Pesticides Application Plan (PAP) for the NPDES Vector Control Permit Application of the San Joaquin County Mosquito and Vector Control District (revised 9/12/2011)

1. Target areas: surface waters and waters of the U.S. within San Joaquin County, CA. Map of San Joaquin County enclosed.

In prior years, the District has applied adulticides and/or larvicides directly to or in the vicinity of the following water bodies:

Dry Creek, tributary to Mokelumne River
Goose Creek, tributary to Dry Creek
Coyote Creek, tributary to Dry Creek
Jahant Slough, tributary to Tracy Lakes
Tracy Lakes
Gill Creek, tributary to Mokelumne River
Murphy Creek, tributary to Mokelumne River
Camanche Reservoir
Lodi Lake
Mokelumne River, tributary to Sacramento River-San Joaquin River Delta
North Fork Mokelumne River
South Fork Mokelumne River
Beaver Slough, tributary to South Fork Mokelumne River
Hog Slough, tributary to South Fork Mokelumne River
Sycamore Slough, tributary to South Fork Mokelumne River
Upland Canal, tributary to White Slough
Bear Creek, tributary to Disappointment Slough
Pixley Slough, tributary to Disappointment Slough
Telephone Cut, tributary to Bishop Cut
Paddy Creek, tributary to Bear Creek
Middle Paddy Creek, tributary to Paddy Creek
South Paddy Creek, tributary to Paddy Creek
Mosher Creek, tributary to Mosher Slough
Mosher Slough, tributary to Disappointment Slough
Five Mile Slough, tributary to Disappointment Slough
Duck Creek, tributary to Mormon Slough
Indian Creek, tributary to Calaveras River
Calaveras River, tributary to San Joaquin River
Podesto Lake
Mormon Slough, tributary to Stockton Diverting Canal
Stockton Diverting Canal, tributary to Calaveras River
Mormon Slough, tributary to Stockton Deep Water Channel
Stockton Deep Water Channel, tributary to San Joaquin River
Smith’s Canal, tributary to San Joaquin River
Potter Creek, tributary to Mormon Slough
North Fork Duck Creek, tributary to Duck Creek
Duck Creek, tributary to Walker Slough
Walker Slough, tributary to French Camp Slough
Rock Creek, tributary to LittleJohns Creek
LittleJohns Creek, tributary to North and South LittleJohns creeks
North LittleJohns Creek, tributary to French Camp Slough
South LittleJohns Creek, tributary to N. Fork S. LittleJohns Creek
South LittleJohns Creek, tributary to S. Fork S. LittleJohns Creek
N. Fork S. LittleJohns Creek, tributary to French Camp Slough
S. Fork S. LittleJohns Creek, tributary to French Camp Slough
French Camp Slough, tributary to San Joaquin River
Avena Drain, tributary to Lone Tree Creek
Lone Tree Creek, tributary to S. Fork S. LittleJohns Creek
Stanislaus River, tributary to San Joaquin River
San Joaquin River, tributary to Sacramento River-San Joaquin River Delta
Walthall Slough, tributary to San Joaquin River
Red Bridge, tributary to Walthall Slough and San Joaquin River
Tom Paine Slough, tributary to Old River
Sugar Cut, tributary to Tom Paine Slough and Old River
Hospital Creek
PegLeg Creek, tributary to Lone Tree Creek (sw)
Middle Fork Lone Tree Creek, tributary to Lone Tree Creek (sw)
Sulpher Springs Gulch Creek, tributary to Lone Tee Creek (sw)
North Fork Lone Tree Creek, tributary to Lone Tree Creek (sw)
Corral Hollow Creek
Hellsinger Creek, tributary to Corral Hollow Creek
Patterson Run
Mountain House Creek
White Slough
Honker Cut
Disappointment Slough
Ten Mile Slough
Fourteen Mile Slough
Little Potato Slough
Potato Slough
Venice Cut
Venice Reach
Mandeville Reach
Mandeville Cut
Three River Reach
Burns Reach
Dredge Cut
Twentyone Mile Cut
Haypress Reach
Bishop Cut
Turner Cut
Empire Cut
Whiskey Slough
Latham Slough
Columbia Cut
Middle River
Old River
Connection Slough
Dredger Cut
North Victoria Canal
Victoria Canal
Trapper Slough
Paradise Cut
Salmon Slough
Grant Line Canal
Fabian and Bell Canal

In prior years, the District has applied adulticides and/or larvicides directly to or in the vicinity of canals, ditches, or other constructed conveyance facilities owned and controlled by:

Byron-Bethany Irrigation District
Banta-Carbona Irrigation District
California Irrigation District
Central San Joaquin Water Conservation District
Lathrop Irrigation District
Neglee-Burk Irrigation District
New Del Puerto Water District
North San Joaquin Water Conservation District
Nyjo Water District
Oakdale Irrigation District
South San Joaquin Irrigation District
Stockton East Water District
Woodbridge Irrigation District
West Side Irrigation District
West Stanislaus Irrigation District
Reclamation District #1 Union Island
Reclamation District #2 Union Island
Reclamation District #17 Mossdale
Reclamation District #38 Staten Island
Reclamation District #348 New Hope
Reclamation District #403 Rough and Ready Island
Reclamation District #404 Boggs Tract
Reclamation District #524 Middle Roberts Island
Reclamation District #544 Upper Roberts Island
Reclamation District #548 Terminous
Reclamation District #684 Lower Roberts Island
Reclamation District #756 Bouldin Island
Reclamation District #773 Fabian Tract
Reclamation District #828 Weber Tract
Reclamation District #1007 Pico and Nagle
Reclamation District #1608 Smith Tract
Reclamation District #2023 Venice Island
Reclamation District #2027 Mandevalle Island
Reclamation District #2028 Bacon Island
Reclamation District #2029 Empire Tract
Reclamation District #2030 McDonald Island
Reclamation District #2033 Brack Tract
Reclamation District #2038 Lower Jones Tract
Reclamation District #2039 Upper Jones Tract
Reclamation District #2040 Victoria Island
Reclamation District #2041 Medford Island
Reclamation District #2042 Bishop Tract
Reclamation District #2044 King Island
Reclamation District #2058 Pescadero District
Reclamation District #2062 Stewart Tract
Reclamation District #2064 River Junction
Reclamation District #2072 Woodward Island
Reclamation District #2074 Sargent-Barnhart Tract
Reclamation District #2075 McMullin Ranch
Reclamation District #2085 Kasson District
Reclamation District #2086 Canal Ranch
Reclamation District #2089 Stark Tract
Reclamation District #2094 Walthall
Reclamation District #2095 Paradise Junction
Reclamation District #2096 Wetherbee Lake
Reclamation District #2101 Blewett
Reclamation District #2107 Mossdale
Reclamation District #2108 Tinsley
Reclamation District #2113 Fay Island
Reclamation District #2114 Rio Blanco Tract
Reclamation District #2115 Shima Tract
Reclamation District #2116 Holt Station
Reclamation District #2118 Little Mandevalle Island
Reclamation District #2119 Wright-Elmwood Tract
Reclamation District #2126 Atlas Tract
California Department of Water Resources – California Aqueduct
U.S. Bureau of Reclamation - Delta Mendota Canal
2. Please see the following enclosed references that identify the factors influencing the decision to select pesticide applications for vector control:


The use of pesticides to control adult and immature stages of mosquitoes is determined when other control methodologies cannot or will not be feasible. Following are examples of the limitations that other control methodologies present that may then trigger the need for a pesticide application:

**Biological control** (use of mosquitofish) has definite limitations. For example:

- They can seldom inhabit two important larval sites: small containers and highly polluted water. In temporary water sites, repeated introduction of fish will be required.
- Mosquito-eating fish can harm beneficial organisms (e.g., other fish or insect predators) by eating their eggs and young or by superior competition for food. Their release carries the potential to reduce or eliminate non-target species.
- Larvivorous fish may be preyed upon by larger fish. Their vulnerability to fungi and other pathogens may keep their populations in check.
- Where larvivorous fish are harvested or removed, their populations could be reduced to a level inadequate for mosquito control.
- Mosquito-eating fish may prefer food other than mosquito larvae. In some situations, mosquito larvae production outruns the increase in fish population that would be necessary for control.
- The District can only rear certain amounts of mosquitofish per year in. All mosquitofish produced are used in the District’s biological control element of the IPM program.

**Natural control** (a pest management strategy whereby the environment is disturbed as little as possible) has definite limitations. For example:

- Natural control is sometimes difficult to implement or assess due to the amount of man-made or manipulated vector sources found in the District. Natural control is advocated for sites that are remote and undisturbed, to the least amount practical, for the individual vector specie being contemplated for control.

**Physical control** (or mosquito habitat modification) has definite limitations. For example:

- Only man-made or managed mosquito sources are capable of being physically altered to reduce mosquito abundance. In some cases physically altered lands will reduce, but not eliminate mosquito breeding, requiring the implementation of other forms of control, including biological and chemical control.

3. Pesticide products or types expected to be used and the method in which they will be applied:

<table>
<thead>
<tr>
<th>Pesticide Product</th>
<th>EPA Reg.</th>
<th>Method of Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7395</td>
<td>1021-1570</td>
<td>Ultra low volume (ULV), vehicle (ground) and aircraft (air)</td>
</tr>
<tr>
<td>Evergreen Crop Protection EC 60-6</td>
<td>1021-1770</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Pyrenone Crop Spray</td>
<td>432-1033</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Prentox Pyronyl Crop Spray</td>
<td>655-489</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Pyrocide Mosquito Adulticiding Concentrate for ULV Fogging 7396</td>
<td>1021-1569</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Aquahalt Water-Based Adulticide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pyrocide Mosquito Adulticide 7453</td>
<td>1021-1803</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Pyrenone 25-5 Public Health Insecticide</td>
<td>432-1050</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Prentox Pyronyl Oil Concentrate #525</td>
<td>655-471</td>
<td>ULV ground and air</td>
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<tr>
<td>Prentox Pyronyl Oil Concentrate or 3610A</td>
<td>655-501</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Permanone 31-6</td>
<td>432-1250</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Kontrol 30-30 Concentrate</td>
<td>73748-5</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Aqualuer 20-20</td>
<td>769-985</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Aqua-Reslin</td>
<td>432-796</td>
<td>ULV ground and air</td>
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<td>Aqua-Kontrol Concentrate</td>
<td>73748-1</td>
<td>ULV ground and air</td>
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<td>Kontrol 4-4</td>
<td>73748-4</td>
<td>ULV ground and air</td>
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<tr>
<td>Biomin 4+12 ULV</td>
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<td>ULV ground and air</td>
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<tr>
<td>Permanone RTU 4%</td>
<td>432-1277</td>
<td>ULV ground and air</td>
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<tr>
<td>Prentox Perm-X UL 4-4</td>
<td>655-898</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Allpro Evolver 4-4 ULV</td>
<td>769-982</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Biomin 4+4</td>
<td>8329-35</td>
<td>ULV ground and air</td>
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<tr>
<td>Kontrol 2-2</td>
<td>73748-3</td>
<td>ULV ground and air</td>
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<tr>
<td>Scouge Insecticide with Resmethrin/Piperonyl Butoxide 18%+54% MF Formula II</td>
<td>432-667</td>
<td>ULV ground and air</td>
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<tr>
<td>Scouge Insecticide with Resmethrin/Piperonyl Butoxide 4%+12% MF Formula II</td>
<td>432-716</td>
<td>ULV ground and air</td>
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<tr>
<td>Anvil 10+10 ULV</td>
<td>1021-1688</td>
<td>ULV ground and air</td>
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<td>AquaANVIL Water-based Adulticide</td>
<td>1021-1807</td>
<td>ULV ground and air</td>
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<td>Duet Dual-Action Adulticide</td>
<td>1021-1795</td>
<td>ULV ground and air</td>
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<tr>
<td>Anvil 2+2 ULV</td>
<td>1021-1687</td>
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<tr>
<td>Zenivex E20</td>
<td>2724-791</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Trumpet EC Insecticide</td>
<td>5481-481</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Fyfanon ULV Mosquito</td>
<td>67760-34</td>
<td>ULV ground and air</td>
</tr>
<tr>
<td>Vectolex CG Biological Larvicide</td>
<td>73049-20</td>
<td>Conventional, vehicle (ground), hand-held (hand), and aircraft (air)</td>
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<tr>
<td>Vectolex WDG Biological Larvicide</td>
<td>73049-57</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Vectolex WSP Biological Larvicide</td>
<td>73049-20</td>
<td>Conventional ground/hand/air</td>
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<td>Vectobac Technical Powder</td>
<td>73049-13</td>
<td>Conventional ground/hand/air</td>
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<td>Vectobac-12 AS</td>
<td>73049-38</td>
<td>Conventional ground/hand/air</td>
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<td>Aquabac 200G</td>
<td>62637-3</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Aquabac XT</td>
<td>62637-1</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>FourStar Briquets</td>
<td>83362-3</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>FourStar SBG</td>
<td>85685-1</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Spheratax SPH (50G) WSP</td>
<td>84268-2</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Product Name</td>
<td>Code</td>
<td>Application Method</td>
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<tr>
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<tr>
<td>Spheratax SPH (50G)</td>
<td>84268-2</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Teknar HP-D</td>
<td>73049-404</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Vectobac-G Biological Mosquito Larvicide Granules</td>
<td>73049-10</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Vectomax CG Biological Larvicide</td>
<td>73049-429</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Vectomax WSP Biological Larvicide</td>
<td>73049-429</td>
<td>Conventional ground/air</td>
</tr>
<tr>
<td>Vectomax G Biological Larvicide/Granules</td>
<td>73949-429</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>Zoecon Altosid Pellets</td>
<td>2724-448</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Zoecon Altosid Liquid Larvicide Mosquito Growth Regulator</td>
<td>2724-392</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Zoecon Altosid XR Entended Residual Briquets</td>
<td>2724-421</td>
<td>Conventional ground/hand</td>
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<tr>
<td>Zoecon Altosid Liquid Larvicide Concentrate</td>
<td>2724-446</td>
<td>Conventional ground/hand/air</td>
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<td>Zoecon Altosid XR-G</td>
<td>2724-451</td>
<td>Conventional ground/hand/air</td>
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<td>Zoecon Altosid SBG Single Brood Granule</td>
<td>2724-489</td>
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<td>Mosquito Larvicide GB-1111</td>
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<td>Conventional ground/hand/air</td>
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<td>BVA 2 Mosquito Larvicide Oil</td>
<td>70589-1</td>
<td>Conventional ground/hand/air</td>
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<td>BVA Spray 13</td>
<td>55206-2</td>
<td>Conventional ground/hand/air</td>
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<tr>
<td>Agnique MMF Mosquito Larvicide &amp; Pupicide</td>
<td>53263-28</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>Agnique MMF G</td>
<td>53263-30</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>Abate 2-BG</td>
<td>8329-71</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>5% Skeeter Abate</td>
<td>8329-70</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>Natular 2EC</td>
<td>8329-82</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>Natular G</td>
<td>8329-80</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>Natular XRG</td>
<td>8329-83</td>
<td>Conventional ground/hand/air</td>
</tr>
<tr>
<td>Natular XRT</td>
<td>8329-84</td>
<td>Conventional ground/hand</td>
</tr>
</tbody>
</table>

4. Following is a general description and listing of the application areas and the target areas in San Joaquin County that are being planned to be applied or may be applied:

001 Alfalfa
002 Small grains (corn, milo, safflower, oats, wheat)
003 Pasture, clover
004 Rice, white
005 Rice, wild
006 Row crops, (tomatoes, sugar beets, cucumbers, melons, etc.)
007 Sudan grass
008 Weeds, fallow
009 Other field crops
010 Orchards, fruit
011 Orchards, nuts
012 Vineyards, grape
013 Vineyards, other (kiwi, berry, etc.)
014 Animal waste ponds
015 Animal waste drains
016 Animal water trough
017 Animal cooling water
018 Irrigation ditch
019 Irrigation pipeline
020 Drain ditch, canal
021 Return flow drain or pond
022 Organic crop (all)
023 Spud ditch
024 Nursery
025 Sod
026 Vegetable packing shed waste drain
027 Vegetable packing shed waste pond
028 Walnut huller pond, drains
040 Creek, slough, river
041 Area, community drains
5. The other control methods used and their limitations include:

a. Biological Control. Biological control is the intentional use of natural predators, parasites or pathogens to achieve desired reductions in pest and vector population levels. The use of biological control is a primary method of control if the use of other control methods presents environmental concern and current vector populations are low or tolerable. The use of biological control organisms and strategies is limited to those that have been researched and field tested against target and non-target organisms. In addition, any biological control organism to be considered for use by the District will also be recognized and authorized by appropriate federal, state, and local agencies.

The District operates a large-scale aquaculture facility that produces several thousand pounds of mosquitofish annually. The fish are planted in aquatic sites in agriculture (e.g. rice), environmental (e.g. managed wetlands), residential (e.g. swimming pools), and industrial (e.g. storm water retention ponds) sources.

b. Legal abatement. Legal abatement is the process of preventing vectors through the enactment of legislation that enforces control measures or imposes regulations to prevent the production, introduction, or spread of pests and vectors. Legal abatement includes
the use of federal, state and local guidelines and laws designed to prevent the creation and/or harborage of pests and vectors.

The District regularly enforces the California Health and Safety Code, which specifically addresses the creation and/or harborage of vectors and vector breeding sites.

*The District’s legal abatement policy provides for a three-step process to work with landowners to limit mosquito production on lands under their control. The steps proceed from providing the landowner with information that acknowledges their creation of a public nuisance and specific recommendations on mosquito prevention (including reference to CDPH’s *Best Management Practices for Mosquito Control in California, 2011*). If the mosquito problem continues, the landowner can be cited per California Health and Safety Code regulations (Section 2000 et seq). Not all mosquito sources can be legally abated. Naturally-occurring sources created by rainfall (e.g. native tree holes and vernal pools) would be exempt from the District’s implementation of legal abatement.*

c. Natural control. Natural control is a pest management strategy in which the environment is disturbed as little as possible. Reliance is placed on naturally occurring parasites, predators, and diseases to control vectors. One scientific definition of natural control is “... the maintenance of a fluctuating population density within definable upper and lower limits over a period by the combined affects of abiotic and biotic elements in the environment”. Natural control is sometimes difficult to implement or assess due to the amount of man-made or manipulated vector sources found in the District. Natural control is advocated for sites that are remote and undisturbed, to the least amount practical, for the individual vector species being contemplated for control.

d. Physical control. Physical control, or habitat modification, is achieved by altering the major ecological components of the vector’s environment associated with the establishment and production of the vector’s immature stages. The primary operational objective of physical control is to reduce the vector carrying capacity of a site to preclude the use of control methods that would adversely impact the environment and wildlife. The District complies with requirements, as specified, of any general permit issued to the California Department of Health Services as the lead agency, pertaining to physical environmental modification to achieve pest and vector prevention. Additionally, the District routinely reviews and comments on proposed projects within San Joaquin County being considered by the various city and county departments, thus providing opportunities to “design out” vector breeding conditions prior to construction and development.

6. The amount and type of product needed and how this amount was determined is difficult to project on a prospective basis, however, the *San Joaquin County Mosquito and Vector Control District* can provide the amount and type of products used in 2010 as an estimate of what may be used in 2011 and outlying years. Following is the 2010 information:

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>EPA REG. NO.</th>
<th>AMOUNT USED</th>
<th># OF APPLICATIONS</th>
<th>ACRES TREATED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pyreneone Crop Spray</td>
<td>432 1033</td>
<td>17.79 gal</td>
<td>123</td>
<td>490.96</td>
</tr>
<tr>
<td>Suspend SC</td>
<td>432 763</td>
<td>8.12 gal</td>
<td>294</td>
<td>341.41</td>
</tr>
<tr>
<td>Aquabac XT</td>
<td>62637 1</td>
<td>531.64 gal</td>
<td>1076</td>
<td>2,136.78</td>
</tr>
<tr>
<td>BVA 2</td>
<td>70589 1</td>
<td>8,007.39 gal</td>
<td>2,048</td>
<td>2,821.73</td>
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<tr>
<td>Golden Bear 1111</td>
<td>8329 72 AA</td>
<td>107.02 gal</td>
<td>152</td>
<td>32.21</td>
</tr>
<tr>
<td>Agnique MMFG</td>
<td>53263 30</td>
<td>65.44 lb</td>
<td>10</td>
<td>9.28</td>
</tr>
<tr>
<td>Agnique MMF</td>
<td>2302 14</td>
<td>6.66 gal</td>
<td>10</td>
<td>19.52</td>
</tr>
<tr>
<td>Evergreen EC 60-6</td>
<td>1021 1770 AA</td>
<td>495.67 gal</td>
<td>295</td>
<td>98,167.12</td>
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<tr>
<td>Pyrocide 7396</td>
<td>1021 1569</td>
<td>243.06 gal</td>
<td>194</td>
<td>37,551.74</td>
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<tr>
<td>Prentox Pyronyl Crop</td>
<td>655 489 2A</td>
<td>0.61 gal</td>
<td>4</td>
<td>19.65</td>
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<tr>
<td>Pyronyl Crop Oil 525</td>
<td>655 471</td>
<td>20.5 gal</td>
<td>18</td>
<td>3,116.60</td>
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<tr>
<td>Trumpet EC</td>
<td>5481 481</td>
<td>607.50 gal</td>
<td>8</td>
<td>76,436</td>
</tr>
<tr>
<td>VectoBac 12 AS</td>
<td>73049 38</td>
<td>11034.1 gal</td>
<td>2,309</td>
<td>4,586.57</td>
</tr>
<tr>
<td>VectoBac G</td>
<td>73049 10</td>
<td>238,940.40 lb</td>
<td>278</td>
<td>47,425.5</td>
</tr>
<tr>
<td>VectoLex CG</td>
<td>73049 20</td>
<td>60.64 lb</td>
<td>30</td>
<td>9.3</td>
</tr>
<tr>
<td>VectoLex WDG</td>
<td>73049 57</td>
<td>68.25 lb</td>
<td>39</td>
<td>139.26</td>
</tr>
</tbody>
</table>
7. Representative monitoring locations and the justification for selecting these locations are provided in the MVCAC NPDES Coalition Monitoring Plan.

8. Not applicable.

9. Items 2.a. through 2.g. (above) were used in the evaluation of available BMPs for the determination of feasible alternatives to selected pesticide applications that could reduce potential water quality impacts.

Specifically, employees will evaluate the ability of a given mosquito breeding source to be reduced or eliminated per biological and/or physical control strategies outlined in the District’s IPM plan after determining: 1) the species of mosquito, 2) the immediate population of mosquitoes, and 3) the current public health threat posed by the mosquito species(s), the current mosquito population, and related arbovirus activity. Additional information regarding arbovirus activity is also used in determining what type of control technique should be implemented and when.

10. Items 2.a. through 2.g. (above) describe the BMPs to be implemented.

11. Prior to the first pesticide application covered under the permit that will result in a discharge of biological and residual pesticides to waters of the U.S., and at least once each calendar year thereafter prior to the first pesticide application for that calendar year the District will do the following for each vector management area:

   a. Utilize densities for larval and adult vector populations identified in the District’s IPM plan (item 2.f. above) for implementing pest management strategies;

The District utilizes the term “tolerance threshold” when determining if or when mosquito control should be implemented. Tolerance threshold is the population density of mosquitoes at which control measures should be implemented to prevent an increasing population from reaching an intolerable level. The data from sampling and monitoring is used to help decide at which infestation level to initiate control activities. This decision level is based on larval and adult mosquito populations, citizen complaints, and the potential for disease outbreaks, and the risk of control activities to non-target organisms.

Action levels are different for each situation. In some areas, a public health or general annoyance condition does not occur until the number of adult female mosquitoes exceeds 10 per trap night. Other action levels that have been used are landing rates averaging more than two mosquitoes in one minute, and dipper counts averaging 0.1 larvae per dip. Action levels for urban, suburban, and rural residential areas can be lower than for remote, uninhabited areas, or areas of low human use.

**Adult mosquito threshold(s)**

Adult mosquitoes are measured by the use of the three techniques identified in the section “Surveillance”. Because the District operates the mosquito surveillance and control program year round, the tolerance threshold can be changed by many factors. Examples of the many factors that change the adult mosquito tolerance threshold are listed below:
- As weather conditions change in late fall and early winter, human activity in the outdoors is reduced, and arbovirus activity in the environment less important. Although the adult mosquito population is at or above a tolerance threshold for other conditions, the District may not implement certain control actions because the mosquito population will not create an annoyance or public health problem.
- Generally, adult mosquito control is implemented when populations of the encephalitis mosquito Culex tarsalis reach a level of 10 females per trap night. However, if encephalitis virus has been detected in humans, domestic animals, mosquito pools, dead birds or sentinel chicken flocks, the District may initiate adulticiding at a lower number of adult mosquitoes per trap night.
- High populations (≥10 mosquitoes/trap night) of certain species, i.e., Culex erythrothorax, would not necessarily require control action if the population were found in a low human-use or remote area.

**Immature mosquito threshold(s)**

Immature mosquitoes are generally measured by the use of the dipping technique identified in the section “Surveillance”. Because the District operates the mosquito surveillance and control program year round, the tolerance threshold can be changed by many factors. Examples of the many factors that change the immature mosquito tolerance threshold are listed below:

- Although an immature mosquito population of 0.1 larvae per dip (one larvae in 10 dips) is not seen as a large problem with certain species, i.e., Culiseta inornata, in the winter months, it would be a significant public health risk for the species Culex tarsalis during the months of April through November.
- Relatively small populations of larvae (<1 larvae per dip) of the species Culex pipiens can be tolerated in a rural waste water impoundment, but would be unacceptable if found in a suburban area swimming pool.
- The larvae of the mosquito species Aedes nigromaculis can develop rapidly into more mature stages in warm weather, generally requiring immediate treatment with the use of a larvicide. Larvae of the species Aedes sierrensis can mature much slower, allowing for aspects of naturalistic control to be considered as a method of IPM.

b. Utilize vector identification and surveillance techniques identified in the Best Management Practices for Mosquito Control in California (item 2.a. above), the California Mosquito-Borne Disease Surveillance and Response Plan (item 2.b. above), and the District's IPM plan (item 2.f. above) to identify vector species in the development of species-specific pest management strategies;

**Monitoring immature mosquito populations**

Typically, the application of biological control agents and larvicides in locations where physical control is not an option is preferred to adulticiding. This procedure minimizes the area treated and the amount of resources (bio-control agents or chemicals) required. Because the District’s mosquito control program utilizes several different types of control strategy, information and data regarding mosquito breeding sites and larval monitoring are collected. The District maintains a permanent record of each mosquito-breeding site, along with information on larval development found at each inspection.

Immature mosquitoes are sampled using a variety of methods and equipment. Mosquito larvae and pupae are collected with dippers, suction devices, and container evacuation methods. The most commonly used apparatus is the standard one-pint dipper, using standardized dipping techniques. The dipper is used as a survey tool simply to determine
the presence of larvae. Standardized dipping methods are used when mosquito densities are to be quantified, usually in values taking additional dipper samples from specific areas in the habitat and counting the number of larvae in each dip. In most cases, the District’s control program uses the measure of larval density as a basis for control action. Currently, the District utilizes a threshold value of 0.1 larvae per dip (≥1 larvae in 10 dips) for consideration of a form of mosquito control, i.e., mosquitofish planting, larviciding, etc.

To maximize the usefulness of immature mosquito surveillance data, the District monitors certain environmental parameters such as rainfall and mountain snow pack. In certain areas of San Joaquin County, tide levels are also monitored. Rainfall and tide changes dictate when certain areas will need to be inspected for mosquito larvae. Mountain snow pack levels can translate to adequate agriculture irrigation supplies and river flows capable of creating seepage problems.

**Monitoring adult mosquito populations**

The District uses one or more methods to measure adult mosquito populations before a control decision is made. The two (2) methods used most often are landing/resting rates and mechanical trap counts. The purpose of monitoring adult mosquitoes is 1) to determine where adults are most numerous, 2) to substantiate telephone service request claims of a mosquito problem, 3) to provide data that satisfies District policy and state regulation for applying adulticides (e.g., the pest or vector must be present at the treatment site), and 4) to determine the effectiveness of different control methods.

Landing/resting rates are a frequently used method for measuring adult mosquito activity. For the mosquito genera Aedes and Anopheles, the landing rate technique comprises a count of the number of mosquitoes that land on a person in a given amount of time. Resting rates are a method of measuring the activity of Culex, and to a lesser degree, Anopheles and Culiseta species of mosquitoes. The quantity of adult mosquitoes found resting on walls, under eaves, in culverts and pipelines, and in dense vegetation is measured by area, i.e., the number of mosquitoes per square foot. The specific method used to determine landing or resting rates could vary. Important variables are the time of day at which observations are made, the length of time an observation is made, and the portion of body and/or number of sites examined. Emphasis is placed on using the same protocol at given sites, and to use the same inspector to assess landing or resting counts at the same site from one date to the next.

Mechanical traps are used extensively throughout the District on a continuous, year-round basis to monitor adult mosquito populations. Mechanical traps include the standard New Jersey-style light trap (NJLT), encephalitis virus surveillance (EVS) trap, baited Fay trap, and gravid trap.

- **EVS traps** are used at different times during the year. The traps are used to collect adult Culex pipiens and Cx. tarsalis mosquitoes for use as mosquito pools, which are either tested in the District’s laboratory or sent to the CDPH Viral and Rickettsial Disease Laboratory for encephalitis virus detection. EVS traps are also used to assess pre- and post-treatment populations of adult mosquitoes to determine control effectiveness.
- **Fay traps** are used for special purpose monitoring, i.e., in the spring to measure localized populations of Aedes sierrensis.
- **Gravid traps** can be used to selectively sample gravid female mosquitoes that are seeking suitable oviposition sites and are generally used in urban and suburban settings where Culex pipiens have been detected.
**Monitoring telephone service requests and resident complaints**

The third method of ascertaining a mosquito problem is through telephone and website service requests and resident complaints. The District maintains several different listed telephone numbers, including a toll-free line that residents and visitors can call to request mosquito control services; additionally, residents are encouraged to use District’s website at [www.sjmosquito.org](http://www.sjmosquito.org) to seek assistance also. Service requests are also received at numerous community fairs where the District operates an information booth. The District responds to an average of 1,000 service requests per year.

Service requests generally are related to specific mosquito species, although the mosquitoes that cause service requests vary considerably from one area to the next. Telephone service requests and citizen complaints are always verified as to their validity prior to any control action being implemented. District personnel substantiate mosquito activity by assessing larval and adult mosquito populations using the techniques described earlier.

c. Utilize the District’s GIS mosquito surveillance and control record keeping system (Sentinel) for the identification of known breeding areas for source reduction, larval control, and habitat management;

d. Utilize the District’s GIS mosquito surveillance and control record keeping system (Sentinel), the University of California/CVEC Gateway system, and the California Department of Public Health’s data sets to analyze existing surveillance data for the identification of new or unidentified sources of vector problems as well as areas that may have recurring vector problems.

Following is an example of some of the West Nile virus surveillance information provided by the University of California, Center for Vector-Borne Disease (CVEC). The black, blue and red dots indicate the presence of virus activity in dead birds, mosquito pools (e.g. collections), and sentinel chicken flocks. The surveillance information is collected from local mosquito control agencies and the California Department of Public Health. The surveillance information provides real-time analysis of mosquito and arbovirus information that can be used to determine a mosquito control strategy.
12. The District will utilize the resources identified in 2.a. through 2.g. (above) in the examination of alternatives to pesticides. If there are no alternatives to pesticides, the District, to the extent practical, will use the least amount of pesticide necessary to control the target pest, and will only apply pesticides when vectors are present at a levels identified in the IPM plan (item 2.f. above).

*The District’s interpretation of integrated pest management, referred to as IPM, is a sustainable approach, or plan, to managing public health pests and vectors, by combining biological, chemical, legal, natural and physical control tactics in a way that minimizes economic, health and environmental risks. IPM can also be considered as a systematic approach to public health pest management, which combines a variety of surveillance and control practices. For the purposes of the District’s plan, a pest is defined as any organism that is unacceptably abundant. A vector is an organism (such as an insect or other arthropod) which 1) transports and transmits a parasite (including disease causing pathogens) from one host to another, 2) causes direct harm or injury without transmitting a parasite, or 3) causes significant annoyance to humans and/or animals. The words pest and vector are used interchangeably for the purposes of the District’s surveillance and control plans for specific vectors.*

13. The District will ensure that all reasonable precautions are taken to minimize the impacts caused by pesticide applications, and will comply with all regulations related to pesticide application, mixing, storing, and transport. The District is signatory to a cooperative agreement administered by the California Department of Public Health (copy attached) regarding pesticides, and agrees to: 1) calibrate all application equipment, 2) seek assistance from the County Agriculture Commissioner (CAC) for interpretation of pesticide labeling, 3) maintain records of each pesticide application for two or more years, 4) to submit monthly pesticide use reports to the CAC and CDPH-VBDS, 5) to report to the CAC and CDPH-VBDS any suspected adverse issues resulting from a pesticide application, 6) to certify and routinely train pesticide applicators, and 7) to be inspected by the CAC and the CDPH-VBDS to ensure that our activities are in compliance with laws and regulations related to pesticide application.