MVCAC NPDES Permit Coalition
2013 Annual Report
NPDES Vector Control Permit
(Order No. 2011-0002-DWQ, as amended by 2012-0003-DWQ)

Prepared by

Mosquito and Vector Control Association of California NPDES Permit Coalition

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Tables

µg/L	micrograms per liter
BMPs	Best Management Practices
Coalition	MVCAC NPDES Permit Coalition
DO	dissolved oxygen
EC	electrical conductivity
IPM	integrated pest management
MAD	Mosquito Abatement District
MRP	Monitoring and Reporting Program
MVCAC	Mosquito and Vector Control Association of California
MVCD	Mosquito and Vector Control District
NPDES	National Pollutant Discharge Elimination System
PAP	Pesticide Application Plan
PBO	piperonyl butoxide
SWRCB	State Water Resources Control Board
VCD	Vector Control District
VCSD	Vector Control Services District

The Statewide National Pollutant Discharge Elimination System (NPDES) Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications (Water Quality Order No. 2011-0002-DWQ; Vector Control Permit) became effective on November 1, 2011. This general permit was later amended by Water Quality Order No. 2012-0003-DWQ on April 3, 2012. The Vector Control Permit covers the point source discharge of biological and residual pesticides resulting from direct and indirect spray applications for vector control. Under this general permit, entities involved in the application of vector control pesticides that result in a discharge of biological and residual pesticides to waters of the United States are to comply with the permit's Monitoring and Reporting Program (MRP). The permit encourages dischargers to form monitoring coalitions with others doing similar applications in similar environmental settings. The Mosquito Vector Control Association of California (MVCAC) NPDES Permit Coalition (Coalition) consists of 64 member districts and agencies. In 2011 and 2012, the Coalition conducted visual, physical, and chemical monitoring consistent with its Monitoring Plan (dated September 12, 2011) and Quality Assurance Project Plan (dated September 12, 2011) which were developed to comply with the MRP from the Vector Control Permit.

During 2013, the Coalition did not conduct chemical monitoring or perform visual, physical, and chemical testing reportable under the Vector Control Permit. Chemical monitoring and associated visual and physical monitoring were suspended due to ongoing negotiations with the State Water Resources Control Board (SWRCB). These discussions were centered on the removal of the physical and chemical monitoring requirements in the permit. The SWRCB is currently proposing significant changes to the Vector Control Permit which have a direct impact on the monitoring component.

MVCAC member agencies also suspended visual and physical monitoring during application of larvicides. They did not document visual monitoring observations due to high West Nile virus activity in 2013. This is consistent with the SWRCB notification letter of July 13, 2012 to MVCAC that because visual monitoring requirements were "interfering with the need for maximal efficient application to adequately protect human health from vector-borne diseases like West Nile virus," that the visual monitoring was no longer required by individual member districts. The member districts continued to follow the guidelines of its Pesticide Application Plan (PAP).

Improvements to individual district PAPs and their associated best management practices (BMPs) were determined by individual member districts during their annual reporting as required by the Vector Control Permit.

1.1 INTRODUCTION

This is the 2013 Annual Report for MVCAC NPDES Permit Coalition, as required under the Statewide NPDES Permit for Biological and Residual Pesticide Discharges to Waters of the United States from Vector Control Applications (Water Quality Order No. 2011-0002-DWQ, as amended by Water Quality Order No. 2012-0003-DWQ). The Coalition conducts chemical monitoring for its members under the Vector Control Permit MRP (Attachment C of the permit).

Member districts of the Coalition submit individual annual reports consistent with the Vector Control Permit. Individual annual reports focus on larvicide and adulticide applications, site locations, and comprehensive pesticide applications logs for all larvicide and adulticide applications to Waters of the United States. Member district annual reports also address recommendations to improve PAPs and BMPs. Members of the Coalition are listed in Table 1.

Table 1. Members of the MVCAC NPDES Permit Coalition

Alameda County MAD	Merced County MAD
Alameda County VCSD	Napa County MAD
Burney Basin MAD	Nevada County Community Development Agency
Butte County MVCD	Northern Salinas Valley MAD
City of Alturas	Northwest MVCD
City of Blythe	Orange County VCD
City of Long Beach	Oroville MAD
City of Moorpark	Owens Valley MAD
City of Pasadena	Pine Grove MAD
City of San Francisco	Placer MVCD
Coachella Valley MVCD	Riverside County Vector Control Program
Colusa MAD	Sacramento - Yolo MVCD
Compton Creek MAD	Saddle Creek Community Services District
Consolidated MAD	San Benito County Agricultural Commission
Contra Costa MVCD	San Bernardino County
Delta VCD	San Diego County Department of Environmental Health - Vector Control Program
Durham MAD	San Gabriel Valley MVCD
East Side MAD	San Joaquin County MVCD
El Dorado County Environmental Management	San Mateo County MVCD
Fresno MVCD	Santa Barbara County, Mosquito and Vector Management District of
Fresno Westside MAD	Santa Clara County VCD
Glenn County MVCD	Santa Cruz County MVCD

Table 1. Members of the MVCAC NPDES Permit Coalition

Greater Los Angeles County VCD	Shasta MVCD
Imperial County Vector Control	Solano County MAD
June Lake Public Utility District	South Fork MAD
Kern MVCD	Sutter-Yuba MVCD
Kings MAD	Tehama County MVCD
Lake County VCD	Tulare County MAD
Los Angeles County West VCD	Turlock MAD
Madera County MVCD	Ventura County Environmental Health Division
Mammoth Lakes MAD	West Side MVCD
Marin/Sonoma MVCD	West Valley MVCD

Notes:
MAD = Mosquito Abatement District
MVCD = Mosquito and Vector Control District
VCD = Vector Control District
VCSD = Vector Control Services District

1.2 WEST NILE VIRUS ACTIVITY

West Nile virus is a mosquito-borne disease that is common in Africa, west Asia, the Middle East, and more recently, North America. Human infection with West Nile virus may result in serious illness. It first appeared in California in 2002, and in 2004, West Nile virus activity was observed in all 58 counties.

ArboNET is the Center for Disease Control's internet-based passive surveillance system for arboviral diseases (including West Nile virus) in the United States. Data are uploaded to ArboNET on a weekly basis by state and local health departments. In 2013, a total of 368 human cases of West Nile virus and 15 fatalities were reported to ArboNET. Based on Center for Disease Control studies, there were probably thousands of additional cases that were not diagnosed or reported.

2.1 PRIOR MONITORING ACTIVITY

The Coalition conducted chemical monitoring at 61 locations during 19 adulticide application events in 2011 and 2012 and performed the necessary visual, physical, and chemical testing reportable under the Vector Control Permit. The Coalition also coordinated physical monitoring for 136 larvicide application events in 2012. MVCAC member agencies were in full compliance with the monitoring requirements of the Vector Control Permit.

Samples and measurements taken for the purpose of monitoring were representative of the monitored activity. They characterized aerial and truck applications, and covered a broad geographic range. Visual observations included descriptions of the monitoring area, appearance of the waterway, and weather conditions.

Chemical monitoring by the Coalition included the adulticide active ingredients listed in the Vector Control Permit. Table 2 illustrates the Coalition's progress towards meeting the chemical monitoring requirements of the Vector Control Permit MRP. Concentrations of pyrethrins, permethrin, sumithrin, prallethrin, etofenprox, piperonyl butoxide (PBO), naled, and malathion were analyzed and reported by the California Department of Fish and Wildlife Water Pollution Control Laboratory (Gold River, California) in 2011 and Caltest Analytical Laboratory (Napa, California) in 2012. In 2012, five application events of chemical pesticides, including malathion, PBO in PBO/pyrethrin mixtures, and etofenprox, resulted in exceedances of Receiving Water Limitations or Receiving Water Monitoring Triggers. Several of the compounds were also found in the pre-application event at concentrations greater than the monitoring trigger. Investigations of these exceedances were conducted as required by the Vector Control Permit. No adverse effects were witnessed.

Table 2. MVCAC NPDES Permit Coalition Chemical Monitoring, 2011 and 2012

Active Ingredient	Agricultural		Urban		Wetland	
	Required	Completed	Required	Completed	Required	Completed
Pyrethrin	6	**6**	6	**6**	6	**6**
PBO/Pyrethrin	6	**6**	6	**6**	6	**6**
Permethrin	6	**6**	6	**6**	6	1
Resmethrin	6	0	6	0	6	0
PBO/Resmethrin	6	0	6	0	6	0
Sumithrin	6	**6**	6	**6**	6	**6**
Prallethrin	6	0	6	1	6	0
Etofenprox	6	0	6	1	6	0
PBO	6	**12**	6	**13**	6	**7**
Naled	6	1	6	**6**	6	2
Malathion	6	1	6	0	6	1
MGK-264	6	0	6	0	6	0

Temephos	6	0	6	0	6	0

The Coalition sampled 87 of the required 180 application events in 2011 and 2012 with the majority of those being five products (pyrethrin, PBO with pyrethrin, sumithrin, permethrin, and PBO). The other five products (resmethrin, PBO with resmethrin, prallethrin, etofenprox, and MGK 264) are rarely used and it is unlikely that sufficient uses would be available to complete the testing in the future.

With the exception of PBO, the data collected in 2011 and 2012 had low detection frequencies. Active ingredients were detected in only 8 of 51 samples (16%) analyzed for pyrethrin, permethrin, sumithrin, or etofenprox. PBO was analyzed in 100 total samples because it was applied with all pyrethroids and PBO was detected above the method detection limit of 0.005 µg/L in 63 (63%) of those samples. Detection frequencies are expected to be similar for active ingredients that were not sampled in 2011 and 2012, based on the similar nature of the applications.

Physical measurements (temperature, pH, electrical conductivity [EC], and dissolved oxygen [DO], and turbidity) for larvicide applications were coordinated by the Coalition. Physical measurements collected in the field included temperature, pH, EC, and DO. Turbidity was measured in the field or at a laboratory. Table 3 lists which districts collected physical measurements for each larvicide active ingredient in 2012. Some of the representing districts completed their physical measurements in early-2013.

Table 3. MVCAC NPDES Permit Coalition Physical Measurements, 2012

Product Name	Registration Number	Environmental Setting		
		Rural/Ag	Urban	Wetland
Bacillus sphaericus		**Volunteer District**		
Vectolex CG Biological Larvicide	73049-20	San Joaquin (6)	Greater LA (6)	San Mateo (6)
Vectolex WDG Biological Larvicide	73049-57			
Vectolex WSP Biological Larvicide	73049-20			
Spheratax SPH (50 G) WSP	84268-2			
Spheratax SPH (50 G)	84268-2			
Bacillus thuringiensis				
Vectobac Technical Powder	73049-13	Placer (6)	Greater LA (6)	Butte County (6)
Vectobac-12 AS	73049-38			
Aquabac 200G	62637-3			
Teknar HP-D	3049-404			
Vectobac-G Biological Mosquito Larvicide Granules	73049-10			
Aquabac xt	62637-1			
Bacillus sphaericus and *Bacillus thurigensis*				
Vectomax CG Biological Larvicide	3049-429	Lake County (6)	San Joaquin (2) San Diego (4)	San Joaquin (2) San Diego (4)
Vectomax WSP Biological Larvicide	3049-429			
Vectomax G Biological Larvicide/Granules	3949-429			
FourStar Briquets	83362-3			
FourStar SBG	85685-1			

Table 3. MVCAC NPDES Permit Coalition Physical Measurements, 2012

Product Name	Registration Number	Environmental Setting		
		Rural/Ag	Urban	Wetland
Methoprene				
Zoecon Altosid Pellets	2724-448	Shasta (6)	Greater LA (6)	Napa County (6)
Zoecon Altosid Pellets	2724-375			
Zoecon Altosid Liquid Larvicide Mosquito Growth Regulator	2724-392			
Zoecon Altosid XR Entended Residual Briquets	2724-421			
Zoecon Altosid Liquid Larvicide Concentrate	2724-446			
Zoecon Altosid XR-G	2724-451			
Zoecon Altosid SBG Single Brood Granule	2724-489			
Petroleum Distillates				
Mosquito Larvicide GB-1111	8329-72	San Joaquin (6)	Greater LA (6)	Sac-Yolo (6)
BVA 2 Mosquito Larvicide Oil	70589-1			
BVA Spray 13	55206-2			
Monomolecular Films				
Agnique MMF Mosquito Larvicide & Pupicide	53263-28	Sac-Yolo (3) Owens Valley (3)	Coachella (6)	Coachella (6)
Agnique MMF G	53263-30			
Spinosads				
Natular 2EC	8329-82	Coachella (6)	Greater LA (6)	Sac-Yolo (6)
Natular G	8329-80			
Natular XRG	8329-83			
Natular XRT	8329-84			

The MRP does not require assessment of visual observations or physical measurement data. However, a review of the results suggests that (with one exception) there are no differences between background, event, and post-event samples that could not be explained by diurnal factors or subjective observations by different field personnel. There is nothing to demonstrate that results of the physical monitoring differ from the normal variability that would occur at sites with no applications. Moreover, many of the application and monitoring sites are in areas with public access and are therefore subject to impacts beyond the control of MVCAC member districts. This is particularly true of sites in urban settings.

2.2 MONITORING ACTIVITY IN 2013

During 2013, the Coalition did not conduct chemical monitoring or perform visual, physical, and chemical testing reportable under the Vector Control Permit. Chemical monitoring and associated visual and physical monitoring were suspended due to ongoing negotiations with the SWRCB. These discussions were centered on the removal of the physical and chemical monitoring requirements in the permit. The SWRCB is currently proposing significant changes to the Vector Control Permit which have a direct impact on the monitoring component.

MVCAC member agencies also suspended visual monitoring due to high West Nile virus activity in 2013. This is consistent with the SWRCB notification letter of July 13, 2012 to

MVCAC that because visual monitoring requirements were "interfering with the need for maximal efficient application to adequately protect human health from vector-borne diseases like West Nile virus," that the visual monitoring was no longer required by individual member districts. The member districts continued to follow the guidelines of its PAP.

2.3 DISCUSSION

The Coalition was formed to gather data to better understand how the activities of MVCAC members and their application of pesticides affect the important goals of water quality. The initial concern regarding mosquito control products was the products used for adulticiding, as these products are designed to target mosquitoes in the air. Adulticides treat a specific area with the material drifting through an application zone, killing mosquitoes when they come in contact with the product. It is understood that some of the material, if applied over waterways, could come in contact with the water. In contrast to adulticides, larval control applications implemented by mosquito control districts are required by the Vector Control Permit to have visual and physical monitoring only (aside from temephos) due to the recognition that these products are highly specific to mosquito larvae and are widely accepted as excellent BMPs.

The physical and chemical monitoring results contained in the 2011-2012 report indicate that the active ingredient being sampled is rarely present in the waterway and/or the presence of the material in the waterway is of extremely short duration. Thus, there does not seem to be any significant long-term impact to the beneficial uses of the waters.

The Coalition's 2011-2012 annual report provided the following conclusions:

- 1 out of 136 visual observations showed a difference between background and post-event samples;
- 108 physical monitoring samples showed no difference between background and post-event samples; and
- 6 out of 112 samples exceeded the receiving water monitoring limitation or triggers.

The report indicated that there was no significant impact to beneficial uses of receiving waters due to application of vector control pesticides in accordance with approved application rates. This is consistent with the primary mandate for vector control districts of protecting public health by reducing vector-borne diseases from mosquitos and other vectors.

During the same time period, the University of California Davis, Department of Environmental Toxicology conducted the toxicity study for the SWRCB (in 2011 and 2012). University of California Davis submitted the Draft General Pesticide Permit Toxicity Study Report to the SWRCB in December 2012. The draft report provided the following conclusions:

- 17 out of 106 (16 percent) samples were toxic, primarily due to dichlorvos which is a degradation by-product of the active ingredient naled;
- Other toxic samples could be due to the presence of other pyrethroids not used in vector control applications and piperonyl butoxide, which synergized pyrethroids already in the water or sediments;
- Chemical monitoring can be used in lieu of toxicity testing to determine compliance with the permit.

- Although the toxicity study showed some toxicity resulted from vector control applications, the incidence of toxicity was found not to be significant.

For all the above reasons, further chemical testing is not likely to result in identification of any new information or any environmentally beneficial improvements to water quality and therefore chemical testing was not performed in 2013.

3.1 VECTOR CONTROL MANAGEMENT PRACTICES

MVCAC member agencies employ integrated pest management (IPM) and thus use of adulticides to control adult mosquitos is the method of control when it becomes necessary, such as in the event of a disease outbreak (documented presence of infectious virus in active host-seeking adult mosquitoes), or lack of access to larval sources leading to the emergence of large numbers of adult mosquitoes. First and foremost, MVCAC promotes education to prevent the formation of mosquito habitat. To that end, MVCAC encourages all public agencies to incorporate the California Department of Public Health BMPs in their planning and permitting documents and requirements. More than any other collective action that MVCAC could take; educating landowners about the simple, low-cost ways to prevent mosquito breeding habitats will have the greatest effects on disease prevention. This step alone has the greatest potential to reduce the need for adulticides. While MVCAC presses for introduction of these education and information tools throughout the state, its second level of protection is the use of physical and biological control tools to reduce the potential formation of mosquito breeding sites. Such steps include the use of water management practices, the removal of vegetation, and the introduction of predacious organisms such as mosquito fish to control the mosquito populations in their aquatic stage. Many districts conduct surveillance to ensure that they are targeting only those mosquitoes with the greatest impact to public health and this surveillance component helps drive control efforts. The third and fourth steps in the IPM process are chemical control of mosquitoes using larvicides and adulticides.

3.2 BMPS CURRENTLY IN USE

Member districts of MVCAC implement the BMPs provided in their respective PAPs in meeting the requirements of the Vector Control Permit. MVCAC member agencies follow an IPM approach that strives to efficaciously use pesticides and minimize their impact on the environment while protecting public health. Each member agency determines what vector management methods are appropriate in their district, and follows response plans that use surveillance tools to determine the extent of the problem and guide treatment decisions, with an emphasis on source reduction and control of mosquitoes in their immature stages. The least toxic materials available for control of the larval stages, focusing on bacterial larvicides, growth regulators and surface films are used rather than organophosphates or pyrethroids. Control of adult mosquitoes may become necessary under some circumstances, such as in the event of a disease outbreak (documented presence of infectious virus in birds, human population or active host-seeking adult mosquitoes), or lack of access to larval sources leading to the emergence of large numbers of biting adult mosquitoes. Organophosphate insecticides (naled and malathion) are used in rotation with pyrethrins or pyrethroids to avoid the development of resistance. The active ingredients currently used for control of adult mosquitoes have been deliberately selected for lack of persistence and minimal effects on non-target organisms when applied at label rates for ultra-low volume mosquito control. All BMPs included in the product labels are followed and include such measures as restrictions in certain land uses and weather (i.e., wind speed) parameters. Additional information about specific BMPs by region can be found in member agency's PAPs.

3.3 BMP MODIFICATIONS

Modifications to BMPs are handled by individual member districts on a district-by-district basis. Any modifications to BMPs can be found in respective member districts annual reports prepared as required by the Vector Control Permit. Pesticide application logs and site locations of the applications are also reported by the member districts in the district's annual report.

3.4 VIOLATIONS

Individual member districts would report violations of the Vector Control Permit in the district's annual report. No adverse impacts were reported to the Coalition.

The Vector Control Permit contains provisions for reducing monitoring and reporting requirements, if certain conditions are met. On May 22, 2013, MVCAC requested a reduction of the monitoring requirements and SWRCB consideration of requirements that complement the vector control districts' public safety mission and that do not interfere with the timing of their critical pesticide applications.

On December 31, 2013, the SWRCB issued an amended draft MRP for the Vector Control Permit. Based on the 2011-2012 monitoring data, the SWRCB found that application of pesticides in accordance with approved application rates does not impact beneficial uses of receiving waters, continuation of the existing monitoring requirements provides redundant information, and that continuing the prior monitoring regime is unnecessary.

The SWRCB concluded that visual observations, monitoring and reporting of pesticide application rates, and reporting of non-compliant applications provide information that is equivalent to the existing monitoring and reporting requirements in determining compliance with the Vector Control Permit. Therefore, the visual, physical, and chemical monitoring would be replaced with reporting of visual observations, monitoring and reporting of application rates, and reporting of non-compliant applications.

MVCAC and member agencies are currently in the process of responding to the draft amendment to the Vector Control Permit MRP. This process should help finalize monitoring and reporting requirements for 2014.