

ANVIL FIELD TRIALS

STATEN ISLAND, NY

8/27 – 9/17, 2000

Aerial and Ground ULV field trials were conducted on Staten Island in New York from August 27 – September 17, 2000 to determine efficacy using Anvil 10+10 neat (undiluted). A total of 4 trials were conducted:

- 1- Natural Population (Aerial)
- 2- Open Field Caged Trials (Aerial)
- 1- Ground Operational Caged Trial

METHODS

All applications were applied undiluted at a rate of .0036# AI/Acre. All aerial and ground ULV equipment were characterized and calibrated prior to treatments. Helicopter calibration occurred on August 17, 2000 at Linden Airport in Linden, NJ. The MMDs recorded at the time for both helicopters ranged between 30.1 microns and 27.4 microns (report attached). All truck mounted ULV spray equipment was calibrated to flow and droplet size at the Clarke Mosquito Control facility in Bronx, NY. The flow rates were 3.7 oz/min, equivalent to .0036#/AI/acre at 10 mph and the mmd's ranged between 10 and 14 microns.

Caged Trials:

The mosquitoes tested in these trials were collected via CO₂ baited ABC light traps and consisted of *Culex pipiens*, *Aedes vexans*, *Coquilleltidia perturbans*, *Psorophora ferox*, *Anopheles spp*, and *Culiseta melanura*. The collections were made from the same locations used in the Natural Population Study, in the middle of an aerial spray block. In addition to wild caught mosquitoes, mosquitoes were used from a colony of *Culex* mosquitoes acquired from Rutgers University.

Aerial caged trials were conducted at the La Tourette Golf Course (map attached), which was centered in the aerial spray block. Mosquito cages were placed on stakes 5 feet above ground with 4 replicates (3 cages each replicate). Replicates were approximately 150 feet apart.

The Ground trial was conducted in an operational setting on the grounds of Staten Island College. Mosquito cages were placed at intervals of 150' and 300' from application in an area with buildings and tree obstructions in order to obtain data during actual operations in a residential setting.

Mosquitoes in these trials were mouth aspirated into spray cages and once treated, they were allowed a specified exposure time :

- Aerial Applications – 45 minutes
 - o *Exposure time during the aerial application was longer than the ground trial due to the fact that these trials were conducted during the aerial application spray mission and the cages were not directly sprayed by helicopter. Time was required for the product to pass through study area.*
- Ground Applications – 10 minutes

The sprayed mosquitoes were then transferred (via mouth aspiration) to non-contaminated holding cages and monitored for knockdown and mortality at 2 hr., 12 hr., and 24 hr. intervals. All caged mosquitoes were fed a 10% sugar-water solution during the entire monitoring period.

Non-treated control mosquitoes were included in all four trials and all mosquitoes were handled identical to treated mosquitoes.

Natural Populations:

CO₂ baited ABC traps were placed in 3 selected areas within the aerial spray zone. These locations were within High Rock Conservation Center (map attached) and were heavily wooded with significant canopy and undergrowth. Two non-treated sites located at the Flushing Airport in Queens, NY were also monitored. Populations were monitored 2 nights prior to treatment and 24 hours post-treatment. *Mosquitoes collected at these sites were also used for the caged mosquito trials.*

A weather station was on site for each trial and monitored the weather conditions throughout the entire efficacy trial periods.

Materials:

Product: Anvil 10+10[®] applied at a rate of .0036# AI/Acre

Applications were conducted by:

Aerial: Bell 47 Helicopters (2) equipped with Hydraulic Beecomist Rotary Nozzles

Ground: Grizzly ULV Sprayer

CO₂ baited ABC light traps were used to monitor the natural population pre and post aerial applications.

Results of these trials are reported in the following tables and graphs:

Trial 1: Aerial Application - MMD - 21.6 μ

Natural Population via CO₂ baited light traps

Temp – 72° F Winds – 3-4 MPH

Staten Island Treatment Sites	August 25, 2000	August 26, 2000		August 27, 2000 (Trap set 1 hour post treatment)	August 28, 2000 24 hrs Post Treatment
Site 1 High Rock Park	62	59		3	0
Site 2 High Rock Park	92	56		2	2
Site 3 High Rock Park	63	69		1	2
Control 1 Flushing Airport	196	175		215	226
Control 2 Flushing Airport	162	167		297	207

Trial 2: Aerial - Open Field Caged trial

On site monitoring – 5:00pm – 10:00 pm

La Tourette Golf Course

August 27, 2000, Staten Island, NY

MMD - 21.6μ

Temperature – 72° F Winds ranged from 3-7 MPH

	2 HR Knockdown	12 HR Knockdown	24 HR Mortality	Total # Mosquitoes/cage
Cage A 1	23/100%	23/100%	23/100%	23
Cage A 2	28/100%	28/100%	28/100%	28
Cage B 1	24/100%	24/100%	24/100%	24
Cage B 2	27/100%	27/100%	27/100%	27
Cage C 1	21/100%	21/100%	21/100%	21
Cage C 2	19/83%	21/91%	21/91%	23
Cage D 1	22/100%	22/100%	22/100%	22
Cage D 2	23/100%	23/100%	23/100%	23
Cage E 1	22/100%	22/100%	22/100%	22
Cage E 2	22/96%	22/96%	22/96%	23
Cage F 1	19/100%	19/100%	19/100%	19
Cage F 2	23/88%	25/96%	25/96%	26

	2 HR	12 HR	24 HR	Total
Control 1	0	0	0	21
Control 2	0	0	0	24
Control 3	0	0	0	25
Control 4	0	0	0	26
Control 5	0	0	0	21
Control 6	0	0	0	23

CONTROL MORTAITY – 0%

Trial 3: Aerial - Open Field Caged trial

August 30, 2000, Staten Island, NY

On site monitoring – 5:00pm – 10:00 pm

La Tourette Golf Course

MMD - 18.1 μ

Temperature – 74° F Winds ranged from 2-5 MPH

	2 HR Knockdown	12 HR Knockdown	24 HR Mortality	Total # Mosquitoes/cage
Cage A 1	29/100%	29/100%	29/100%	29
Cage A 2	24/89%	24/89%	24/89%	27
Cage B 1	23/96%	23/96%	23/96%	24
Cage B 2	36/90%	36/90%	36/90%	40
Cage C 1	23/100%	23/100%	23/100%	23
Cage C 2	31/100%	31/100%	31/100%	31
Cage D 1	28/100%	28/100%	28/100%	28
Cage D 2	26/100%	26/100%	26/100%	26
Cage E 1	20/100%	20/100%	20/100%	20
Cage E 2	30/100%	30/100%	29/97%	30
Cage F 1	26/100%	26/100%	24/93%	26
Cage F 2	29/100%	29/100%	27/93%	29

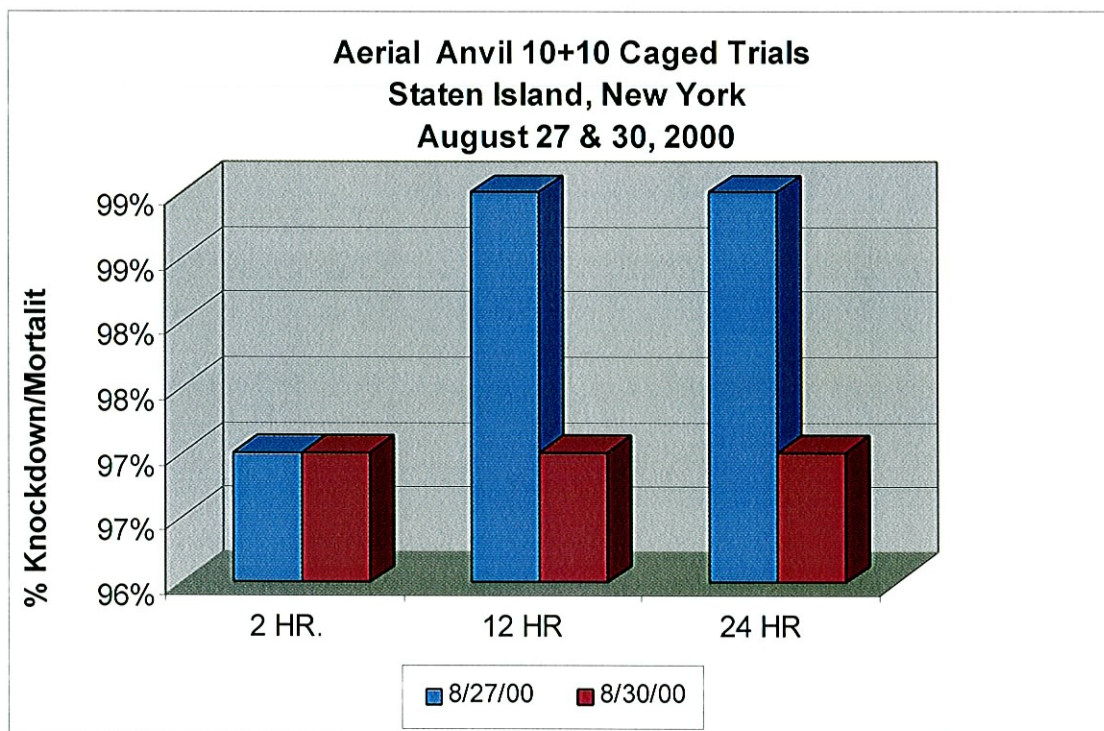
	2 HR	12 HR	24 HR	Total
Control 1	0	1	1	30
Control 2	0	0	0	30
Control 3	0	0	0	25
Control 4	0	0	0	29
Control 5	0	2	2	30
Control 6	0	3	3	29

CONTROL MORTALITY – 3%

Note:

The cages that reflect recovery or non-mortality were cages that contained only the colony mosquitoes. All the wild caught mosquitoes recorded 100% mortality following treatment.

Trials 2 & 3 Summary Results:



Controls: 8/27/00 – 0%

Controls: 8/30/00 - 3% Mortality

Trial 4: Ground - Caged trial in an operational setting at Staten Island College.

September 17, 2000 - 11:00pm - 1:00 am (September 18, 2000)

Staten Island College, Staten Island, NY

Grizzly at 3.8 oz/min = .0036#AI/acre

MMD @ 150' - 18.3 microns

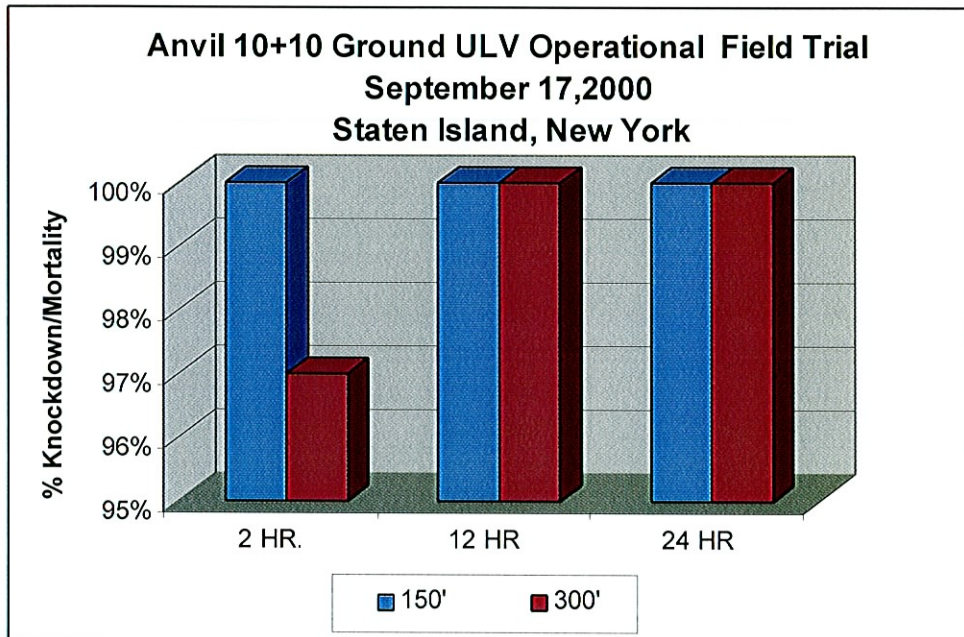
MMD @ 300' - 14.6 microns

Temperature - 61° F Winds @ 3-4 MPH

	2 HR Knockdown	12 HR Knockdown	24 HR Mortality	Total
Cage 1-150'	28/100%	28/100%	28/100%	28
Cage 2-150'	23/100%	23/100%	23/100%	23
Cage 3-150'	26/100%	26/100%	26/100%	26
Cage 4-150'	21/100%	21/100%	21/100%	21
Cage 5 -150'	26/100%	26/100%	26/100%	26
Cage 6-150'	25/100%	25/100%	25/100%	25
Cage 7-300'	22/96%	23/100%	23/100%	23
Cage 8-300'	27/96%	28/100%	28/100%	28
Cage 9-300'	24/100%	24/100%	24/100%	24
Cage 10 -300'	20/91%	22/100%	22/100%	22
Cage 11 -300'	22/100%	22/100%	22/100%	22
Cage 12 -300'	27/100%	27/100%	27/100%	27

	2 HR	12 HR	24 HR	Total
Control 1	0	0	0	23
Control 2	0	0	0	26
Control 3	0	0	0	28
Control 4	0	0	3%	26

Trial 4: Summary Results



Controls: 3% Mortality

Conclusions:

These field data were collected under operational field conditions to demonstrate the efficacy of ANVIL 10+10. In the Natural Population Study a significant reduction was achieved in High Rock Park under moderate to dense canopy. The control-untreated mosquito populations increased in both trap locations.

Evaluation of the efficacy of any insecticide in an operational condition is difficult to achieve because of the number of variables involved.

Additionally, any adulticide spray operation will only effect that part of the population actively flying while the insecticide droplets are still present. Mosquitoes which are not actively flying will not be effected by adulticide applications.

Because of this selectivity towards active, host-seeking mosquitoes, repeated applications should be considered over a 3-5 day period.

**Meteorological Data
Stanten Island, NY
August 2000**

Date	Time	Air			Wind		Wind Dir
		Temp	Hi	Low	Speed (MPH)	Hi	
8/27/00	5:20 PM	79.9	80	79.9	1	2	ESE
8/27/00	5:21 PM	80.1	80.1	80	1	1	ESE
8/27/00	5:22 PM	80.2	80.2	80.1	0	1	ESE
8/27/00	5:23 PM	80.3	80.3	80.2	1	3	ESE
8/27/00	5:24 PM	80.4	80.4	80.3	1	1	ESE
8/27/00	5:25 PM	80.4	80.4	80.4	1	2	SE
8/27/00	5:26 PM	80.4	80.4	80.4	3	5	ESE
8/27/00	5:27 PM	80.3	80.3	80.2	3	6	ESE
8/27/00	5:28 PM	80.1	80.2	80.1	2	4	ESE
8/27/00	5:29 PM	80	80.1	79.9	2	5	E
8/27/00	5:30 PM	79.9	79.9	79.8	2	4	ESE
8/27/00	5:31 PM	79.7	79.8	79.6	4	6	ESE
8/27/00	5:32 PM	79.5	79.6	79.5	3	7	ESE
8/27/00	5:33 PM	79.5	79.5	79.4	2	5	ESE
8/27/00	5:34 PM	79.4	79.4	79.4	2	4	SSE
8/27/00	8:29 PM	79.4	79.4	79.4	1	2	SE

**Meteorological Data
Stanten Island, NY**

Date	Time	Air			Wind		Wind Dir
		Temp	Hi	Low	Speed	Hi	
9/18/00	11:00 PM	63.8	63.8	63.7	0	0	---
9/18/00	11:01 PM	63.8	63.9	63.8	0	0	---
9/18/00	11:02 PM	63.9	63.9	63.9	0	0	---
9/18/00	11:03 PM	63.9	63.9	63.9	1	1	WSW
9/18/00	11:04 PM	63.9	63.9	63.9	1	1	WSW
9/18/00	11:05 PM	63.9	63.9	63.9	0	0	---
9/18/00	11:06 PM	63.9	63.9	63.8	1	2	WSW
9/18/00	11:07 PM	63.7	63.8	63.7	0	1	WSW
9/18/00	11:08 PM	63.7	63.7	63.6	0	0	---
9/18/00	11:09 PM	63.6	63.6	63.6	0	0	---
9/18/00	11:10 PM	63.6	63.6	63.6	0	0	---
9/18/00	11:11 PM	63.6	63.6	63.5	1	2	WSW
9/18/00	11:12 PM	63.5	63.6	63.5	1	3	WSW
9/18/00	11:13 PM	63.6	63.6	63.6	2	4	S
9/18/00	11:14 PM	63.6	63.6	63.6	1	2	S
9/18/00	11:15 PM	63.6	63.6	63.5	1	2	W
9/18/00	11:16 PM	63.5	63.6	63.5	1	2	WNW
9/18/00	11:17 PM	63.6	63.6	63.6	0	0	---
9/18/00	11:18 PM	63.6	63.6	63.6	0	1	WNW
9/18/00	11:19 PM	63.6	63.6	63.6	1	2	WNW
9/18/00	11:20 PM	63.7	63.7	63.6	1	1	WNW
9/18/00	11:21 PM	63.7	63.7	63.7	0	2	WNW
9/18/00	11:22 PM	63.7	63.8	63.7	0	2	WNW
9/18/00	11:23 PM	63.7	63.7	63.7	0	2	WNW
9/18/00	11:24 PM	63.7	63.7	63.6	1	2	WNW
9/18/00	11:25 PM	63.6	63.6	63.6	1	3	WNW
9/18/00	11:26 PM	63.6	63.6	63.6	2	3	SSE
9/18/00	11:27 PM	63.6	63.6	63.6	2	3	WSW
9/18/00	11:28 PM	63.6	63.6	63.6	2	4	S
9/18/00	11:29 PM	63.6	63.6	63.6	2	3	NW
9/18/00	11:30 PM	63.6	63.6	63.6	2	3	WNW
9/18/00	11:31 PM	63.6	63.7	63.6	2	3	WNW
9/18/00	11:32 PM	63.6	63.7	63.6	0	0	---
9/18/00	11:33 PM	63.6	63.7	63.6	1	3	W
9/18/00	11:34 PM	63.6	63.6	63.6	0	0	---
9/18/00	11:35 PM	63.6	63.6	63.5	0	0	---
9/18/00	11:36 PM	63.5	63.5	63.5	2	3	SSW
9/18/00	11:37 PM	63.6	63.6	63.5	1	2	SW
9/18/00	11:38 PM	63.5	63.6	63.5	2	3	S
9/18/00	11:39 PM	63.5	63.5	63.5	2	3	SW
9/18/00	11:40 PM	63.5	63.5	63.5	2	3	WSW
9/18/00	11:41 PM	63.6	63.6	63.5	2	3	SSW
9/18/00	11:42 PM	63.6	63.6	63.5	1	2	WNW
9/18/00	11:43 PM	63.5	63.5	63.5	1	3	WNW
9/18/00	11:44 PM	63.5	63.5	63.4	1	2	WNW
9/18/00	11:45 PM	63.4	63.4	63.4	0	0	---
9/18/00	11:46 PM	63.4	63.4	63.3	0	1	WNW
9/18/00	11:47 PM	63.3	63.3	63.3	0	1	WNW
9/18/00	11:48 PM	63.2	63.2	63.2	1	2	WNW
9/18/00	11:49 PM	63.1	63.2	63.1	1	2	WNW
9/18/00	11:50 PM	63	63.1	63	1	2	WNW
9/18/00	11:51 PM	62.9	63	62.9	1	2	WNW
9/18/00	11:52 PM	62.9	62.9	62.8	1	2	WNW
9/18/00	11:53 PM	62.8	62.8	62.8	1	2	WNW
9/18/00	11:54 PM	62.8	62.8	62.7	2	3	WNW
9/18/00	11:55 PM	62.7	62.7	62.7	1	2	SW
9/18/00	11:56 PM	62.7	62.7	62.7	1	2	SW
9/18/00	11:57 PM	62.6	62.7	62.6	0	1	SW
9/18/00	11:58 PM	62.6	62.6	62.6	0	0	---
9/18/00	11:59 PM	62.5	62.6	62.5	0	0	---

ANVIL 10+10
CHARACTERIZATION and CALIBRATION
of
Clarke Mosquito Control Helicopters
Linden Airport
Linden, New Jersey
August 17, 2000

AIRCRAFT SPECIFICATIONS

- **Bell 47- N4032NG**
 - ⇒ 60 MPH
 - ⇒ 500' Swath
 - ⇒ 60.6 Acres/minute
 - ⇒ 37.6 oz/min equivalent to .0036# AI/Acre
 - ⇒ Equipped with 2 Beecomist Rotary Atomizers

- **Bell 47 – 2618W**
 - ⇒ 60 MPH
 - ⇒ 300' Swath
 - ⇒ 36.4 Acres/minute
 - ⇒ 22.5 oz/min equivalent to .0036 #AI/Acre
 - ⇒ Equipped with 1 Beecomist Rotary Atomizer

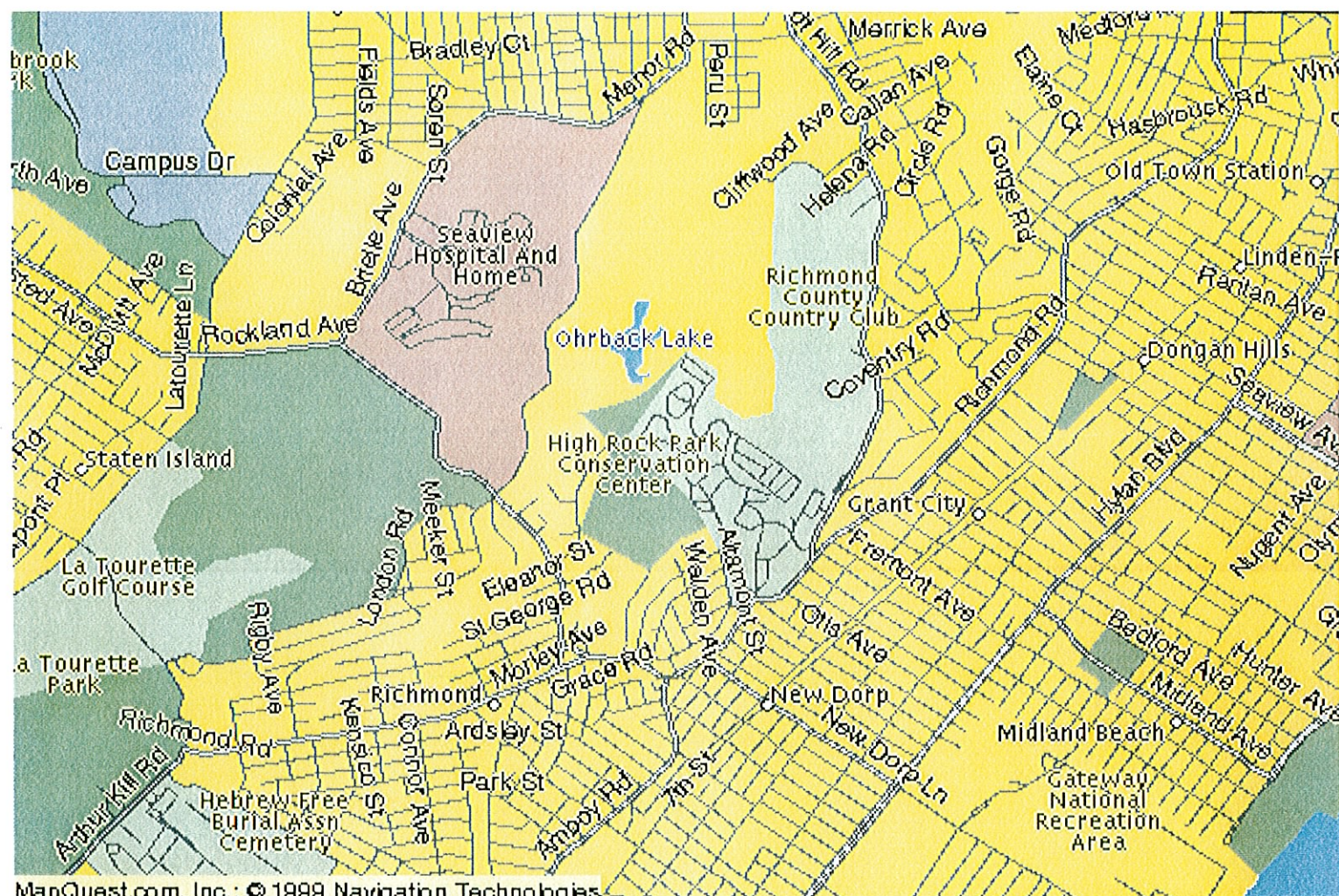
August 17, 2000
Time: 4:30 PM
Wind- NE @ 3-5 MPH
Temp. 76 F

Four spinners placed in grass field adjacent to runway so that spinners are in line with spray.

Sprayed at 75' altitude into wind directly above spinners and for approximately 1000' past spinners.

Good droplet deposition was achieved.

MMDs – N4032G – 30.1 μ
2618W - 27.4 μ



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