usually considered the most common pest mosquito in urban and suburban settings. *Cx pipiens* is referred to as the “Northern House Mosquito” because it is rarely found below 39 degrees latitude (although found in), and is more suited for cooler weather conditions. They are regularly found entering homes. Adults are generally active only during the warmer months and prefer to bite birds over mammals. These species can be considered “bridge” vectors, because they maintain the viruses within bird populations and then transmits viruses between birds and mammals. *Culex pipiens* is a vector, or carrier, of St. Louis Encephalitis (SLE), West Nile Virus (WNV), Western Equine Encephalitis (WEE), Heart worm in dogs, and bird Malaria.

***Culex tarsalis*** (Coquillett, 1895)

*Cx. tarsalis* is widely distributed throughout Southern Utah and in Sevier County. The largest numbers are collected along marshy areas around the Sevier River corridor, and especially in Salina and Redmond. Types of habitat vary immensely from pasture and other flood irrigated crops to wetlands. This species of mosquito is probably the most prominent vector of arboviruses in North America. *Cx. tarsalis* is the most important transmitter of viruses in Southern Utah. In this area, *Cx. tarsalis* have been determined to carry Western Equine Encephalitis (WEE), St. Louis Encephalitis (SLE), and West Nile Virus (WNV). In early spring, infected mosquitoes are found, probably as infected overwintering females.

***Culiseta inornata*** (Williston, 1893)

*Cu. inornata* have been found in small numbers in almost all collection locations within South Central Utah. They are more common in marshy areas surrounded with taller vegetation near farms with cattle or horses. They are active flyers and can disperse 5-10 miles from their emergence site. *Cu. inornata* mostly feeds on large mammals, with no preference between horses and cattle. Females will sometimes bite humans but are not considered to be a major pest. Extensive testing has not revealed any pools of *Cu. inornata* infected with diseases in South Central Utah

***Ochlerotatus nigromaculis*** (Ludlow, 1907)

In South Central Utah, *Oc. nigromaculis* have been collected in large numbers in areas associated with agricultural crops like alfalfa and feed corn, mostly in the Central Valley Fields area. *Oc. nigromaculis* competes directly with *Ae. Vexans* for habitat space. Residential areas surrounding these fields are inundated with aggressive females usually shortly after rain storms and heavy flooding of fields. *Oc. nigromaculis* is rarely found in other areas of South-central Utah even though it is a strong flyer (females are capable of flights up to 20 miles when seeking a blood meal). This species is not known to be a natural carrier of disease.

Pasture mosquitoes are considered pests and can interfere with agricultural operations as well as the use of recreation areas.

**E. Action Threshold**

To better guide the Sevier County Mosquito Control program, treatments for adult mosquitoes, thresholds were established according to different criteria. Those criteria have been established based on the fact that in Sevier County, the Mosquito Abatement Program was created to treat either for nuisance and/or for public health protection (potential transmission of diseases by the mosquitoes). Those thresholds are:

1. Ten mosquitoes that are vectors of West Nile virus, i.e. *Culex tarsalis* or *Culex erythrothorax* from any trap site in the county.
2. Ten nuisance mosquitoes, i.e. *Aedes vexans* or *Ochlerotatus nigromaculis* or *Anopheles franciscanus* or *Anopheles freborni* from any trap site in the county.
3. One or more of the following could trigger the need to spray a given area.
  - a. If this is a zone where a threshold is already reached (nuisance or vectors), spraying is already scheduled and performed for that zone.
  - b. If this is a zone where a threshold has not been reached, a CDC trap is set up to assess the problem. If needed (see thresholds), spraying will be performed.
  - c. Field supervisors reporting a larvicide failure at any breeding site located near populated areas.
  - d. Based on a service request, limited area treatments may be conducted prior to special events or community functions.

The following thresholds were established to trigger larviciding missions within the county:

1. Treatments of a larval mosquito habitat may be conducted in areas that are found to contain an average of at least one 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.
2. A limited number of known, historic breeding sites may be treated after a major rain or flooding event without the dip survey.



Control of mosquitoes at the larval stage is a major part of a mosquito control program. Trained technicians survey potential larval habitats and use larvicides when larvae are found.

Larvicides are pesticides that are added to the water in order to kill the mosquito larvae before they emerge as adults. Many of the products are applied by hand or with a power backpack.

This is done on foot, from all terrain vehicles (ATV's), or from trucks.

Some of the pesticides used for larviciding, both in granular and liquid formulations, would include:

Chemicals (nerve toxins), bacterial products, surface agents and growth regulators.

#### Adulticiding.

The Red colored lines indicate areas treated with adulticides (Figure 3).

Adult mosquito control is used to rapidly knock down biting adult mosquitoes. This can become necessary when larval control measures are insufficient or not feasible.

Adulticiding is used mostly when there is a large possibility of disease transmission in an area such as the West Nile Virus (WNV) and where adult mosquitoes are considered a nuisance for the public.

The most common method of adult mosquito control is ultra-low volume (ULV) spraying. ULV spraying is the process of putting very small amounts of liquid into the air as a fine mist of droplets. These droplets float on the air currents and quickly kill mosquitoes that come into contact with them. ULV adulticides are applied in the evening, the night or predawn hours when mosquitoes are most active (different peaks of activity depending on the species). ULV applications are only done during environmental conditions that ensure desirable product movement.

Labels and Material Safety Data Sheets (MSDS) of all larvicides and adulticides used in our operation are available for the public and can be picked up at our office at 2780 South Mulberry Lane Richfield, Utah.

The United States Environmental Protection Agency (USEPA) approves the use of pesticides nationally. Before pesticides are registered by USEPA, they must undergo laboratory testing for acute and chronic health effects. In these tests, laboratory animals are purposely fed a pesticide at high doses for an extended period of time especially to see if toxin's effect occur. These tests help scientists judge how these chemicals might affect humans, domestic animals, and wildlife in the case of exposure. We will never exceed the allowable amount of chemical listed on the label.

**WE WILL NEVER SPRAY CHEMICALS THAT DOES NOT HAVE EPA NUMBERS AND APPROVALS.**

Figure 3. General location map of all known treatment areas (larviciding & Adulticiding) within Sevier County, UT.

## **F. Water Quality Standards**

Waterways in Sevier County are not impaired with any pesticide used by the Sevier County Mosquito Control Program.

### **Control Measure Description**

A brief explanation of the control measures to demonstrate how to meet the applicable technology-based or water quality-based effluent limitations. These control measures used at the site to reduce pesticide discharge include evaluation and implementation of management tools:

**No action** or at least delayed action may be taken by the Sevier County Mosquito Abatement & Control at times when a major portion of the county has been inundated with water. When a county wide flooding event takes place it is 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 a larval habitat to dry before mosquitoes can complete their aquatic life stages, and no adults result.

**Prevention, mechanical/physical methods and cultural methods** are by definition very similar in nature and share many characteristics. These methods can be as basic as simply emptying water from containers or as complex as repairing broken water lines which often require the involvement of other county departments. Mechanical/physical and cultural methods manipulate a larval habitat to prevent favorable conditions for mosquitoes to complete their aquatic development. Physical manipulation of environments such as removing blockages in ditches that serve as barriers to natural predators of mosquitoes are sometimes quick and effective means to resolve problems on a localized level.

**Educational program and area events** allow the opportunity to suggest ways that residents can assist in the prevention of mosquito problems by removing containers and articles from their yards that provide a larval habitat, and to be mindful that birdbaths and pet water bowls could serve as mosquito sanctuaries when not properly maintained.

**Biological control products\*** can be used for the control of larval stages of mosquitoes. Formulations containing *Bacillus sphaericus* and/or *Bacillus thuringiensis israelensis* are used to treat flood water and other larval sites.

**Chemical pesticides\*** often are any abatement agency's last choice of control measures. These products are applied as directed by their respective label, and all equipment used in this process is closely monitored and calibrated by staff.

*\* A list of all insecticides (labels and MSDS) used in the past or still in use is provided on the SCMA website ([www.sevierutah.net](http://www.sevierutah.net)). You can also find on the website the mode of action of the different families of products (organophosphates, growth regulators, etc.). Both documents are also posted at the end of this document.*

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

**Larval control efficacy** is more difficult to access, as our primary larvicide product is a growth hormone that does not cause mortality until the later stages of the larvae's development. Often, in this case, a failure is not realized until "healthy" adults are found emerging after their pupal stage. However, post-treatment surveys do verify successful treatments when using larvicide oils and films, or biological control products, such as *B.sphaericus* or *Bti* products.

### **Schedules and Procedures Pertaining to Control Measures Used to Comply with the Effluent Limitations.**

Pertaining to control measures used to comply with the effluent limitations Application Rate and Frequency Procedures.

1. Application Rate Determination
  - a. Determine species and age of target mosquito (es)
  - a. Evaluate environmental conditions
  - b. Consider target area flora and fauna
  - c. Determine an appropriate application rate based on product label recommendations, previous experience and efficacy tests
2. Frequency Determination
  - a. Determine target site treatment history with selected pesticide
  - b. Evaluate effect of selected pesticide use on frequency and quantity thresholds for an active ingredient
  - c. Consider alternate treatment options & compare costs.
3. Resistance Considerations
  - a. 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.
  - b. Consider the use of alternate control options and compare costs.
4. Perform monthly inspections of chemical storage rooms and the warehouse (Garage) areas. Maintain buildings to full function ability.

5. Keep OSHA requirement's log (spill response supplies, PPE Locations, chemical List) up to date

#### Pesticide Application Equipment Procedures.

1. Ground Adulticiding
  - a. Operations:

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

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

Routine cleaning and maintenance of the spray system must be performed to ensure system is operating properly.
  - b. Maintenance:

Weekly Checks - Visually check the fog generator each week before use and make any necessary adjustments and /or repairs. Before making any repairs, repairs that required, PPE is worn.
  - c. Check all gasoline hoses, insecticide lines and fittings for cracks, leaks or wear. Replace if needed.
  - d. Check all bolts and fasteners and tighten as necessary.
  - e. Ensure that pesticide tanks have sufficient chemicals for assigned spray mission.
  - f. Check all nozzle parts for wear or physical damage. Replace damaged parts.
  - g. Inspect blower air filter for cleanliness and serviceability.
  - h. Check engine oil. Add oil as needed.
  - i. Check fuel level.
  - j. Start engine, listen for any unusual noises and watch for excessive smoke or Any engine oil leaks.

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

2. Ground Larviciding
  - a. Ground larviciding is conducted by the Sevier County Mosquito Abatement & Control staff in a number of situations using various products throughout the Season
  - b. Hand treatments are conducted within Sevier County by licensed personnel Using their best professional judgment. These treatments generally take place On a daily basis. Listed sites are visited monthly and surveyed for the presence Of larvae. Some sites may be pretreated where historic data justifies such actions. Equipment used during hand treatment work include small 1 gallon or 1 quart sized hand sprayers, and pressurized 25 gallon truck mounted sprayers That is calibrated prior to each season.

## **Pest Surveillance Procedures**

1. Adult Surveillance
  - a. Service request inspections are taken from telephone and from telephone messages and emails (on our website). Many of these are simple requests for treatments, although occasionally such calls lead to finding problems needing Attention. Technicians generally will check for mosquito larvae and determine if adult populations warrant treatment during these inspections from observed Densities.
  - b. New Jersey trap collections are paramount to our WNV surveillance. This trap Type is particularly effective in catching new jersey *Culex pipiens* and *Culex Tarsalis*, the latest is our primary WNV vector. Fifteen new jersey traps Are deployed throughout the county each week during the mosquito season. CDC light trap collections are used for both nuisance mosquito census and WNV surveillance.
2. Larval Surveillance
  - a. Service request inspections preformed by our Field Supervisors will check for mosquito larvae and determine if adult populations warrant treatment during these inspections.
  - b. Breeding site inspections are conducted by our Field Supervisors following Flooding events caused by rains, snow melts or farmers. Larval surveillance Entails locating the larval source (if not already known), sampling for larvae And estimating larval density, determining larval developmental stage(s) Collecting larvae for identification purposes. Other factors considered during Larval inspections include the type of environment (pond, ditch, etc.), Presence of aquatic vegetation, and if any natural predators (like fish) are Present.
3. Disease Surveillance
  - a. Mosquito pool analysis is the most useful indicator of the presence of WNV in our service area. Up to 25 adult mosquitoes (RAMP technology) or 50 adult mosquitoes (RT-PCR technology) are grouped to form a single sample for WNV virus analysis.

## Assessing Environmental Conditions Procedures.

1. 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.

2. Adult mosquito treatments.

Treatments for adult mosquitoes occur in both urban and rural areas of the county. Applicators are always aware of nearby crops, blooming crops and bee hive 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.

3. Ground Adulticiding Procedures

- a. Apply when insects are most active and meteorological 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 50 F.
- c. Apply when ground wind speeds are equal to or greater than 1 mph but less than 9 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. Pesticide is highly toxic to bees exposed to direct treatment on blooming crops or weeds. 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, tribal or 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 or tribe during a natural disaster recovery effort.
- f. To minimize hazard to bees, it is recommended that the product is not applied more than two hours after sunrise or two hours before sunset, limiting application to times when bees are least active
- g. Bee keepers are notified at the beginning of the season of areas susceptible to be sprayed during the season based on spraying of previous years. They can choose other locations that will help in protecting their colonies.

4. Larval mosquito treatments.

Two major environmental considerations are tree canopy and the amount of aquatic vegetation present within the treatment site. Tree canopy may deflect or otherwise prevent the penetration of pesticide from reaching the target area. Heavy vegetation within a wetland can interfere with the migration of the larviciding agent through the water column. Pertaining to Other Actions Necessary to Minimize Discharges.

### **Spill Response Procedures.**

The suggested guidelines in the event of a chemical spill are known as the three **Cs**:

**Control the spill, contain it, and clean it up.** This procedure is described in the National Pesticide Applicator Certification core manual and required by the State Of Utah Department of Agriculture and Food for certification (see addendum at The end of this document).

### **Adverse Incident Response Procedures.**

1. To help avoid or at least minimize adverse incidents, the Sevier County Mosquito Abatement & Control applicators turn off spray equipment when approaching Areas with high human activity, such as outdoor sport practices, games, or other Events.
2. Spray schedule is posted on the County website at [www.sevierutah.net](http://www.sevierutah.net) And is available by calling the SCMA Office for individuals that have any sensitivity to the products we use, enabling these individuals to avoid contact from these products all together.
3. In addition, our courtesy no spray request extends to backyard organic gardeners and Beekeepers to insure the integrity of their crop and the safety of their apiary.

### **Pesticide Monitoring Schedules and Procedures.**

1. 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:
  - a. Date, time and areas where application occurred.
  - b. Dilution (if applied) and application rate speed of application vehicle
  - c. A description of insecticide delivery system used for the specific application.
  - d. Climate factors (e.g., ambient temperature, wind speed/direction) as determined by a reliable means.
  - e. Employees involved in mixing, loading and applying the pesticides.
  - f. These records must be kept by the responsible public agency or their designee for a minimum of two years using storage methods that will allow the records to be easily retrieved.

### **Insecticides – Modes of action**

Most people know that insecticides kill insects. However, the way in which these chemicals work is a mystery to most of us. How an insecticide works is called its mode of action. A complete understanding of the mode of action of an insecticide requires knowledge of how it affects a specific target site within an organism. The target site is usually a critical protein or enzyme in the insect, but some insecticides affect broader targets. Although most insecticides have multiple biological effects, toxicity is usually attributed to a single major effect.

### **Larvicides and Adulticides — Organophosphates**

Organophosphorus insecticides affect the nervous system. These insecticides are synaptic poisons. The synapse is a junction between two nerves or a nerve connection point (hence the name synaptic poison). Specifically, organophosphorus insecticides bind to an enzyme found in the synapse called acetylcholinesterase. This enzyme is designed to stop a nerve impulse after it has crossed the synapse. Organophosphorus insecticides bind to and prevent the enzyme from working. Therefore, poisoned synapses cannot stop the nerve impulse. Consequently, continued stimulation of the nerve occurs as observed with pyrethroids. Poisoned insects exhibit tremors and uncoordinated movement

### **Larvicides — Growth Regulators**

These chemicals are typically referred to as insect growth regulators or IGRs. IGRs act on the endocrine or hormone system of insects. These insecticides are specific for Insects, have very low mammalian toxicity, are non-persistent in the environment, and cause death slowly. Most of the currently registered IGRs mimic the juvenile hormone produced in the insect brain. Juvenile hormone tells the insect to remain in the immature state. When sufficient growth has occurred, the juvenile hormone production ceases triggering the molt to the adult stage. IGR chemicals, such as Methoprene mimic the action of juvenile hormone and keep the insect in the immature state. Insects treated with these chemicals are unable to molt successfully to the adult stage, and cannot reproduce normally.

### **Larvicides — Bacteria**

*Bacillus thuringiensis* var. *israelensis* (Bti) is a naturally occurring bacterium that produces a crystalline protein toxin (crystal) and a spore. The larval activity of Bti formulations are due to the presence of the protein toxin. The spore has no larvicidal activity. For mosquito larvae, many factors are necessary to produce the toxic effects of Bti crystals. If the crystals are available in sufficient quantity, to suffer toxicity and die, a larva must: 1) Capture and ingest the crystals, 2) Possess a digestive tract with a highly alkaline pH, 3) Possess the enzymes capable of liberating the toxic proteins, and 4) possess the gut membrane receptors, compatible with the solubilized toxin Bti- based products are not insecticides of contact. The active ingredient (crystals) must be ingested to show a toxic activity. This very specific mode of action makes it very safe non-target organisms in the same environment throughout the world. At the time of sporulation, Bs produces crystallin proteins (as in Bti but different) toxic for many species of mosquito larvae upon ingestion.

### **Larvicides/Pupicides**

Very refined oil or surfactant's can be used as larvicides/pupicides. These products have the ability to kill both larvae and pupae. The County is currently using oils but is not using surfactant's. The surfactant used is also called monomolecular film (MMF). Using conventional spraying methods, the invisible monomolecular film quickly spreads over standing water habitats. The film reduces the surface tension of the water making it difficult for the mosquito larvae and pupae to attach to the surface which causes them to drown. Emerging mosquitoes are unable to fully emerge and will drown. Mosquito larvicide and pupicide are effective on all species of mosquitoes that breeds in standing water and require the air/water interface in their life cycle.

### **ULV Adulticides — Pyrethroids**

Pyrethroids are synthetic chemicals whose structures mimic the natural insecticide Pyrethrin. Pyrethrins are found in the flower heads of plants belonging to the family compositae (e.g. chrysanthemums). These insecticides have a unique ability to knock down insects quickly. Synthetic pyrethrins (also known as pyrethroids) have been chemically altered to make them more stable. Pyrethroids are axonic poisons (they poison the nerve fiber). They bind to a protein in nerves called the voltage-gated sodium channel. Normally, this protein opens causing stimulation of the nerve and closes to terminate the nerve signal. Pyrethroids bind to this gate and prevent it from closing normally which results in continuous nerve stimulation. This explains the tremors exhibited by poisoned insects. They lose control of their nervous system and are unable to produce coordinated movement. Pyrethroids are most of the time used with piperonyl butoxide (PBO) which is a synergist that is usually incorporated within the final products. PBO enhances the Effect of pyrethroids by inhibiting an enzyme (cytochrome P450) produced by the insect to break down the pesticides. The PBO allows the insecticides to be effective with less active ingredient than would otherwise be required. References: Insecticides Used in the Urban Environment: Mode of Action. S. M. Valles and P. G. Koehler, <http://edis.ifas.ufl.edu/IN077>. Cognis.

### **Pesticides: List of Pesticides (Labels & MSDS)**

Pesticides used in the past or currently in use by the County that are used to control mosquito larvae (larvicides) or adult mosquitoes (adulticides).

#### *Larvicides — Organophosphates*

Abate 4E (Label / MSDS)

Abate 1% Sand Granules (Label / MSDS)

Provect 1% SG (Label / MSDS)

#### *Larvicides — Growth Regulators*

Altosid ALL (Label / MSDS)

Altosid Pellets (Label / MSDS)

Altosid XR Briquets (Label / MSDS)

#### *Larvicides — Bacteria*

VectoBac 12AS (Label / MSDS)

VectoBac G (Label / MSDS)

VectoBac CG (Label / MSDS)

VectoLex CG (Label / MSDS)

VectoLex WDG (Label / MSDS)

VectoLex WSP (Label / MSDS)

VectoMax (Label / MSDS)

#### *Larvicides/Pupicides*

Agnique MMF (Label / MSDS)

Agnique MMFG (Label / MSDS)

#### *ULV Adulticides — Pyrethroids*

Anvil 2+2 (Label / MSDS)

Duet (Label / MSDS)

Kontrol 4+4 (Label / MSDS)

Permanone RTU (Label / MSDS)

Pyrocide (Label / MSDS)

## SCMA MOSQUITO SPRAY POLICY

The Sevier County Mosquito Abatement Office (SCMA) uses an Integrated Pest Management (IPM) program to control mosquitoes. The County's function is to control mosquitoes and diseases they may carry. Basically, the County has the right to enter all land within the County to exterminate mosquitoes and other insects. The County also may enter onto land outside the County if abatement will benefit the County and to control migration of insects into the County.

### **Courtesy No-Spray Requests**

Some citizens do not wish to have adult mosquito control on their property. Some may be beekeepers or organic farmers registered with the Utah Department of Agriculture and Food (UDAF). SCMA has chosen to grant courtesy no-spray requests from individuals with health concerns or who are beekeepers or organic farmers by not fogging within approximately 300 feet of approved no spray locations. If the request is on property within incorporated municipalities the administration of those municipalities will be contacted by SCMA for their approval before the no spray status is granted.

Beekeepers and organic farmers that are registered with UDAF are requested to provide a copy of their license. We request that individuals with special medical problems, possibly attributed to insecticide exposure, obtain a physician's written opinion acknowledging pesticide sensitivity. People requesting that their property not be sprayed will be given consideration by the County to the extent feasible and practicable. Most people having health-related concerns over insecticide exposures can satisfactorily minimize their concerns by paying attention to the fogging schedule and following common sense measures such as temporarily leaving the fogging area and/or closing the doors, windows, and vents of their house; etc. However, given the safety of the EPA-registered insecticides and how the products are required to be applied, the human health risks are extremely minimal. The vast majority of people should not need to take any special precautions.

If a disease is found in the mosquito pool or sentinel chicken, such as WNV (West Nile Virus) or WEE (Western Equine Encephalitis), the courtesy no-spray zones will be decreased or eliminated. SCMA works closely with the public health department (Central Utah health Department) to track WNV and WEE in human.

To request being put on the courtesy no-spray list, please visit the county website at [www.sevierutah.net](http://www.sevierutah.net) to download the form or contact the Abatement Office at 435-896-6636 to request the form. ***Courtesy no-spray requests must be renewed in writing each year.***

### **General Emergency Waiver**

The County, for exceptional circumstances or during a declared vector emergency, may modify this policy on a case-by-case basis. The County reserves the right to modify or nullify any and all courtesy no spray requests.

**SEVIER COUNTY MOSQUITO ABATEMENT  
NO-SPRAY REQUEST FORM  
For 20\_\_\_\_\_ Year**

Annual renewal is required!

**NOTE: This request is valid for the current spray year only. A request form must be completed each year no-spray is requested.**

Name: \_\_\_\_\_  
PLEASE PRINT

Address: \_\_\_\_\_  
\_\_\_\_\_

Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Reason for no-spray request \_\_\_\_\_ Beekeeper (Utah Department of Agriculture and Food  
UDAF license is requested)

\_\_\_\_\_ Organic Farmer Utah Department of Agriculture and Food  
UDAF license is requested)

\_\_\_\_\_ Health (physician certification requested)

**WARNING: If a public health threat is identified during the spray year in your area, pesticide will be applied regardless of the no-spray request. If you have a no-spray request for the current year in which a public health threat is identified, you will be given 24 hours' notice before spraying begins.**

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

Mail to: Sevier County Mosquito Abatement  
2780 Mulberry Lane  
Richfield, Utah 84701

Email to: [johnjohnson@sevier.utah.gov](mailto:johnjohnson@sevier.utah.gov)

Website: [www.sevierutah.net](http://www.sevierutah.net)

Phone: (435) 896-6636 Fax: (435) 896-5122