



THE COMMONWEALTH OF MASSACHUSETTS  
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS  
**Department of Agricultural Resources**  
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March 6, 2007

Mr. Anthony Britten, Team Leader  
Emergency Response Team  
U.S. EPA, Office of Pesticide Programs (7504P)  
Document Processing Desk (EMEX)  
Room S4900, One Potomac Yard  
2777 Crystal Drive  
Arlington, VA 22202

**RE: FINAL REPORT FOR EPA FILE SYMBOL: 06-MA-06**

Dear Mr. Dear Mr. Britten:

Dear Mr. Rosenblatt:

Attached please find the final report from the use of Anvil 10+10 (a.i. PBO and d-phenothrin/sumithrin), EPA Reg. No. 1021-1688-8329 in 2006.

This was the first-year that the Department of Agricultural Resources, in cooperation with the Massachusetts Department of Public Health and the State Reclamation and Mosquito Control Board applied Anvil 10+10 over crops under an EPA approved public health emergency exemption. The applications were performed in response to a declaration of public health emergency by the Governor regarding an outbreak of mosquito-borne Eastern Equine Encephalitis virus (EEEV) in the southeastern region of the State.

Should you have any questions related to this final report, please contact me at your convenience.

Sincerely,

Steven Antunes-Kenyon, Environmental Analyst  
(617)626-1784

Enclosures (2)  
By UPS Overnight  
cc: Robert Koethe, EPA Region 1

### **Total Acreage Treated and Total Amount of Pesticide Used**

Overall, 551,290.3 acres were treated with 2,670.3 gallons Anvil 10+10 (0.74 lb. sumithrin and PBO/gal. = 1,976 lb. active ingredients sumithrin and PBO).

#### **First Aerial Application Campaign:**

Application began on Tuesday, August 8, 2006 at 7:55 PM and ended on the morning of Wednesday, August 9, 2006 at 1:54 AM. The area treated encompassed the municipalities of Middleboro, Lakeville, Carver, Kingston and Plympton, plus parts of the communities of New Bedford, Taunton, Raynham, Freetown, Duxbury, Halifax, Plymouth, Rochester and Acushnet (see attached map).

- 140,994.3 acres, as calculated by the GPS-based navigational flight system of the aircraft; and
- Not including gallons used in calibration and droplet size estimation, approximately 683 gallons of Anvil 10 +10 product (0.74 lb. sumithrin and PBO/gal. = 505.42 lb. active ingredients sumithrin and PBO) were used to control mosquitoes and reduce the risks of EEEv infection.

#### **Second Aerial Application Campaign:**

Applications began on Tuesday, August 22, 2006 at sunset and ended in evening Thursday, August 24, 2006 at 9:58 PM. The area treated encompassed the municipalities previously treated during the evenings of August 8th and 9th including Middleboro, Lakeville, Carver, Kingston and Plympton, plus parts of the communities of New Bedford, Taunton, Raynham, Freetown, Duxbury, Halifax, Plymouth, Rochester and Acushnet. Other areas treated during this second round of spraying included the municipalities of Abington, Attleboro, Avon, Berkley, Braintree, Bridgewater, Brockton, Dartmouth, Dighton, East Bridgewater, Easton, Fairhaven, Fall River, Hanover, Hanson, Hingham, Holbrook, Mansfield, Mattapoisett, Norwell, Norton, Pembroke, Randolph, Rehoboth, Rockland, Sharon, Stoughton, Wareham, West Bridgewater, Weymouth, and Whitman. (see attached map).

- 410,296 acres, as calculated by the GPS-based navigational flight system of the aircraft; and
- Not including gallons used in calibration and droplet size estimation, approximately 1,987.37 gallons of Anvil 10 +10 product (0.74 lb. sumithrin and PBO/gal. = 1,470.6 lb. active ingredients sumithrin and PBO) were used to control mosquitoes and reduce the risks of EEEv infection.

### **Discussion of Effectiveness:**

The results of the operation were remarkable. In the **First Aerial Application Campaign** mosquito populations in the treated areas were dramatically reduced, and overall risk to the general public was lessened. Bristol and Plymouth County Mosquito Control Projects staff reported large reductions in mosquito abundance in areas that had been so treated. Overall, Bristol and Plymouth Counties reported reductions of 82.8% and 85.5%, respectively, in mosquito abundance. These reductions included mosquitoes of species that are important as maintenance vectors of EEEv amongst birds and those that are aggressive human biters and suspected to be the bridge vectors of EEEv to people. In addition, the staff of the MDPH State Laboratories Institute reported overall reductions of 59.8 % with noted reductions of mosquito species of concern such as *Ae. vexans* and *Cq. perturbans*. The discrepancies and variability of the measured reductions are attributable to differing methods of analysis as well as confounding factors such as weather changes between pre and post collections, terrain, and mosquito species. The results are presented below:

The information in this report was made available through the efforts of various Massachusetts State agencies including the State Reclamation and Mosquito Control Board, the Department of Public Health, the Department of Environmental Protection. The Department is especially grateful for the operational reports submitted by Mark Buffone, Chairman, SRMCB.

**Summary of Efficacy Results with Anvil 10+10 First Aerial Application Campaign:  
Application Dates Tuesday, August 8, 2006 thru Wednesday, August 9, 2006**

<b>Organization Collecting Data and Trap Used</b>	<b>Individual Target Species</b>	<b>Percent Control</b>
<b>MDPH, State Laboratories using CDC traps baited with 200cc CO<sub>2</sub> per minute.</b>		<b>Overall: 59.8%</b>
	<i>Cq. perturbans</i>	35%
	<i>Oc. canadensis</i>	no control
	<i>Cs. melanura</i>	70.1%
	<i>Ae. vexans</i>	65.2%
<b>Bristol County Mosquito Control Project with CDC traps baited with 200cc CO<sub>2</sub> per minute</b>		<b>Overall: 82.8%</b>
	<i>Cq. perturbans</i>	87.1%
	<i>Oc. canadensis</i>	72.0%
	<i>Cs. melanura</i>	97.1%
	<i>Ae. vexans</i> 77.2%	77.2%
<b>Plymouth County Mosquito Control Project</b>		<b>Overall: 85.5% control</b>
	<i>Cq. perturbans</i>	91.9%
	<i>Oc. canadensis</i>	no control
	<i>Cs. melanura</i>	79.2%
	<i>Ae. vexans</i>	100%

Data from the **Second Aerial Application Campaign** support a conclusion that the spray led to dramatic reductions in abundance where the spray was actually deployed. In adjacent areas, a lesser reduction occurred.

In non-sprayed areas, the numbers of mosquitoes increased. The State Reclamation and Mosquito Control in consultation with the Massachusetts Mosquito Advisory Group (MMAG), speculate that this increase was due to either/both immigration from outside the spray zone and/or emergence of new mosquitoes.

**In summary, the operation was successful in obtaining a positive public health outcome and provided the most meaningful response to this public health emergency.**

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**Discussion of Effectiveness:**

Overall, the results of the aerial operation, round 2, showed good control. Mosquito populations in the treated areas were significantly reduced, and risk to the general public was reduced. Bristol and Plymouth County Mosquito Control Projects staff reported large reductions in mosquito abundance in areas that were treated. Overall, Bristol and Plymouth Counties reported reductions of 88.6% and 60.15%, respectively, in mosquito abundance. Also, trap collections in Norfolk County showed a significant decrease in mosquitoes reporting reductions ranging from 57% to 97%. *In adjacent areas, a lesser reduction occurred. In non-sprayed areas, the numbers rose.*

These reductions included mosquitos' species that are important as maintenance vectors of EEEv amongst birds and those that are aggressive human biters and suspected to be the bridge vectors of EEEv to people. For example, MDPH State Laboratories Institute reported overall reductions of 79.5 % with noted reductions of mosquito species of concern especially *Cq. perturbans*, a human-biting species. The discrepancies and variability of the measured reductions are attributable to differing methods of analysis as well as confounding factors such as weather changes between pre and post collections, terrain, locations and kinds of traps utilized, and mosquito species.

**Description of Unexpected Adverse Effects:**

Significant impacts to the environment have not been observed as a result of the aerial application. Additionally, there have been no reported unintended effects regarding fish, birds, and or bees. However, no quantitative assessment was performed for these non-targets. Verbal reports from the Center for Environmental Health indicate only a few human illness reports (n=8) being investigated as a result of the aerial application. No objective findings have been reported of any alleged adverse effects to the environment to date.

**Results of Any Monitoring Carried Out:**

A multi-agency collaborative effort was undertaken to monitor pesticide residues in surface waters and in cranberries. An informal oral report from the Department of Public Health indicates that residues of sumithrin on cranberries tested were below the limits of detection (not provided) for the methods used. The Department and State Reclamation and Mosquito Control Board have requested documentation of the sampling results.

Water sampling analysis by the Massachusetts Pesticide Analytical Laboratory (MPAL) indicate there were no detectable residues of d-phenothrin/sumithrin in surface water and drinking water supplies tested. The levels of the synergist Piperonyl Butoxide (PBO) were very low and were below the expected environmental concentrations (EEC) as estimated by both the Massachusetts Department of Environmental Protection (MDEP) and the U.S. Environmental Protection Agency (EPA). Neither the MDEP nor the U.S. EPA has established a maximum contaminant level (MCL) or State drinking water guideline for residues of PBO in drinking water. The levels found do not violate any federal or State laws (see attached—3pp. lab summary reports).

**Discussion of Any Enforcement Actions:**

No enforcement actions were taken by the Department related to this public health emergency exemption.

**Method of Disposition of Crop:**

No crops were required to be destroyed as a result of these applications in southeastern Massachusetts. The Department worked closely with the media and multiple State agencies including the Department of Public Health

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and the Department of Environmental Protection to communicate and implement the required grower 2-day PHI and grazing restrictions for treated areas.

The Massachusetts Department of Public Health (MDPH), in cooperation with the Cape Cod Grower's Association collected cranberries from areas treated with Anvil 10+10 ULV. Although a report detailing the methods used and specific results is not currently available, the MDPH has stated that sumithrin levels were not detected, but that low levels of PBO were detected. There is an established tolerance for PBO on cranberries; moreover, there is a general exemption from the requirement of a tolerance for low levels of PBO residues in/on crops.