State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

APPENDICES

FOR THE

Report for the Application
and Ambient Air Monitoring
of Fenamiphos in Fresno County

Engineering and Laboratory Branch

Monitoring and Laboratory Division

Project No. C97-039 (Application)
C97-003 (Ambient)

Date: December 9, 1998

APPENDIX I

SAMPLING PROTOCOL

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Protocol for the Ambient Air Monitoring of Fenamiphos In Fresno County During April, 1997

Engineering and Laboratory Branch

Monitoring and Laboratory Division

Project No. C97-003

Date: March 18, 1997

APPROVED:

Kevin Mongar, Project Engineer

Cynthia L. Castronovo, Manager
Testing Section

George Lew, Chief
Engineering and Laboratory Branch

This protocol has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Protocol for the Ambient Air Monitoring
of Fenamiphos
In Fresno County During April, 1997

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR), (February 27, 1997 Memorandum from John Sanders to George Lew) the Air Resources Board (ARB) staff will determine airborne concentrations of the pesticide fenamiphos [Ethyl 3-methyl-4-(methylthio)phenyl (1-methylethyl) phosphoramidate] over a six week ambient monitoring program in areas frequented by people. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions .... of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. The monitoring program will be conducted in Fresno County.

The draft method development results and "Standard Operating Procedures for the Analysis of Fenamiphos in Ambient Air" (contracted to the University of California, Davis (UCD)) are not included in this protocol but will be included in the draft report.

II. Chemical Properties of Fenamiphos

Fenamiphos (CAS: 22224-92-6) exists as a colorless solid. Fenamiphos has a molecular formula of $C_9H_{10}Cl_2N_2O_3$ and a molecular weight of 249.10 g/mole. It has a Henry's Constant of 9.5×10^{-10} atm·m^3/mol at 30 °C, and a vapor pressure of 9.98×10^{-7} mmHG at 30 °C. Fenamiphos is soluble in water at 306, 329, and 419 mg/L at 10, 20, and 30 °C, respectively. It is miscible with acetone, dimethylsulfoxide, ethanol, and many other common organic solvents.

In soil, fenamiphos oxidizes to the corresponding sulfone and sulfoxide. Its half-life in Arredondo soil is 38-67 days.

Fenamiphos's acute oral LD_{50} is 15.3 and 19.4 mg/kg, for male and female rats, respectively. Its LC_{50} (96 hour) is 72.1 ug/L for rainbow trout, 9.6 ug/L for bluegill sunfish, and 3,200 ug/L for goldfish. Fenamiphos entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on mutagenic effects.

III. Sampling

Samples will be collected by passing a measured volume of ambient air through XAD-4 resin. The resin holders are 4-3/4" long x 1-55/66" O.D. and made of Teflon. Each holder should contain approximately 30cc of specially prepared XAD-4 resin. The resin will be held in place by stainless steel screens on each side of the resin and between the Teflon support rings. The flow rate will be accurately measured and the sampling system operated continuously with the exact operating interval noted. The resin holders will be covered with aluminum foil and supported about 1.5 meters above the ground during the sampling period. At the end of each sampling period the holders will be capped and placed in a zip-lock

plastic bag with an identification label affixed. Any fenamiphos present in the sampled ambient air will be captured by the XAD-4 adsorbent. Subsequent to sampling, the sample cartridges will be transported on dry ice, as soon as reasonably possible, to the Department of Environmental Toxicology, University of California, Davis laboratory for analysis. The samples will be stored in the freezer (-20 C) or analyzed immediately.

A sketch of the sampling apparatus is shown in Attachment A. Calibrated rotameters will be used to set and measure sample flow rates. Samplers will be leak checked prior to and after each sampling period with the sampling cartridges installed. Any change in the flow rates will be recorded in the field log book. The field log book will also be used to record start and stop times, sample identifications and any other significant data.

Ambient Monitoring

The historical trends in fenamiphos use suggest that monitoring should occur over a 30- to 45-day sampling period in Fresno County during the month of April. Three to five sampling sites should be selected in relatively high-population areas or in areas frequented by people. Sampling sites should be located near grape growing areas. Ambient samples should not be collected from samplers immediately adjacent to fields or orchards where fenamiphos is being applied. At each site, twenty to thirty discrete 24-hour samples should be taken during the sampling period. Background samples should be collected in an area distant to fenamiphos applications. Field spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling.

Replicate (collocated) samples are needed for five dates at each sampling location. The date chosen for replicate samples should be distributed over the entire sampling period. They may, but need not be, the same dates at every site.

Four sampling sites plus an urban background site were selected by ARB personnel from the areas of Fresno County where grape farming is predominant. Sites were selected for their proximity to the grape fields with considerations for both accessibility and security of the sampling equipment. The five sites were at the following locations: Addresses for the sites are listed in Table 1.

TABLE 1. Ambient Sampling Sites		
FOW	Fremont Middle School 306 E. Toulumne Fowler, CA 93625	(209) 834-2591 Eric Cederquist Asst. Superintendent Fowler Unified School Dist.
ARB	Air Resources Board, Ambient Air Monitoring Station 3425 N First, Suite 205B Fresno, CA 228-1825	(209) 228-1825
EAS	Washington Union High School 6041 S. Elm Fresno, CA 93706	(209) 485-8805 Bill Griffin Superintendent
ALV	Alvina Elementary School 295 W. Saginow Caruthers, CA 93609	(209) 864-9411 Larry Wilson Superintendent
	TO BE ADDED LATER	

The samples will be collected by ARB personnel over a six week period from March 31 - May 9, 1997. 24-hour samples will be taken Monday through Friday (4 samples/week) at a flow rate of 15 L/minute.

IV. Analysis

The method development results and "Standard Operating Procedures for the Analysis of Fenamiphos in Ambient Air" are not included in this protocol but will be included in the draft report.

V. Quality Assurance

Field Quality Control for the ambient monitoring will include:

1) Five field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling), spiked at five different levels. The field spikes will be obtained by sampling ambient air at the background monitoring site for 24 hour periods at 15 L/minute.

2) Five trip spikes will be prepared and spiked at five different levels.

3) Replicate samples will be taken for six dates at each sampling location.

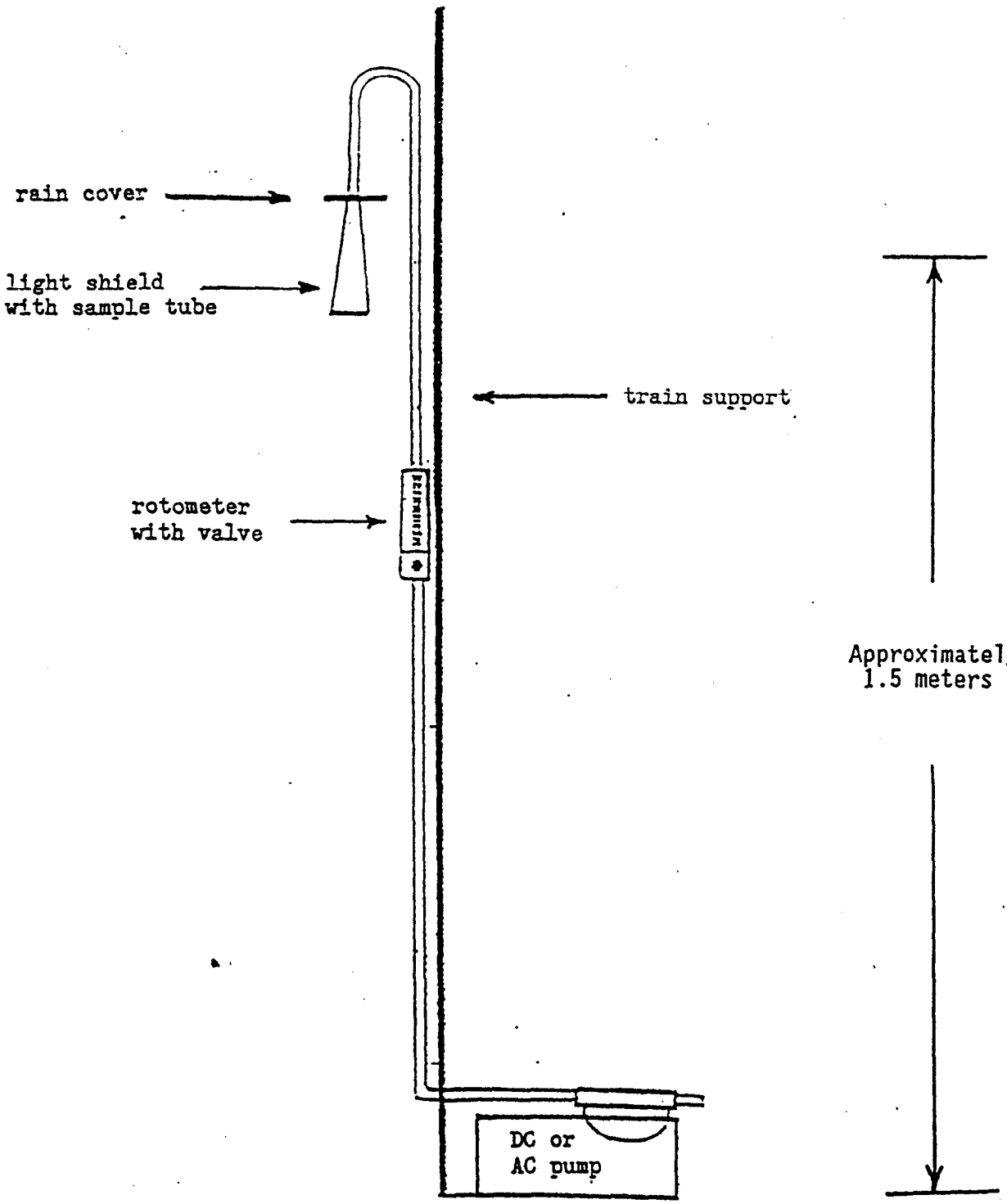
4) Trip blanks will be obtained at each of the five sampling locations.

A chain of custody sheet will accompany all samples. Rotameters will be calibrated prior to and after sampling in the field.

VI. Personnel

ARB personnel will consist of Kevin Mongar (Project Engineer) and an Instrument Technician.

Attachment A


rain cover
light shield
with sample tube
train support
rotometer
with valve
DC or
AC pump
Approximately
1.5 meters

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Protocol for the Application Monitoring of Fenamiphos In the San Joaquin Valley

Engineering and Laboratory Branch

Monitoring and Laboratory Division

Project No. C97-039

Date: August 15, 1997

APPROVED:

Kevin Mongar, Project Engineer

Cynthia L. Castronovo, Manager
Testing Section

George Lew, Chief
Engineering and Laboratory Branch

This protocol has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

Protocol for the Application Monitoring
of Fenamiphos
In the San Joaquin Valley

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR), (March 14, 1997 Memorandum from John Sanders to George Lew) the Air Resources Board (ARB) staff will determine airborne concentrations of the pesticide fenamiphos, Ethyl 3-methyl-4-(methylthio)phenyl (1-methylethyl) phosphoramidate (fenamiphos), over a 72 hour monitoring program at an application site. This monitoring will be done to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5) which requires the ARB "to document the level of airborne emissions .... of pesticides which may be determined to pose a present or potential hazard..." when requested by the DPR. The monitoring program will be conducted in the San Joaquin Valley in August, September or October of 1997.

The draft method development results and "Standard Operating Procedures for the Analysis of Fenamiphos in Ambient Air" (contracted to the University of California, Davis (UCD)) are included as Attachment B.

II. Chemical Properties of Fenamiphos

Fenamiphos (CAS:22224-92-6) exists as a colorless solid. Fenamiphos has a molecular formula of $C_9H_{10}Cl_2N_2O_3$ and a molecular weight of 249.10 g/mole. It has a Henry's Constant of 9.5×10^{-10} atm·m^3/mol at 30 °C, and a vapor pressure of 9.98×10^{-7} mmHg at 30 °C. Fenamiphos is soluble in water at 306, 329, and 419 mg/L at 10, 20, and 30 °C, respectively. It is miscible with acetone, dimethylsulfoxide, ethanol, and many other common organic solvents.

In soil, fenamiphos oxidizes to the corresponding sulfone and sulfoxide. Its half-life in Arredondo soil is 38-67 days.

Fenamiphos's acute oral LD_{50} is 15.3 and 19.4 mg/kg, for male and female rats, respectively. Its LC_{50} (96 hour) is 72.1 ug/L for rainbow trout, 9.6 ug/L for bluegill sunfish, and 3,200 ug/L for goldfish. Fenamiphos entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on mutagenic effects.

III. Sampling

Samples will be collected by passing a measured volume of ambient air through XAD-4 resin. The resin holders are 4-3/4" long x 1-55/66" O.D. and made of Teflon. Each holder should contain approximately 30cc of specially prepared XAD-4 resin. The resin will be held in place by stainless steel screens on each side of the resin and between the Teflon support rings. The flow rate will be accurately measured and the sampling system operated continuously with the exact operating interval noted. The resin holders will be covered with aluminum foil and supported about 1.5 meters above the ground during the sampling period.

At the end of each sampling period the holders will be capped and placed in a zip-lock plastic bag with an identification label affixed. Any fenamiphos present in the sampled ambient air will be captured by the XAD-4 adsorbent. Subsequent to sampling, the sample cartridges will be transported on dry ice, as soon as reasonably possible, to the Department of Environmental Toxicology, University of California, Davis laboratory for analysis. The samples will be stored in the freezer (-20 C) or analyzed immediately.

A sketch of the sampling apparatus is shown in Attachment A. Calibrated rotameters will be used to set and measure sample flow rates. Samplers will be leak checked prior to and after each sampling period with the sampling cartridges installed. Any change in the flow rates will be recorded in the field log book. The field log book will also be used to record start and stop times, sample identifications and any other significant data.

IV. Application-Site Air Monitoring

Generally, the purpose of the application-site monitoring is to document the potential of a pesticide to be found in air when it is being applied at rates close to the maximum label rate. For fenamiphos, no consistent use patterns exist where this pesticide is applied at or near the maximum label rates. However, applications to several tree fruit crops regularly occur at rates greater than 2.5 lbs/acre. These applications occur to citrus (orange/lemon) and stone fruit (cherry, nectarine, peach) crops. For these crops, average application rates range from 0.5 to 8.7 lbs AI/acre. These application rates are routinely found in the summer and early fall in Fresno, San Joaquin, and Stanislaus Counties. Selecting a location appropriate for application site monitoring for fenamiphos will require a more extensive coordination with the growers and the agricultural commissioners in these counties. Monitoring should be conducted in association with the highest possible use rate.

When establishing monitoring stations, care should be taken to prevent nearby applications from contaminating collected samples. A three day monitoring period should be established with sampling times as follows: application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples and two 24-hour samples. A minimum of four samplers should be positioned, one on each side of the field. A fifth sampler should be collocated at one position. Background samples should collect enough volume (either 12 hours at 15 liters/min, or a shorter period with a higher volume pump) to permit a reasonable minimum detection level. Ideally, samplers should be placed a minimum of 20 meters from the field. Field spike samples should be collected at the same environmental conditions (temperature humidity, exposure to sunlight) and experimental conditions (similar air flow rates) as those occurring at the time of sampling.

Additionally, we will provide in the monitoring report: 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the sampler is positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles; 3) meteorological data collected at a minimum of 15-minute intervals including wind speed and direction, humidity, and air temperature, and comments regarding degree of cloud cover; and 4) the elevation of each sampling station with respect to the field, and the orientation of the field with respect to North (identified as either true or magnetic North).

V. Analysis

The method development results and "Standard Operating Procedures for the Analysis of Fenamiphos in Ambient Air" are included in this protocol as attachment B.

VI. Quality Assurance

Field Quality Control for the application monitoring will include:

1) Four field spikes (same environmental and experimental conditions as those occurring at the time of ambient sampling). The field spikes will be obtained by sampling ambient air during the site background monitoring.

2) Four trip spikes.

3) Replicate samples will be taken for all samples at one sampling location.

4) A trip blank will be obtained.

A chain of custody sheet will accompany all samples. Rotameters will be calibrated prior to and after sampling in the field. Samplers will be leak checked prior to and after each sampling period with the sampling cartridges installed. Any change in the flow rates will be recorded in the field log book. The field log book will also be used to record start and stop times, sample identifications and any other significant data.

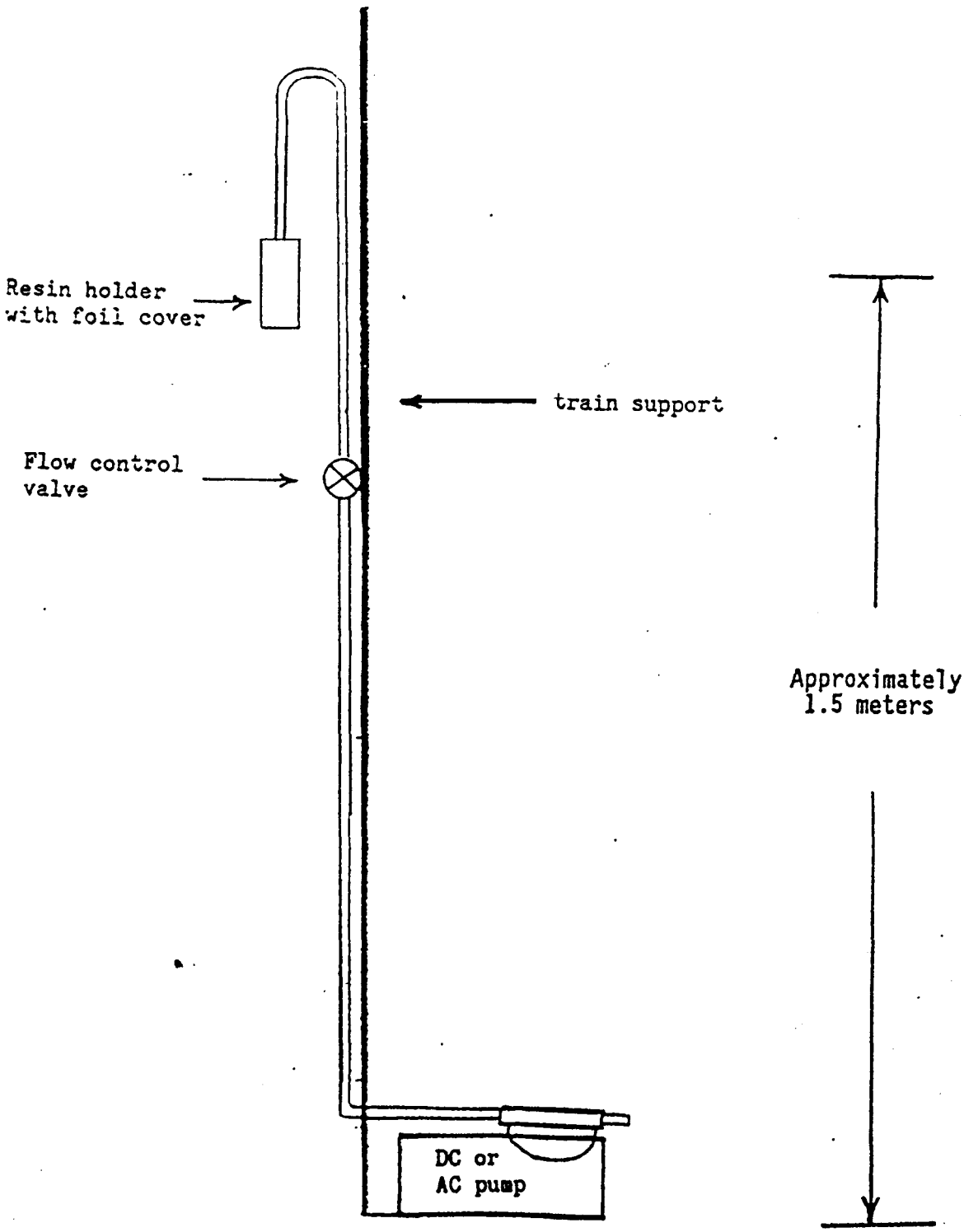
VII. Personnel

ARB personnel will consist of Kevin Mongar (Project Engineer) and two Instrument Technicians.

Attachment A

FIGURE 1

FIELD SAMPLING APPARATUS



Attachment B

Standard Operating Procedure for the Analysis of Fenamiphos in Ambient Air

1. SCOPE

The method utilized is a gas chromatographic method with a flame photometric detector (FPD) and a 526 nm filter that is selective for phosphorus compounds. This method has been used by Environmental Toxicology personnel for the analysis of organophosphates in air.

2. SUMMARY OF METHOD

Exposed XAD-4® resin samples are stored either in an ice chest with dry ice or at -20 °C in a freezer. Samples are extracted with 75 mL of ethyl acetate and an aliquot is oxidized with potassium permanganate to fenamiphos sulfone then concentrated prior to injecting 3 µL on to a gas chromatograph equipped with a flame photometric detector. Results of analysis are mathematically converted back to parent compound and reported as total fenamiphos.

3. INTERFERENCES/LIMITATIONS

Potential interferences may arise due to contaminants in laboratory solvents, reagents, glassware and/or apparatus. A reagent blank and/or control resin blank must be run through the method procedure and analyzed with each set of samples. We reserve the right to change this standard operating procedure should the need arise to handle unforeseen complications with the compounds of interest.

4. EQUIPMENT AND CONDITIONS

A. **Instrumentation**

Hewlett-Packard 5890 Series II gas chromatograph
Hewlett-Packard 7673 Autosampler
Perkin-Elmer TurboChrom® Data System
Microsoft Excel®, version 7.0

Injector : 250°C
Detector: 225°C
Column: Rxt-1 30 m x 0.53 mm wide bore capillary with a 1.5 µm film thickness

Temperature program: initial: 170°C, hold 0 min, ramp to 250°C @ 10°C/min; hold 0 min. Fenamiphos sulfone = 5.63 min.

Flows:
Carrier (He) = 20 mL/min
Make-up (He) = 10 mL/min
Air = 115 mL/min
Hydrogen = 100 mL/min

B. **Auxiliary Apparatus**

1. Rotary platform shaker.
2. 100 mL round bottom flasks.
3. 50 mL graduated cylinders.
4. Rotary evaporator.
5. Disposable pipettes.
6. Separatory funnels, 125 mL.
7. Nitrogen evaporator (N-Evap®).
8. Graduated 15 mL centrifuge tubes.
9. Autosampler vials and screw caps.

C. **Reagents**

1. Ethyl acetate, pesticide grade.
2. Chloroform, pesticide grade.
3. Acetone, pesticide grade.
4. Fenamiphos, Bayer Corp., 96.2 % or equivalent.
5. Fenamiphos sulfone, Bayer Corp, 99.5 % or equivalent.
6. 20% Magnesium sulfate.
7. 0.5 N Potassium permanganate.
8. Sodium sulfate, anhydrous.
9. Filter paper, Whatman 541, 55 mm circles.

5. ANALYSIS OF SAMPLES

1. A solvent blank and/or a control resin blank will be analyzed with each set of samples. The blank must be free of interferences for the analysis of fenamiphos sulfone.

2. Three resin fortification samples must be fortified, extracted and analyzed with each set of samples.

3. Allow samples to come to room temperature and add 75 mL of ethyl acetate. Cap the sample and swirl for one hour on a rotary platform shaker.

4. Quantitatively transfer 37.5 mL to a 100 mL round bottom flask and evaporate the solvent to dryness using a rotary evaporator. Add 2 mL of acetone.

5. Add 5 mL of 20% magnesium sulfate solution and swirl. Add 20 mL of 0.5N potassium permanganate solution and swirl. Allow sample to sit for 30 minutes with occasional swirling. Transfer the oxidized mixture to a 125 mL separatory funnel. Rinse the oxidation flask with 20 mL of chloroform and add to the separatory funnel. Shake the funnel for 30 seconds to extract & allow the phases to separate. Drain the lower layer (chloroform) through No. 541 filter paper containing a teaspoonful of granular, anhydrous sodium sulfate into a 250 mL boiling flask. Repeat the extraction twice more with 20 mL portions of chloroform. Rinse the sodium sulfate with 5 mL of chloroform. Evaporate the combined extracts just to dryness on a rotary vacuum evaporator.

6. Transfer sample using small aliquots of ethyl acetate to a graduated centrifuge tube. Adjust sample to an appropriate volume for injection on to the GC-FPD.

7. Transfer an aliquot of the adjusted sample to an Autosampler vial.

8. Inject 3 µL of sample, along with the appropriate standard concentrations for fenamiphos sulfone into the gas chromatograph. If the peak height for either the parent or the sulfone, is larger than the highest standard, dilute the sample with ethyl acetate and re-inject.

9. Calculate the mass of fenamiphos sulfone in µg, based on the linear regression curve for TurboChrom and the appropriate dilution factors.

10. Concentration (µg/mL) x Dilution Factor (mL)/Sample = µg/sample.

11. Calculate the total fenamiphos in each sample using the following equation:

Total Fenamiphos (µg) = Mass fenamiphos sulfone x 0.904

6. QUALITY ASSURANCE

A. Instrument Reproducibility

Triplicate injections of fenamiphos sulfone at five different concentrations were made to establish the reproducibility of the instrument. The data for fenamiphos sulfone is given in Table 1.

Table 1. Instrument Reproducibility for Fenamiphos Sulfone

Fenamiphos sulfone injected (pg/µL)	Integration Counts	Percent (%)
31	2314 ± 317	13.7
62	4038 ± 361	8.9
125	8039 ± 995	12.4
250	17817±1949	10.9
500	38888 ± 2597	6.7

B. Linearity

A five point calibration curve of fenamiphos sulfone with concentrations ranging from 0.031 µg/mL to 0.50 µg/mL, was injected 3 times during the course of a run that included a total of 72 injection. The run included XAD resin samples and fortified resin samples. The corresponding equations and correlation coefficients are:

For fenamiphos sulfone:

$$Y = 78.817 * x - 1051.7 \qquad Corr = 0.9973$$

C. Minimum Detection Limit

The minimum detection limit (mdl) is set by the minimum concentration injected (31.2 pg/µL) times the minimum total volume (2.0 mL) times the dilution factor (one-half of the sample used). The minimum detectable is 0.13 µg/sample.

Assuming a total air sampling rate of 15 Lpm for 24 hours, the total air volume processed would be: 21 m^3 and the air concentration = 0.13 µg/21 m^3 = 6.0 ng/m^3

D. Laboratory Recovery Data and Air Collection Efficiency (air trapping) of Fenamiphos sulfone

Laboratory recovery data for fenamiphos is given in Table 2 while air collection data for fenamiphos is given in Table 3. A second set of air collection data, where fenamiphos 50 µg of fenamiphos was spiked directly into the resin and air sampled for 24 hours, is given in Table 4.

Table 2. Laboratory Recovery of Fenamiphos from Resin Spikes

Sample	Date Fortified	Fortification (µg)	Recovery (µg)	% Rec	Fenamiphos Average	Stdev.
243MV50R1	3/21/97	50	45.8	92		
244MV50R2	3/21/97	50	43.8	88		
245MV50R3	3/21/97	50	40.7	81	87	5.2
221MV25R4	3/18/97	25	18.4	73		
222MV25R5	3/18/97	25	16.0	64		
223MV25R6	3/18/97	25	16.7	67	68	4.8
216MV25R1	3/16/97	25	18.2	73		
217MV25R2	3/16/97	25	18.1	72		
218MV25R3	3/16/97	25	17.5	70	72	1.4

Table 3. Fenamiphos Air Collection Experiments [A,B,C,D]

Sample 50 (µg)	Glass Wool (µg)	Primary (µg)	Trapping Efficiency (%)	Total Mass Recovery (%)	Average	Std Dev.
226/227-N	8.6	25.0	69.5	67.3		
228/229-N	2.0	31.3	74.9	66.6		
230/231-N	20.2	18.7	72.1	77.7		
232/233-N	1.6	28.4	67.4	59.9		
234/235-N	1.9	14.5	34.5	32.7	63.7	16.5

A: Due to fenamiphos's low vapor pressure, heat (ca 80 °C)was applied to the sampler for ca 5 min.
B: Samplers ran for 24 hours @ ~ 20 Lpm; Maximum temperature 20 °C
C: No fenamiphos sulfone was found in the back up trap
D: "Trapping Efficiency" is = (Primary (µg) x 100)/(amt. spiked (µg) - amt. recovered on Glass wool)/lab recovery.
E: "Total Mass Recovery" is = [(Glass wool (µg) + Primary (µg)) x 100]/amt. spiked (µg).

Table 4. Fenamiphos Air Collection Experiments, Direct Resin Fortification[A]

Sample 50 (µg)	Primary (µg)	Back up	Trapping Efficiency (%)	Average	Std Dev
236-M	34.8	n.d.	84.6		
237-M	33.7	n.d.	82.0		
238-M	34.5	n.d.	84.0		
239-M	37.2	n.d.	90.5		
240-M	33.4	n.d.	81.3		
241-M	34.0	n.d.	82.6	84.2	3.4

A: Samplers ran for 24 hours @ ~ 20 Lpm; Maximum temperature 27 °C
B: Trapping efficiency corrected for lab recovery (87%).

E. Storage Stability

A 30 day freezer storage stability study for fenamiphos and potential metabolites was initiated on March 9, 1997. These samples will be analyzed during the course of the ambient site sample analysis.

F. **Fenamiphos Confirmation**

Selected samples will be confirmed with a Mass Selective Detector in selective ion monitoring mode (SIM). Confirmation will include retention time and visual inspection of the selected ions monitored for sulfone compounds. Additional confirmation may include full spectrum scans and spectral library searches and/or comparison of ion ratios with standards and fortified resin samples. Spectral library searches will depend on the degree of background in the samples and the concentration of the compound of interest. Confirmation will be qualitative not quantitative.

APPENDIX II

LABORATORY REPORT

Method Development, Ambient Site and Application Site Monitoring for Fenamiphos in Air Samples Using XAD-4® Resin as a Trapping Medium

Takayuki Shibamoto

Charles R. Mourer

Gregory L. Hall

Mathew J. Hengel

June 30, 1997

Revised May 20, 1998
(Includes Application Data as Appendix B)

Trace Analytical Laboratory,
Department of Environmental Toxicology,
University of California, Davis

Covered Period: January 1, 1997 to July 1, 1997
Application Period: April 20, 1998 to April 24, 1998

Prepared for California Air Resources Board and the
California Environmental Protection Agency

Disclaimer

The statements and conclusions in the report are those of the contractor and not necessarily those of the California Air Resources Board. The mention of commercial products, their source, or their use in connection with material reported herein is not to be construed as actual or implied endorsement of such products.

Standard Operating Procedure for the Analysis of Fenamiphos in Ambient Air

1. SCOPE

The method utilized is a gas chromatographic method with a flame photometric detector (FPD) and a 526 nm filter that is selective for phosphorus compounds. This method has been used by Environmental Toxicology personnel for the analysis of organophosphates in air.

2. SUMMARY OF METHOD

Exposed XAD-4® resin samples are stored either in an ice chest with dry ice or at -20 °C in a freezer. Samples are extracted with 75 mL ethyl acetate and an aliquot is oxidized with potassium permanganate to fenamiphos sulfone then concentrated prior to injecting 4 µL on to a gas chromatograph equipped with a flame photometric detector. Results of analysis are mathematically converted back to parent compound and reported as total fenamiphos.

3. INTERFERENCES/LIMITATIONS

Potential interferences may arise due to contaminants in laboratory solvents, reagents, glassware and/or apparatus. A reagent blank and/or control resin blank must be run through the method procedure and analyzed with each set of samples. We reserve the right to change this standard operating procedure should the need arise to handle unforeseen complications with the compounds of interest.

4. EQUIPMENT AND CONDITIONS

A. **Instrumentation**

Hewlett-Packard 5890 Series II gas chromatograph
Hewlett-Packard 7673 Autosampler
Perkin-Elmer TurboChrom® Data System v. 4.1
Microsoft Excel®, version 7.0

Injector : 250°C
Detector: 225°C
Column: Restek XTI-5® 30 m x 0.53 mm I.D. with a 1.5 µm film thickness
Instrument was operated in splitless mode with a HP single taper splitless liner
Temperature program: initial: 170°C, hold 0 min, ramp to 250°C @ 10°C/min; hold 0 min. Fenamiphos sulfone = 9.6 min.

Flows:
Carrier (He) = 20 mL/min
Make-up (He) = 10 mL/min
Air = 115 mL/min
Hydrogen = 100 mL/min

B. **Auxiliary Apparatus**

1. Rotary platform shaker.
2. 100 mL round bottom flasks.
3. 50 mL graduated cylinders.
4. Rotary evaporator.
5. Disposable pipettes.
6. Separatory funnels, 125 mL.
7. Nitrogen evaporator (N-Evap®).
8. Graduated 15 mL centrifuge tubes.
9. Autosampler vials and screw caps.

C. **Reagents**

1. Ethyl acetate, pesticide grade.
2. Chloroform, pesticide grade.
3. Acetone, pesticide grade.
4. Fenamiphos, Bayer, 96.2 % or equivalent.
5. Fenamiphos sulfone, Bayer, 99.5 % or equivalent.
6. Fenamiphos sulfoxide, Bayer, 90.4 % or equivalent.
7. 20% Magnesium sulfate.
8. 0.5 N Potassium permanganate.
9. Sodium sulfate, anhydrous.
10. Filter paper, Whatman 541, 55 mm circles.

5. ANALYSIS OF SAMPLES

1. A solvent blank and/or a control resin blank will be analyzed with each set of samples. The blank must be free of interferences for the analysis of fenamiphos sulfone.

2. Three resin fortification samples must be fortified, extracted and analyzed with each set of samples.

3. Allow samples to come to room temperature and add 75 mL of ethyl acetate. Cap the sample and swirl for one hour on a rotary platform shaker.

4. Quantitatively transfer 37.5 mL to a 100 mL round bottom flask and evaporate the solvent to dryness using a rotary evaporator. Add 2 mL of acetone.

5. Add 5 mL of 20% magnesium sulfate solution and swirl. Add 20 mL of 0.5N potassium permanganate solution and swirl. Allow sample to sit for 30 minutes with occasional swirling. Transfer the oxidized mixture to a 125 mL separatory funnel. Rinse the oxidation flask with 20 mL of chloroform and add to the separatory funnel. Shake the funnel for 30 seconds to extract & allow the phases to separate. Drain the lower layer (chloroform) through No. 541 filter paper containing a teaspoonful of granular, anhydrous sodium sulfate into a 250 mL boiling flask. Repeat the extraction twice more with 20 mL portions of chloroform. Rinse the sodium sulfate with 5 mL of chloroform. Evaporate the combined extracts just to dryness on a rotary vacuum evaporator.

6. Transfer sample using small aliquots of ethyl acetate to a graduated centrifuge tube. Adjust sample to an appropriate volume for injection on to the GC-FPD.

7. Transfer an aliquot of the adjusted sample to an Autosampler vial.

8. Inject 4 µL of sample, along with the appropriate standard concentrations for fenamiphos sulfone into the gas chromatograph. If the peak height for the sulfone, is larger than the highest standard, dilute the sample with ethyl acetate and re-inject.

9. Calculate the mass of fenamiphos sulfone in µg, based on the linear regression curve for TurboChrom and the appropriate dilution factors.

10. Concentration (µg/mL) x Dilution Factor (mL)/Sample = µg/sample.

11. Calculate the total fenamiphos in each sample using the following equation (molar conversion of fenamiphos sulfone to fenamiphos parent):

Total Fenamiphos (µg) = Mass fenamiphos sulfone x 0.904

6. QUALITY ASSURANCE

A. Instrument Reproducibility

Triplicate injections of fenamiphos sulfone at five different concentrations were made to establish the reproducibility of the instrument. The data for fenamiphos sulfone is given in Table 1.

Table 1. Instrument Reproducibility for Fenamiphos Sulfone.

Fenamiphos sulfone injected (pg/µL)	Integration Counts	Percent (%)
50	2866 ± 240	± 8.39
100	5456 ± 497	± 9.12
200	10868 ± 345	± 3.17
400	21767 ± 743	± 3.41
800	45209 ± 3006	± 6.65

B. Linearity

A five point calibration curve of fenamiphos sulfone with concentrations ranging from 0.05 µg/mL to 0.80 µg/mL, was injected 3 times during the course of a run that included a total of 41 injections. The run included XAD resin samples and fortified resin samples. The corresponding equations and correlation coefficients are:

For fenamiphos sulfone:

$$Y = 90.1811 * x - 216.869 \qquad Corr = 0.9940$$

C. Minimum Detection Limit

The minimum detection limit (mdl) is set by the minimum concentration injected (50.0 pg/µL) times the minimum total volume (1.0 mL) times the dilution factor (one-half of the sample used). The minimum detectable is 0.10 µg/sample.

Assuming a total air sampling rate of 15 Lpm for 24 hours, the total air volume processed would be: 21 m^3 and the air concentration = 0.10 µg/21 m^3 = 4.7 ng/m^3.

Laboratory Recovery Data and Air Collection Efficiency (air trapping) of Fenamiphos sulfone

Preliminary laboratory recovery data was generated by fortifying XAD resin directly with either 25 or 50 µg of parent fenamiphos, letting the solvent evaporate and then working the fortified resin through the analytical method. Laboratory recovery data for fenamiphos is given in Table 2, while air collection data for is given in Table 3.

Table 2. Laboratory Recovery of Fenamiphos from Resin Spikes.

Sample	Date Fortified	Fortification (µg)	Recovery (µg)	% Rec	Fenamiphos Average	Stdev.
216MV25R1	3/16/97	25	20.1	88%		
217MV25R2	3/16/97	25	20.0	85%		
218MV25R3	3/16/97	25	19.4	91%		
221MV25R4	3/18/97	25	20.3	81%		
222MV25R5	3/18/97	25	17.7	71%		
223MV25R6	3/18/97	25	18.5	74%		
243MV50R1	3/21/97	50	50.6	101%		
244MV50R2	3/21/97	50	48.4	97%		
245MV50R3	3/21/97	50	45.0	90%	86%	10%

Air collection recovery data (trapping efficiencies) for XAD resin was generated by fortifying the glass wool portion of a sampling train consisting of the glass wool fortified with 50 µg of fenamiphos, a primary trap of 30 mL of XAD resin, and a backup trap also consisting of 30 mL of XAD resin. The backup trap was added to check for potential breakthrough of Fenamiphos from the primary trap to the backup. The data for this air collection study is given in Table 3.

Table 3. Fenamiphos Air Collection Experiments [A,B,C].

Sample 50 (µg)	Glass Wool (µg)	Primary (µg)	Trapping Efficiency Uncorrected (%)	Trapping[D] Efficiency (%)	Total Mass[E] Recovery (%)
226/227-N	8.6	25.0	60%	70%	78%
228/229-N	2.0	31.3	65%	66%	77%
230/231-N	20.1	18.7	63%	73%	91%
232/233-N	1.6	28.4	59%	68%	70%
234/235-N	1.9	14.5	30%	35%	38%

A: Due to the low vapor pressure of fenamiphos, heat (ca 80 °C) was applied to the sampler for ca 5 min.
B: Samplers ran for 24 hours @ ~ 20 Lpm; Maximum temperature 20 °C
C: No fenamiphos sulfone was found in the back up trap
D: "Trapping Efficiency" is = (Primary (µg) x 100)/(amt. spiked (µg) - amt. recovered on Glass wool)/lab recovery (86%).
E: "Total Mass Recovery" is = [(Glass wool (µg) + Primary (µg)) x 100]/amt. spiked (µg)]/lab recovery (86%).

A second air collection study where fenamiphos was directly applied to the resin in the primary trap. This study was conducted to demonstrate that the resin would hold onto fenamiphos once it was trapped on the resin. The data for this study is given in Table 4.

Table 4. Fenamiphos Air Collection Experiments, Direct Resin Fortification[A].

Sample 50 (µg)	Primary (µg)	Back up (µg)	Trapping Efficiency Uncorrected (%)	Trapping[B] Efficiency Corrected (%)
236-M	42.8	n.d.	86%	100%
237-M	43.4	n.d.	87%	101%
238-M	40.8	n.d.	82%	95%
239-M	43.4	n.d.	87%	101%
240-M	39.8	n.d.	80%	93%
241-M	43.1	n.d.	86%	100%

A: Samplers ran for 24 hours @ ~ 20 Lpm; Maximum temperature 27 °C
B: Trapping efficiency corrected for concurrent lab recovery (87%).

E. Storage Stability

A 45 day freezer storage stability study for fenamiphos and potential metabolites was initiated on March 9, 1997. The results of this study is given in Table 5.

F. Fenamiphos Confirmation

Selected samples will be confirmed with a Mass Selective Detector in selective ion monitoring mode (SIM). Confirmation will include retention time and visual inspection of the selected ions monitored for sulfone compounds. Additional confirmation may include full spectrum scans and spectral library searches and/or comparison of ion ratios with standards and fortified resin samples. Spectral library searches will depend on the degree of background in the samples and the concentration of the compound of interest. Confirmation will be qualitative not quantitative.

G. Fenamiphos Concurrent Laboratory Validation Samples

Concurrent Laboratory validation samples, in triplicate, were analyzed with each set of ambient fenamiiphos air samples. The results of these samples are given in Table 6.

Table 5. Fenamiphos Storage Stability Results.

Summary for Fenamiphos Storage Stability Samples Injected on 4/23/97
Storage Time (3/9/97-4/23/97) = 45 Days Storage

Fenamiphos Fortification (50µg)

Sample TAL #	Fenamiphos Sulfone (µg)	Fenamiphos (µg)	Total % Rec	Ave % Rec	Stdev
479C	<0.20	<0.20			
480NV50R1	53.80	48.63	97%		
481NV50R2	51.67	46.71	93%		
482NV50R3	50.96	46.07	92%	94%	3%
137NS50R1	48.53	43.87	88%		
138NS50R2	48.54	43.88	88%		
139NS50R3	46.98	42.47	85%		
140NS50R4	47.51	42.95	86%		
141NS50R5	50.74	45.87	92%		
142NS50R6	48.69	44.02	88%	88%	2%

Fenamiphos Sulfoxide Fortification (50µg)

Sample TAL #	Fenamiphos Sulfone (µg)	Fenamiphos Sulfoxide (µg)	Total % Rec	Ave % Rec	Stdev
143NXS50R1	43.9	41.8	84%		
144NXS50R2	44.0	41.9	84%		
145NXS50R3	42.6	40.6	81%		
146NXS50R4	44.7	42.5	85%		
147NXS50R5	43.5	41.4	83%		
148NXS50R6	43.3	41.2	82%	83%	1%

Fenamiphos Sulfone Fortification (50µg)

Sample TAL #	Fenamiphos Sulfone (µg)	Fenamiphos Sulfone (µg)	Total % Rec	Ave % Rec	Stdev
149NNS50R1	41.4	41.4	83%		
150NNS50R2	40.0	40.0	80%		
151NNS50R3	39.4	39.43	79%		
152NNS50R4	40.1	40.1	80%		
153NNS50R5	38.72	38.7	77%		
154NNS50R6	40.3	40.3	81%	80%	2%

Adjusted Fenamiphos (µg) = Mass of Fenamiphos Sulfone x 0.904 (molar conversion)
Adjusted Fenamiphos Sulfoxide (µg) = Mass of Fenamiphos Sulfone x 0.952 (molar conversion)

Table 6. Concurrent Laboratory Validation Results (% Recovery).

Analysis Date	Sample TAL #	Fortification Level (µg)	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)	Adjusted % Rec	Ave. % Rec	Stdev
4/4/97	302C	-----	<0.20	<0.20			
4/4/97	303MV0.2R4	0.20	0.21	0.19	94%		
4/4/97	304MV0.2R5	0.20	0.20	0.18	90%		
4/4/97	305MV0.2R6	0.20	0.24	0.22	108%	98%	9%
4/11/97	353C	-----	<0.20	<0.20			
4/11/97	354MV1.0R1	1.00	1.05	0.95	95%		
4/11/97	355MV1.0R2	1.00	1.04	0.94	94%		
4/11/97	356MV1.0R3	1.00	1.05	0.95	95%	95%	0%
4/18/97	409C	-----	<0.20	<0.20			
4/18/97	410MV1.0R4	1.00	1.22	1.11	111%		
4/18/97	411MV1.0R5	1.00	1.25	1.13	113%		
4/18/97	412MV1.0R6	1.00	1.19	1.08	108%	110%	3%
4/25/97	483C	-----	<0.20	<0.20			
4/25/97	484MV0.2R7	0.20	0.49	0.44	222%*		
4/25/97	485MV0.2R8	0.20	0.28	0.25	127%*		
4/25/97	486MV0.2R9	0.20	0.32	0.29	146%*	165%	50%
5/2/97	539C	-----	<0.20	<0.20			
5/2/97	540MV0.4R1	0.40	0.52	0.47	117%		
5/2/97	541MV0.4R2	0.40	0.51	0.46	115%		
5/2/97	542MV0.4R3	0.40	0.50	0.45	113%	115%	2%
5/9/97	599C	-----	<0.20	<0.20			
5/9/97	600MV0.4R4	0.40	0.48	0.43	108%		
5/9/97	601MV0.4R5	0.40	0.50	0.45	113%		
5/9/97	602MV0.4R6	0.40	0.47	0.43	107%	109%	3%

* Samples inadvertently mis-fortified due to analyst error.

Figure 1. Method Schematic of Analysis for Fenamiphos

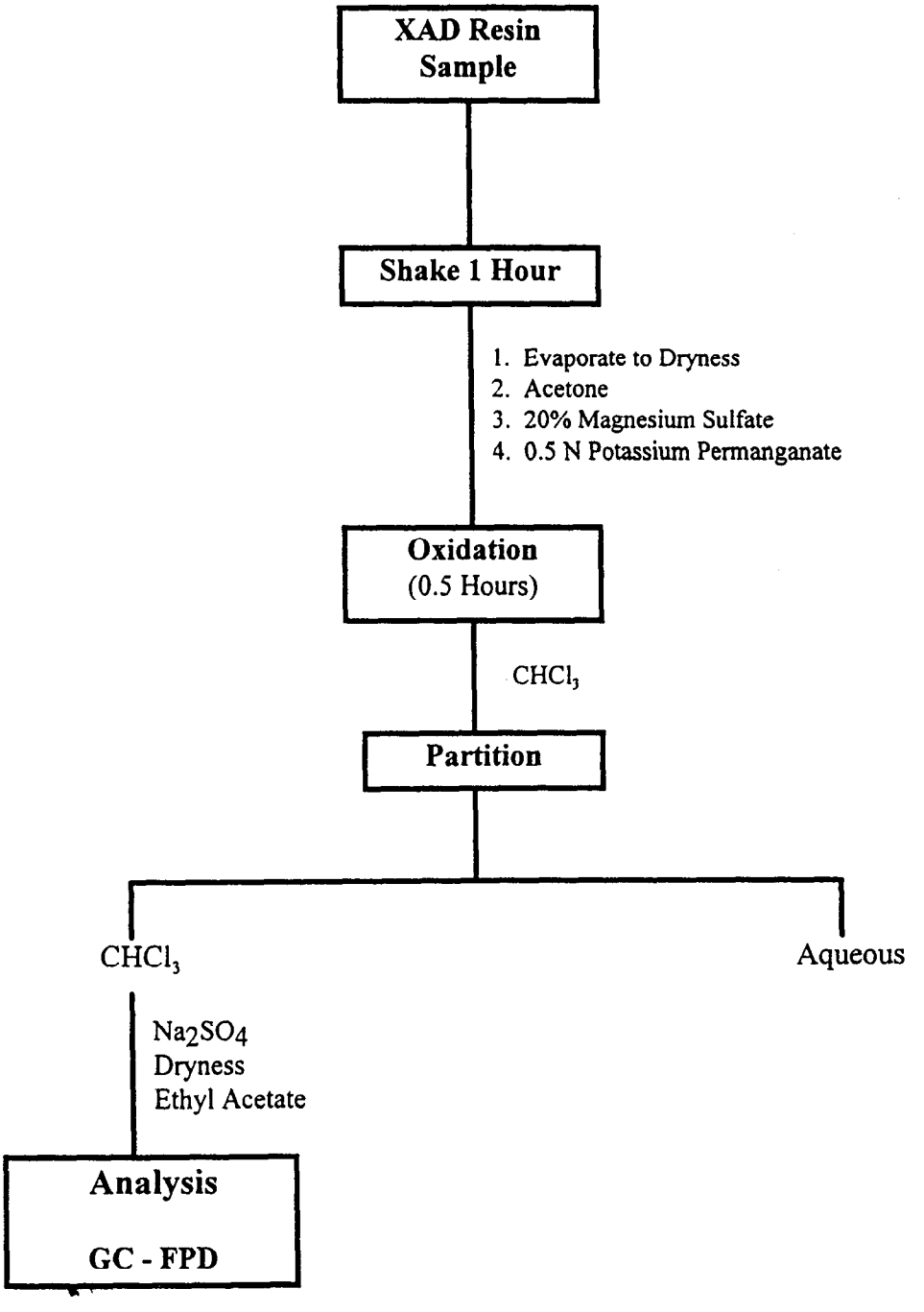


Table 7. Fenamiphos Ambient Site Results (3/31/97-4/4/97).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
306	1	ALV-1	<0.20	<0.20
307	2	EAS-1	<0.20	<0.20
308	3	FOW-1	<0.20	<0.20
309	4	ARB-1	<0.20	<0.20
310	5	ALV-2	<0.20	<0.20
311	6	EAS-2	<0.20	<0.20
312	7	FOW-2	<0.20	<0.20
313	8	ARB-2	<0.20	<0.20
314	9	ALV-3	<0.20	<0.20
315	10	ALV-3D	<0.20	<0.20
316	11	EAS-3	<0.20	<0.20
317	12	EAS-3D	<0.20	<0.20
318	13	FOW-3	<0.20	<0.20
319	14	FOW-3D	<0.20	<0.20
320	15	ARB-3	<0.20	<0.20
321	16	ARB-3D	<0.20	<0.20
322	17	ALV-4	<0.20	<0.20
323	18	EAS-4	<0.20	<0.20
324	19	FOW-4	<0.20	<0.20
325	20	ARB-4	<0.20	<0.20
326	21	Blank	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 7 Continued . Fenamiphos Ambient Site Results (4/7/97-4/11/97).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
357	22	ALV-5	<0.20	<0.20
358	23	EAS-5	<0.20	<0.20
359	24	WU-5	<0.20	<0.20
360	25	FOW-5	<0.20	<0.20
361	26	ARB-5	<0.20	<0.20
362	27	ALV-6	<0.20	<0.20
363	28	EAS-6	<0.20	<0.20
364	29	WU-6	<0.20	<0.20
365	30	FOW-6	<0.20	<0.20
366	31	ARB-6	<0.20	<0.20
367	32	ALV-7	<0.20	<0.20
368	33	ALV-7D	<0.20	<0.20
369	34	EAS-7	<0.20	<0.20
370	35	EAS-7D	<0.20	<0.20
371	36	WU-7	<0.20	<0.20
372	37	WU-7D	<0.20	<0.20
373	38	FOW-7	<0.20	<0.20
374	39	FOW-7D	<0.20	<0.20
375	40	ARB-7	<0.20	<0.20
376	41	ARB-7D	<0.20	<0.20
377	42	ALV-8	<0.20	<0.20
378	43	EAS-8	<0.20	<0.20
379	44	WU-8	<0.20	<0.20
380	45	FOW-8	0.37*	0.33*
381	46	ARB-8	<0.20	<0.20
382	47	Blank	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

*: Sample was reanalyzed by GC/MS; Fenamiphos sulfone residue was <0.20 µg.

Table 7 Continued . Fenamiphos Ambient Site Results (4/14/97-4/18/97).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
413	48	ALV-9	<0.20	<0.20
414	49	EAS-9	<0.20	<0.20
415	50	WU-9	<0.20	<0.20
416	51	FOW-9	<0.20	<0.20
417	52	ARB-9	<0.20	<0.20
419	54	ALV-10	<0.20	<0.20
420	55	EAS-10	<0.20	<0.20
421	56	WU-10	<0.20	<0.20
422	57	FOW-10	<0.20	<0.20
423	58	ARB-10	<0.20	<0.20
425	60	ALV-11	<0.20	<0.20
426	61	ALV-11D	<0.20	<0.20
427	62	EAS-11	<0.20	<0.20
428	63	EAS-11D	<0.20	<0.20
429	64	WU-11	<0.20	<0.20
430	65	WU-11D	<0.20	<0.20
431	66	FOW-11	<0.20	<0.20
432	67	FOW-11D	<0.20	<0.20
433	68	ARB-11	<0.20	<0.20
434	69	ARB-11D	<0.20	<0.20
435	70	ALV-12	<0.20	<0.20
436	71	B-12	<0.20	<0.20
437	72	EAS-12	<0.20	<0.20
438	73	WU-12	<0.20	<0.20
439	74	FOW-12	<0.20	<0.20
440	75	ARB-12	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 7 Continued . Fenamiphos Ambient Site Results (4/21/97-4/25/97).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
487	82	ALV-13	<0.20	<0.20
488	83	EAS-13	<0.20	<0.20
489	84	WU-13	<0.20	<0.20
490	85	FOW-13	<0.20	<0.20
491	86	ARB-13	<0.20	<0.20
492	87	ALV-14	<0.20	<0.20
493	88	EAS-14	<0.20	<0.20
494	89	WU-14	<0.20	<0.20
495	90	FOW-14	<0.20	<0.20
496	91	ARB-14	<0.20	<0.20
497	92	ALV-15	<0.20	<0.20
498	93	ALV-15D	<0.20	<0.20
499	94	EAS-15	<0.20	<0.20
500	95	EAS-15D	<0.20	<0.20
501	96	WU-15	<0.20	<0.20
502	97	WU-15D	<0.20	<0.20
503	98	FOW-15	<0.20	<0.20
504	99	FOW-15D	<0.20	<0.20
505	100	ARB-15	<0.20	<0.20
506	101	ARB-15D	<0.20	<0.20
507	102	ALV-16	<0.20	<0.20
508	103	EAS-16	<0.20	<0.20
509	104	WU-16	<0.20	<0.20
510	105	FOW-16	<0.20	<0.20
511	106	ARB-16	<0.20	<0.20
512	107	Blank	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 7 Continued . Fenamiphos Ambient Site Results (5/28/97-5/2/97).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
543	108	ALV-17	<0.20	<0.20
544	109	EAS-17	<0.20	<0.20
545	110	WU-17	<0.20	<0.20
546	111	FOW-17	<0.20	<0.20
547	112	ARB-17	<0.20	<0.20
548	113	ALV-18	<0.20	<0.20
549	114	EAS-18	<0.20	<0.20
550	115	WU-18	<0.20	<0.20
551	116	FOW-18	<0.20	<0.20
552	117	ARB-18	<0.20	<0.20
553	118	ALV-19	<0.20	<0.20
554	119	ALV-19D	<0.20	<0.20
555	120	EAS-19	<0.20	<0.20
556	121	EAS-19D	<0.20	<0.20
557	122	WU-19	<0.20	<0.20
558	123	WU-19D	<0.20	<0.20
559	124	FOW-19	<0.20	<0.20
560	125	FOW-19D	<0.20	<0.20
561	126	ARB-19	<0.20	<0.20
562	127	ARB-19D	<0.20	<0.20
563	128	ALV-20	<0.20	<0.20
564	129	EAS-20	<0.20	<0.20
565	130	WU-20	<0.20	<0.20
566	131	FOW-20	<0.20	<0.20
567	132	ARB-20	<0.20	<0.20
568	133	Blank	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 7 Continued . Fenamiphos Ambient Site Results (5/5/97-5/9/97).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
603	134	ALV-21	<0.20	<0.20
604	135	EAS-21	<0.20	<0.20
605	136	WU-21	<0.20	<0.20
606	137	FOW-21	<0.20	<0.20
607	138	ARB-21	<0.20	<0.20
608	139	ALV-22	<0.20	<0.20
609	140	EAS-22	<0.20	<0.20
610	141	WU-22	<0.20	<0.20
611	142	FOW-22	<0.20	<0.20
612	143	ARB-22	<0.20	<0.20
613	144	ALV-23	<0.20	<0.20
614	145	ALV-23D	<0.20	<0.20
615	146	EAS-23	<0.20	<0.20
616	147	EAS-23D	<0.20	<0.20
617	148	WU-23	<0.20	<0.20
618	149	WU-23D	<0.20	<0.20
619	150	FOW-23	<0.20	<0.20
620	151	FOW-23D	<0.20	<0.20
621	152	ARB-23	<0.20	<0.20
622	153	ARB-23D	<0.20	<0.20
623	154	Blank	<0.20	<0.20
624	155	ALV-24	<0.20	<0.20
625	156	EAS-24	<0.20	<0.20
626	157	WU-24	<0.20	<0.20
627	158	FOW-24	<0.20	<0.20
628	159	ARB-24	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 8. Field and Trip Spike Results.

Total Fenamiphos Summary

Sample TAL #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)	Adjusted % Rec	Ave. % Rec	Stdev
452	FS-1	0.43	0.38			
418	FS-2	0.38	0.34			
458	FS-3	0.40	0.36			
424	FS-4	0.39	0.35			
441	FS-5	0.41	0.37			
442	TS-1	0.42	0.38			
443	TS-2	0.46	0.41			
444	TS-3	0.43	0.38			
445	TS-4	0.44	0.40			
446	TS-5	0.35	0.32			

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 9. Qualitative MSD Confirmation Results.

Sample ID	Sample Type	MSD Analysis Date	Fenamiphos
Standard	50 pg/µL	4/7/97	+
302C	Control Resin	4/7/97	–
303MV0.2R4	0.2 µg Resin Fort	4/7/97	+
310 (ALV-2)	Ambient Air Sample	4/7/97	–
313 (ARB-2)	Ambient Air Sample	4/7/97	–
319 (FOW-3D)	Ambient Air Sample	4/7/97	–
Standard	50 pg/µL	4/14/97	+
353C	Control Resin	4/14/97	–
354MV1.0R4	1.0 µg Resin Fort	4/14/97	+
361 (ALB-5)	Ambient Air Sample	4/14/97	–
367 (ARV-7)	Ambient Air Sample	4/14/97	–
380 (FOW-8)	Ambient Air Sample	4/14/97	–
Standard	50 pg/µL	4/21/97	+
409C	Control Resin	4/21/97	–
412MV1.0R4	1.0 µg Resin Fort	4/21/97	+
422 (FOW-10)	Ambient Air Sample	4/21/97	–
423 (ARB-10)	Ambient Air Sample	4/21/97	–
435 (ALV-12)	Ambient Air Sample	4/21/97	–
Standard	50 pg/µL	4/28/97	+
483C	Control Resin	4/28/97	–
484MV0.2R7	0.2 µg Resin Fort	4/28/97	+
506 (ARB-15D)	Ambient Air Sample	4/28/97	–
507 (ALV-16)	Ambient Air Sample	4/28/97	–
511 (ARB16)	Ambient Air Sample	4/28/97	–
Standard	50 pg/µL	5/5/97	+
539C	Control Resin	5/5/97	–
541MV0.4R2	0.4 µg Resin Fort	5/5/97	+

Table 9 Cont. Qualitative MSD Confirmation Results.

Sample ID	Sample Type	MSD Analysis Date	Fenamiphos
546 (FOW-17)	Ambient Air Sample	4/28/97	-
547 (ARB-17)	Ambient Air Sample	4/28/97	-
563 (ARV-20)	Ambient Air Sample	5/5/97	-

A (+) denotes a positive hit for nemacur sulfone equal or greater than 0.10 µg/sample, while a (-) denotes a negative hit or residue levels below 0.10µg/sample.

GC/MS Instrumentation

Hewlett-Packard 6890 Gas Chromatograph with integrated autosampler
Hewlett-Packerd 5972 Mass Selective Detector (MSD)
Hewlett-Packard Chemstation Software, version A.02.00

Injector: 250°C, splitless injection
Detector: 280°C
Column: HP-1701 30 m x0.25 mm I.D. with a 0.25 µm film thickness
Tempurature program: initial: 150°C, hold 0 min., ramp to 250°C @ 20°/min., hold 20 min.
Carrier Gas Flow (He) = 2.0 mL/min
Selected Ion Monitoring: m/z = 292, 320, and 335 (50 ms Dwell Time)
Retention Time for Phorate Sulfone = 12.91 min.

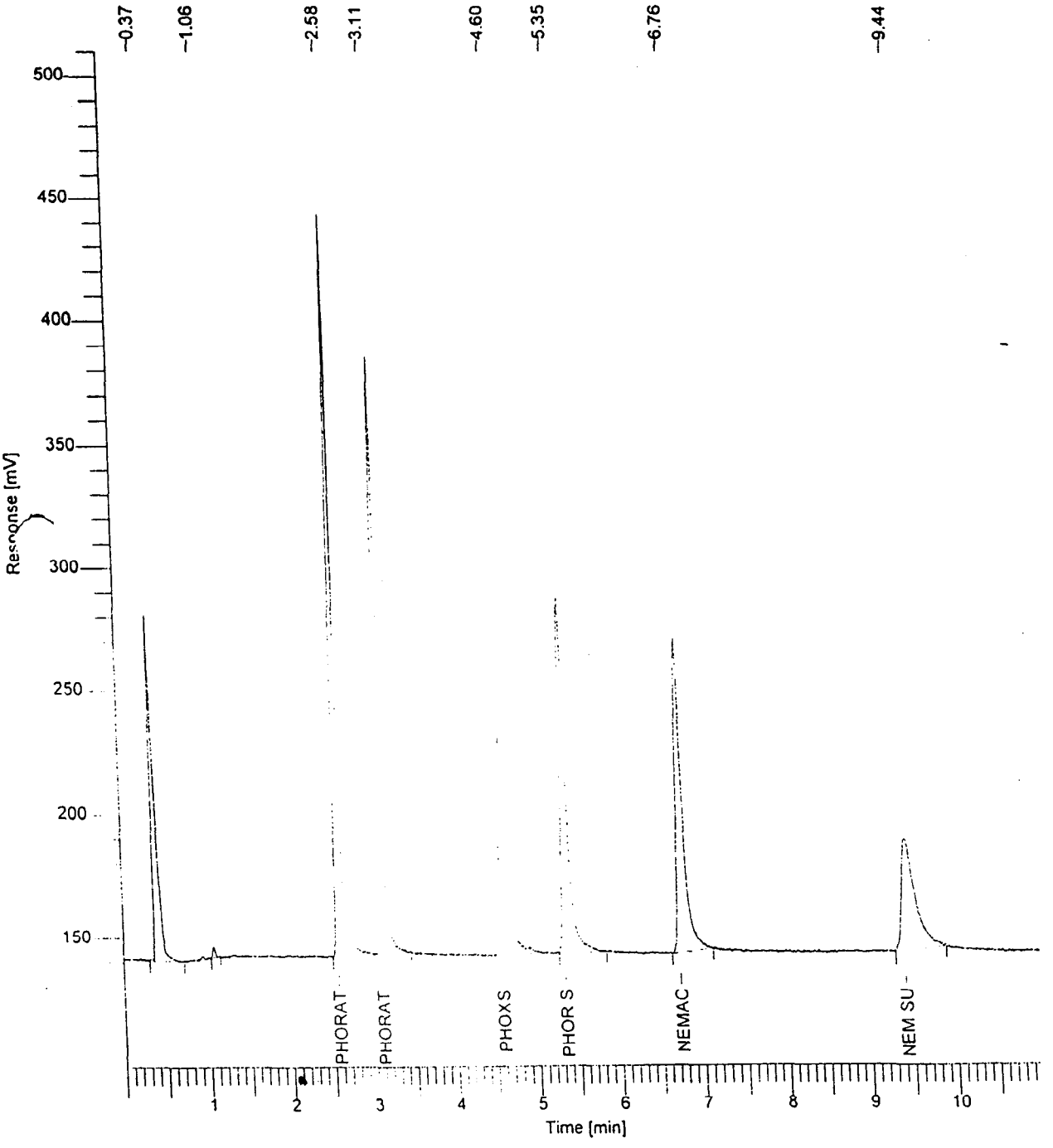
APPENDIX A. GC and GC/MS Sample Chromatograms (Monitoring).

1. Calibration Standard (GC-FPD), 400 pg/µL Fenamiphos Sulfone (NEM SU).
2. Calibration Standard (GC-FPD). 50 pg/µL Fenamiphos Sulfone (NEM SU).
3. Resin Blank (GC-FPD).
4. Resin Spike, 1.0 µg (GC-FPD).
5. Monitoring Sample (GC-FPD).
6. ARB-QA Field Spike (GC-FPD).
7. ARB-QA Trip Spike (GC-FPD).
8. Storage Stability Sample, 50 µg (GC-FPD).
9. Calibration Standard (GC/MS), 50 pg/µL Fenamiphos Sulfone.
10. Resin Blank (GC/MS).
11. Resin Spike, 0.2 µg (GC/MS).
12. Monitoring Sample (GC/MS).

Chromatogram

ımple Name : Std _Sample #: 400pg/ul Page 1 of 1
eName : X:\Data\NPD_FPD\Arb_97\Thi_Nem\082997\829X002-19970830-005844.raw
ıte : 08/31/97 05:37:06 PM
eth : Nem_fpd Time of Injection: 08/30/97 12:58:28 AM
ar : 0.00 min End Time : 11.00 min Low Point : 135.00 mV High Point : 510.00 mV
cale Factor: 0.0 Plot Offset: 135.00 mV Plot Scale: 375.0 mV

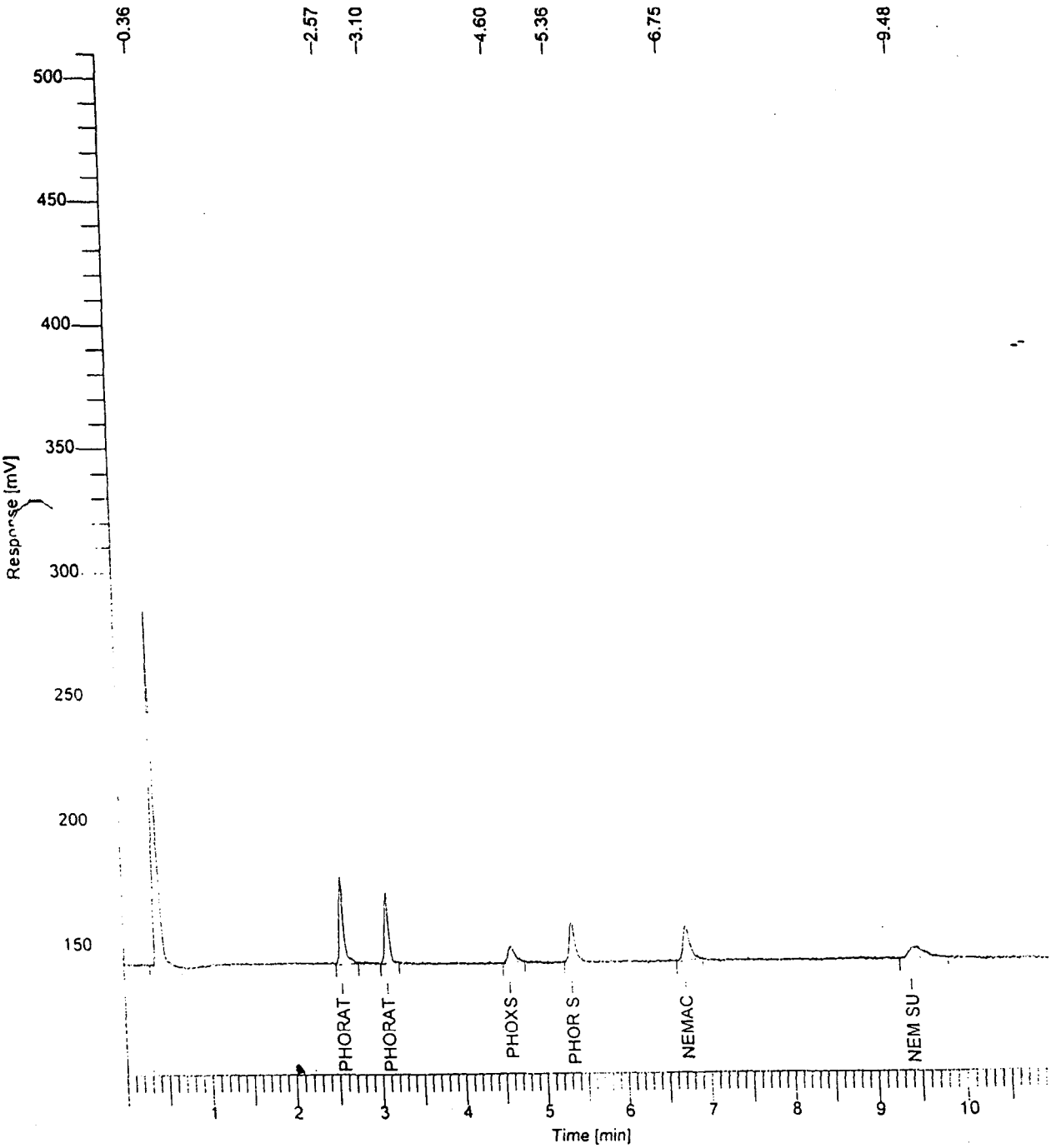
Chromatogram 1



Chromatogram

mple Name : Std Sample #: 50pg/ul Page 1 of 1
Name : X:\Data\NPD_FPD\Arb_97\Thi_Nem\082997\829X005-19970830-014046.raw
te : 08/31/97 05:37:32 PM
th : Nem_fpd Time of Injection: 08/30/97 01:40:28 AM
art Time : 0.00 min End Time : 11.00 min Low Point : 135.00 mV High Point : 510.00 mV
ale Factor: 0.0 Plot Offset: 135.00 mV Plot Scale: 375.0 mV

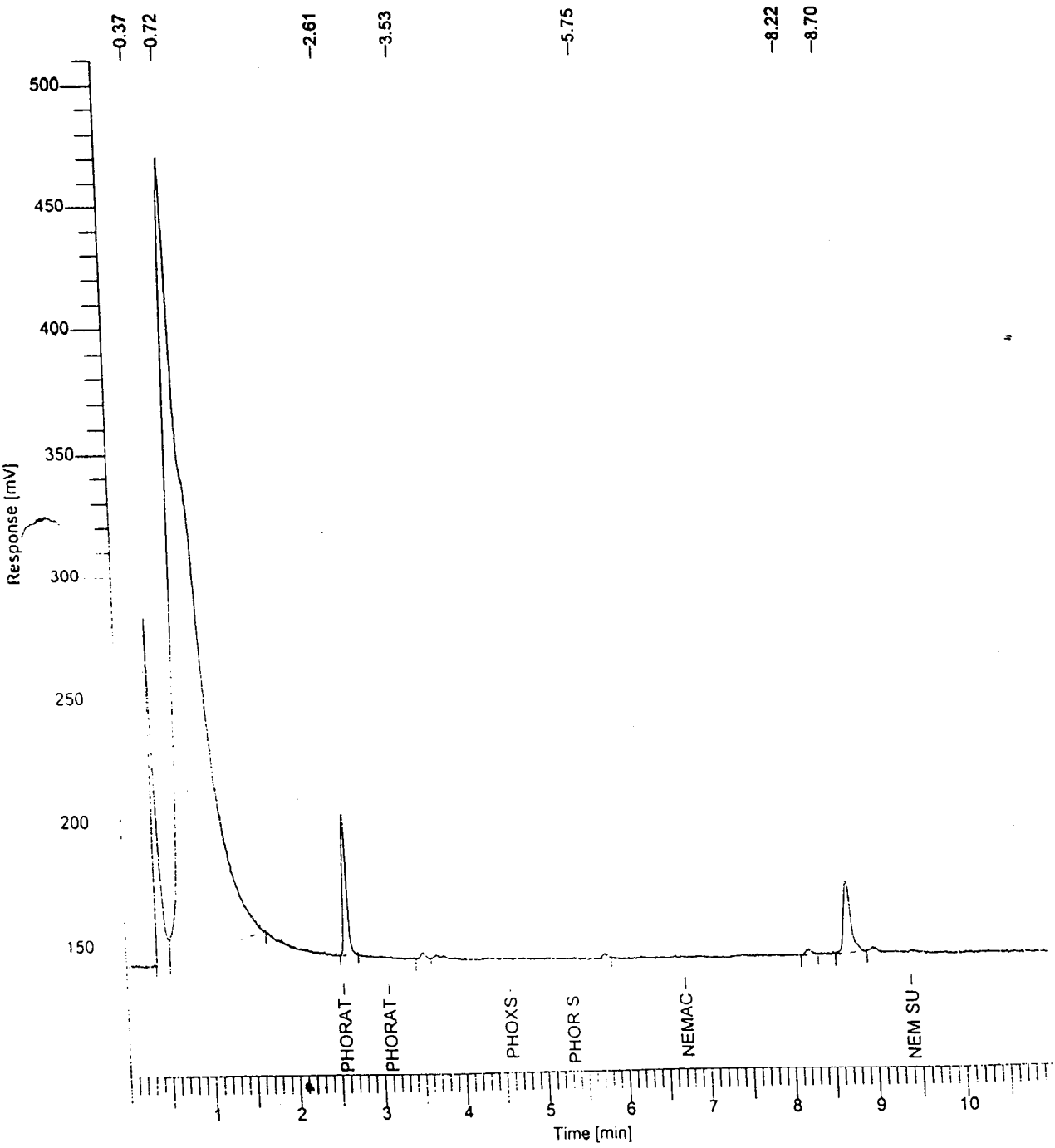
Chromatogram 2



Chromatogram

mple Name : Control Sample #: 629C Page 1 of 1
eName : X:\Data\NPD_FPD\Arb_97\Thi_Nem\082997\829X006-19970830-015447.raw
ıte : 08/31/97 05:37:41 PM
ɜthc : Nem_fpd Time of Injection: 08/30/97 01:54:29 AM
art : 0.00 min End Time : 11.00 min Low Point : 135.00 mV High Point : 510.00 mV
ɔale Factor: 0.0 Plot Offset: 135.00 mV Plot Scale: 375.0 mV

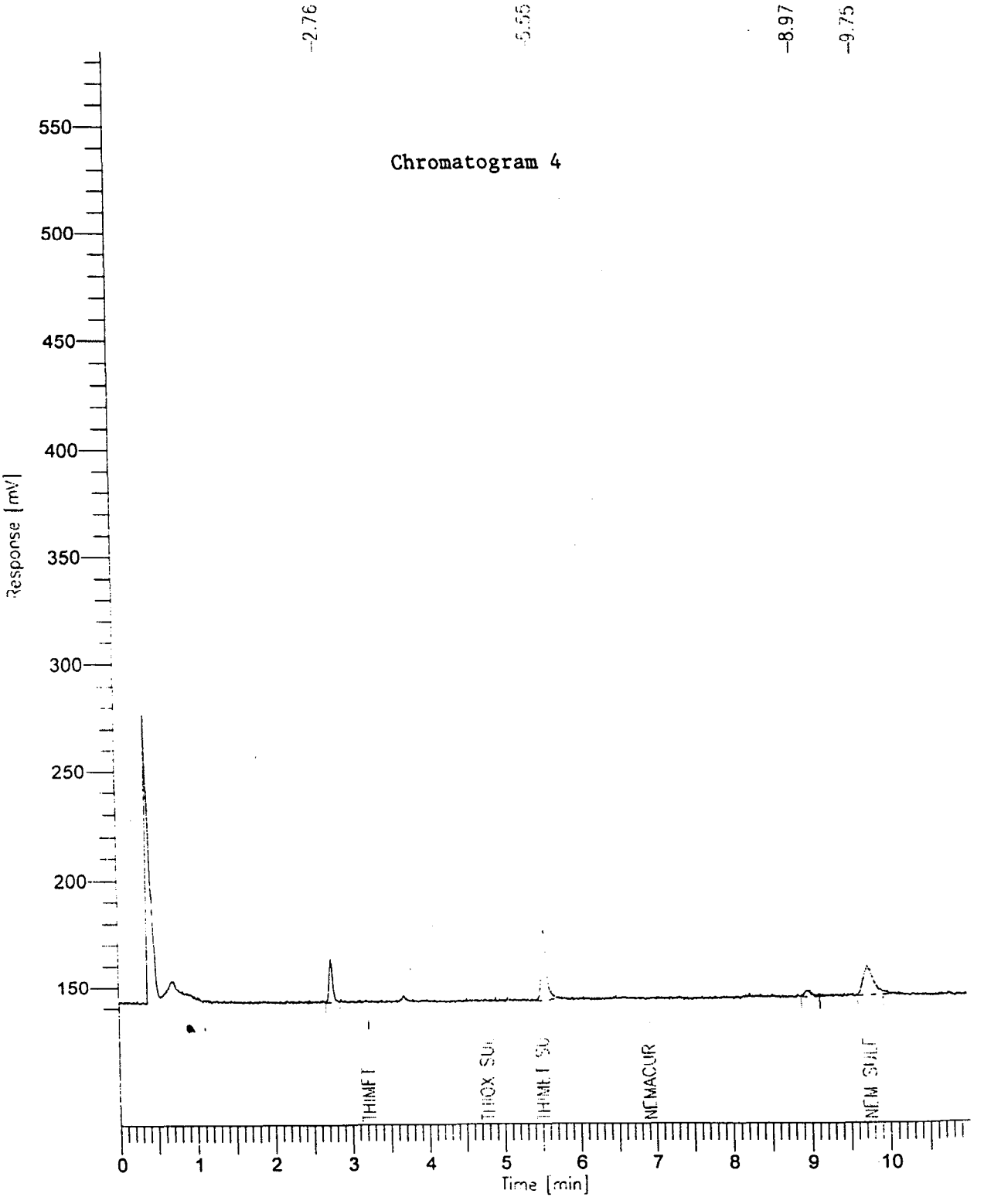
Chromatogram 3



Chromatogram

Sample Name : Recovery
FileName : X:\DATA\NPD_FPD\ARB_97\THI_NEM\041897\418C008
Method : NEM_FPD
Start Time : 0.00 min End Time : 11.00 min
Scale Factor: 0.0 Plot Offset: 135 mV

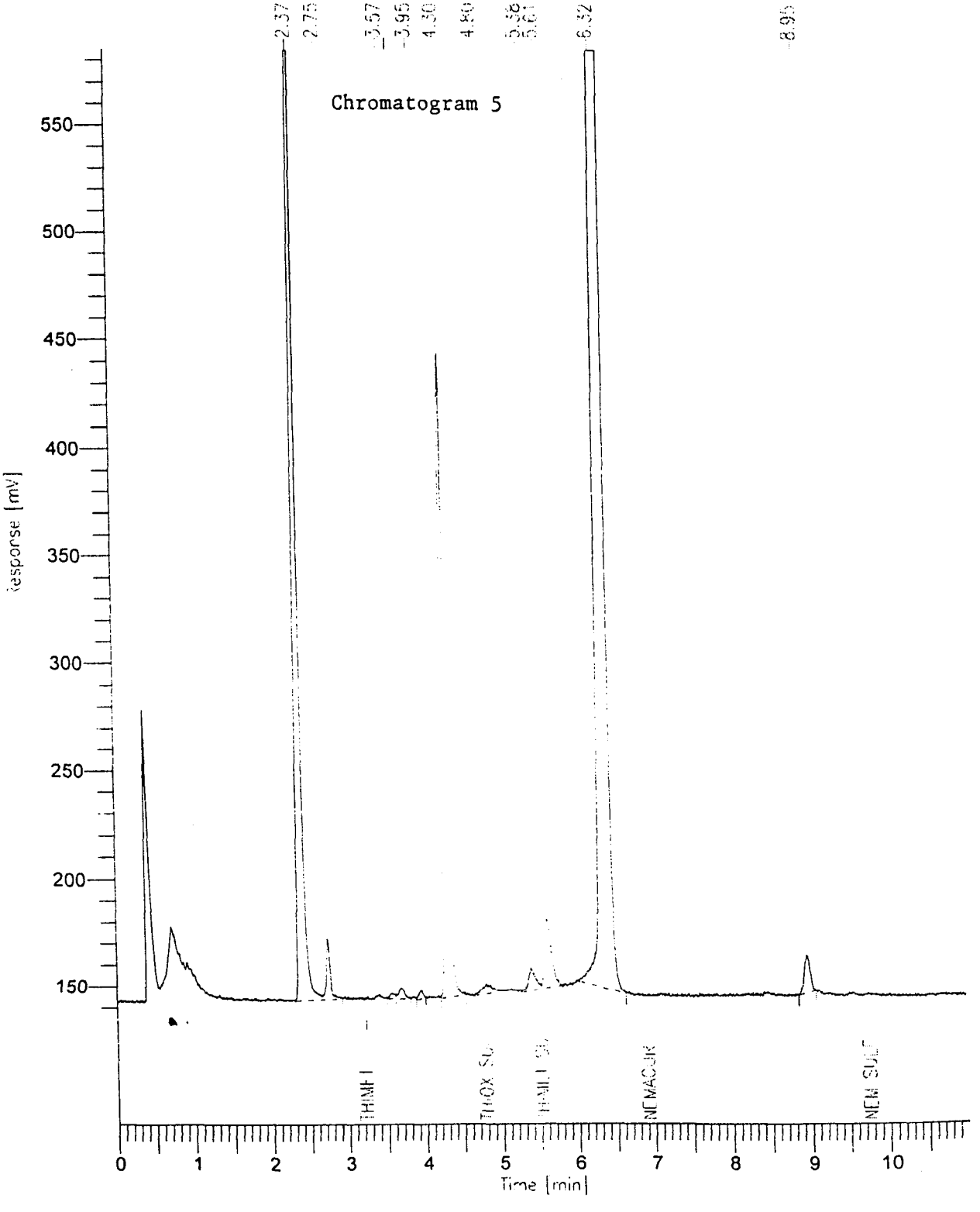
Sample #: 410MV1.0R4 Page 1 of 1
Date : 4/21/97 11:35 AM
Time of Injection: 4/18/97 06:29 PM
Low Point : 135.00 mV High Point : 585.00 mV
Plot Scale: 450.0 mV



Chromatogram

Sample Name : ALV-9
FileName : X:\DATA\NPD_FPD\ARB_97\THI_NEM\041897\418C017
Method : NEM_FPD
Start Time : 0.00 min End Time : 11.00 min
Scale Factor: 0.0 Plot Offset: 135 mV

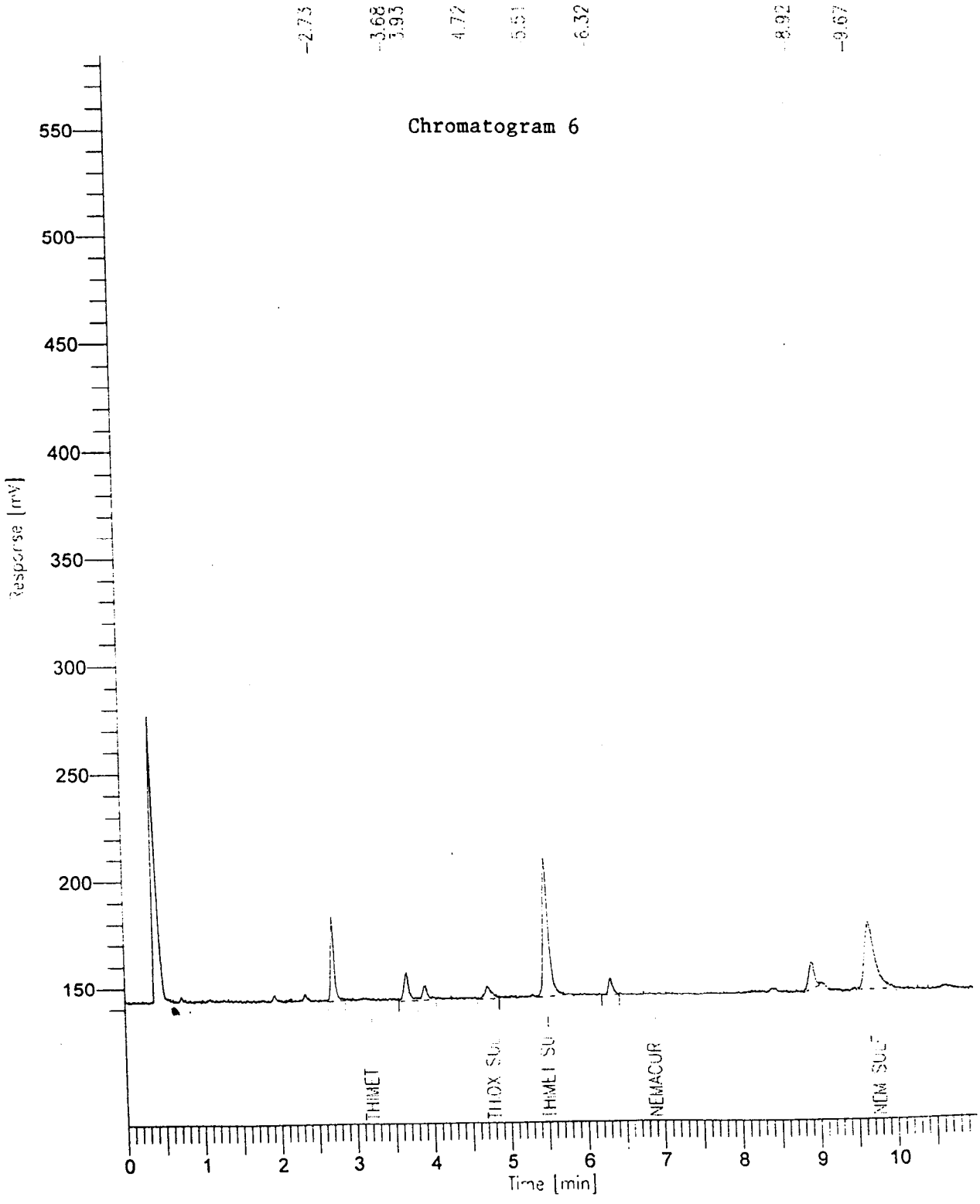
Sample #: 413 Page 1 of 1
Date : 4/21/97 11:36 AM
Time of Injection: 4/18/97 08:35 PM
Low Point : 135.00 mV High Point : 585.00 mV
Plot Scale: 450.0 mV



Chromatogram

Sample Name : FS-5
FileName : X:\DATA\NPD_FPD\ARB_97\THI_NEM\042197\421C012
Method : NEM_FPD
Start Time : 0.00 min End Time : 11.00 min
Scale Factor: 0.0 Plot Offset: 135 mV

Sample #: 441 Page 1 of 1
Date : 4/22/97 10:19 AM
Time of Injection: 4/21/97 05:55 PM
Low Point : 135.00 mV High Point : 585.00 mV
Plot Scale: 450.0 mV

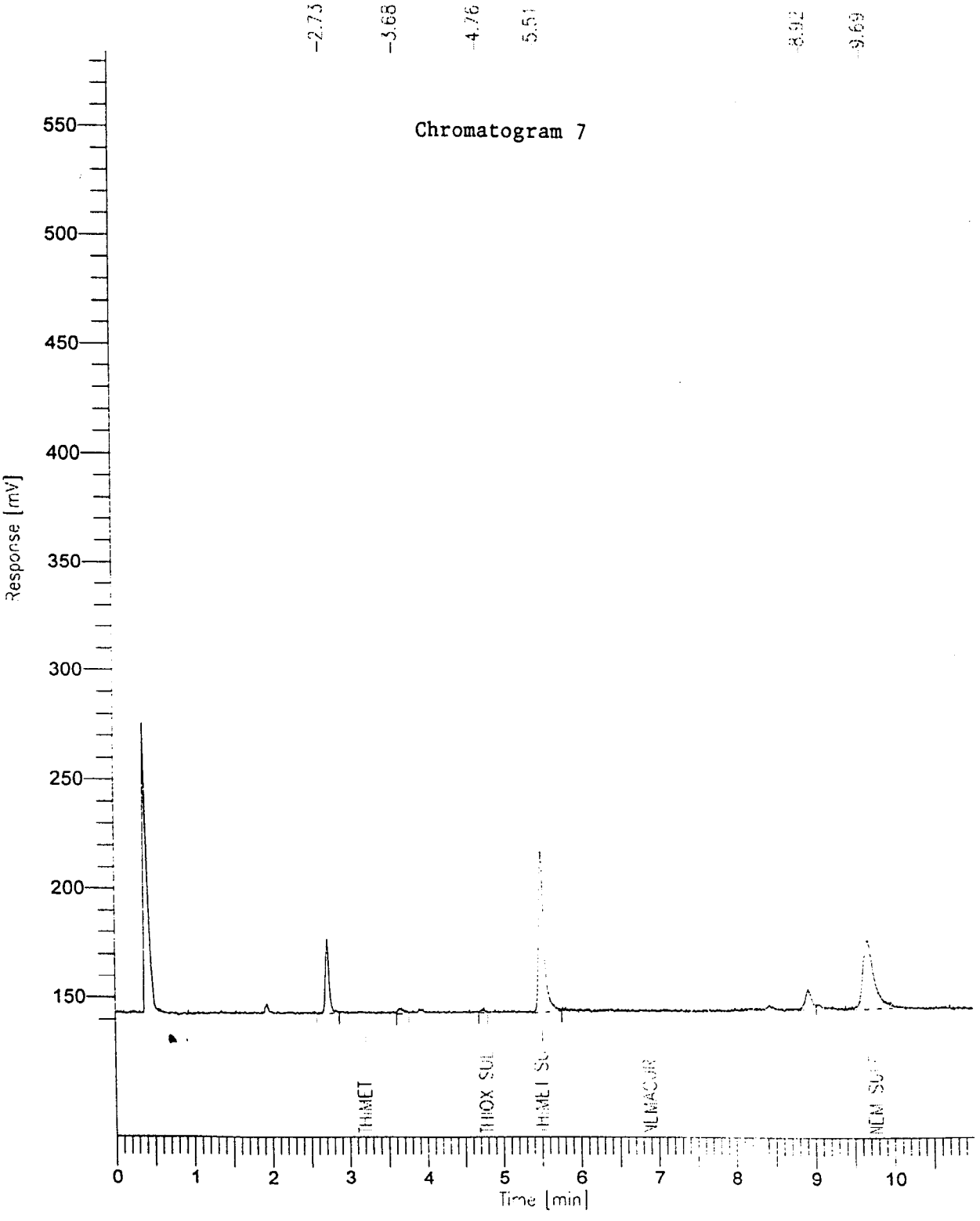


48

Chromatogram

Sample Name : TS-1
FileName : X:\DATA\NPD_FPD\ARB_97\THI_NEM\042197\421C013
Method : NEM_FPD
Start Time : 0.00 min End Time : 11.00 min
Scale Factor: 0.0 Plot Offset: 135 mV

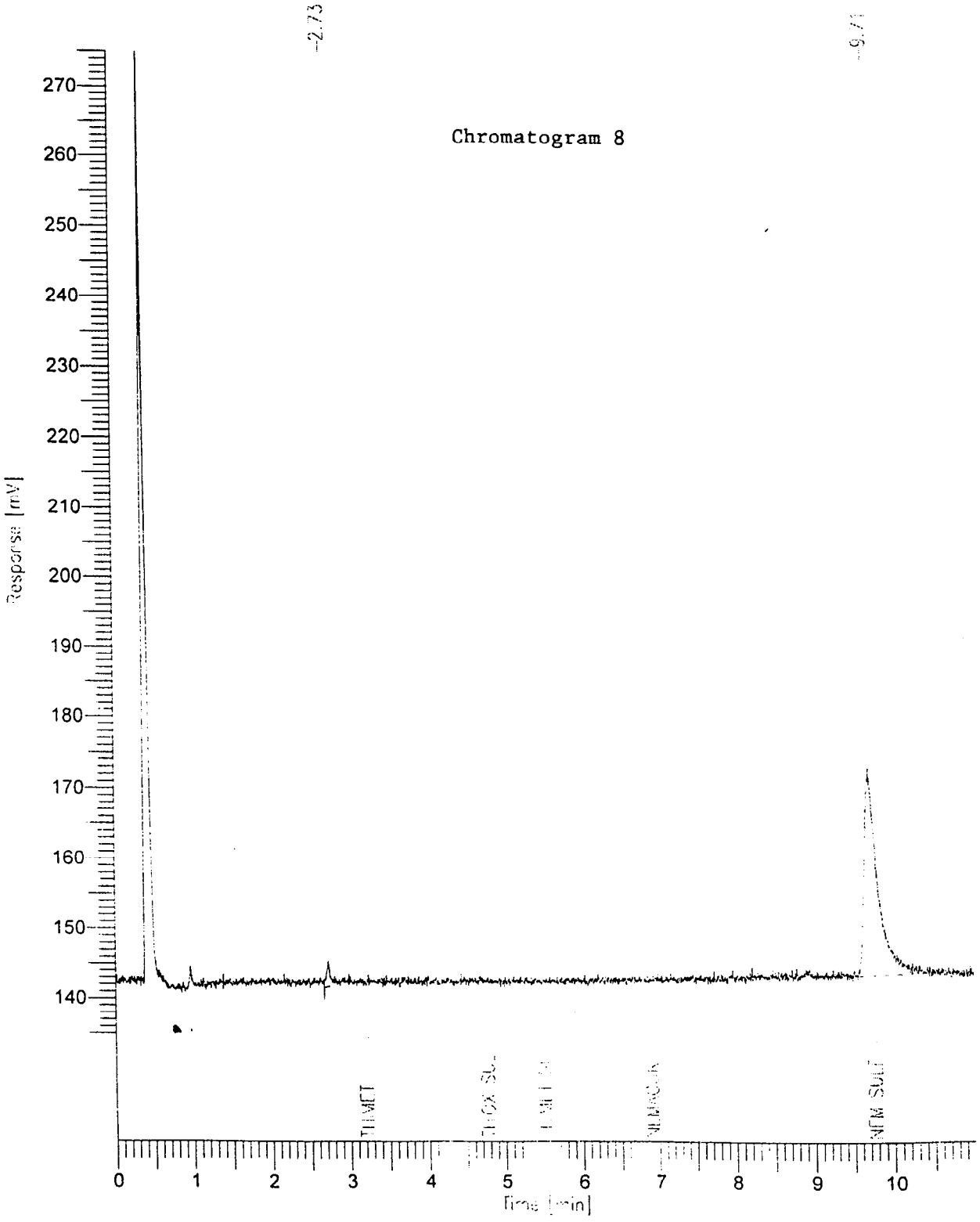
Sample #: 442 Page 1 of 1
Date : 4/22/97 10:19 AM
Time of Injection: 4/21/97 06:09 PM
Low Point : 135.00 mV High Point : 585.00 mV
Plot Scale: 450.0 mV



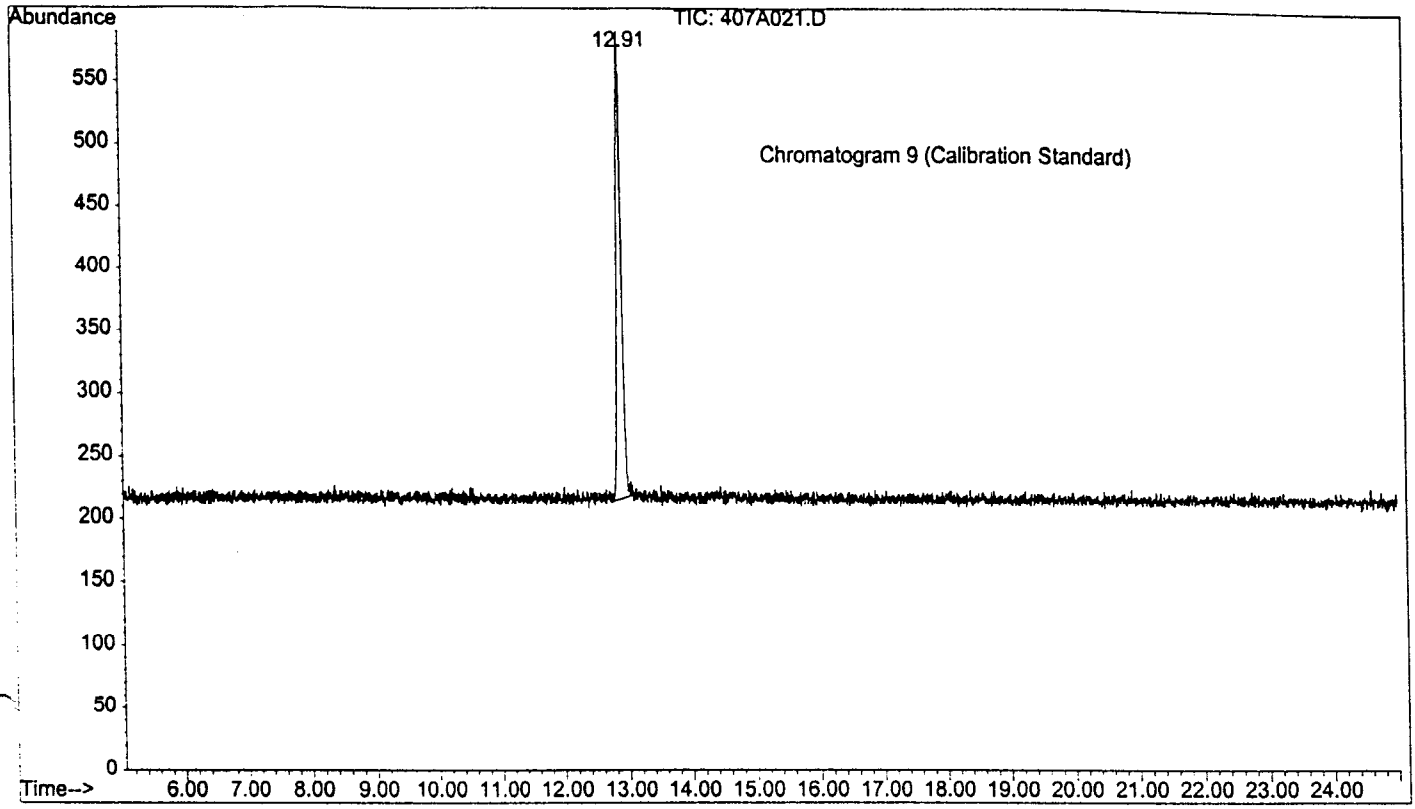
Chromatogram

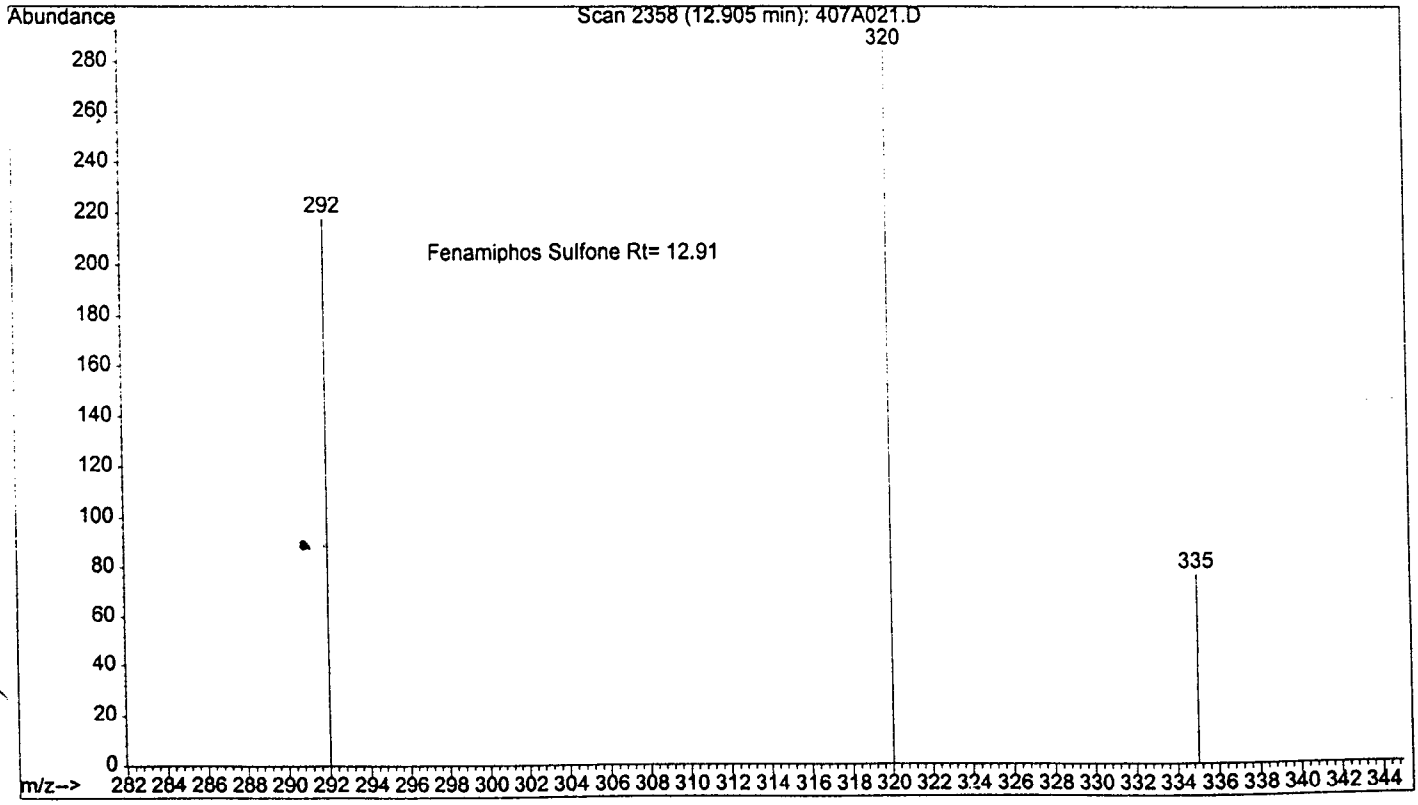
Sample Name : Stability
FileName : X:\DATA\NPD_FPD\ARB_97\THI_NEM\042397\423C051
Method : NEM_FPD
Start Time : 0.00 min End Time : 11.00 min
Scale Factor: 0.0 Plot Offset: 135 mV

Sample #: 148NXS50R6 Page 1 of 1
Date : 4/24/97 10:21 AM
Time of Injection: 4/24/97 03:47 AM
Low Point : 135.00 mV High Point : 275.00 mV
Plot Scale: 140.0 mV



File : D:\MSDATA\TAL\ARB97\THIMET\040797\407A021.D
Operator : Matt Hengel
Acquired : 8 Apr 1997 1:31 am using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 50 pg/ul 3ul inj.
Misc Info :
Vial Number: 11





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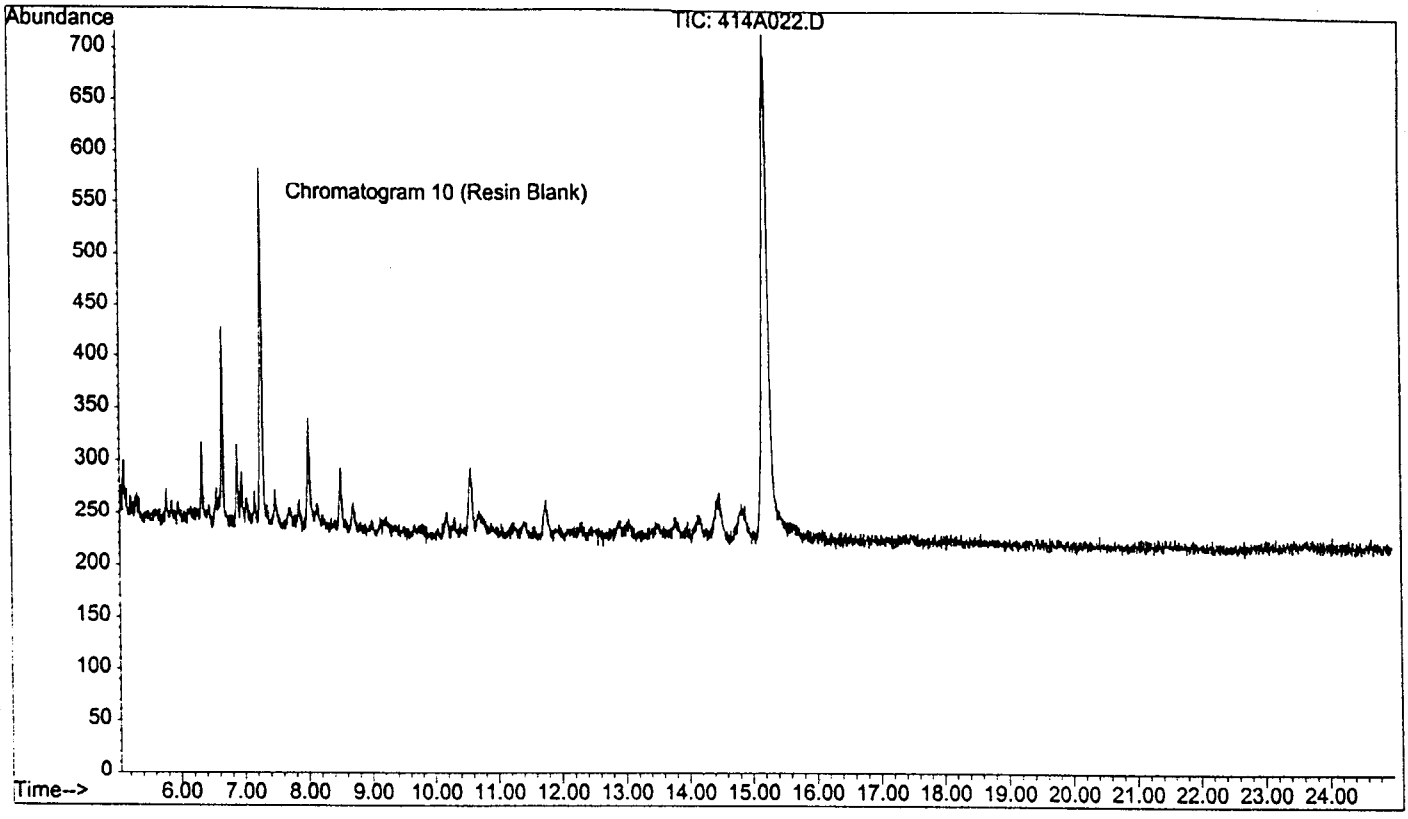
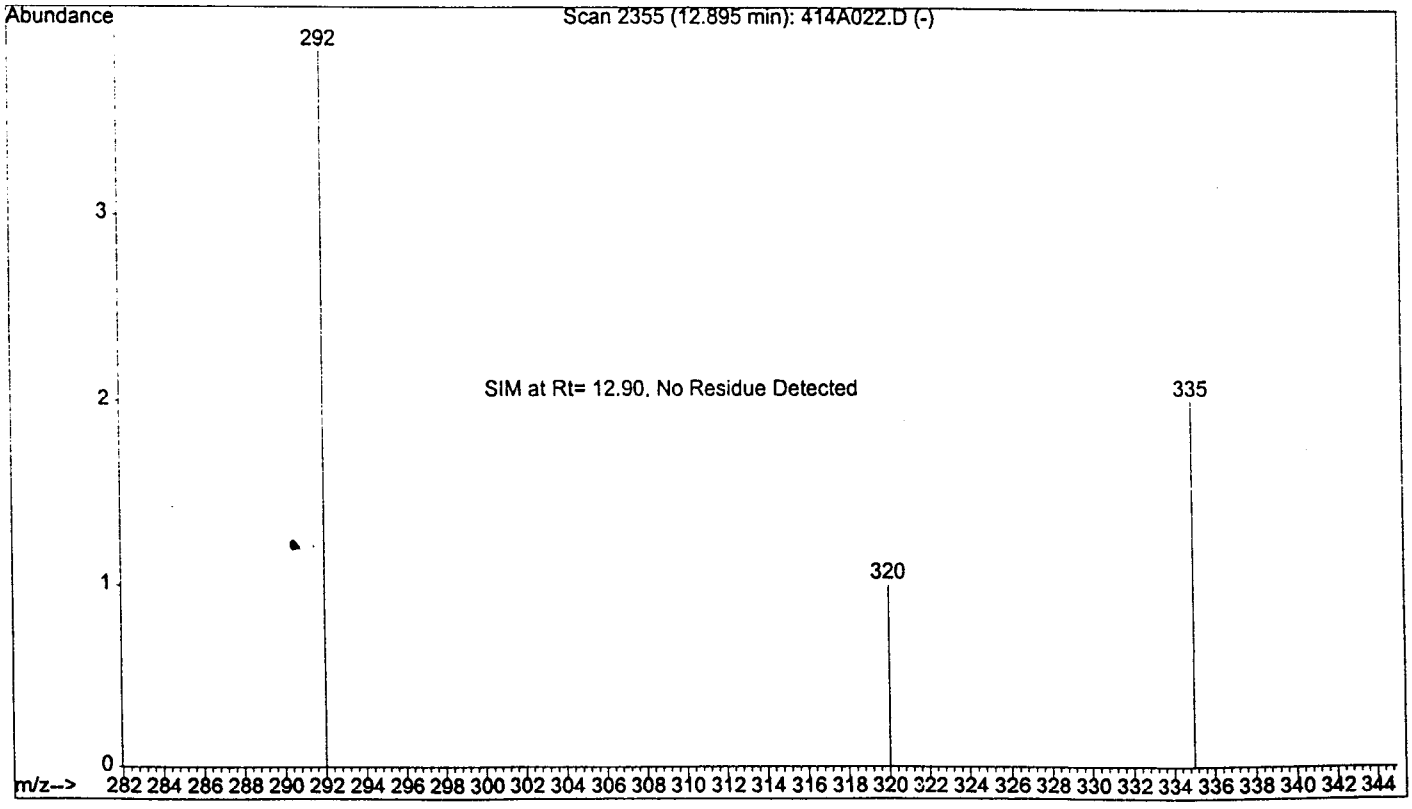
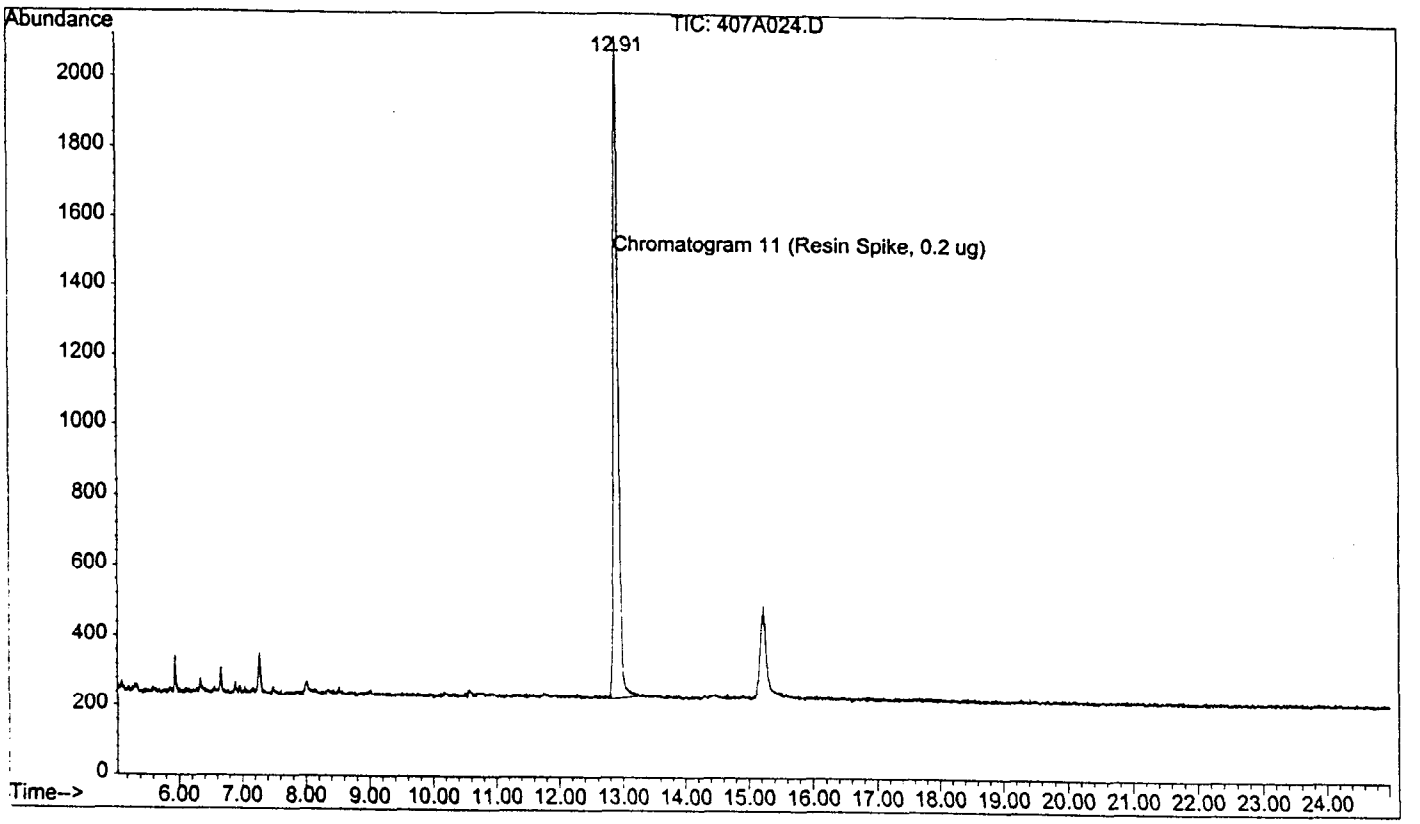
File : D:\MSDATA\TAL\ARB97\THIMET\041497\414A022.D
Operator : Matt Hengel
Acquired : 14 Apr 1997 11:47 pm using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 353C/2ml 3ul inj.
Misc Info :
Vial Number: 4

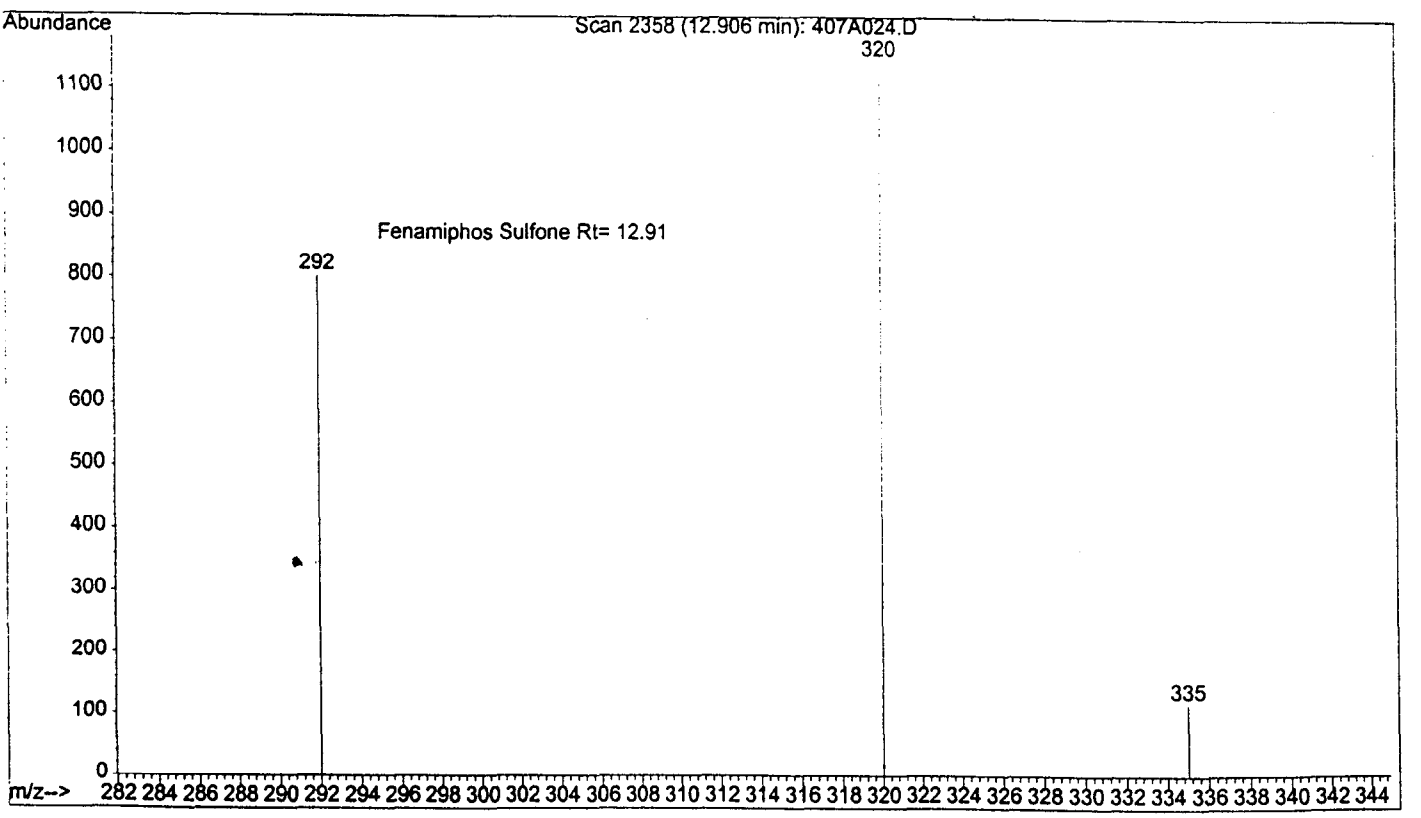




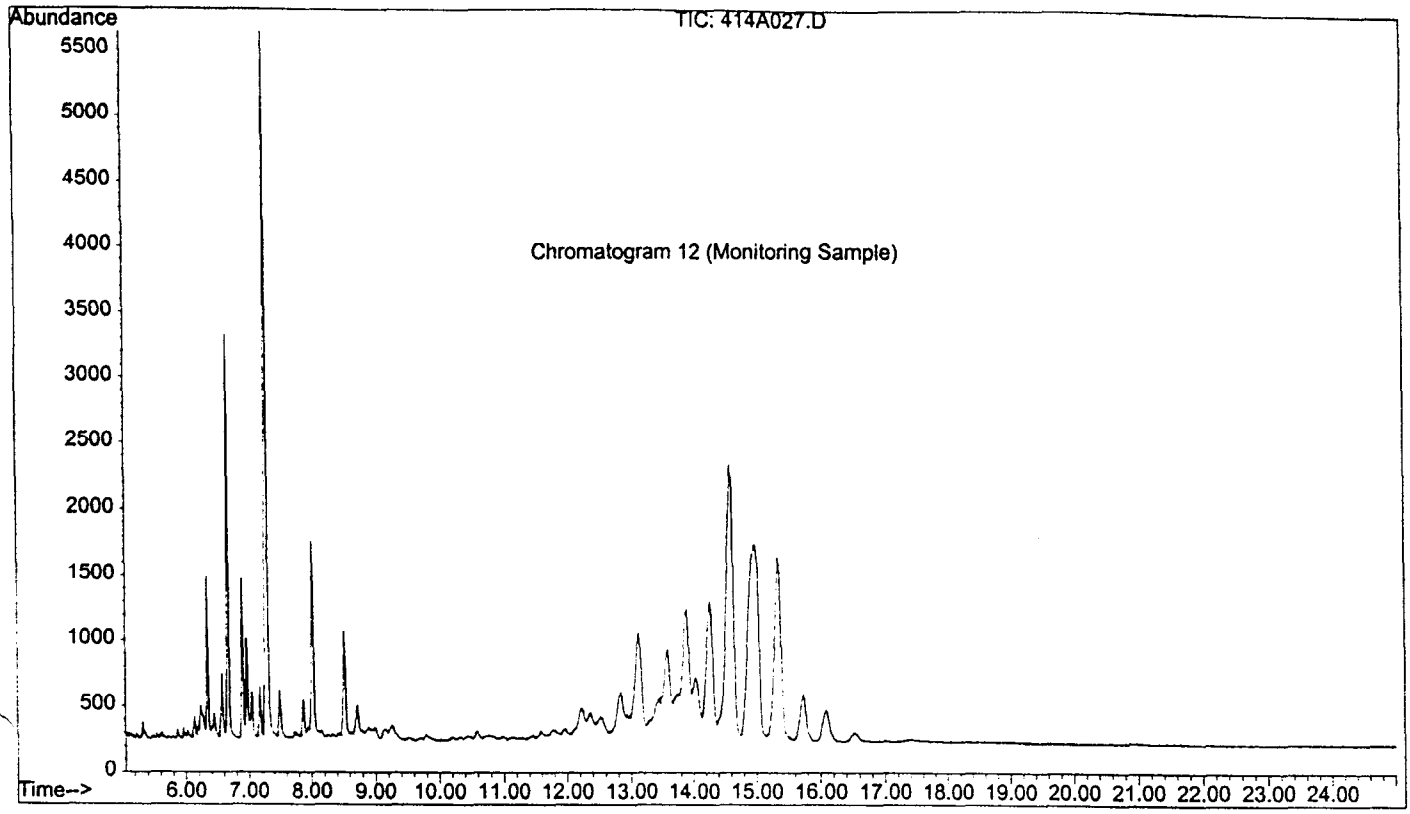
52

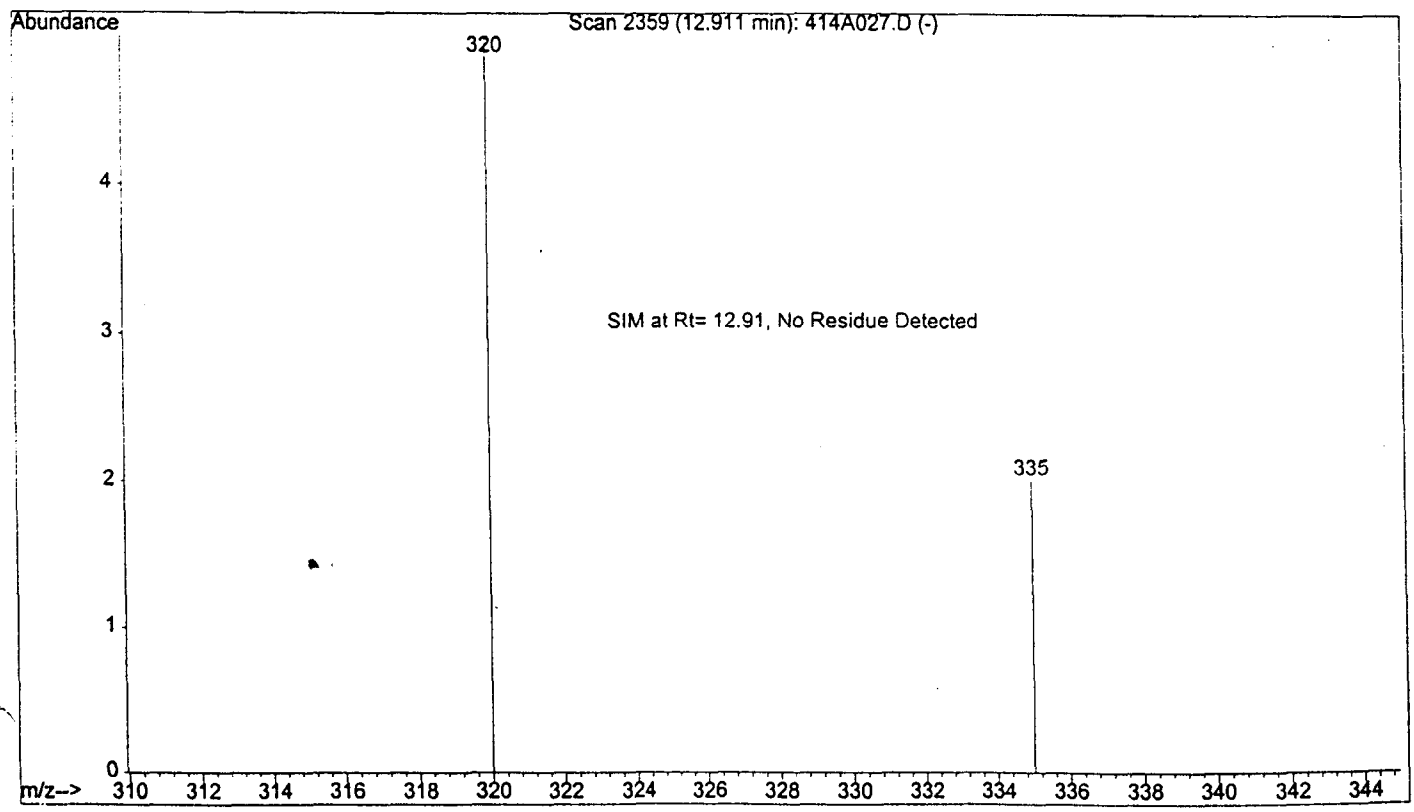
File : D:\MSDATA\TAL\ARB97\THIMET\040797\407A024.D
Operator : Matt Hengel
Acquired : 8 Apr 1997 2:55 am using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 303MV0.2R4/2ml 3ul inj.
Misc Info :
Vial Number: 5





File : D:\MSDATA\TAL\ARB97\THIMET\041497\414A027.D
Operator : Matt Hengel
Acquired : 15 Apr 1997 2:08 am using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 361(ARB-5)/2ml 3ul inj.
Misc Info :
Vial Number: 12





APPENDIX B. Field Application Results.

Table10. Fenamiphos Application Site Results (4/20/98-4/24/98).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
689	1	BW	<0.20	<0.20
691	3	BE	<0.20	<0.20
693	5	BS	<0.20	<0.20
695	7	BN	<0.20	<0.20
701	13	1S	<0.20	<0.20
702	14	1SD	<0.20	<0.20
703	15	1W	<0.20	<0.20
704	16	1E	<0.20	<0.20
705	17	1N	0.53	0.48
706	18	Blank	<0.20	<0.20
707	19	2S	<0.20	<0.20
708	20	2SD	<0.20	<0.20
709	21	Fenap-2W	<0.20	<0.20
710	22	2E	0.24	0.21
711	23	2N	<0.20	<0.20
712	24	3S	<0.20	<0.20
713	25	3SD	<0.20	<0.20
714	26	3W	<0.20	<0.20
715	27	3E	<0.20	<0.20
716	28	3N	<0.20	<0.20
717	29	4S	<0.20	<0.20
718	30	4SD	<0.20	<0.20
719	31	Fenap-4W	<0.20	<0.20
720	32	4E	<0.20	<0.20
721	33	4N	<0.20	<0.20
722	34	5S	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table10 Cont. Fenamiphos Application Site Results (4/20/98-4/24/98).

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)
723	35	5SD	<0.20	<0.20
724	36	5W	<0.20	<0.20
725	37	5E	<0.20	<0.20
726	38	5N	<0.20	<0.20
727	39	6S	<0.20	<0.20
728	40	6SD	<0.20	<0.20
729	41	Fenap-6W	<0.20	<0.20
730	42	6E	<0.20	<0.20
731	43	6N	<0.20	<0.20
732	44	7S	<0.20	<0.20
733	45	7SD	<0.20	<0.20
734	46	7W	<0.20	<0.20
735	47	7E	<0.20	<0.20
736	48	7N	<0.20	<0.20
737	49	B2	<0.20	<0.20

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 11. Concurrent Laboratory Validation Results (% Recovery).

Analysis Date	Sample TAL #	Fortification Level (µg)	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)	Adjusted % Rec	Ave. % Rec	Stdev
4/28/98	742C	-----	<0.20	<0.20			
4/28/98	743NV0.2R4	0.40	0.37	0.34	84%		
4/28/98	744NV0.2R5	0.40	0.39	0.35	88%		
4/28/98	745NV0.2R6	0.40	0.38	0.34	86%	86%	2%

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 12. Field, Trip, and Lab Spike Results.

Total Fenamiphos Summary

Sample TAL #	ARB Log #	ARB ID	Fenamiphos Sulfone (µg)	Adjusted Fenamiphos (µg)	Adjusted % Rec	Ave. % Rec	Stdev
696	8	FS-1	0.36	0.33			
694	6	FS-2	0.38	0.34			
690	2	FS-3	0.40	0.36			
692	4	FS-4	0.37	0.33			
697	9	TS-1	0.42	0.38			
698	10	TS-2	0.44	0.40			
699	11	TS-3	0.43	0.39			
700	12	TS-4	0.45	0.41			
738	50	LS-1	0.33	0.29			
739	51	LS-2	0.34	0.31			
740	52	LS-3	0.37	0.34			
741	53	LS-4	0.36	0.33			

Adjusted Fenamiphos (µg) = Mass of fenamiphos sulfone x 0.904 (molar conversion)

Table 13. Qualitative MSD Confirmation Results For Application Samples.

Sample ID	Sample Type	MSD Analysis Date	Fenamiphos
Standard	50 pg/µL	4/30/98	+
302C	Control Resin	4/30/98	–
743N0.4R4	0.4 µg Resin Fort	4/30/98	+
689 (BW)	Background Air Sample	4/30/98	–
705 (1N)	Application Air Sample	4/30/98	+
710 (2E)	Application Air Sample	4/30/98	+
711 (2N)	Application Air Sample	4/30/98	–

A (+) denotes a positive hit for nemacur sulfone equal or greater than 0.10 µg/sample, while a (-) denotes a negative hit or residue levels below 0.10µg/sample.

GC/MS Instrumentation

Hewlett-Packard 6890 Gas Chromatograph with integrated autosampler
Hewlett-Packerd 5972 Mass Selective Detector (MSD)
Hewlett-Packard Chemstation Software, version A.02.00

Injector: 250°C, splitless injection
Detector: 280°C
Column: DB-XLB 15 m x0.25 mm I.D. with a 0.25 µm film thickness
Tempurature program: initial: 120°C, hold 0 min., ramp to 280°C @ 20°/min., hold 2min.
Carrier Gas Flow (He) = 2.0 mL/min
Selected Ion Monitoring: m/z = 292, 320, and 335 (50 ms Dwell Time)
Retention Time for Phorate Sulfone = 7.39 min.

APPENDIX C. GC and GC/MS Sample Chromatograms (Application).

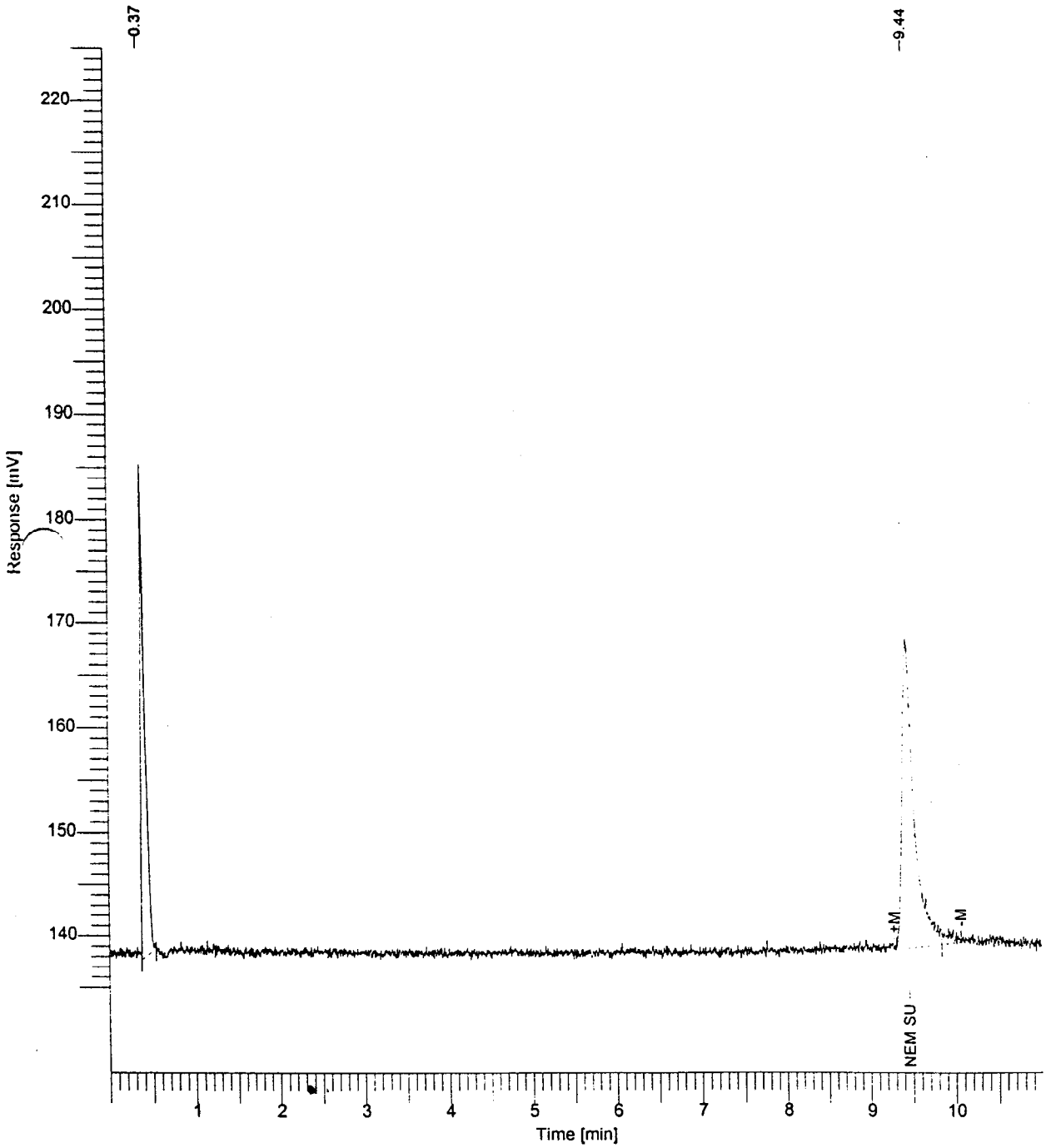
1. Calibration Standard (GC-FPD), 400 pg/µL Fenamiphos Sulfone (NEM SU).
2. Calibration Standard (GC-FPD). 50 pg/µL Fenamiphos Sulfone (NEM SU).
3. Resin Blank (GC-FPD).
4. Resin Spike, 0.4 µg (GC-FPD).
5. Application Sample (GC-FPD).
6. ARB-QA Field Spike (GC-FPD).
7. ARB-QA Trip Spike (GC-FPD).
8. Calibration Standard (GC/MS), 50 pg/µL Fenamiphos Sulfone.
9. Resin Blank (GC/MS).
10. Resin Spike, 0.4 µg (GC/MS).
11. Application Sample (GC/MS).

Chromatogram

Sample Name : Std
Sample #: 400pg/ul

FileName : X:\Data\Npd_Fpd\Arb_97\Thi_Nem\980427\427a010.raw
Date : 04/28/98 07:13:01 PM
Method : Nem_fpd
Time of Injection: 04/27/98 09:37:22 PM
Start Time : 0.00 min
End Time : 11.00 min
Low Point : 135.00 mV
High Point : 225.00 mV
Scale Factor: 0.0
Plot Offset: 135.00 mV
Plot Scale: 90.0 mV

Chromatogram 1

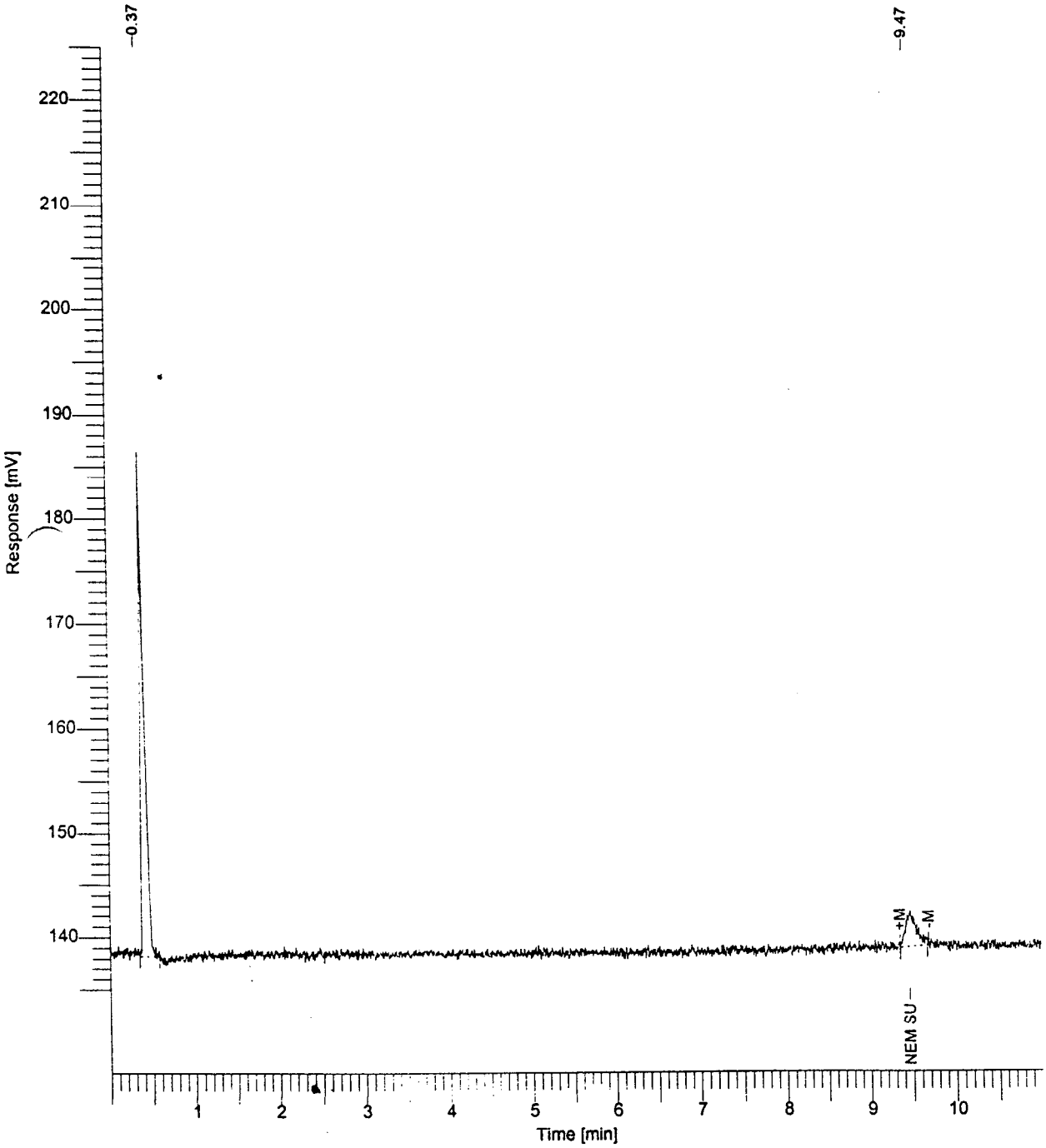


Chromatogram

Sample Name : Std
FileName : X:\Data\Npd_Fpd\Arb_97\Thi_Nem\980427\427a019.raw
Date : 04/28/98 07:13:21 PM
Method : Nem_fpd
Start Time : 0.00 min
Scale Factor: 0.0

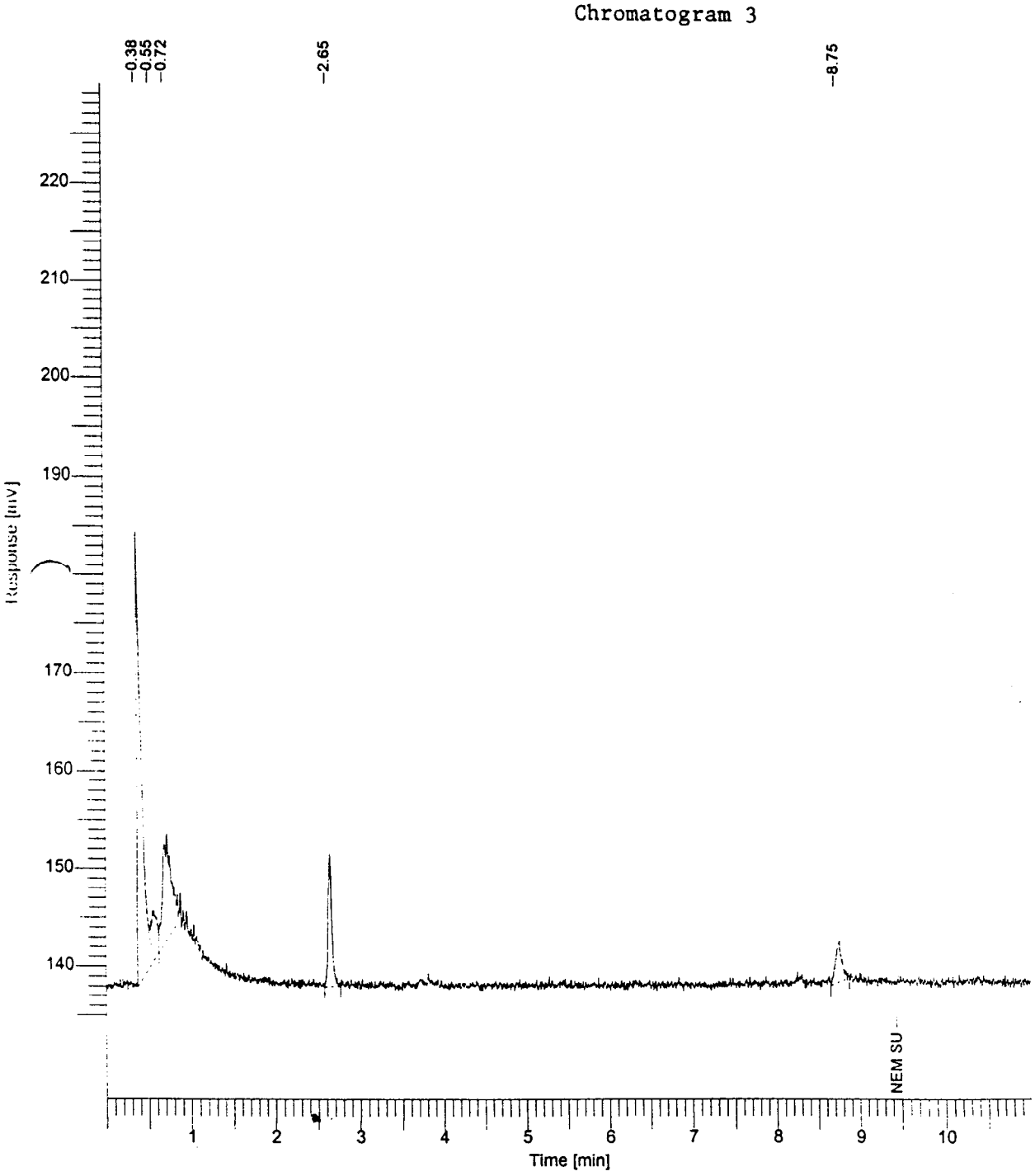
Sample #: 50pg/ul
Page 1 of 1
Time of Injection: 04/27/98 11:43:25 PM
End Time : 11.00 min
Low Point : 135.00 mV
High Point : 225.00 mV
Plot Offset: 135.00 mV
Plot Scale: 90.0 mV

Chromatogram 2



Chromatogram

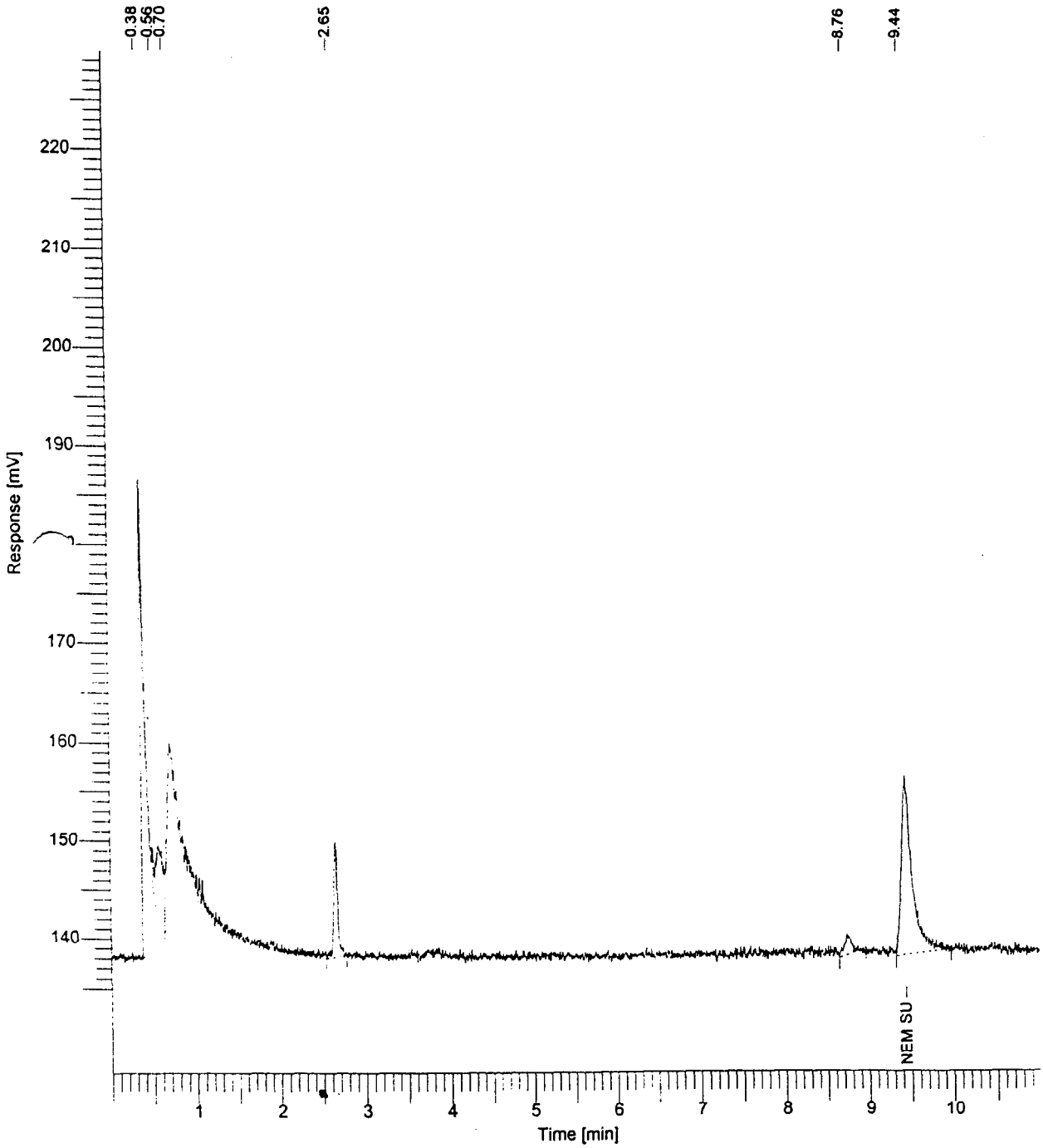
Sample Name : Control Sample #: 742C
FileName : X:\Data\Npd_Fpd\Arb_97\Thi_Nem\980428\428a007.raw
Date : 04/29/98 02:00:59 PM
Method : Nem_fpd Time of Injection: 04/28/98 09:11:12 PM
Start Time : 0.00 min End Time : 11.00 min Low Point : 135.00 mV High Point : 230.00 mV
Scale Factor: 0.0 Plot Offset: 135.00 mV Plot Scale: 95.0 mV



Chromatogram

Sample Name : Recovery Sample #: 743NV0.4R4 Page 1 of 1
FileName : X:\Data\Npd_Fpd\Arb_97\Thi_Nem\980428\428a008.raw
Date : 04/29/98 02:01:02 PM
Method : Nem_fpd Time of Injection: 04/28/98 09:25:12 PM
Start Time : 0.00 min End Time : 11.00 min Low Point : 135.00 mV High Point : 230.00 mV
Scale Factor: 0.0 Plot Offset: 135.00 mV Plot Scale: 95.0 mV

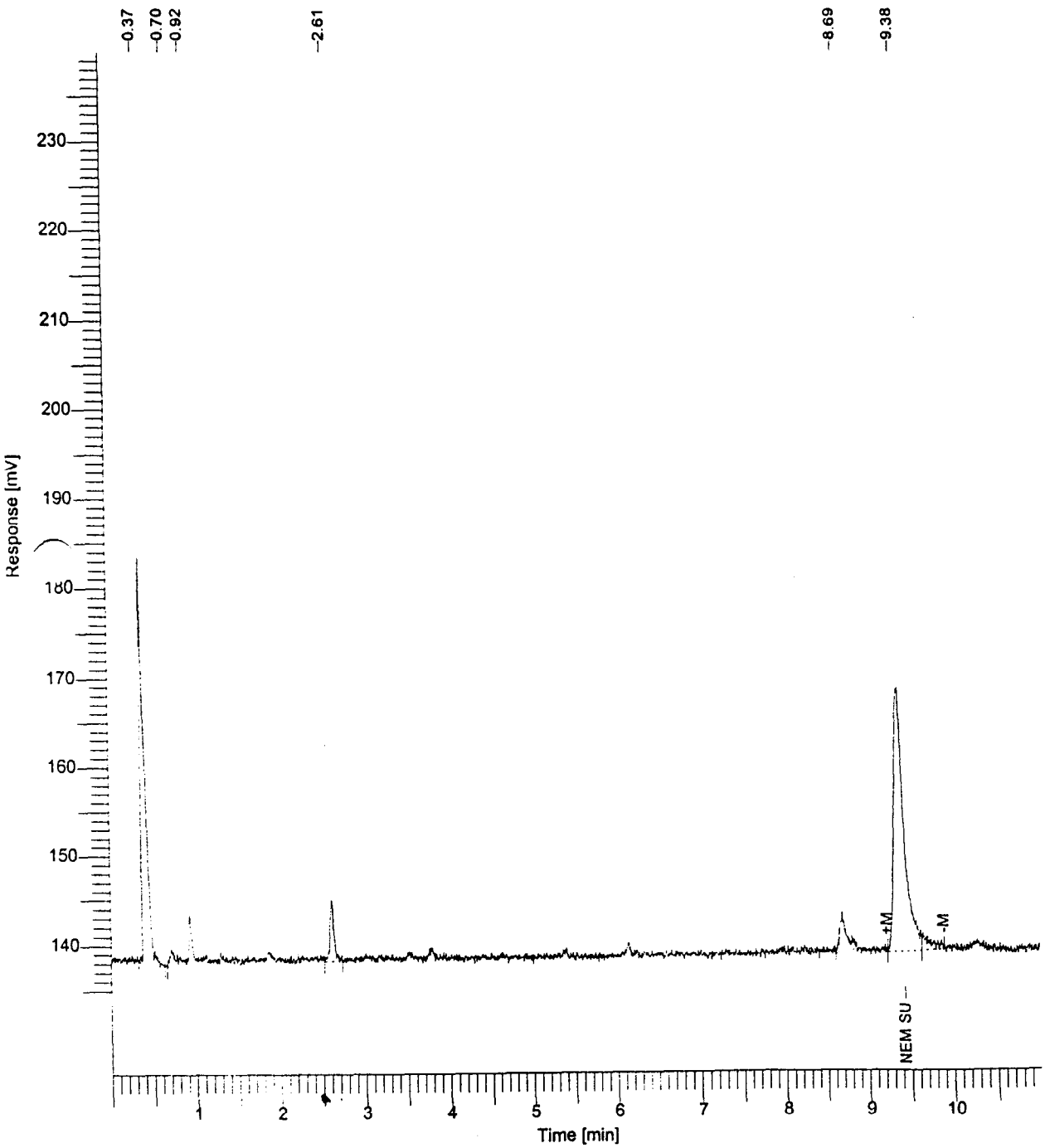
Chromatogram 4



Chromatogram

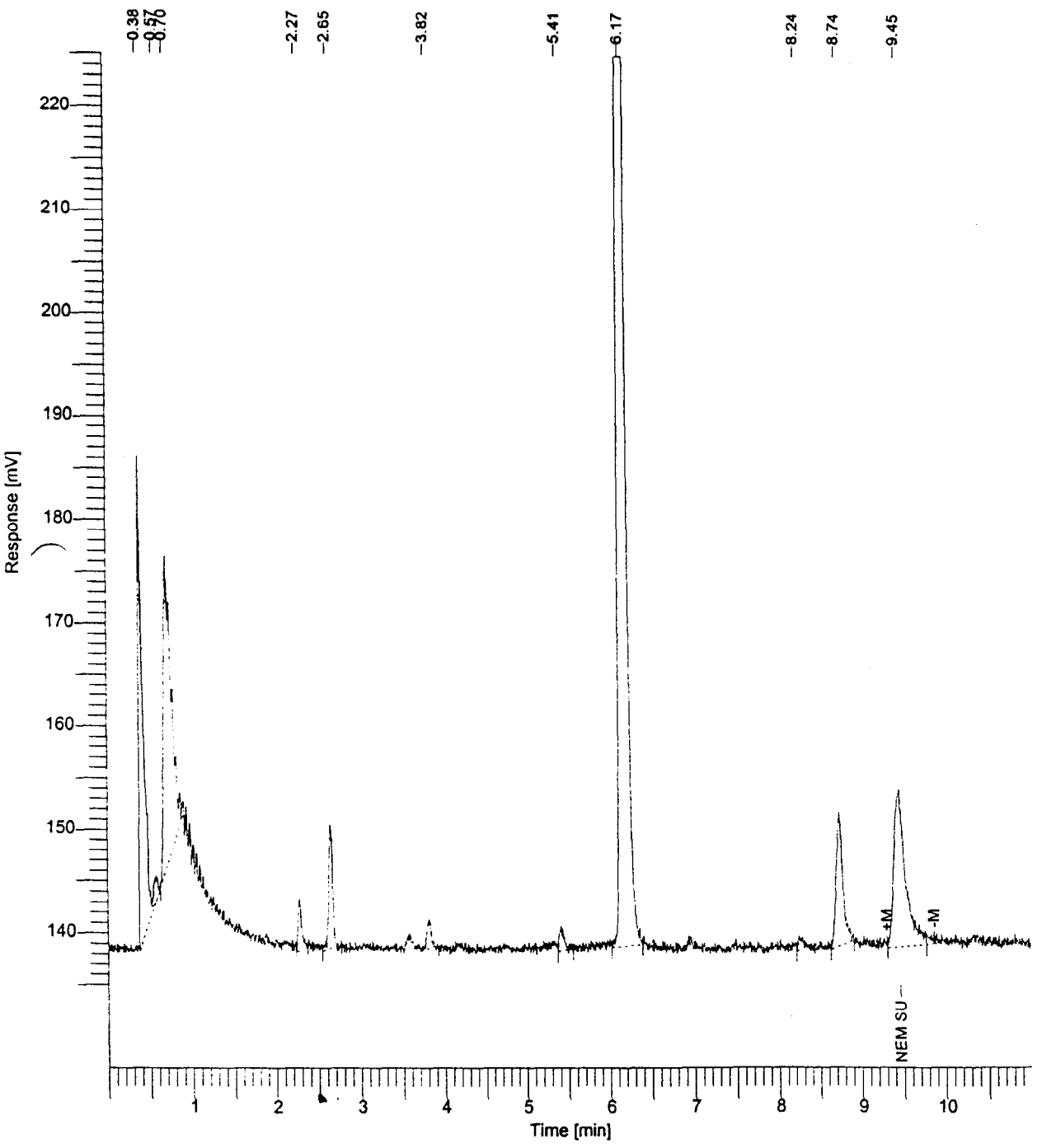
Sample Name : 1N Sample #: 705 Page 1 of 1
FileName : X:\Data\Npd_Fpd\Arb_97\Thi_Nem\980429\429a016.raw
Date : 04/30/98 10:13:29 AM
Method : Nem_fpd Time of Injection: 04/29/98 08:43:57 PM
Start Time : 0.00 min End Time : 11.00 min Low Point : 135.00 mV High Point : 240.00 mV
Scal tor: 0.0 Plot Offset: 135.00 mV Plot Scale: 105.0 mV

Chromatogram 5



Sample Name : FS1 Sample #: 696 Page 1 of 1
FileName : X:\Data\Npd_Fpd\Arb_97\Thi_Nem\980427\427a020.raw
Date : 04/28/98 07:13:23 PM
Method : Nem_fpd Time of Injection: 04/27/98 11:57:23 PM
Start Time : 0.00 min End Time : 11.00 min Low Point : 135.00 mV High Point : 225.00 mV
Scale Factor: 0.0 Plot Offset: 135.00 mV Plot Scale: 90.0 mV

Chromatogram 6

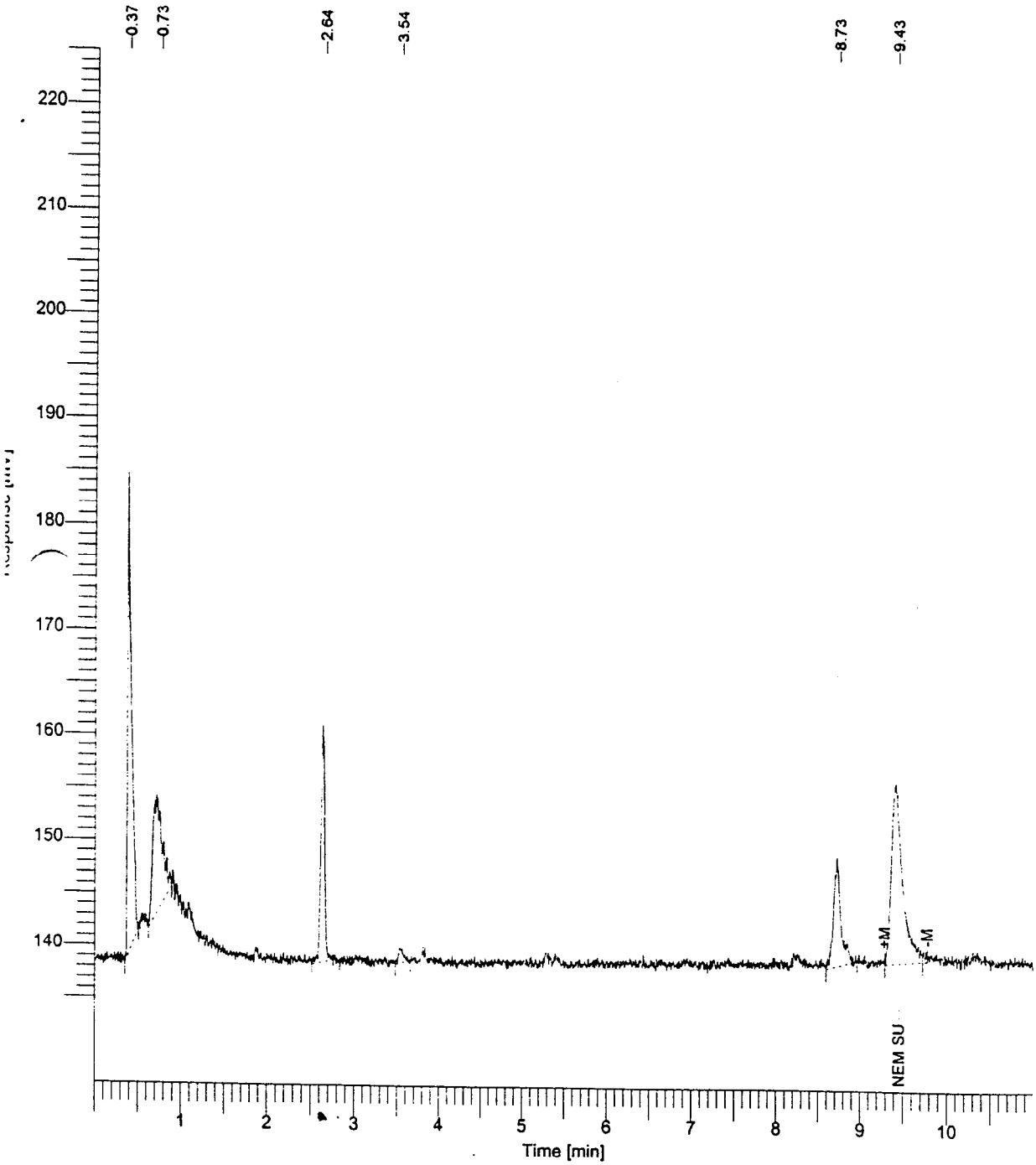


Chromatogram

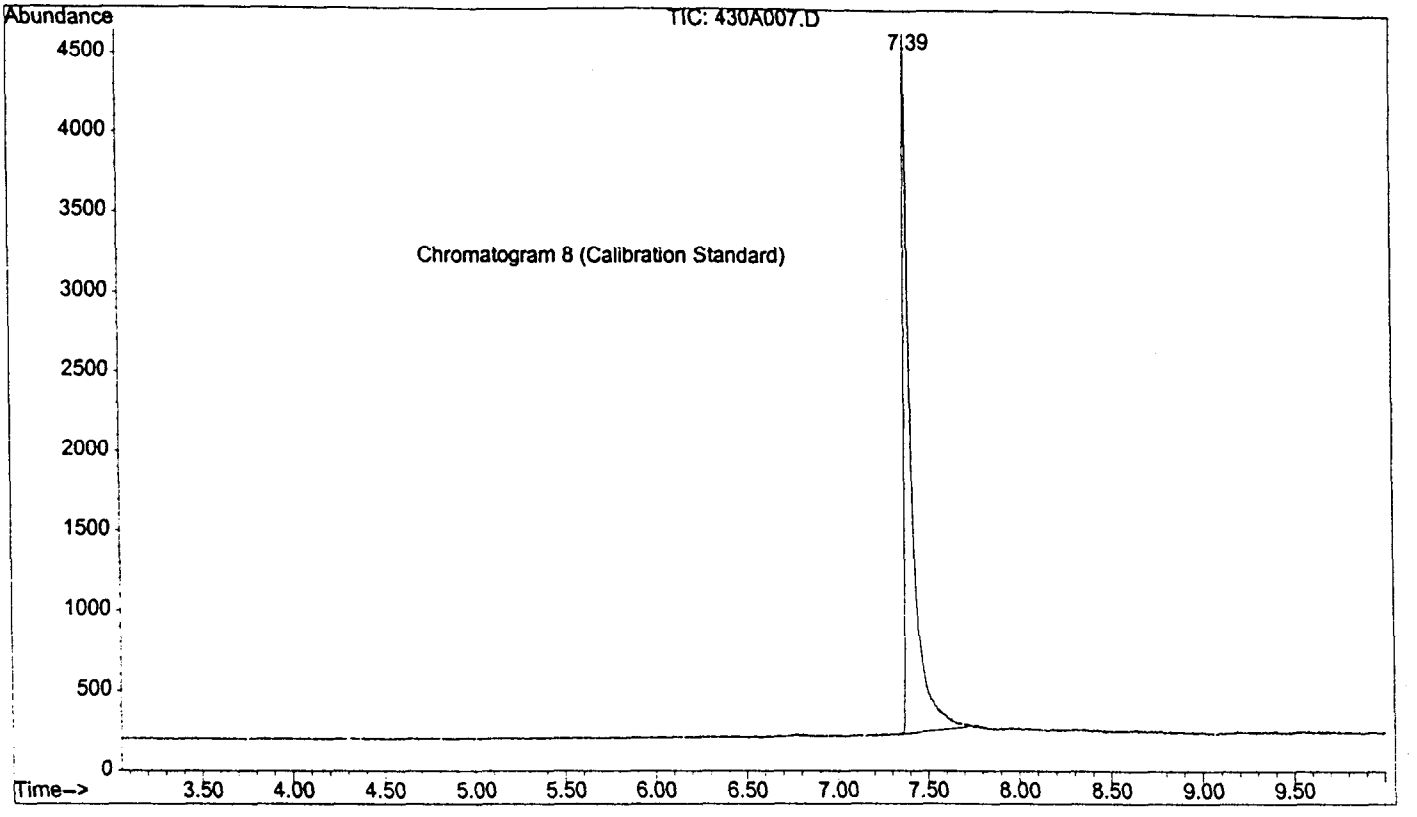
Sample Name : TS1
FileName : X:\Data\Npd_Fpd\Arb_97\Thi_Nem\980427\427a034.raw
Date : 04/28/98 07:13:53 PM
Method : Nem_fpd
Start Time : 0.00 min
Scale Factor: 0.0

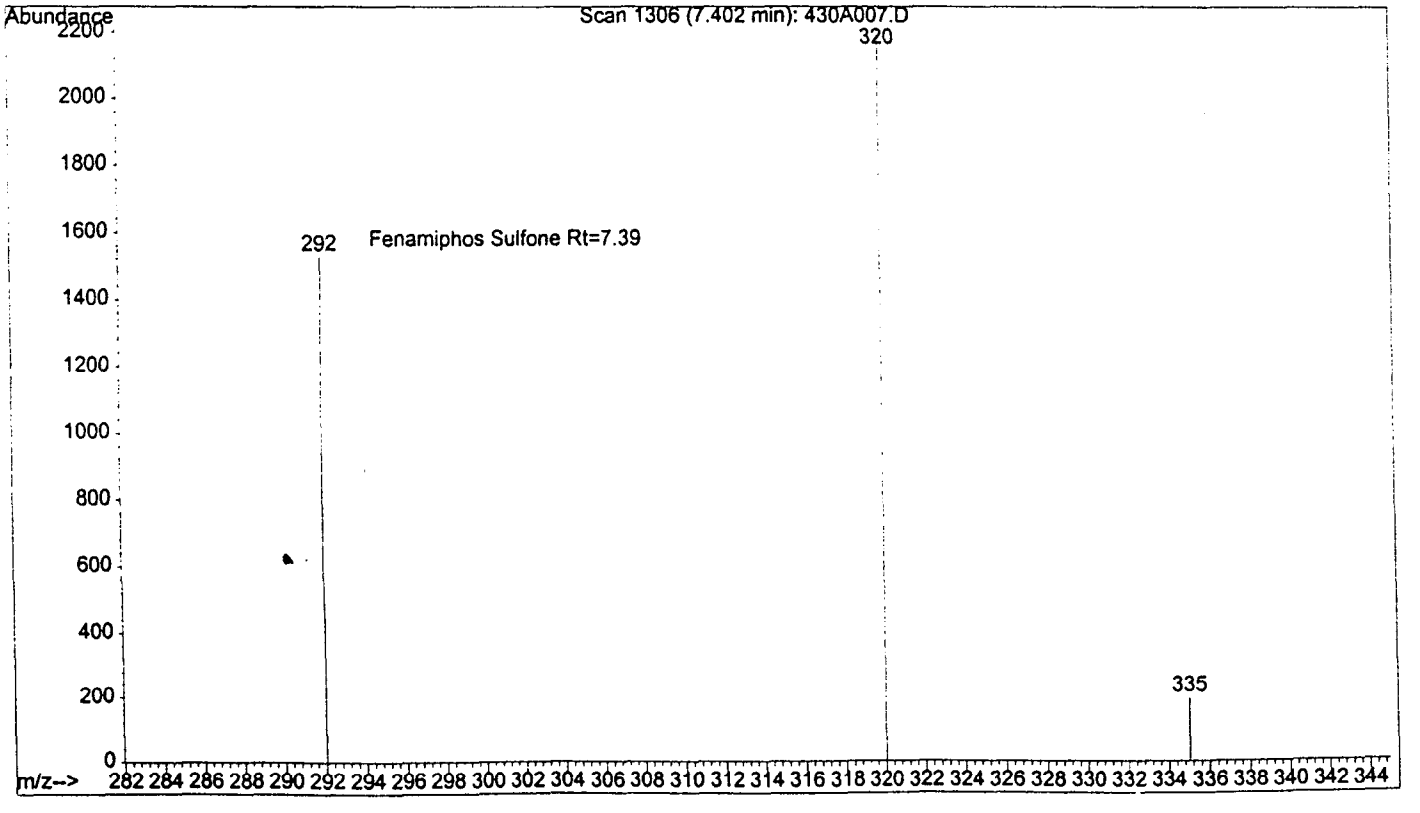
Sample #: 697
Page 1 of 1
Time of Injection: 04/28/98 03:13:26 AM
End Time : 11.00 min
Low Point : 135.00 mV
High Point : 225.00 mV
Plot Offset: 135.00 mV
Plot Scale: 90.0 mV

Chromatogram 7



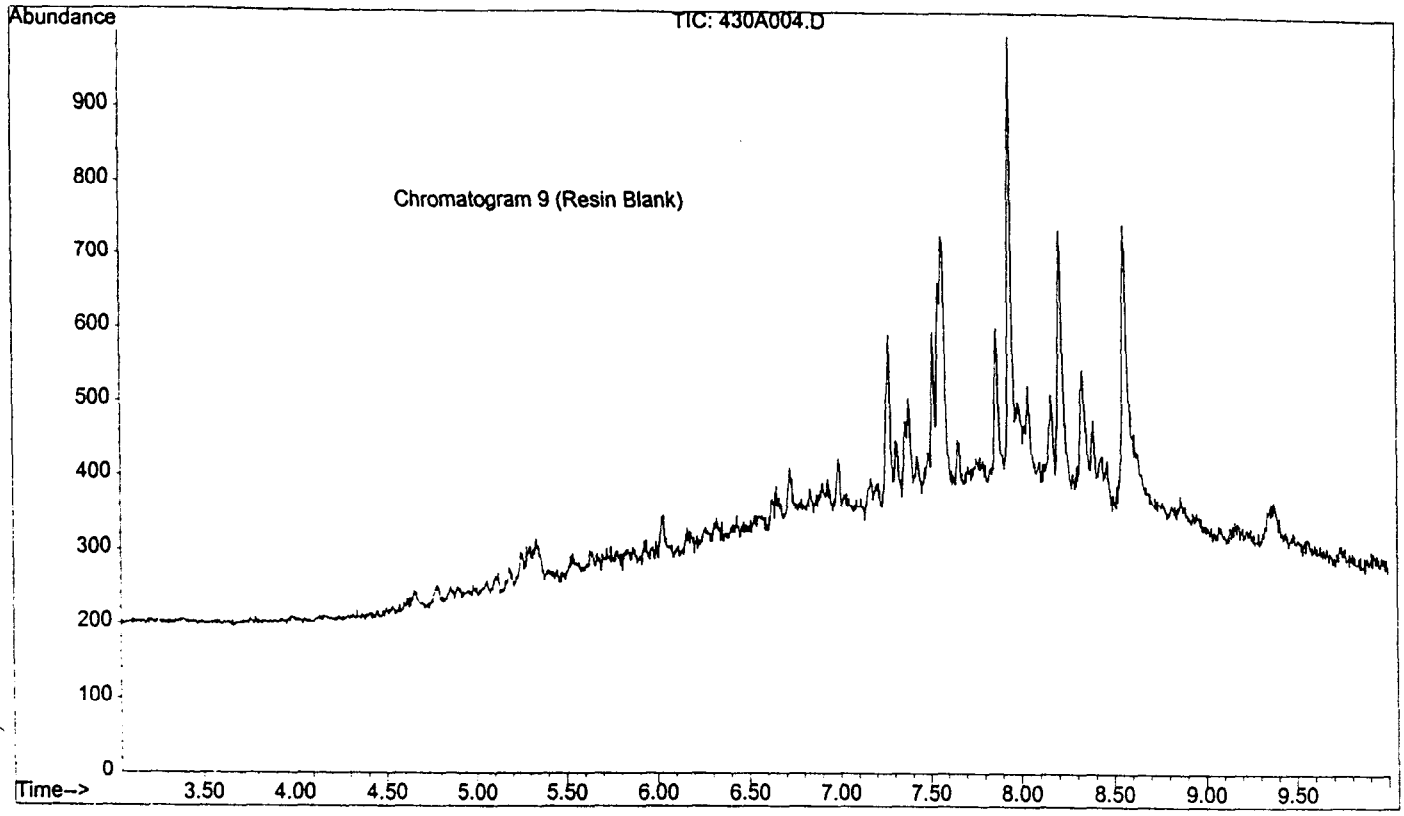
File : D:\MSDATA\TAL\ARB97\NEMACUR\980430\430A007.D
Operator : Matt Hengel
Acquired : 30 Apr 98 12:58 pm using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 50 pg/ul 3ul inj.
Misc Info :
Vial Number: 2

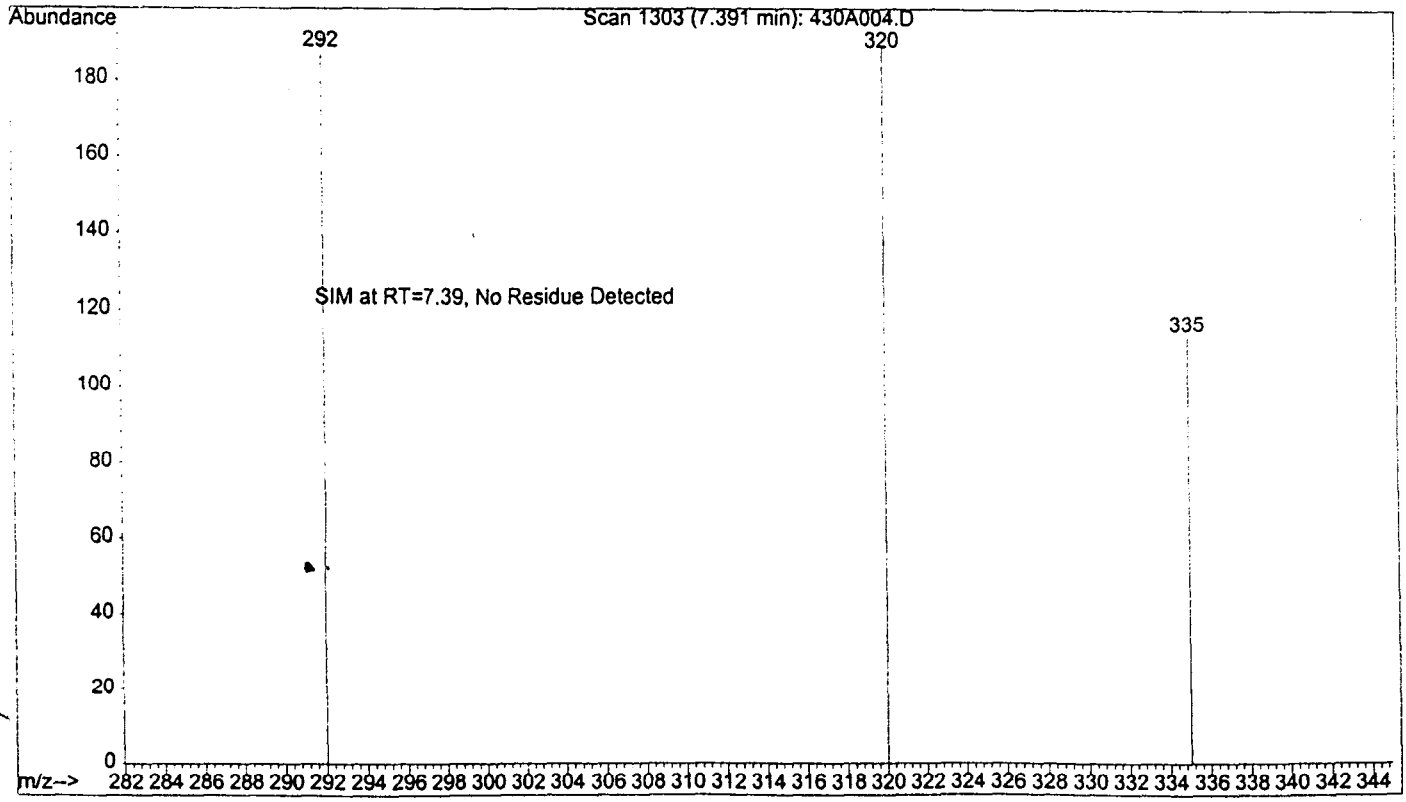




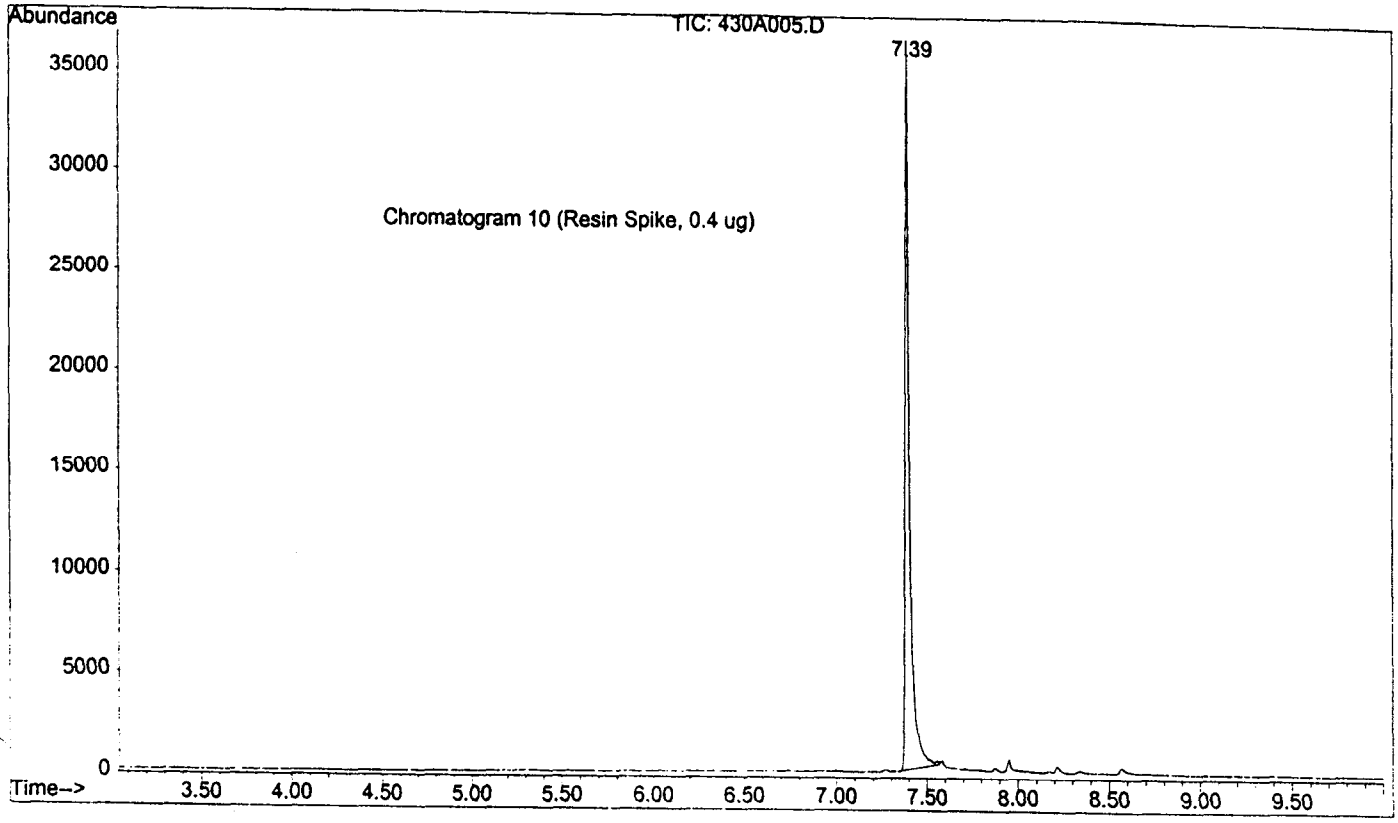
67

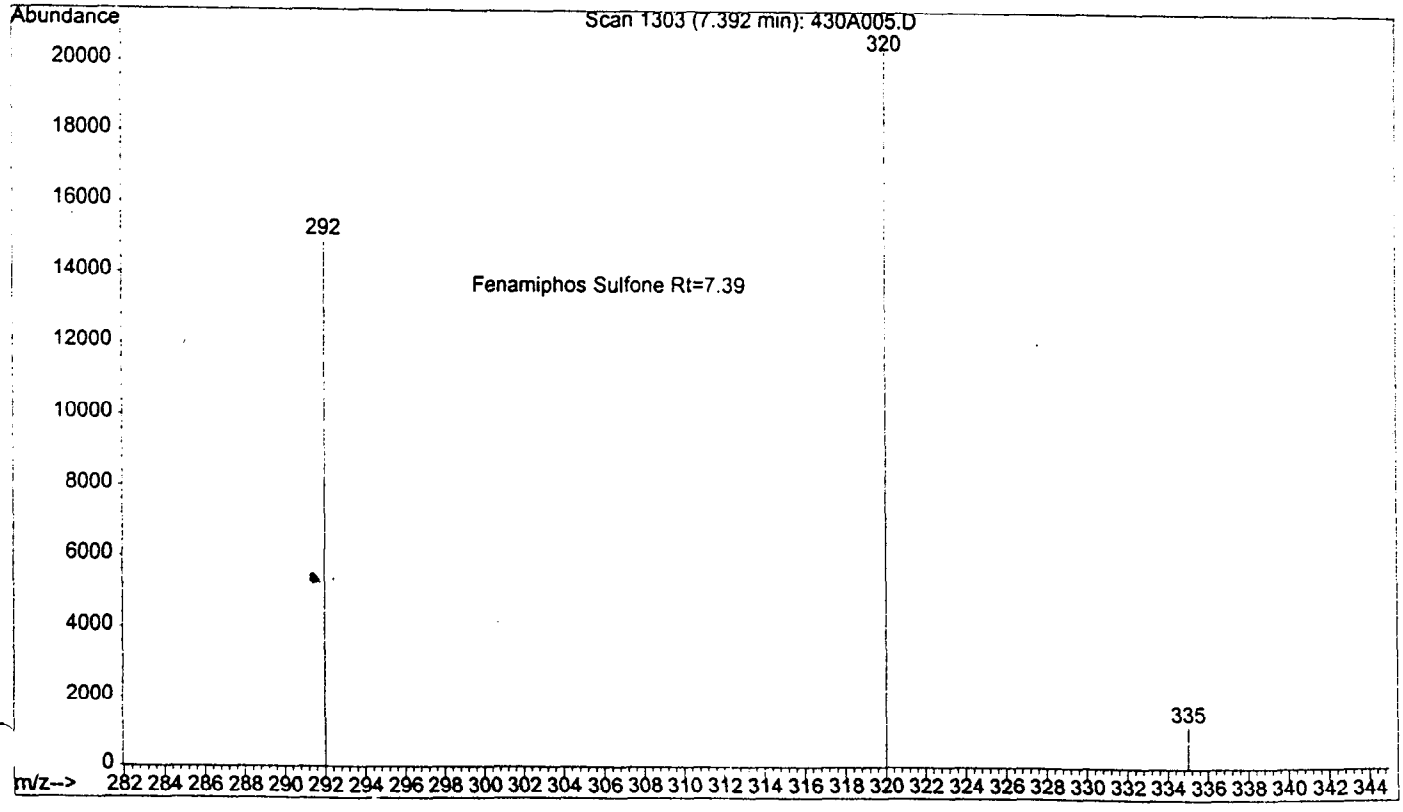
File : D:\MSDATA\TAL\ARB97\NEMACUR\980430\430A004.D
Operator : Matt Hengel
Acquired : 30 Apr 98 12:18 pm using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 742C/2ml 3ul inj.
Misc Info :
Vial Number: 3



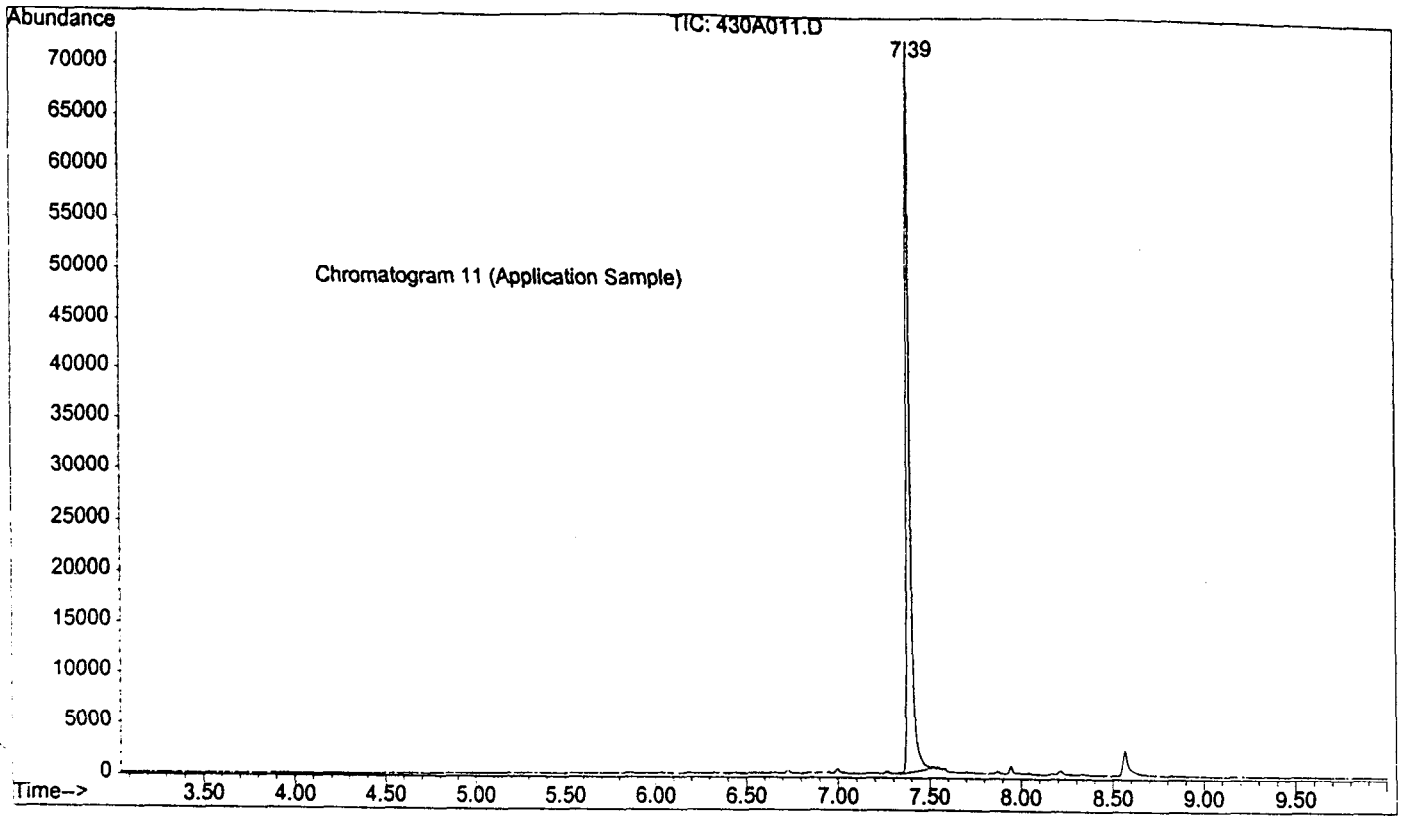


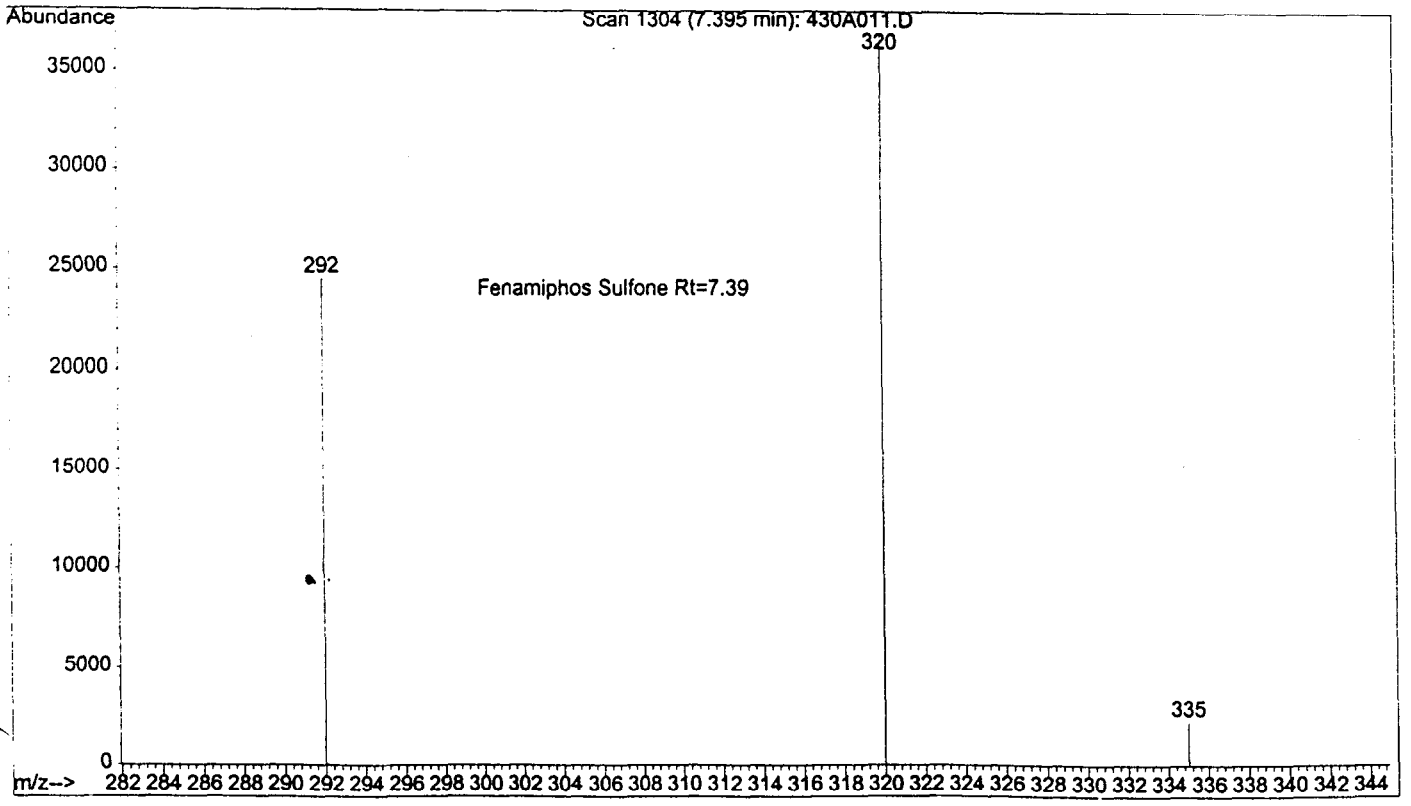
File : D:\MSDATA\TAL\ARB97\NEMACUR\980430\430A005.D
Operator : Matt Hengel
Acquired : 30 Apr 98 12:31 pm using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 743NV0.4R4/10ml 3ul inj.
Misc Info :
Vial Number: 4





File : D:\MSDATA\TAL\ARB97\NEMACUR\980430\430A011.D
Operator : Matt Hengel
Acquired : 30 Apr 98 1:52 pm using AcqMethod NEMSULF
Instrument : GC/MS Ins
Sample Name: 705(1N)/2ml 3ul inj.
Misc Info :
Vial Number: 6





APPENDIX III

PESTICIDE USE REPORT

Nemacur test area: county #10, Section #5, Township 13-S, Range 19-E.

BAYER CORPORATION

Research and Development

Worksheet for Calibration of	Sprayer

Test No.: Nemacur 3EC on Thompson Seedless grapes Study No.: Cg. State Air Resources Board Date: 4/21/98

6. Chemical Rates

Use the chemical application rate per plot as designated from the computer GLP Plot Rate calculator or from the computer NTST calculator (attach a copy of the computer calculation to this worksheet),

or, manually calculate the rate application per plot in the following space.

I. GPA

a) $\frac{43560\ ft^2/acre}{475\ ft^2\ (Calibration\ Pass)} = 91.71 \times \underset{(Aver.\ H_2O\ applied\ per\ pass)}{950\ mls} = \underset{applied\ per\ acre}{87,120.0\ mls}$

b) $\frac{87,120.0\ mls}{3,785\ mls/gal} = 23.0\ GPA$

II. MPH

a) $\frac{3,600\ Seconds/HR}{21.84\ Aver.\ Seconds\ Per\ Pass.} = 164.83 \times \underset{(Length\ of\ plot\ per\ pass)}{100\ ft.} = \underset{Traveled\ per\ hour.}{16,484.0\ feet}$

b) $\frac{16,484.0\ ft.\ Traveled}{5,280\ ft./mile} = 3.12\ MPH$

7. Comments or notes regarding this test or equipment used in calibration.

Nemacur 3EC loaded into spray tank with a closed system.

8. Signature of person performing this calibration:

Signature: Joseph A. Sagaser Date: 4/21/98

F-00182
03/04/93

County #10, Section 5, Township 13-S, Range 19E

1. 2 gals. of Nemacur 3 EC was applied per acre = 6 lbs a.i applied per acre. 8.8 Gals. nemacur on 4.4 acres.

2. Speed and H_2O discharge from 2 T-Jet fan nozzles over 100' course = 3.12 mPH and 950 mls of H_2O Discharged. This is average of several passes.

3. 125 gallons of solution was miped (115 gals. of water plus 10 gal of Nemacur 3EC.).

4. 101.2 gals was applied to the 4.4 Thompson Seedless test plot.

5. After application, 23.8 gal of solution remained in the spray tank, of which most was applied to 6 short rows of wine grapes, and the remainder was dumped (and equip. cleaned) in a carbon filter wash area designed for this purpose.

6. The wine grapes are located ± 100 ft. So. and West of the Thompson Seedless test area and ± 200 ft. from the nearest air sampling machine.

7. The Berms on the grape rows were not treated because there was no way to incorporate the Nemacur on the berms. The application was 2 bands between the berms.

8. after application, the (nemacur) soil was disk incorporated.

9. Incorporation by disk was followed 19 hours later by a normal irrigation of 3 inches.

10. The test applied April 21, 1998. It was monitored by State personnel from April 20, 1998 to april 24, 1998.

11. Row Spacing is 12 feet, Vine Spacing is 8 feet.

4/24/98
Joseph K Lagasse

APPENDIX IV

DPR's
MONITORING RECOMMEDATIONS FOR FENAMIPHOS

State of California

Memorandum

To: George Lew, Chief
Engineering and Laboratory Branch
Monitoring and Laboratory Division
Air Resources Board
600 North Market Boulevard
Sacramento, California 95812

Date: March 14, 1997

From: **Department of Pesticide Regulation** - 1020 N Street, Room 161
Sacramento, California 95814-5624

Subject: AIR MONITORING RECOMMENDATION FOR FENAMIPHOS

Attached is the Department of Pesticide Regulation's (DPR) recommendation for monitoring the nematicide-insecticide fenamiphos. DPR provides this recommendation pursuant to the requirements of Assembly Bill 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5). DPR bases its air monitoring recommendations on historical fenamiphos use information. Therefore, we request you consult with the agricultural commissioner in the county where air monitoring will be conducted to select appropriate sites.

We anticipate submission of air monitoring data by October, 1998.

If you have any questions, please contact Pam Wales, of my staff, at (916) 322-3877.

John S. Sanders

John S. Sanders, Chief
Environmental Monitoring and
Pest Management Branch
(916) 324-4100

Attachment

SURNAME			

cc: Cosmo C. Insalaco - Agricultural Commissioner, Fresno County (w/attachment)
Scott T. Hudson - Agricultural Commissioner, San Joaquin County (w/attachment)
Donald O. Cripe - Agricultural Commissioner, Stanislaus County (w/attachment)
Raymond Menebroker - ARB (w/attachment)
Kevin Mongar - ARB (w/attachment)
Lynn Baker - ARB (w/attachment)
Charles M. Andrews - DPR (w/attachment)
Barry Cortez - DPR (w/attachment)
John Donahue - DPR (w/attachment)
Gary Patterson - DPR (w/attachment)
Pam Wales - DPR (w/attachment)
Madeline Brattesani - DPR (w/attachment)

California Department of Pesticide Regulation
Environmental Monitoring and Pest Management Branch

Staff Report

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDE ACTIVE INGREDIENT FENAMIPHOS

March 1997

Kevin Kelley
Associate Environmental Research Scientist
and
Pamela Wales
Environmental Research Scientist

State of California
Department of Pesticide Regulation
1020 N Street
Sacramento, California 95814-5624

USE INFORMATION AND AIR MONITORING RECOMMENDATION FOR THE PESTICIDE ACTIVE INGREDIENT FENAMIPHOS

A. BACKGROUND

This recommendation contains general information regarding the physical-chemical properties and the historical uses of Ethyl 3-methyl-4-(methylthio)phenyl (1-methylethyl) phosphoramidate (fenamiphos). The Department of Pesticide Regulation (DPR) provides this information to assist the Air Resources Board (ARB) in their selection of appropriate locations for conducting pesticide air monitoring operations.

Fenamiphos (CAS: 22224-92-6) exists as a colorless solid. Fenamiphos has a molecular formula of $C_9H_{10}Cl_2N_2O_3$ and a molecular weight of 249.10 g/mole. It has a Henry's Constant of 9.5×10^{-10} atm·m³/mol at 30 °C, and a vapor pressure of 9.98×10^{-7} mmHg at 30 °C. Fenamiphos is soluble in water at 306, 329, and 419 mg/L at 10, 20, and 30°C, respectively. It is miscible with acetone, dimethylsulfoxide, ethanol, and many other common organic solvents.

In soil, fenamiphos oxidizes to the corresponding sulfone and sulfoxide. Its half-life in Arredondo soil is 38-67 days.

Fenamiphos's acute oral LD_{50} is 15.3 and 19.4 mg/kg, for male and female rats, respectively. Its LC_{50} (96 hour) is 72.1 µg/L for rainbow trout, 9.6 µg/L for bluegill sunfish, and 3,200 µg/L for goldfish. Fenamiphos entered the risk assessment process at DPR under the SB 950 (Birth Defect Prevention Act of 1984) based on mutagenic effects.

B. USE OF FENAMIPHOS

As of February 19, 1997, three fenamiphos-containing products were registered for use in California. Fenamifos is a systemic organophosphate nematicide–insecticide.

With DPR's implementation of full pesticide use reporting in 1990, all users report the agricultural use of any pesticide to their county agricultural commissioners, who subsequently forward this information to DPR. DPR compiles and publishes the use information in the annual Pesticide Use Report (PUR). Because of California's broad definition for agricultural use, DPR includes data from pesticide applications to parks, golf courses, cemeteries, rangeland, pastures, and rights-of-way, postharvest applications of pesticides to agricultural commodities, and all pesticides used in poultry and fish production, and some livestock applications in the PUR. DPR does not collect use information for home and garden use, or for most industrial and institutional uses. The information included in this monitoring recommendation reflects widespread cropland applications of fenamiphos. Use rates were calculated by dividing the total pounds of fenamiphos used (where fenamiphos was applied to acreage) by the total number of acres treated.

In California, the primary use of fenamiphos is to control nematodes in certain fruit, vegetable, and ornamental crops. Further benefits of fenamiphos use is the secondary control of some soil weevils. Fenamiphos is formulated as either an emulsifiable concentrate or as granules. Labeled use rates range from less than one pound per acre for the treatment of early season cotton to nine pounds per acre for the control of nematodes in grapes. Fenamiphos-containing products include the Signal Word "Poison/Danger" on their labels.

According to the PUR, over 95 percent of California's total fenamiphos use occurs in twelve counties (Table 1). The information included in this monitoring recommendation reflects widespread cropland applications of fenamiphos. Use rates were calculated by dividing the total pounds of fenamiphos used (where fenamiphos was applied to acreage) by the total number of acres treated.

Table 1. Annual Agricultural Use of Fenamiphos (Pounds of Active Ingredient)

County	1995	1994	1993
Fresno	42,580.0	35,547.6	50,300.6
Santa Barbara	17,599.1	27,670.9	49,440.0
Kern	35,103.0	25,080.3	31,226.7
Monterey	28,547.3	26,788.7	28,143.9
Tulare	12,413.9	11,565.6	19,018.0
Madera	10,091.7	10,572.0	11,083.7
San Luis Obispo	10,900.9	14,075.0	10,600.3
San Joaqin	7,541.7	4,471.2	8,783.0
Riverside	5,416.2	5,782.2	8,241.2
Ventura	6,587.1	7,021.3	7,532.4
Merced	3,773.0	2,409.5	2,557.4
Stanislaus	913.9	1,301.1	1,957.4
County Totals	181,468.5	172,280.7	228,887.5
Percent of Total	***95.6***	***94.8***	***98.3***
CALIFORNIA TOTAL	**189,815.3**	**181,656.9**	**232,932.7**

According to the PUR, Fresno County routinely receives the greatest applications of fenamiphos; Fresno County growers use nearly one-quarter of all the fenamiphos reported used in California. Table 2 summarizes the total amounts and average daily rates of fenamiphos applied in Fresno County—the county of highest use—during the months of greatest use. Applications are highest in April and early May.

Table 2. Applications of Fenamiphos in Fresno County

	1995		1994		1993	
County - Month	*Lbs Used*[1]	*Rate*[2]	*Lbs Used*[1]	*Rate*[2]	*Lbs Used*[1]	*Rate*[2]
Fresno - April	17,434.9	1.5	16,314.9	1.3	19,044.9	1.5
Fresno - May	12,454.2	1.2	4,354.1	1.3	11,762.7	1.3

[1] In pounds of active ingredient.
[2] Average rate (in pounds of active ingredient per acre).

For fenamiphos, no consistent use patterns exist where this pesticide is applied at or near the maximum label rates. Furthermore, from 1992 through 1995, fenamiphos was not predictably applied at rates greater than 2.5 lbs AI/acre. However, the greatest average rates of fenamiphos applications occur to stone fruit (cherry, nectarine, peach) crops (Table 3). For these crops, average application rates range from 0.5 to 8.7 lbs AI/acre.

Table 3. Averaged Monthly Rate of Fenamiphos Use for 1993 through 1995.

County-Month	Commodity	lbs Used	Acres	Rate
Fresno - September	Nectarine/Peach	335.0	112.0	2.5 - 3.5
Fresno - October	Nectarine/Peach	900.0	300.1	2.0 - 3.4
San Joaquin - April	Nectarine/Peach	81.0	17.0	4.4
San Joaquin - June	Cherry	425.0	92.0	4.4 - 4.6
San Joaquin - July	Cherry	282.0	42.0	4.4 - 8.7
San Joaquin - September	Cherry/Nectarine/Peach	144.4	41.5	2.9 - 8.7
San Joaquin - October	Cherry/Nectarine/Peach	388.7	85.0	2.0 - 8.4
Stanislaus - October	Nectarine	78.1	29.0	2.9 - 4.4

[1] In pounds active ingredient per acre.

C. RECOMMENDATIONS

1. Ambient Air Monitoring

The historical trends in fenamiphos use suggest that monitoring should occur over a 30- to 45-day sampling period in Fresno County during the month of April. Three to five sampling sites should be selected in relatively high-population areas or in areas frequented by people. Sampling sites should be located near grape growing areas. Ambient samples should not be collected from samplers immediately adjacent to fields or orchards where fenamiphos is being applied. At each site, twenty to thirty discrete 24-hour samples should be taken during the sampling period. Background samples should be collected in an area distant to fenamiphos applications.

Replicate (collocated) samples are needed for five dates at each sampling location. Two collocated samplers (in addition to the primary sampler) should be run on those days. The date chosen for replicate samples should be distributed over the entire sampling period. They may, but need not be, the same dates at every site. Field blank and spike samples should be collected at the same environmental conditions (e.g., temperature, humidity, exposure to sunlight) and experimental conditions (e.g., air flow rates) as those occurring at the time of ambient sampling.

2. Application-Site Air Monitoring

Generally, the purpose of the application-site monitoring is to document the potential of a pesticide to be found in air when it is being applied at rates close to the maximum label rate. For fenamiphos, no consistent use patterns exist where this pesticide is applied at or near the maximum label rates. However, applications to several tree fruit crops regularly occur at rates greater than 2.5 lbs/acre. These applications occur to citrus (orange/lemon) and stone fruit (cherry, nectarine, peach) crops. For these crops, average application rates range from 0.5 to 8.7 lbs AI/acre. These application rates are routinely found in the summer and early fall in Fresno, San Joaquin, and Stanislaus Counties.

Therefore, the historical trends in use suggest that application-site air monitoring should be conducted in the counties and months listed in Table 3. Selecting a location appropriate for application site monitoring for fenamiphos will require a more extensive coordination with the growers and the agricultural commissioners in these counties. We recommend that monitoring be conducted in association with the highest possible use rate.

When establishing monitoring stations, care should be taken to prevent nearby applications from contaminating collected samples. A three day monitoring period should be established with sampling times as follows: application + 1 hour, followed by one 2-hour sample, one 4-hour sample, two 8-hour samples and two 24-hour samples. A minimum of four samplers should be positioned, one on each side of the field. A fifth sampler should be collocated at one position. Background samples should collect enough volume (either 12 hours at 15 liters/min, or a shorter period with a higher volume pump) to permit a reasonable minimum detection level. Ideally, samplers should be placed a minimum of 20 meters from the field. Field blank and field spike

samples should be collected at the same environmental conditions (temperature humidity, exposure to sunlight) and experimental conditions (similar air flow rates) as those occurring at the time of sampling.

Additionally, we request that you provide in the monitoring report: 1) an accurate record of the positions of the monitoring equipment with respect to the field, including the exact distance that the sampler is positioned from the field; 2) an accurate drawing of the monitoring site showing the precise location of the meteorological equipment, trees, buildings, and other obstacles; 3) meteorological data collected at a minimum of 15-minute intervals including wind speed and direction, humidity, and air temperature, and comments regarding degree of cloud cover; and 4) the elevation of each sampling station with respect to the field, and the orientation of the field with respect to North (identified as either true or magnetic North).

D. REFERENCES

DPR. 1993-1995. Annual Pesticide Use Reports. Department of Pesticide Regulation, Sacramento, California.

Montgomery, J.H. 1993. Agrochemicals Desk Reference: Environmental Data. Lewis Publishers, Ann Arbor, Michigan.

APPENDIX V

APPLICATION AND AMBIENT FIELD LOG SHEETS

LOG BOOK

Project: Fenamiphos Application in Fresno Co.

Project #: C97-039

Log #	Sample ID	Date	Time	Comments	Rate	weather o=overcast pc=partly cloudy k=clear	taken by
1	fenap-BW	4/20/98 4/21	1510 0655	Background	9	K	KEM (in room)
2	fenap-FS3	4/20/98 4/20/98	1510 0705	West Field Spike	29	UNPLUGGED!	
3	fenap-BE	4/20/98 4/21	1515 0710		24		KEM
4	fenap-FS4	4/20/98 4/21	1515 0710		26		
5	fenap-BS	4/20/98 4/21	1520 0700		31		
6	fenap-FS2	4/20/98 4/21	1520 0700		25		
7	fenap-BN	4/20/98 4/21	1530 0720		6		
8	fenap-FS1	4/20/98 4/21	1530 0715		28		
9	fenap-TS1	4/21	0500	Trip Spike			
10	fenap-TS2	4/21	0500				
11	fenap-TS3	4/21	0500				
12	fenap-TS4	4/21	0500				
13	fenap-1S	4/21 4/21	0700 0950			K	
14	fenap-1SD	4/21 4/21	0700 0950				
15	fenap-1W	4/21 4/21	0705 0955		9		
16	fenap-1E	4/21 4/21	0710 1000		24		
17	fenap-1N	4/21 4/21	0720 1005		6		
18	fenap-BLANK	4/21	0520	Trip Blank			
19	fenap-2S	4/21 4/21	0950 1153		25		
20	fenap-2SD	4/21 4/21	0950 1155		31		
21	fenap-2W	4/21 4/21	0955 1200				
22	fenap-2E	4/21 4/21	1000 1200				

Start app at 8:33
End 8:50

Discing started about 10:00 (in field to the SW)

LOG BOOK

Project: Fenamiphos Application in Fresno Co.
Project #: C97-039

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear | taken by	
23	fenap-2N	4/21	1205		K	KEM
24	fenap-2S	4/21	1610	25		
25	fenap-2SC	4/21	1610	31		
26	fenap-2W	4/21	1615			
27	fenap-2E	4/21	1620			
28	fenap-3N	4/21	1605			
29	fenap-4S	4/21	2340			
30	fenap-4SC	4/21	2340			
31	fenap-4W	4/21	2350			
32	fenap-4E	4/21	2350			
33	fenap-4N	4/21	2355			
34	fenap-5S	4/22	0810			
35	fenap-5SC	4/22	0810			
36	fenap-5W	4/22	0825			
37	fenap-5E	4/22	0830			
38	fenap-5N	4/22	0845			
39	fenap-6S	4/23	0815			
40	fenap-6SC	4/23	0815			
41	fenap-6W	4/23	0825			
42	fenap-6E	4/23	0830			
43	fenap-6N	4/23	0840			
	fenap-					

LOG BOOK

Project: Fenamiphos Application in Fresno Co.
Project #: C97-039

Log #	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
44	fenap-7S	4/23	0515		PC	KEM
		4/24	0550			
45	fenap-7SL	4/23	0915			
		4/24	0350			
46	fenap-7W	4/23	0925			
		4/24	0900			
47	fenap-7E	4/23	0930			
		4/24	0905			
48	fenap-7N	4/23	0840			
		4/24	0845			
49	fenap-B2	4/24	0845	Blanks #2		
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					
	fenap-					

LOG BOOK

Project: Fenamiphos Ambient

Project #: C97-003

LARGE

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
1	ALV-1	3-31-97 4-1-97	1140 1130	RoTo-	NORTH 20MPH	LOT
2	EAS-1	3-31-97 4-1-97	1230 1155	RoTo-27		
3	FOW-1	3-31-97 4-1-97	1310 1220	RoTo-		
4	ARB-1	3-31-97 4-1-97	1330 1245			
5	ALV-2	4-1-97 4-2-97	1130 1230			
6	EAS-2	4-1-97 4-2-97	1155 1250			
7	FOW-2	4-1-97 4-2-97	1220 1310			
8	ARB-2	4-1-97 4-2-97	1245 1335			
9	ALV-3	4-2-97 4-3-97	1230 1205	RoTo-7		
10	ALV-3D	4-2-97 4-3-97	1230 1205	ROTO-28		
11	EAS-3	4-2-97 4-3-97	1250 1230	RoTo-27		
12	EAS-3D	4-2-97 4-3-97	1250 1230	RoTo-10		
13	FOW-3	4-2-97 4-3-97	1310 1300	RoTo-2		
14	FOW-3D	4-2-97 4-3-97	1310 1300	RoTo-20		
15	ARB-3	4-2-97	1335 1330	RoTo-6		
16	ARB-3D	4-2-97	1335 1330	RoTo-11		
17	ALV-4	4-3-97 4-4-97	1205 1030			
18	EAS-4	4-3-97 4-4-97	1230 1100			
19	FOW-4	4-3-97 4-4-97	1330 1130			
20	ARB-4	4-3-97 4-4-97	1330 1200			
21	BLANK	4-3-97	1335	ARB-Site		
22	ALV-5	4-3-97 4-4-97	0930 1120		K	DMH

LOG BOOK
Project: Fenamiphos Ambient
Project #: C97-003

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
23	EAS-5	4-7-97	0945		K	DR
		4-8-97	1135			
24	WU-5	4-7-97	1010	#22 Primary	↓	↓
		4-8-97	1150			
25	FOW-5	4-7-97	1030		↓	↓
		4-8-97	1205			
26	ARB-5	4-7-97	1110			
		4-8-97	1230			
27	ALV-6	[illegible]-97	1120		Cloudy	
		4-9-97	1105			
28	EAS-6	4-8-97	1135		↓	
		4-9-97	1120			
29	WU-6	4-8-97	1150			
		4-9-97	1135			
30	FOW-6	4-8-97	1205			
		4-9-97	1200			
31	ARB-6	4-8-97	1230			
		4-9-97	1225			
32	ALV-7	4-9-97	1105			
		4-10-97	1105			
33	ALV-7D	4-9-97	1105		↓	
		4-10-97	1105			
34	EAS-7	4-9-97	1120			
		4-10-97	1150			
35	EAS-7D	4-9-97	1120			
		4-10-97	1150			
36	WU-7	4-9-97	1135			
		4-10-97	1205			
37	WU-7D	4-9-97	1135			
		4-10-97	1205			
38	FOW-7	4-9-97	1200			
		4-10-97	1225			
39	FOW-7D	4-9-97	1200			
		4-10-97	1225			
40	ARB-7	4-9-97	1225			
		4-10-97	1250			
41	ARB-7D	4-9-97	1225			
		4-10-97	1250			
42	ALV-8	4-10-97	1205			
		4-11-97	1035			
43	EAS-8	4-10-97	[illegible]50			
		4-11-97	1100			
44	WU-5	4-10-97	1205			
		4-11-97	1110			

LOG BOOK
Project: Fenamiphos Ambient
Project #: C97-003

Log Number	Sample ID	Date	Time	Comments	weather o=overcast pc=partly cloudy k=clear	taken by
45	FOW-8	4-10-97	1275			QR
		4-11-97	1120			
46	ARB-8	4-10-97	~1250			
		4-11-97	1140			
47	Blank	4-11-97	1015	Alvina School		
48	ALV-9	4-14-97	1245			F.J.
		4-15-97	1135			
49	EAS-9	4-14-97	1305			
		4-15-97	1155			
50	WU-9	4-14-97	1325			
		4-15-97	1210			
51	FOW-9	4-14-97	1345			
		4-15-97	1230			
52	ARB-9	4-14-97	1425			
		4-15-97	1300			
53	FS-2	4-14-97	1425	ARB SITE FIELD SPIKE ROTO 11		
		4-15-97	1300			
54	ALV-10	4-15-97	1135			
		4-16-97	1130			
55	EAS-10	4-15-97	1155			
		4-16-97	1200			
56	WU-10	4-15-97	1210			
		4-16-97	1220			
57	FOW-10	4-15-97	1230			
		4-16-97	1240			
58	ARB-10	4-15-97	1300			
		4-16-97	1320			
59	FS-4	4-15-97	1300	ARB SITE FIELD SPIKE ROTO 11		
		4-16-97	1320			
60	ALV-11	4-16-97	1130			
		4-17-97	1105			
61	ALV-11D	4-16-97	1130	DUPLICATE		
		4-17-97	1105			
62	EAS-11	4-16-97	1200			
		4-17-97	130			
63	EAS-11D	4-16-97	1200	DUPLICATE		
		4-17-97	1130			
64	WU-11	4-16-97	1220			
		4-17-97	1145			
65	WU-11D	4-16-97	1220	DUPLICATE		
		4-17-97	1145			
66	FOW-11	4-16-97	1240			
		4-17-97	1205			

LOG BOOK
Project: Fenamiphos Ambient
Project #: C97-003

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
67	FOW-11D	4-16-97	1240	DUPLICATE		J.J.
68	ARB-11	4-16-97	1320			
		4-17-97	1240			
69	ARB-11D	4-16-97	1320	DUPLICATE		
		4-17-97	1240			
70	ALV-12	4-17-97	1105			
		4-18-97	1010			
71	B-12	4-17-97	1105	BLANK ALVINA ELEMENTRY		
		—	—			
72	EAS-12	4-17-97	1130			
		4-18-97	1025			
73	WW-12	4-17-97	1145			
		4-18-97	1040			
74	FOW-12	4-17-97	1205			
		4-18-97	1055			
75	ARB-12	4-17-97	1240			
		4-18-97	0740	1st SITE ON 4-18-97		
76	FS-5	4-17-97	1240	ROTO 11		
		4-18-97	0740	FIELD SPIKE ARB SITE		
77	TS-1	—	—			
		4-11-97	LAB	TRIP SPIKE		
78	TS-2	—	—			
		4-11-97	LAB	TRIP SPIKE		
79	TS-3	—	—			
		4-11-97	LAB	TRIP SPIKE		
80	TS-4	—	—			
		4-11-97	LAB	TRIP SPIKE		
81	TS-5	—	—			
		4-11-97	LAB	TRIP SPIKE		
82	ALV-13	4-21-97	~930		PC	DR
		4-22-97	1035			
83	EAS-13	4-21-97	0945			
		4-22-97	1050			
84	WW-13	4-21-97	1000			
		4-22-97	1100			
85	FOW-13	4-21-97	1015			
		4-22-97	1120			
86	ARB-13	4-21-97	1040			
		4-22-97	1140			
87	ALV-14	4-22-97	1035			
		4-23-97	1045			
88	EAS-14	4-22-97	1050			
		4-23-97	1100			

LOG BOOK
Project: Fenamiphos Ambient
Project #: C97-003

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
89	WA-14	4-22-97	1100			
		4-23-97	1115			
90	FOW-14	4-22-97	1120			
		4-23-97	1130			
91	ARB-14	4-22-97	1140			
		4-23-97	1150			
92	ALV-15	4-23-97	1045			
		4-24-97	1100			
93	ALV-15D	4-23-97	1045			
		4-24-97	1100			
94	EAS-15	4-23-97	1100			
		4-24-97	1120			
95	EAS-15D	4-23-97	1100			
		4-24-97	1120			
96	WA-15	4-23-97	1115			
		4-24-97	1150			
97	WA-15D	4-23-97	1115			
		4-24-97	1130			
98	FOW-15	4-23-97	1130			
		4-24-97	1145			
99	FOW-15D	4-23-97	1130			
		4-24-97	1145			
100	ARB-15	4-23-97	1150			
		4-24-97	1215			
101	ARB-15D	4-23-97	1150			
		4-24-97	1215			
102	ALV-16	4-24-97	1100			
		4-25-97	0945			
103	EAS-16	4-24-97	1120			
		4-25-97	1000			
104	WA-16	4-24-97	1130	Painting close by		
		4-25-97	1015			
105	FOW-16	4-24-97	1145			
		4-25-97	1025			
106	ARB-16	4-24-97	1215			
		4-25-97	1050			
107	Blank	4-25-97	1025	Fremont Middle School		
108	ALV-17	4-28-97	1020		IL	DAM
		4-29-97	1045			
109	EAS-17	4-28-97	1035			
		4-29-97	1150			
110	WA-17	4-28-97	1045			
		4-29-97	1115			

LOG BOOK
Project: Fenamiphos Ambient
Project #: C97-003

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear	taken by
111	FOW-17	4-28-97	1100			
		4-29-97	1130			
112	ARB-17	4-28-97	1125			
		4-29-97	1200			
113	ALV-18	4-29-97	1045			
		4-30-97	0945			
114	EAS-18	4-29-97	1100			
		4-30-97	1000			
115	WU-18	4-29-97	1115			
		4-30-97	1015			
116	FOW-18	4-29-97	1130			
		4-30-97	1020			
117	ARB-18	4-29-97	1200			
		4-30-97	1055			
118	ALV-19	4-30-97	0945			
		5-1-97	1005			
119	ALV-19D	4-30-97	0945			
		5-1-97	1005			
120	EAS-19	4-30-97	1000			
		5-1-97	1025			
121	EAS-19D	4-30-97	1000			
		5-1-97	1025			
122	WU-19	4-30-97	1015			
		5-1-97	1030			
123	WU-19D	4-30-97	1015			
		5-1-97	1030			
124	FOW-19	4-30-97	1030			
		5-1-97	1050			
125	FOW-19D	4-30-97	1030			
		5-1-97	1050			
126	ARB-19	4-30-97	1055			
		5-1-97	1120			
127	ARB-19D	4-30-97	1055			
		5-1-97	1120			
128	ALV-20	5-1-97	1005			
		5-2-97	0920			
129	EAS-20	5-1-97	1025			
		5-2-97	0935			
130	WU-20	5-1-97	1030			
		5-2-97	0950			
131	FOW-20	5-1-97	1050			
		5-2-97	1005			
132	ARB-20	5-1-97	1120			
		5-2-97	1025			

LOG BOOK
Project: Fenamiphos Ambient
Project #: C97-003

Log Number	Sample ID	Date	Time	Comments	weather o=overcast pc=partly cloudy k=clear	taken by
133	Blank	5-2-97	0920	Alvina Elem.		
134	ALV-21	5-5-97	1030	RoTo 28	PC	LDT
		5-6-97	0930			
135	EAS-21	5-5-97	1045	RoTo 27		
		5-6-97	0955			
136	WW-21	5-5-97	1122	RoTo 21		
		5-6-97	1010			
137	FOW-21	5-5-97	1115	RoTo 2		
		5-6-97	1030			
138	ARB-21	5-5-97	1140	RoTo 11		
		5-6-97	1100			
139	ALV-22	5-6-97	0930			
		5-7-97	0935			
140	EAS-22	5-6-97	0955			
		5-7-97	0950			
141	WW-22	5-6-97	1010			
		5-7-97	1015			
142	FOW-22	5-6-97	1030			
		5-7-97	1035			
143	ARB-22	5-6-97	1100			
		5-7-97	1100			
144	ALV-23	5-7-97	0935			
		5-8-97	0936			
145	ALV-23D	5-7-97	0935	RoTo 7		
		5-8-97	0930			
146	EAS-23	5-7-97	0950			
		5-8-97	0950			
147	EAS-23D	5-7-97	0950	RoTo 10		
		5-8-97	0950			
148	WW-23	5-7-97	1015			
		5-8-97	1010			
149	WW-23D	5-7-97	1015	RoTo 22		
		5-8-97	1010			
150	FOW-23	5-7-97	1035			
		5-8-97	1035			
151	FOW-23D	5-7-97	1035	RoTo 20		
		5-8-97	1035			
152	ARB-23	5-7-97	1100			
		5-8-97	1100			
153	ARB-23D	5-7-97	1115	RoTo 6		
		5-8-97	1115			
154	BLI	5-8-97	1015	Washington Union	✓	✓

LOG BOOK
Project: Fenamiphos Ambient
Project #: C97-003

Log Number	Sample ID	Date	Time	Comments	weather o = overcast pc = partly cloudy k = clear | taken by	
155	ALV-24	5-8-97 5-9-97	0930 0830		K	LDT
156	EAS-24	5-8-97 5-9-97	0950 8855			
157	WU-24	5-8-97 5-9-97	1010 1005			
158	FOW-24	5-8-97 5-9-97	1035 1035			
159	ARB-24	5-8-97 5-9-97	1100 1100			

APPENDIX VI

FENAMIPHOS APPLICATION METEOROLOGICAL DATA

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	110	1431	1.4	79.2	1006	41	293
1998	110	1446	0.7	81.2	1005	41	258
1998	110	1501	0.3	81.6	1004	40	287
1998	110	1516	0.5	81.3	1004	39	302
1998	110	1531	0.3	82.2	1004	40	257
1998	110	1546	0.6	82.0	1004	40	282
1998	110	1601	0.8	81.9	1004	40	325
1998	110	1616	1.6	81.8	1004	41	319
1998	110	1631	0.9	82.4	1004	42	299
1998	110	1646	1.9	81.7	1004	42	309
1998	110	1701	1.2	82.0	1004	43	320
1998	110	1716	4.3	81.1	1004	44	338
1998	110	1731	2.1	81.1	1004	45	306
1998	110	1746	5.2	80.4	1004	46	276
1998	110	1801	5.4	79.7	1003	48	321
1998	110	1816	4.3	79.1	1004	51	273
1998	110	1831	6.4	78.1	1004	51	321
1998	110	1846	5.1	77.2	1004	51	336
1998	110	1901	3.9	76.3	1003	51	342
1998	110	1916	1.4	75.1	1003	53	330
1998	110	1931	0.3	73.5	1003	55	328
1998	110	1946	0.0	72.4	1003	55	336
1998	110	2001	0.0	71.3	1004	56	331
1998	110	2016	0.0	70.7	1004	59	318
1998	110	2031	0.0	70.2	1004	61	323
1998	110	2046	0.0	69.7	1004	63	309
1998	110	2101	0.0	68.9	1004	64	295
1998	110	2116	0.0	68.4	1004	67	273
1998	110	2131	0.0	67.8	1004	70	269
1998	110	2146	0.0	67.3	1004	73	296
1998	110	2201	0.0	66.5	1005	75	269
1998	110	2216	0.0	65.6	1005	77	292
1998	110	2231	0.0	65.2	1005	81	271
1998	110	2246	0.0	65.0	1005	83	253
1998	110	2301	0.0	64.2	1005	85	267
1998	110	2316	0.0	63.7	1005	87	269
1998	110	2331	0.0	63.1	1005	89	259
1998	110	2346	0.0	63.0	1005	90	302
1998	111	1	0.0	62.8	1005	92	311
1998	111	16	0.0	63.5	1005	93	296
1998	111	31	0.0	63.3	1005	92	325
1998	111	46	0.0	62.2	1005	92	273

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	111	101	0.0	61.4	1005	94	250
1998	111	116	0.0	60.2	1004	95	119
1998	111	131	0.0	59.6	1004	97	43
1998	111	146	0.0	59.3	1004	99	57
1998	111	201	0.0	59.0	1004	100	106
1998	111	216	0.0	59.5	1004	100	177
1998	111	231	0.0	59.7	1004	100	234
1998	111	246	0.0	59.2	1004	100	245
1998	111	301	0.0	58.9	1004	100	215
1998	111	316	0.0	58.1	1004	99	188
1998	111	331	0.0	58.2	1004	100	265
1998	111	346	0.0	57.5	1004	100	93
1998	111	401	0.0	57.2	1004	100	51
1998	111	416	0.0	56.8	1003	100	49
1998	111	431	0.0	56.7	1003	100	80
1998	111	446	0.0	56.7	1003	100	84
1998	111	501	0.0	56.7	1003	100	114
1998	111	516	0.0	56.6	1003	100	101
1998	111	531	0.0	56.3	1003	100	100
1998	111	546	0.0	56.1	1003	100	108
1998	111	601	0.0	55.8	1003	100	258
1998	111	616	0.0	56.0	1003	100	85
1998	111	631	0.0	56.0	1004	100	184
1998	111	646	0.0	55.8	1004	100	251
1998	111	701	0.0	56.6	1004	100	197
1998	111	716	0.0	58.0	1004	100	234
1998	111	731	0.0	60.5	1004	100	248
1998	111	746	0.0	62.6	1004	100	250
1998	111	801	0.0	65.3	1004	97	186
1998	111	816	0.0	66.4	1004	92	163
1998	111	831	0.0	67.5	1004	88	137
1998	111	846	0.0	69.1	1004	83	109
1998	111	901	0.0	71.4	1004	78	139
1998	111	916	0.0	72.8	1004	72	138
1998	111	931	0.0	72.7	1004	67	170
1998	111	946	0.0	74.2	1004	65	194
1998	111	1001	0.0	75.9	1004	62	182
1998	111	1016	0.0	77.2	1004	59	221
1998	111	1031	0.0	78.0	1004	56	193
1998	111	1046	0.0	78.8	1004	53	223
1998	111	1101	0.0	79.6	1004	51	214
1998	111	1116	0.3	79.9	1004	48	205

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	111	1131	0.0	82.0	1004	46	207
1998	111	1146	0.1	81.6	1003	42	219
1998	111	1201	0.0	82.7	1003	41	269
1998	111	1216	0.0	84.4	1003	39	233
1998	111	1231	0.0	85.0	1003	35	273
1998	111	1246	0.0	85.3	1003	34	218
1998	111	1301	0.0	85.3	1002	35	234
1998	111	1316	0.1	85.0	1002	35	296
1998	111	1331	0.0	85.7	1002	36	275
1998	111	1346	0.0	86.5	1002	35	304
1998	111	1401	0.0	88.1	1002	35	221
1998	111	1416	0.0	88.0	1002	33	241
1998	111	1431	0.0	88.2	1002	33	301
1998	111	1446	0.0	88.0	1001	33	316
1998	111	1501	0.0	89.4	1001	33	306
1998	111	1516	0.0	89.2	1001	32	274
1998	111	1531	0.0	90.3	1001	31	280
1998	111	1546	0.0	90.2	1000	30	248
1998	111	1601	0.0	90.5	1000	29	212
1998	111	1616	0.0	91.6	1000	28	252
1998	111	1631	0.0	92.2	1000	28	217
1998	111	1646	0.0	92.4	1000	25	238
1998	111	1701	0.0	92.4	999	26	236
1998	111	1716	0.0	92.6	999	25	150
1998	111	1731	0.0	92.8	999	25	236
1998	111	1746	0.0	92.3	999	25	300
1998	111	1801	0.0	91.3	999	25	293
1998	111	1816	0.0	91.6	999	25	297
1998	111	1831	0.0	90.5	999	30	121
1998	111	1846	0.0	87.5	999	37	60
1998	111	1901	0.0	86.2	999	41	235
1998	111	1916	0.0	84.5	998	45	328
1998	111	1931	0.0	82.4	999	48	339
1998	111	1946	0.0	80.7	998	52	340
1998	111	2001	0.0	79.5	999	56	344
1998	111	2016	0.0	78.6	999	61	344
1998	111	2031	0.0	76.7	999	64	308
1998	111	2046	0.0	76.3	999	66	326
1998	111	2101	0.0	75.5	999	68	323
1998	111	2116	0.0	74.6	999	72	325
1998	111	2131	0.0	73.9	999	74	280
1998	111	2146	0.0	71.7	999	75	125

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	111	2201	0.0	72.1	999	78	322
1998	111	2216	0.0	70.6	999	81	272
1998	111	2231	0.0	70.5	999	83	58
1998	111	2246	0.0	71.0	999	88	300
1998	111	2301	0.0	70.7	999	89	339
1998	111	2316	0.0	70.2	999	90	301
1998	111	2331	0.0	68.0	999	90	28
1998	111	2346	0.0	67.3	999	95	39
1998	112	1	0.0	66.9	999	98	187
1998	112	16	0.0	66.3	999	99	119
1998	112	31	0.0	65.4	999	100	158
1998	112	46	0.0	65.0	999	100	114
1998	112	101	0.0	65.0	999	100	137
1998	112	116	0.0	64.8	999	100	58
1998	112	131	0.0	64.9	999	100	331
1998	112	146	0.0	64.2	999	100	125
1998	112	201	0.0	64.2	999	100	80
1998	112	216	0.0	64.6	999	100	52
1998	112	231	0.0	64.0	998	100	66
1998	112	246	0.0	63.5	998	100	69
1998	112	301	0.0	63.1	998	100	90
1998	112	316	0.0	63.4	998	100	168
1998	112	331	0.0	62.4	998	100	33
1998	112	346	0.0	62.0	998	100	32
1998	112	401	0.0	62.3	998	98	76
1998	112	416	0.0	62.9	998	94	53
1998	112	431	0.0	62.5	998	94	140
1998	112	446	0.0	62.1	998	93	140
1998	112	501	0.0	61.4	998	93	97
1998	112	516	0.0	62.3	998	93	95
1998	112	531	0.0	62.3	998	93	81
1998	112	546	0.0	61.4	997	94	110
1998	112	601	0.0	61.8	997	95	90
1998	112	616	0.0	62.2	998	97	106
1998	112	631	0.0	62.4	998	98	100
1998	112	646	0.0	63.7	998	97	103
1998	112	701	0.0	64.6	998	94	95
1998	112	716	0.2	65.6	998	90	87
1998	112	731	1.0	66.8	998	85	86
1998	112	746	3.2	68.2	998	79	79
1998	112	801	3.1	70.1	998	74	91
1998	112	816	5.0	71.9	998	69	97

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	112	831	5.5	74.0	998	63	100
1998	112	846	4.9	75.8	998	57	124
1998	112	901	4.4	77.0	998	52	134
1998	112	916	3.8	77.9	998	50	138
1998	112	931	3.4	79.0	998	48	145
1998	112	946	2.9	78.9	998	49	148
1998	112	1001	4.1	78.5	998	50	142
1998	112	1016	3.8	80.0	998	51	150
1998	112	1031	2.5	81.2	998	50	134
1998	112	1046	3.0	82.8	998	49	133
1998	112	1101	3.1	83.5	998	46	131
1998	112	1116	3.2	83.7	998	46	122
1998	112	1131	4.0	85.3	998	44	129
1998	112	1146	3.5	86.3	998	43	137
1998	112	1201	3.0	87.5	998	40	136
1998	112	1216	1.9	88.1	998	37	140
1998	112	1231	3.1	88.8	998	37	137
1998	112	1246	2.4	88.8	997	36	158
1998	112	1301	1.7	89.9	997	35	161
1998	112	1316	2.7	89.9	997	34	145
1998	112	1331	2.3	90.6	997	33	143
1998	112	1346	2.5	90.8	997	32	174
1998	112	1401	1.3	91.7	997	29	175
1998	112	1416	1.1	91.8	997	28	153
1998	112	1431	2.5	91.3	996	27	171
1998	112	1446	1.8	91.7	996	28	154
1998	112	1501	0.4	92.9	996	27	170
1998	112	1516	0.0	94.0	996	25	244
1998	112	1531	0.2	93.3	995	23	222
1998	112	1546	1.4	92.7	995	21	229
1998	112	1601	1.0	92.6	995	21	223
1998	112	1616	3.2	92.2	995	21	209
1998	112	1631	2.6	92.0	995	21	217
1998	112	1646	10.0	89.9	995	20	231
1998	112	1701	9.8	89.4	995	18	215
1998	112	1716	7.2	88.8	995	17	218
1998	112	1731	6.1	89.4	995	16	215
1998	112	1746	3.9	89.0	995	18	211
1998	112	1801	5.1	89.5	995	16	209
1998	112	1816	2.5	88.7	995	18	195
1998	112	1831	2.0	87.7	995	20	192
1998	112	1846	0.9	86.5	995	23	211

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	112	1901	0.3	85.4	995	24	256
1998	112	1916	0.0	83.7	995	25	248
1998	112	1931	0.0	81.4	995	27	277
1998	112	1946	0.0	79.1	995	28	274
1998	112	2001	0.0	77.4	995	29	311
1998	112	2016	0.0	76.4	995	31	306
1998	112	2031	0.0	75.5	995	32	275
1998	112	2046	0.0	74.7	995	33	270
1998	112	2101	0.0	73.4	996	34	247
1998	112	2116	0.0	72.2	996	34	258
1998	112	2131	0.0	71.3	996	37	233
1998	112	2146	0.0	68.7	996	41	71
1998	112	2201	0.0	68.9	996	42	123
1998	112	2216	0.0	68.7	996	52	30
1998	112	2231	0.3	67.8	996	56	32
1998	112	2246	0.0	67.0	996	63	133
1998	112	2301	0.0	65.8	996	65	181
1998	112	2316	0.0	65.6	996	69	114
1998	112	2331	0.0	66.6	996	68	200
1998	112	2346	0.0	66.4	996	68	296
1998	113	1	0.0	66.1	996	68	296
1998	113	16	0.0	64.0	996	71	196
1998	113	31	0.0	63.7	996	74	237
1998	113	46	0.0	64.0	996	74	189
1998	113	101	0.0	62.6	996	74	230
1998	113	116	1.3	62.6	996	75	268
1998	113	131	0.0	62.6	996	73	302
1998	113	146	0.9	61.4	996	77	280
1998	113	201	0.0	60.5	997	81	261
1998	113	216	0.0	59.7	997	84	220
1998	113	231	0.0	59.5	997	89	276
1998	113	246	0.4	59.0	997	94	149
1998	113	301	0.3	58.7	997	99	313
1998	113	316	0.2	58.1	997	100	306
1998	113	331	0.6	57.6	997	100	337
1998	113	346	2.2	57.4	997	99	327
1998	113	401	2.8	57.2	997	97	290
1998	113	416	3.1	56.6	997	95	126
1998	113	431	0.2	56.1	997	98	343
1998	113	446	0.5	55.7	998	100	255
1998	113	501	0.0	55.2	998	100	139
1998	113	516	0.0	54.6	998	100	117

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	113	531	0.0	54.2	998	100	120
1998	113	546	0.0	54.2	998	100	255
1998	113	601	0.0	53.9	998	100	144
1998	113	616	0.0	53.7	998	100	199
1998	113	631	0.0	53.6	998	100	192
1998	113	646	0.0	54.0	999	100	257
1998	113	701	0.0	55.5	999	100	255
1998	113	716	0.8	56.3	999	100	308
1998	113	731	2.0	56.7	999	100	313
1998	113	746	2.5	56.1	999	100	303
1998	113	801	3.1	56.7	999	100	300
1998	113	816	4.8	58.0	1000	98	301
1998	113	831	3.2	59.3	1000	94	278
1998	113	846	4.9	61.1	1000	88	315
1998	113	901	6.8	62.3	1000	80	331
1998	113	916	6.6	63.2	1000	74	272
1998	113	931	5.8	64.5	1000	69	257
1998	113	946	6.9	64.7	1000	66	145
1998	113	1001	3.9	64.7	1001	65	272
1998	113	1016	1.4	65.5	1001	64	304
1998	113	1031	2.0	64.8	1001	64	131
1998	113	1046	1.7	65.2	1001	61	72
1998	113	1101	0.1	64.1	1001	61	58
1998	113	1116	0.0	63.9	1002	63	76
1998	113	1131	0.5	63.6	1002	63	44
1998	113	1146	1.3	64.1	1002	64	69
1998	113	1201	1.7	65.0	1002	62	71
1998	113	1216	2.1	65.9	1002	60	100
1998	113	1231	3.6	68.2	1002	57	118
1998	113	1246	5.2	68.9	1002	51	121
1998	113	1301	5.8	68.6	1001	50	126
1998	113	1316	5.9	69.7	1001	49	109
1998	113	1331	7.6	69.7	1001	46	129
1998	113	1346	5.8	71.6	1001	46	135
1998	113	1401	7.1	70.7	1001	44	123
1998	113	1416	6.8	69.5	1001	46	121
1998	113	1431	5.8	68.5	1001	49	128
1998	113	1446	4.5	68.1	1001	50	138
1998	113	1501	2.7	68.5	1001	51	141
1998	113	1516	1.3	67.7	1001	52	188
1998	113	1531	0.0	67.3	1001	55	184
1998	113	1546	5.0	63.4	1001	71	296

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	113	1601	5.9	59.8	1001	90	282
1998	113	1616	6.1	59.5	1002	97	270
1998	113	1631	5.7	59.5	1001	100	60
1998	113	1646	4.8	59.9	1001	100	107
1998	113	1701	7.0	61.1	1001	95	62
1998	113	1716	4.8	61.8	1001	89	67
1998	113	1731	3.7	61.4	1001	86	39
1998	113	1746	5.2	62.0	1001	86	40
1998	113	1801	3.3	63.6	1001	82	56
1998	113	1816	3.6	63.7	1002	78	63
1998	113	1831	3.0	61.7	1002	78	72
1998	113	1846	1.7	61.2	1002	82	63
1998	113	1901	1.4	61.9	1002	87	84
1998	113	1916	1.3	62.4	1002	86	93
1998	113	1931	2.8	61.2	1002	87	106
1998	113	1946	1.9	60.5	1001	91	113
1998	113	2001	1.7	60.2	1002	91	117
1998	113	2016	0.2	59.8	1002	93	135
1998	113	2031	0.0	59.2	1002	95	147
1998	113	2046	0.0	59.0	1002	98	141
1998	113	2101	0.1	59.1	1002	99	144
1998	113	2116	0.1	58.7	1002	100	127
1998	113	2131	0.0	58.1	1002	100	141
1998	113	2146	0.0	57.4	1002	100	116
1998	113	2201	0.0	57.2	1002	100	84
1998	113	2216	0.0	56.2	1003	100	266
1998	113	2231	0.0	55.2	1003	100	29
1998	113	2246	0.0	55.0	1003	100	106
1998	113	2301	0.0	54.5	1003	100	224
1998	113	2316	0.0	54.0	1003	100	61
1998	113	2331	1.4	54.0	1003	100	236
1998	113	2346	0.5	54.1	1003	100	242
1998	114	1	0.0	54.2	1003	100	287
1998	114	16	0.0	54.3	1003	100	334
1998	114	31	0.1	54.1	1003	100	101
1998	114	46	0.0	54.0	1003	100	91
1998	114	101	0.0	54.4	1003	100	136
1998	114	116	0.3	55.2	1003	100	226
1998	114	131	0.0	55.7	1003	100	326
1998	114	146	0.0	56.0	1003	100	327
1998	114	201	1.0	56.7	1003	100	315
1998	114	216	1.0	57.3	1003	100	310

Fenamiphos Application Meteorological Data (15 min. averages)

Year	Julian Date	Time	Wind Speed (mph)	Temp. (F)	Barometric Pressure (hPa)	Relative Humidity (%)	Wind Direction (0/360 deg. = geo. N)
1998	114	231	1.0	57.2	1003	100	313
1998	114	246	0.9	56.9	1003	100	313
1998	114	301	1.9	56.9	1003	100	304
1998	114	316	0.7	56.8	1003	100	324
1998	114	331	0.5	56.7	1002	100	320
1998	114	346	0.0	56.6	1002	100	323
1998	114	401	0.3	56.5	1002	100	327
1998	114	416	0.4	56.5	1002	100	305
1998	114	431	0.2	56.3	1002	100	306
1998	114	446	0.2	55.9	1002	100	288
1998	114	501	0.2	55.4	1002	100	278
1998	114	516	0.9	55.0	1002	100	307
1998	114	531	0.1	54.3	1002	100	293
1998	114	546	1.3	54.3	1002	100	306
1998	114	601	2.1	54.2	1002	100	294
1998	114	616	2.5	53.9	1003	100	289
1998	114	631	2.1	53.7	1003	100	288
1998	114	646	2.4	53.8	1003	100	300
1998	114	701	3.6	54.5	1003	100	287
1998	114	716	4.0	55.2	1003	100	297
1998	114	731	4.8	55.5	1003	100	302
1998	114	746	6.1	56.3	1003	100	300
1998	114	801	5.6	57.2	1003	100	300
1998	114	816	6.4	57.4	1003	100	311
1998	114	831	6.4	58.2	1003	98	314
1998	114	846	7.7	59.4	1003	93	304
1998	114	901	7.1	59.7	1003	89	329