California Environmental Protection Agency

Air Resources Board

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Report for Air Monitoring
Around a Bed Fumigation Application
of Chloropicrin
Fall 2001

Prepared by
Operations Planning and Assessment Section
Quality Management Branch
Monitoring and Laboratory Division

Project No. P-01-002

March 17, 2003

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.

Monitoring Report Approval

Report for Air Monitoring Around a Bed Fumigation Application
of Chloropicrin - Fall 2001

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Approval: The following monitoring report has been reviewed and approved by the Monitoring and Laboratory Division.

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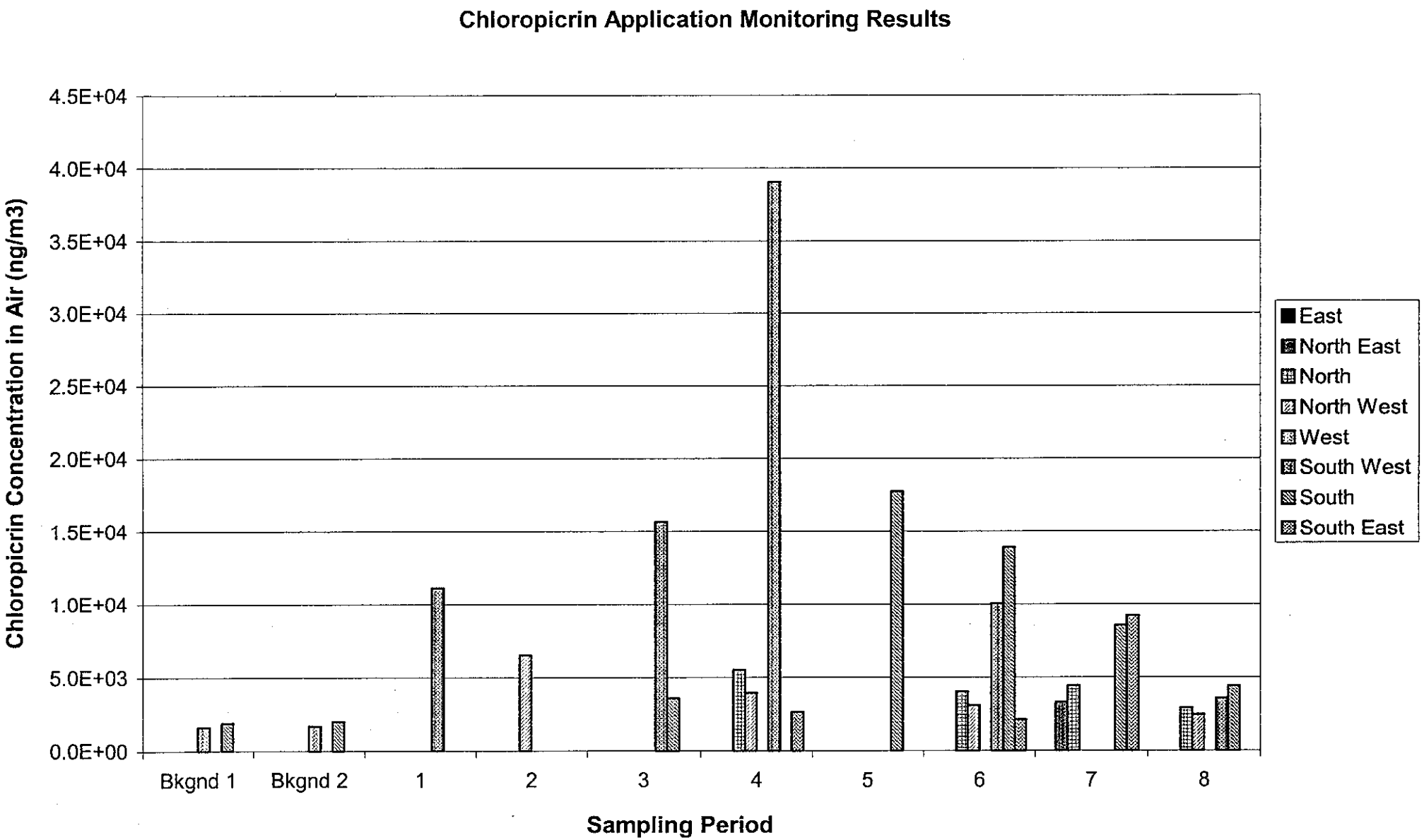
Executive Summary

Report for the Application
Air Monitoring for Chloropicrin – Fall 2001

This report presents the results of application air monitoring for chloropicrin conducted in Monterey County associated with a pre-plant bed fumigation on a 22 acre field (pre-plant for strawberries) from October 29 to November 4, 2001. The field was fumigated with a 50:50 mixture of chloropicrin and methyl bromide. Due to the methyl bromide use regulations the application was conducted over 3 days. In addition to the ARB's chloropicrin monitoring, staff of the Department of Pesticide Regulation collected samples for methyl bromide, which were analyzed by the California Department of Food and Agriculture's pesticide laboratory. This report will only address the monitoring for chloropicrin and will not address the DPR sampling/analysis for methyl bromide. The bar graph attached to this Executive Summary illustrates the results of the ARB's chloropicrin application study.

The monitoring included samples collected for two background periods (i.e., samples collected around the field prior to the application) and 8 sampling periods during and after the 3-day applications. Of the 64 application samples collected (spikes, blanks, background samples and the lower of each pair of collocated samples excluded), 22 sample results were found to be above the estimated quantitation limit (EQL), 15 sample results were below the EQL but 'detected', 21 sample results were less than the method detection limit (MDL) and six (6) samples were invalidated due to a sampling problem. The highest concentration, 39,000 ng/m^3 (5800 pptv), was observed at the SW sampling site during the 4th sampling period (overnight after 2nd application day). The second, third, and fourth highest concentrations were 18,000 ng/m^3 (2600 pptv), 17,000 ng/m^3 (2500 pptv), and 14,000 ng/m^3 (2100 pptv), respectively.

Four samples were collected for each of the two background periods, one each from the east (CE), north (CN), west (CW), and south (CS) sites. In both background periods the results from the west and south sites were above the EQL with the highest concentration of 2000 ng/m3 found at the south site during 'background 2'. Results of all four background samples collected at the east and north sites were 'detected'.


Chloropicrin Application Monitoring Results
Chloropicrin Concentration in Air (ng/m3)
4.5E+04
4.0E+04
3.5E+04
3.0E+04
2.5E+04
2.0E+04
1.5E+04
1.0E+04
5.0E+03
0.0E+00
Bkgnd 1
Bkgnd 2
1
2
3
4
5
6
7
8
Sampling Period
East
North East
North
North West
West
South West
South
South East

Acknowledgments

Assistance in sampling site selection was provided by staff of the Monterey County Agricultural Commissioner's Office. Staff of the ARB Air Quality Surveillance Branch (AQSB) collected the ambient samples. Steve Rider of the AQSB coordinated the field work. Terry Houston of the ARB Special Analysis Section laboratory performed the method development and chemical analyses. Lynn Baker of the ARB Stationary Source Division provided helpful advice and comments in regard to project planning and the monitoring protocol and report.

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Report for Air Monitoring
Around a Bed Fumigation Application
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Fall 2001

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR) (June 28, 2000 Memorandum, Helliker to Lloyd), the Air Resources Board (ARB) staff determined airborne concentrations of the pesticide chloropicrin around a bed fumigation application. The study was conducted in Monterey County associated with a pre-plant bed fumigation on a 22 acre field (pre-plant for strawberries) from October 29 to November 4, 2001. This monitoring was done to fulfill the requirements of Assembly Bill 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 DPR requested that a chloropicrin application where methyl bromide was also being used be selected for the monitoring study. The DPR collected samples for methyl bromide, which were analyzed by the California Department of Food and Agriculture's pesticide laboratory. This report will only address the monitoring for chloropicrin and will not address the DPR sampling/analysis for methyl bromide.

The sampling and analysis followed the procedures outlined in 1) the monitoring protocol (Appendix 1 of the separate volume of Appendices), 2) the quality assurance guidelines described in the "Quality Assurance Plan for Pesticide Air Monitoring" (May 11, 1999 version)(page 7 of the Appendices), and 3) the procedures described in the "Standard Operating Procedure, Sampling and Analysis of Trichloronitromethane (Chloropicrin) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector" (page 60 of the Appendices).

II. Sampling

Chloropicrin samples were collected on XAD-4 resin sampling cartridges. The tubes are 8 mm x 140 mm, XAD-4, with 400 mg in the primary section, and 200 mg in the secondary section (obtained from SKC special order). Sample collection was at a flow rate of 90 standard cubic centimeters per minute (sccpm). Subsequent to sampling, the tubes were capped, labeled, placed in a culture tube, and stored and transported in an insulated container with dry ice. The samples were driven to the ARB laboratory in Sacramento.

Caution was used during field monitoring, transportation, storage, and lab analysis to minimize exposure of samples to sunlight in order to prevent photo degradation of chloropicrin.

Each sample train consisted of an adsorbent tube, Teflon fittings and tubing, rain/sun shield, needle valve, train support, and a 12 volt DC vacuum pump (see Figure 1). Each tube was prepared in the field by breaking off both sealed glass ends and then immediately inserting the tube into the fitting. The tubes were oriented in the sample train with a small arrow printed on the side of each tube indicating the direction of flow. Needle valves were used to control the flow for sampling. The flow rates were set using a calibrated digital mass flow meter (MFM) before the start of each sampling period. The MFM used for the chloropicrin samplers has a range of 0-100 sccpm. The mass flow meter was calibrated to standard conditions (1 atm and 25 °C). The flow rate was also checked and recorded, using the MFM, at the end of each sampling period. Samplers were leak checked prior to each sampling period with the sampling tubes installed. Any change in flow rates was recorded in the field log sheets (page 82 of the Appendices). The pesticide sampling procedures for adsorbent tubes are included on page 42 of the Appendices.

III. Application Monitoring

The DPR's monitoring recommendation (July 25, 2001 memo, Sanders to Cook, Updated Monitoring Recommendations for 2001) suggested that application-site air monitoring should be conducted around a bed fumigation of chloropicrin in which methyl bromide was also used so that they could be monitored simultaneously. Ideally, monitoring was to be conducted at a site using the highest allowed rates of use (i.e., between 150 to 400 pounds per acre overall). The sampling schedule recommended by the DPR consisted of samples collected during daylight and overnight periods as shown below in Table 1.

Table 1
Application Sampling Schedule

Sample period begins	**Sample duration time**
Background (pre-application)	24 hours if possible; minimum 12 hours (if <24 hours must meet 24-hour Target EQL)
During application and post –application	Start of application until 1 hour before sunset
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour before sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour before sunrise	Daytime (until 1 hour before sunset)

1 hour before sunset | Overnight (until 1 hour after sunrise)

In the event that application occured at night, the alternate day-night schedule was to be followed. If the fumigation took two or more days, samples were to be collected during the overnight period separating the applications and the overnight/daytime schedule was then to be followed from the last day of application.

The test was originally scheduled for a site in San Diego County (see protocol, Appendix I) but the chloropicrin application was cancelled by the grower.

A field of approximately 22 acres in Monterey County was chosen for the application monitoring site. Refer to Figure 2 for a diagram of the application site and surrounding area. Refer to Appendix III (page 66 of Appendices) for a copy of the notice of intent to apply restricted materials. Table 2 summarizes the application information.

Table 2
Application Information

Location:	Monterey County, off Alisal Road
R/T/S:	4/15S/5
Field Size:	Approximately 22 acres
Product Applied:	AmeriBrom 50% methyl bromide, 50% chloropicrin (by weight)
Type of Application:	Bed tarpaulin fumigation
Commodity:	Soil, strawberry pre-plant
Application Rate:	125 lbs. each Mebr and chloropicrin per acre
Grower/Applicator:	Chavez/Santa Maria Valley Fume

Methyl bromide use regulations required an 'inner buffer zone' of 240 feet and an 'outer buffer zone' of 870 feet. As per the DPR's July 25, 2001 memo:

> "In the case of methyl bromide/chloropicrin fumigations, an outer buffer zone distance and an inner buffer zone distance are specified. Monitoring should occur at the outer buffer zone distance, since this is the buffer zone that pertains to nearby residents".

The samplers were located at approximately 870 feet from the edge of the field except at the southwest end of the field which was positioned 1650 feet from the field edge due to the recent application/tarping of adjacent fields. Refer to Figure 3 for a diagram of the location of the samplers around the application site. Eight samplers were positioned around the field. A ninth sampler was collocated at the CN (north) position. Table 3 lists the GPS coordinates of the field corners and sampling locations. Trees (approximately 60 feet high) blocked the southeast side from SEC for 300 feet towards SWC. Trees also blocked the southwest side up to SWC. All sampler inlets were

approximately 2 meters above the ground. All samplers were at the same elevation relative to the field.

Table 3
Chloropicrin Application 10/29/01 through 11/04/01
Field Corners and Sampler Waypoints

Field Corners:

NEC: Northeast Corner = N 36° 39.267', W 121° 34.221'

SEC: Southeast Corner = None Taken

SWC: Southwest Corner = N 36° 38.986', W 121° 34.406'

NWC: Northwest Corner = N 36° 39.099', W 121° 34.513'

ENWC: Extreme Northwest Corner = N 36° 38.941', W 121° 34.786'

ESWC: Extreme Southwest Corner = N 36° 38.747', W 121° 34.609'

Sampler Positions:

CN: Waypoint = N 36°39.304', W 121° 34.469'

CNE: Waypoint = N 36° 39.371', W 121° 34.346'

CE: Waypoint = N 36° 39.365', W 121° 34.087'

CSE: Waypoint = N 36° 39.127', W 121° 34.078'

CS: Waypoint = N 36° 39.038', W 121° 34.150'

CSW: Waypoint = N 36° 38.919', W 121° 34.248'

CW: Waypoint = N 36° 38.844', W 121° 34.699'

CNW: Waypoint = N 36° 39.135', W 121° 34.691'

MET: Waypoint = N 36° 39.222', W 121° 34.762'

Background samples were taken at the CW, CN, CE and CS positions to establish if any chloropicrin was detectable in the air before the application (i.e., from nearby applications). The background samples were initially collected from 1500 to 1400,

October 29 to 30, 2001 (23 hours). However, the application was delayed due to excess soil moisture and so an additional background period was monitored from 1500 to 1000, October 30 to 31, 2001 (19 hours). Due to the methyl bromide use regulations the application was conducted over 3 days. The first application was conducted from 1200 to 1630 on October 31, the second application was conducted from 0800 to 1530 on November 1, and the third application was conducted from 0700 to 1530 on November 2. The fumigation and tarping procedure was conducted by tractor and started in the southwest corner forming north/south rows. Table 4 lists the approximate sampling periods.

Table 4.
Application Sampling Periods

Period	Approx. # Hours	Date	Time
Background 1	23 hours	10/29-30/01	1500 to 1400
Background 2	19 hours	10/30-31/01	1500 to 1000
1 (Application)	5 1/4 hours	10/31/01	1200 to 1715
2 (overnight)	14 1/4 hours	10/31-11/1/01	1715 to 0730
3 (Application)	8 3/4 hours	11/1/01	0730 to 1615
4 (overnight)	14 3/4 hours	11/1-2/01	1615 to 0700
5 (Application)	9 1/2 hours	11/2/01	0700 to 1630
6 (overnight)	15 hours	11/2-3/01	1630 to 0730
7 (daytime)	9 hours	11/3/01	0730 to 1630
8 (overnight)	15 hours	11/3-4/01	1630 to 0730

The meteorological station (oriented toward true north) was positioned 1425 feet to the northwest of the northwest corner of the field. The meteorological station was set up, at a height of 21 feet, to determine wind speed and direction, air temperature, barometric pressure and relative humidity. The raw meteorological station data is available on a 1.44 MB diskette in comma delimited text format. Appendix IV (page 68 of the Appendices) lists the meteorological station data in 15-minute averages for the test period. ARB staff noted the degree of cloud cover on the sample log sheet whenever sample cartridges were changed. The conditions ranged from clear to overcast to foggy during the study period.

IV. Analytical Methodology

The sampling and analysis method and validation results for chloropicrin are included in the laboratory report (page 47 of the Appendices). The chloropicrin method consists of sampling with XAD-4 resin cartridges along with GC analysis with mass selective detector. The method detection limit (MDL) and estimated quantitation limit (EQL) for chloropicrin were set by the lab staff at 30 nanograms per sample (ng/sample) and 150 ng/sample, respectively. As stated in the lab report:

"This MDL is based upon the requested EQL and may differ from the actual MDL

but better reflects the instrument response at the requested EQL. Please refer to the standard operating procedure for the actual method MDL".

For a 24-hour sample at 90 sccpm, the MDL and EQL would be 231 nanograms per cubic meter (ng/m^3) and 1160 ng/m^3, respectively, as associated with the MDL and EQL stated above. The DPR recommended a target 24-hour EQL for chloropicrin of 1 ug/m^3 (1000 ng/m^3). Results equal to or above the MDL but below the EQL were reported as detected (Det). Laboratory results, in units of ng/sample, equal to or above the EQL were reported to 3 significant figures. The laboratory results are included in Appendix II. The analyses were performed by the Northern Laboratory Branch laboratory in Sacramento.

V. Application Monitoring Results

Table 5 presents the results of application air monitoring for chloropicrin in units of ng/m^3 and parts per trillion by volume (pptv). A summary of the results is presented in Tables 6 and Figure 14. The monitoring study included two background periods and eight sampling periods.

The equation used to convert chloropicrin air concentration results from units of ng/m^3 to units of pptv at 1 atmosphere and 25 °C is shown below.

$$\text{pptv} = (\text{ng/m}^3) \times \frac{(0.0820575 \text{ liter-atm/mole-°K})(298\text{°K})}{(1 \text{ atm})(164.4 \text{ gram/mole})} = (0.1487) \times (\text{ng/m}^3)$$

Four samples were collected for each of the two background periods (i.e., prior to application) from the east (CE), north (CN), west (CW) and south (CS) sites. During both background sampling periods, the results from the west and south sites were above the EQL. The highest concentration of 2000 ng/m^3 was found at the south site during 'background 2'. Results of all four background samples collected at the east and north sites were 'detected'. Of the 64 application samples collected (spikes, blanks, background samples and the lower of each pair of collocated samples excluded) 22 sample results were found to be above the EQL, 15 sample results were "detected", 21 sample results were <MDL, and six (6) samples were invalidated due to a sampling problem. The highest concentration, 39,000 ng/m^3 (5800 pptv), was observed at the SW sampling site during the 4th sampling period (overnight after 2nd application day).

No sample results have been adjusted or corrected for recoveries of quality assurance spike samples.

Wind speed and direction 'wind roses' for each of the sampling periods are shown in Figures 4 through 13. Normally the sample results for each sampling site, for each period, are included on the 'wind roses' (i.e., positioned with correct direction orientation relative to the wind rose. However, this was not feasible in this case due to the irregular

configuration of the field and sampler positions.

VI. Field Quality Assurance

Field quality assurance for the application monitoring included the following:

1) Four field spikes obtained by sampling ambient air at the application monitoring site. The field spikes were obtained by sampling ambient air during the background monitoring (i.e., collocated with a background sample at the same environmental and experimental conditions).

2) Four trip spikes prepared at the same level as the field spikes. The trip spikes were labeled, recorded on the field log-sheet, and transported along with the field spikes and application samples.

3) Four lab spikes prepared at the same level as the field and trip spikes. The lab spikes remained in the laboratory freezer and were extracted and analyzed along with the field and trip spikes.

4) Collocated (replicate) samples taken for all sampling periods (except the background period) at one sampling location (CN).

5) A trip blank was obtained, labeled, recorded on the field log-sheet, and transported along with the field spikes and application samples.

VII. Quality Assurance Results

A. Method Development

Refer to Appendix II (page 49 of Appendices) for discussion and results of method development studies. The freezer storage stability study results (page 50 of Appendices) show that chloropicrin is stable for at least 4 weeks. All of the application samples were analyzed within 4 weeks. Refer to Appendix VI (page 88 of the separate volume of Appendices) for raw data for the MDL determination, for the sample collection and extraction efficiency, and for the storage stability studies.

B. Trip Blanks

The application trip blank result was <MDL for chloropicrin.

C. Application Background Sample Results

As stated previously, four samples were collected for each of the two background periods from the east (CE), north (CN), west (CW) and south (CS) sites. In both cases the results from the west and south sites were above the EQL with the highest

concentration of 2000 ng/m3 found at the south site during 'background 2'. Results of all four background samples collected at the east and north sites were 'detected'.

D. Collocated Sample Results

Referring to Table 7, four collocated pairs of samples for the application study had both results above the EQL. The relative percent differences (|C1-C2|/(C1+C2)/2*100) of the data pairs ranged from 1% to 13%.

E. Laboratory, Trip and Field Spikes

Laboratory, trip and field spikes are all prepared at the same time and at the same concentration . The spikes are prepared in replicate sets of four (4) to allow statistics to be applied if necessary to evaluate differences in the results of the three sets. The laboratory spikes are placed immediately in a freezer and kept there until extraction and analysis. The trip spikes are kept in a freezer until transported to the field. The trip spike samples are kept on dry ice in an ice chest (the same one used for samples) during transport to and from the field and at all times while in the field except for trip spike sample log-in and labeling. The field spikes are kept in a freezer until transported to the field. The field spike samples are kept on dry ice in an ice chest (the same one used for samples) during transport to and from the field and at all times while in the field except for the sampling period. Field spikes were collected at the same environmental and experimental conditions as those occurring at the time of ambient sampling. The field spikes were obtained by sampling ambient air through the previously spiked cartridges and were collocated with a background sample. The extraction and analysis of laboratory, trip and field spikes normally occurs at the same time. Laboratory, trip and field spikes for the application were prepared by Special Analysis Section staff.

1) Laboratory Spikes: The laboratory spike results for the application study are listed in Table 8. Each of the spike cartridges was spiked with 1200 ng of chloropicrin. The average recovery for chloropicrin for the application lab spikes was 99%.

2) Trip Spikes: The trip spike results for the application study are listed in Table 9. Each of the cartridges was spiked with 1200 ng of chloropicrin. The average recovery for chloropicrin for the application trip spikes was 95%. These results are consistent with the lab spike results and indicate that the sample transport, storage and analytical procedures used in this study produce acceptable results for chloropicrin.

3) Field Spikes: The field spike results for the application study are listed in Table 10. Each of the cartridges was spiked with 1200 ng of chloropicrin. The average recovery for chloropicrin for the application field spikes was 94%. The field spike results are consistent with the lab and trip spike results and indicate that the sampling, sample transport, storage and analytical procedures used in this study produce acceptable results for chloropicrin.

MANIFOLD SAMPLER

01/29/02

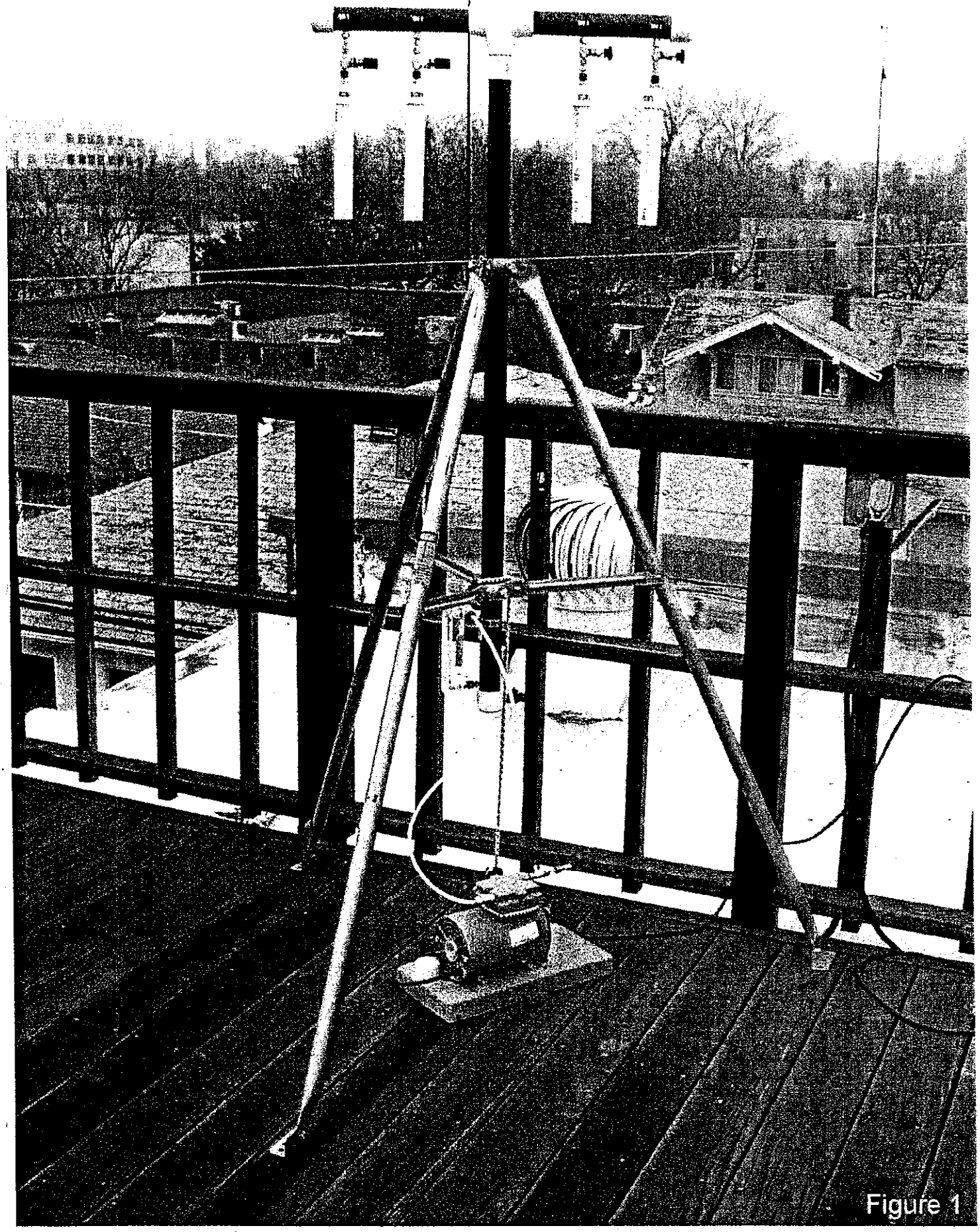


Figure 1

Figure 2.
Chloropicrin Application Diagram

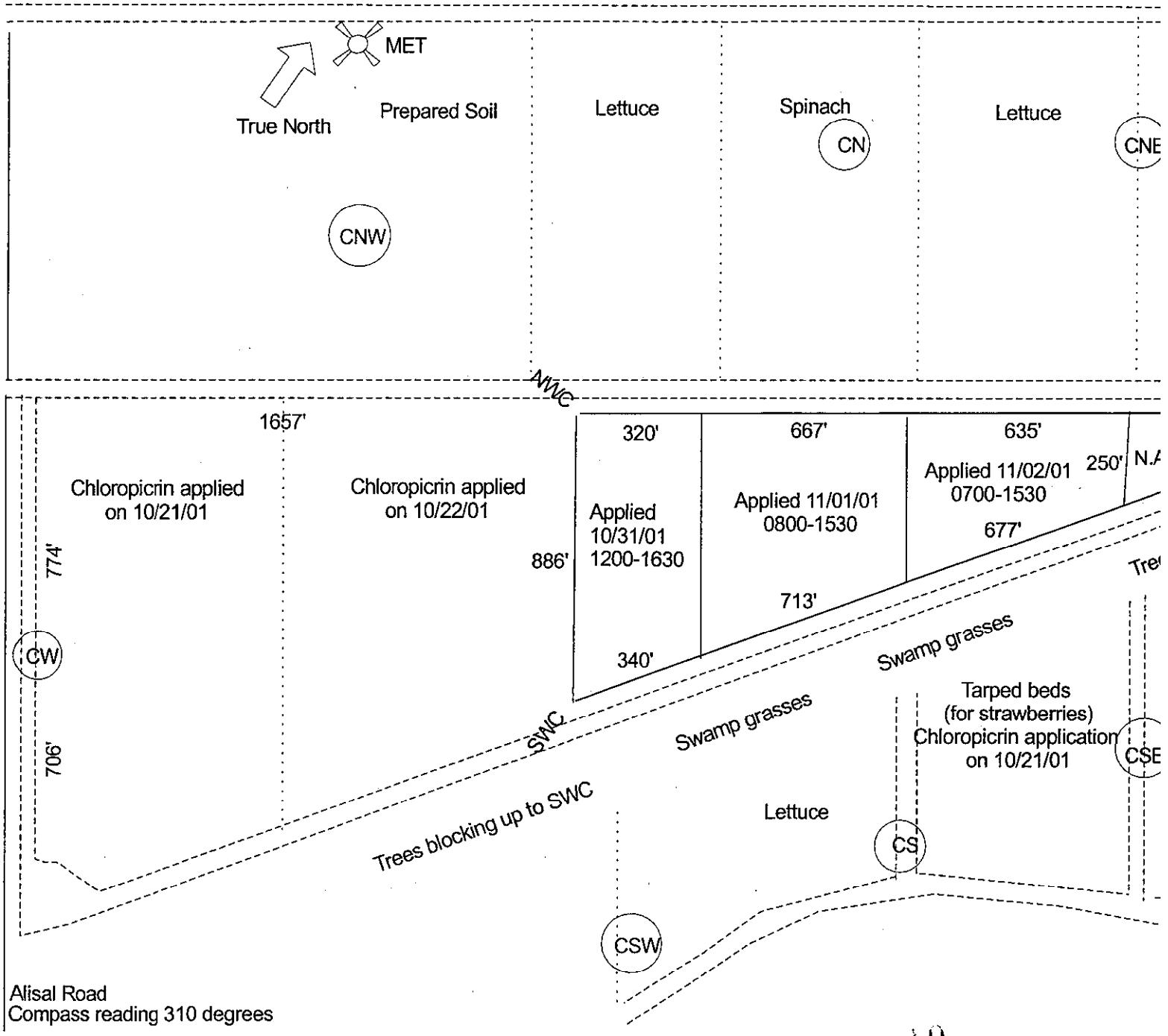
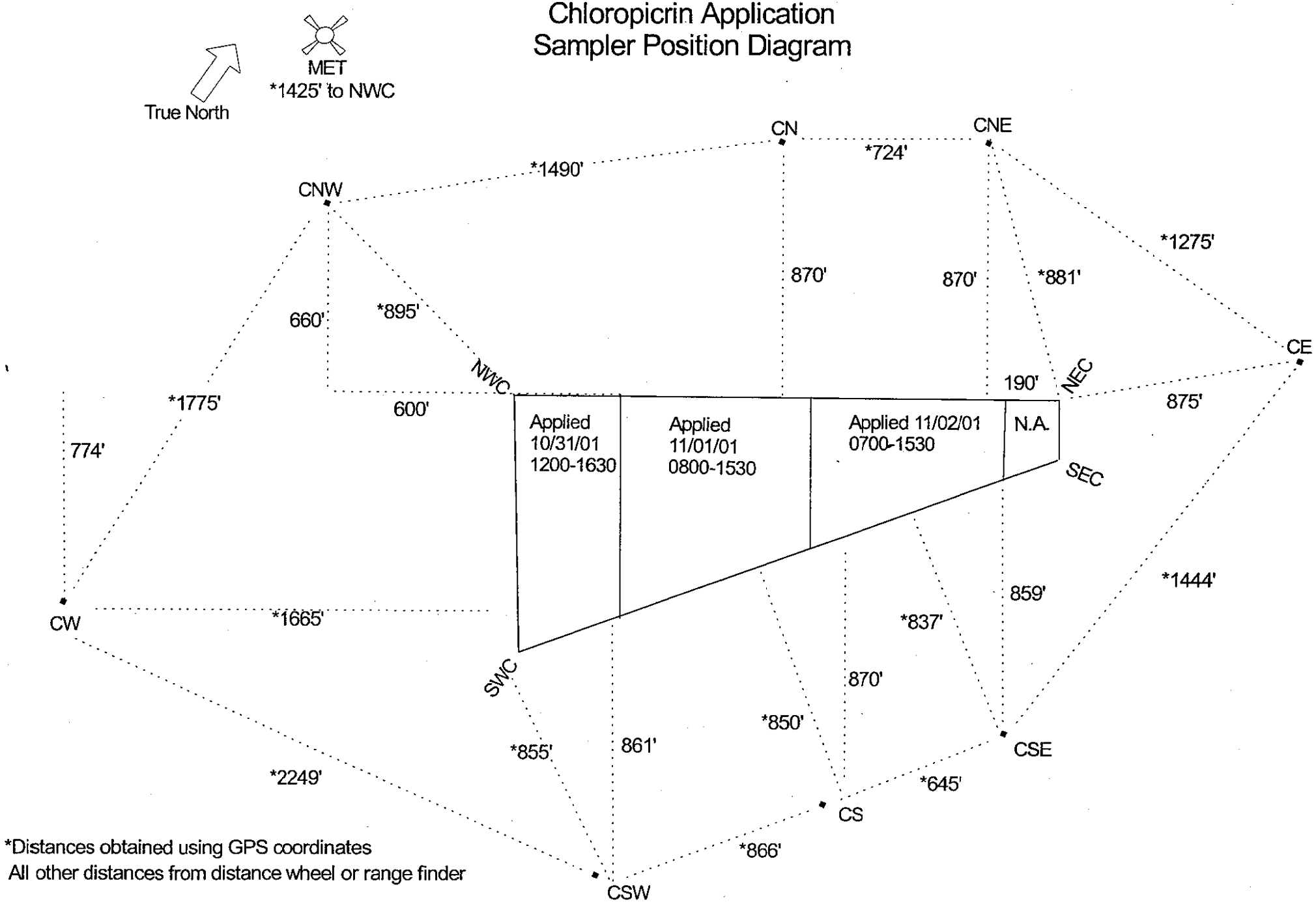


Figure 3
Chloropicrin Application
Sampler Position Diagram



*Distances obtained using GPS coordinates
All other distances from distance wheel or range finder

Table 5. Chloropicrin Application Monitoring Results

Log #	Sample ID	Start Date/Time	End Date/Time	Time (min)	Time (hours)	Volume (m3)	Chloropicrin (ng/sample)	(ng/m3)	*(pptv)
1	CEB-1	10/29/01 1519	10/30/01 1340	1341	22.4	0.11	Det	Det	Det
3	CWB-1	10/29/01 1532	10/30/01 1351	1339	22.3	0.11	1.95E+02	1.8E+03	2.7E+02
5	CSB-1	10/29/01 1545	10/30/01 1714	1529	25.5	0.14	2.63E+02	1.9E+03	2.8E+02
7	CNB-1	10/29/01 1600	10/30/01 1733	1533	25.5	0.14	Det	Det	Det
9	CEB-2	10/30/01 1452	10/31/01 0938	1126	18.8	0.10	Det	Det	Det
10	CNB-2	10/30/01 1506	10/31/01 0938	1112	18.5	0.10	Det	Det	Det
11	CWB-2	10/30/01 1525	10/31/01 1002	1117	18.6	0.10	1.72E+02	1.7E+03	2.5E+02
12	CSB-2	10/30/01 1537	10/31/01 1012	1115	18.6	0.10	2.01E+02	2.0E+03	3.0E+02
13	CE-3	10/31/01 1159	10/31/01 1626	267	4.5	0.02	<MDL	<MDL	<MDL
14	CNE-3	10/31/01 1157	10/31/01 1640	283	4.7	0.02	<MDL	<MDL	<MDL
15	CN-3	10/31/01 1205	10/31/01 1651	286	4.8	0.03	<MDL	<MDL	<MDL
16	CN-3C	10/31/01 1206	10/31/01 1656	290	4.8	0.03	<MDL	<MDL	<MDL
17	CNW-3	10/31/01 1217	10/31/01 1709	292	4.9	0.03	<MDL	<MDL	<MDL
18	CW-3	10/31/01 1226	10/31/01 1722	296	4.9	0.02	<MDL	<MDL	<MDL
19	CSW-3	10/31/01 1235	10/31/01 1740	305	5.1	0.03	3.06E+02	1.1E+04	1.6E+03
20	CS-3	10/31/01 1240	10/31/01 1750	310	5.2	0.03	Det	Det	Det
21	CSE-3	10/31/01 1246	10/31/01 1800	314	5.2	0.03	<MDL	<MDL	<MDL
22	CE-4	10/31/01 1628	11/01/01 0648	860	14.3	0.08	<MDL	<MDL	<MDL
23	CNE-4	10/31/01 1643	11/01/01 0700	857	14.3	0.08	<MDL	<MDL	<MDL
24	CN-4	10/31/01 1653	11/01/01 0711	858	14.3	NA	NA	NA	NA
25	CN-4C	10/31/01 1656	11/01/01 0717	861	14.3	0.08	Det	Det	Det
26	CNW-4	10/31/01 1513	11/01/01 0842	1049	17.5	0.09	6.17E+02	6.5E+03	9.7E+02
27	CW-4	10/31/01 1725	11/01/01 0735	850	14.2	NA	NA	NA	NA
28	CSW-4	10/31/01 1744	11/01/01 0755	851	14.2	0.08	Det	Det	Det
29	CS-4	10/31/01 1754	11/01/01 0803	849	14.2	0.08	Det	Det	Det
30	CSE-4	10/31/01 1803	11/01/01 0815	852	14.2	NA	NA	NA	NA
31	CE-5	11/01/01 0655	11/01/01 1533	518	8.6	0.04	<MDL	<MDL	<MDL
32	CNE-5	11/01/01 0702	11/01/01 1548	526	8.8	0.05	<MDL	<MDL	<MDL

*pptv at 1 atm and 25 C; pptv = (ng/m3) x (0.0820575 liter-atm/mole- K)(298 K)/(1 atm)(164.4 gram/mole) = (0.1487) x (ng/m3)
MDL = 30 ng/sample
Det = Value was below the EQL of 150 ng/sample but ≥MDL
NA = Not Applicable (sampling problem)

Table 5. Chloropicrin Application Monitoring Results

Log #	Sample ID	Start Date/Time	End Date/Time	Time (min)	Time (hours)	Volume (m3)	Chloropicrin (ng/sample)	(ng/m3)	*(pptv)
33	CN-5	11/01/01 0715	11/01/01 1603	528	8.8	0.05	<MDL	<MDL	<MDL
34	CN-5C	11/01/01 0720	11/01/01 1609	529	8.8	0.05	<MDL	<MDL	<MDL
35	CNW-5	11/01/01 0846	11/01/01 1623	457	7.6	0.04	Det	Det	Det
36	CW-5	11/01/01 0738	11/01/01 1626	528	8.8	NA	NA	NA	NA
37	CSW-5	11/01/01 0757	11/01/01 1653	536	8.9	0.04	7.57E+02	1.7E+04	2.5E+03
38	CS-5	11/01/01 0807	11/01/01 1702	535	8.9	0.05	1.72E+02	3.6E+03	5.3E+02
39	CSE-5	11/01/01 0823	11/01/01 1712	529	8.8	0.05	<MDL	<MDL	<MDL
40	CE-6	11/01/01 1536	11/02/01 0633	897	15.0	0.08	<MDL	<MDL	<MDL
41	CNE-6	11/01/01 1553	11/02/01 0802	969	16.1	0.09	Det	Det	Det
42	CN-6	11/01/01 1607	11/02/01 0826	979	16.3	0.09	4.88E+02	5.5E+03	8.2E+02
43	CN-6C	11/01/01 1613	11/02/01 0827	974	16.2	0.09	5.24E+02	6.0E+03	8.9E+02
44	CNW-6	11/01/01 1627	11/02/01 0848	981	16.4	0.09	3.46E+02	3.9E+03	5.8E+02
45	CW-6	11/01/01 1641	11/02/01 0652	851	14.2	0.08	Det	Det	Det
46	CSW-6	11/01/01 1657	11/02/01 0710	853	14.2	0.08	3.00E+03	3.9E+04	5.8E+03
47	CS-6	11/01/01 1706	11/02/01 0719	NA	NA	NA	NA	NA	NA
48	CSE-6	11/01/01 1718	11/02/01 0734	856	14.3	0.08	2.02E+02	2.6E+03	3.9E+02
49	CE-7	11/02/01 0635	11/02/01 1528	533	8.9	0.05	Det	Det	Det
50	CNE-7	11/02/01 0806	11/02/01 1545	459	7.6	0.04	Det	Det	Det
51	CN-7	11/02/01 0833	11/02/01 1558	445	7.4	0.04	Det	Det	Det
52	CN-7C	11/02/01 0836	11/02/01 1603	447	7.5	0.04	Det	Det	Det
53	CNW-7	11/02/01 0853	11/02/01 1617	444	7.4	0.04	<MDL	<MDL	<MDL
54	CW-7	11/02/01 0657	11/02/01 1630	573	9.6	0.05	<MDL	<MDL	<MDL
55	CSW-7	11/02/01 0713	11/02/01 1645	572	9.5	NA	NA	NA	NA
56	CS-7	11/02/01 0724	11/02/01 1656	572	9.5	0.05	9.14E+02	1.8E+04	2.6E+03
57	CSE-7	11/02/01 0737	11/02/01 1705	568	9.5	0.05	Det	Det	Det
63	CE-8	11/02/01 1535	11/03/01 0636	901	15.0	0.08	<MDL	<MDL	<MDL
64	CNE-8	11/02/01 1549	11/03/01 0650	901	15.0	0.08	Det	Det	Det
65	CN-8	11/02/01 1601	11/03/01 0704	903	15.0	0.08	3.26E+02	4.0E+03	6.0E+02

*pptv at 1 atm and 25 C; pptv = (ng/m3) x (0.0820575 liter-atm/mole- K)(298 K)/(1 atm)(164.4 gram/mole) = (0.1487) x (ng/m3)
MDL = 30 ng/sample
Det = Value was below the EQL of 150 ng/sample but ≥MDL
NA = Not Applicable (sampling problem)

Table 5. Chloropicrin Application Monitoring Results

Log #	Sample ID	Start Date/Time	End Date/Time	Time (min)	Time (hours)	Volume (m3)	Chloropicrin (ng/sample)	(ng/m3)	*(pptv)
66	CN-8C	11/02/01 1601	11/03/01 0708	907	15.1	0.08	3.29E+02	4.0E+03	6.0E+02
67	CNW-8	11/02/01 1620	11/03/01 0723	903	15.0	0.08	2.49E+02	3.1E+03	4.6E+02
68	CW-8	11/02/01 1634	11/03/01 0736	902	15.0	0.08	<MDL	<MDL	<MDL
69	CSW-8	11/02/01 1650	11/03/01 0752	902	15.0	0.08	8.18E+02	1.1E+04	1.6E+03
70	CS-8	11/02/01 1659	11/03/01 0801	902	15.0	0.08	1.13E+03	1.4E+04	2.1E+03
71	CSE-8	11/02/01 1709	11/03/01 0810	901	15.0	0.08	1.71E+02	2.1E+03	3.1E+02
72	CE-9	11/03/01 0641	11/03/01 1535	534	8.9	0.05	Det	Det	Det
73	CNE-9	11/03/01 0655	11/03/01 1545	530	8.8	0.05	1.57E+02	3.3E+03	4.9E+02
74	CN-9	11/03/01 0707	11/03/01 1555	528	8.8	0.05	2.12E+02	4.5E+03	6.6E+02
75	CN-9C	11/03/01 0711	11/03/01 1558	527	8.8	0.05	1.95E+02	4.1E+03	6.1E+02
76	CNW-9	11/03/01 0727	11/03/01 1558	511	8.5	0.05	<MDL	<MDL	<MDL
77	CW-9	11/03/01 0740	11/03/01 1623	523	8.7	0.05	<MDL	<MDL	<MDL
78	CSW-9	11/03/01 0755	11/03/01 1638	523	8.7	0.05	Det	Det	Det
79	CS-9	11/03/01 0803	11/03/01 1649	526	8.8	0.05	4.05E+02	8.5E+03	1.3E+03
80	CSE-9	11/03/01 0814	11/03/01 1658	524	8.7	0.05	4.34E+02	9.2E+03	1.4E+03
81	CE-10	11/03/01 1537	11/04/01 0654	917	15.3	0.08	<MDL	<MDL	<MDL
82	CNE-10	11/03/01 1547	11/04/01 0703	916	15.3	0.08	Det	Det	Det
83	CN-10	11/03/01 1557	11/04/01 0710	913	15.2	0.08	2.39E+02	2.9E+03	4.3E+02
84	CN-10C	11/03/01 1601	11/04/01 0712	911	15.2	0.08	2.09E+02	2.6E+03	3.8E+02
85	CNW-10	11/03/01 1611	11/04/01 0724	913	15.2	0.08	2.01E+02	2.4E+03	3.6E+02
86	CW-10	11/03/01 1625	11/04/01 0734	909	15.1	0.08	<MDL	<MDL	<MDL
87	CSW-10	11/03/01 1642	11/04/01 0746	904	15.1	0.08	2.90E+02	3.6E+03	5.3E+02
88	CS-10	11/03/01 1653	11/04/01 0754	901	15.0	0.08	3.60E+02	4.4E+03	6.6E+02
89	CSE-10	11/03/01 1702	11/04/01 0807	905	15.1	0.08	Det	Det	Det

*pptv at 1 atm and 25 C; pptv = (ng/m3) x (0.0820575 liter-atm/mole- K)(298 K)/(1 atm)(164.4 gram/mole) = (0.1487) x (ng/m3)
MDL = 30 ng/sample
Det = Value was below the EQL of 150 ng/sample but ≥MDL
NA = Not Applicable (sampling problem)

Table 6. Summary of Chloropicrin Application Results (ng/m3)

Sampling Period	Approx. # Hours	East	North East	North	North Coll.	North West	West	South West	South	South East
Bkgnd 1	23	Det		Det			1.8E+03		1.9E+03	
Bkgnd 2	19	Det		Det			1.7E+03		2.0E+03	
1	5 1/4	<MDL	<MDL	<MDL	<MDL	<MDL	<MDL	1.1E+04	Det	<MDL
2	14 1/4	<MDL	<MDL	NA	Det	6.5E+03	NA	Det	Det	NA
3	8 3/4	<MDL	<MDL	<MDL	<MDL	Det	NA	1.7E+04	3.6E+03	<MDL
4	14 3/4	<MDL	Det	5.5E+03	6.0E+03	3.9E+03	Det	3.9E+04	NA	2.6E+03
5	9 1/2	Det	Det	Det	Det	<MDL	<MDL	NA	1.8E+04	Det
6	15	<MDL	Det	4.0E+03	4.0E+03	3.1E+03	<MDL	1.1E+04	1.4E+04	2.1E+03
7	9	Det	3.3E+03	4.5E+03	4.1E+03	<MDL	<MDL	Det	8.5E+03	9.2E+03
8	15	<MDL	Det	2.9E+03	2.6E+03	2.4E+03	<MDL	3.6E+03	4.4E+03	Det

Table 7. Chloropicrin Application Collocated Results (ng/m3)

Sampling Period	North	North Coll.	Average	Relative Difference
1	<MDL	<MDL	<MDL	<MDL
2	NA	Det	NA	NA
3	<MDL	<MDL	<MDL	<MDL
4	5.5E+03	6.0E+03	5.8E+03	8%
5	Det	Det	Det	Det
6	4.0E+03	4.0E+03	4.0E+03	1%
7	4.5E+03	4.1E+03	4.3E+03	8%
8	2.9E+03	2.6E+03	2.7E+03	13%

MDL = 30 ng/sample
Det = Value was below the EQL of 150 ng/sample but ≥ MDL
NA = Not Applicable

Table 8. Chloropicrin Lab Spike Results

Sample ID	Chloropicrin		
	Expected (ng/sample)	Actual (ng/sample)	Percent Recovery
Lab spike 1	1200	1127	94%
Lab spike 2	1200	1061	88%
Lab spike 3	1200	1253	104%
Lab spike 4	1200	1296	108%
		Ave.=	**99%**

Table 9. Chloropicrin Trip Spike Results

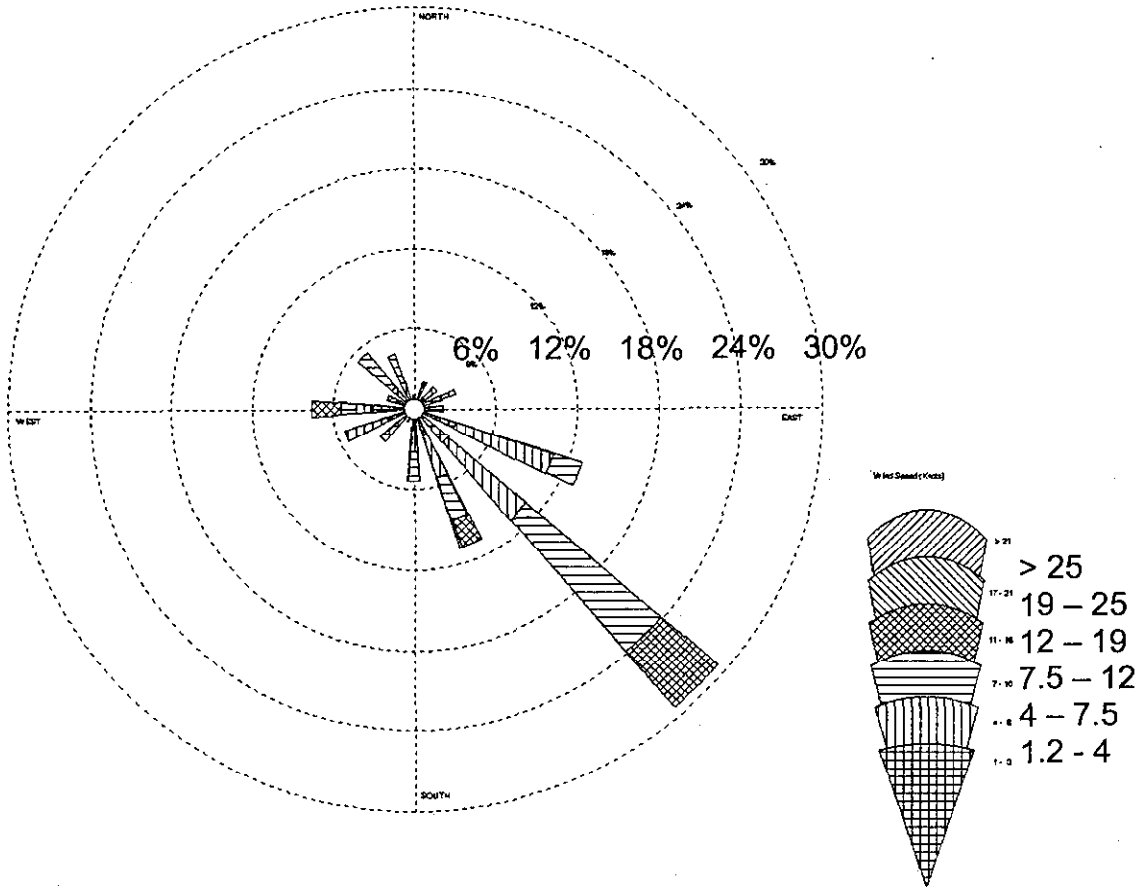
Sample ID	Chloropicrin		
	Expected (ng/sample)	Actual (ng/sample)	Percent Recovery
CTS1	1200	1131	94%
CTS2	1200	1163	97%
CTS3	1200	1127	94%
CTS4	1200	1130	94%
		Ave.=	**95%**

Table 10. Chloropicrin Field Spike Results

Sample ID	Chloropicrin				
	Expected (ng/sample)	Actual (ng/sample)	Collocated Amount	*Corrected Amount	Percent Recovery
CEBFS1	1200	1192	98.1	1094	91%
CWBFS1	1200	NA	195	NA	NA
CSBFS1	1200	1398	262	1136	95%
CNBFS1	1200	1221	78.3	1143	95%
				Ave.=	**94%**

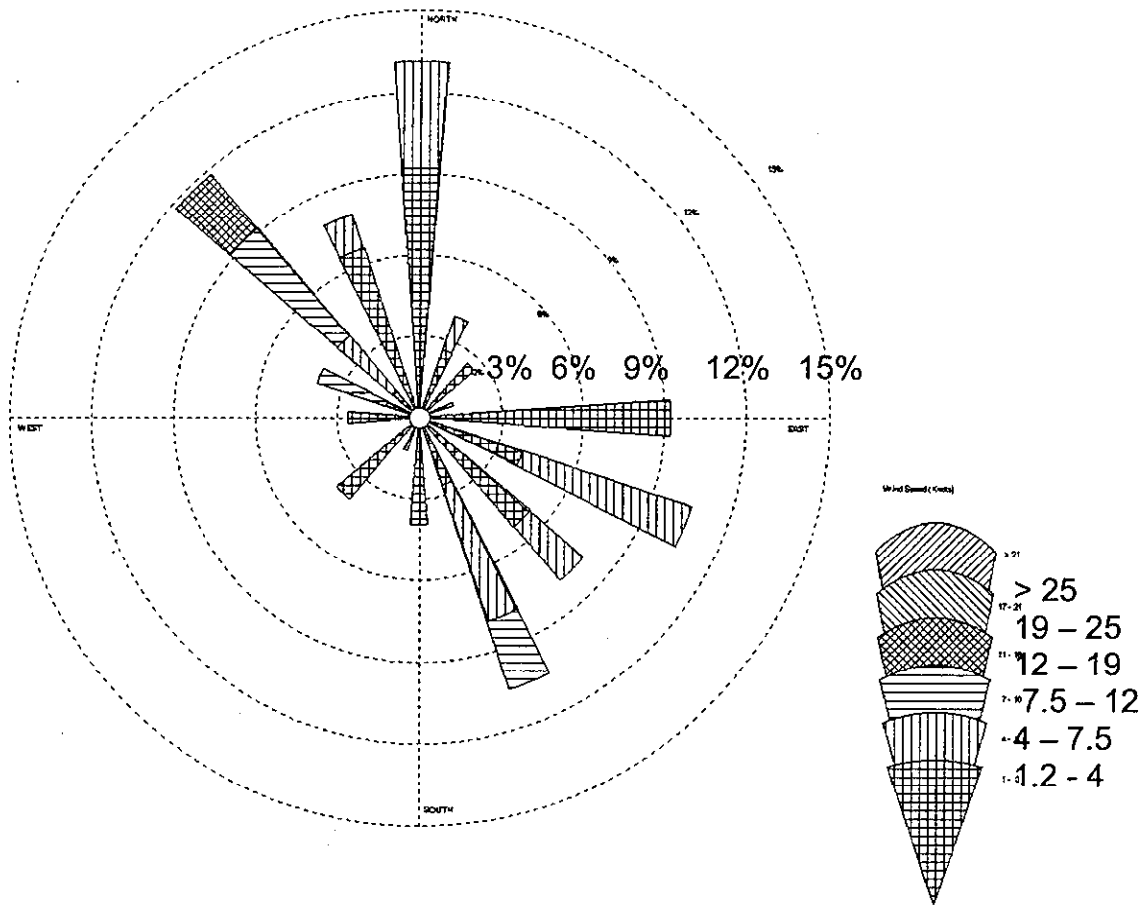
*Corrected by subtracting the amount found in the corresponding collocated sample.
NA = Not Applicable (sampling problem)

Figure 4
Chloropicrin Application Wind Rose
Background 1



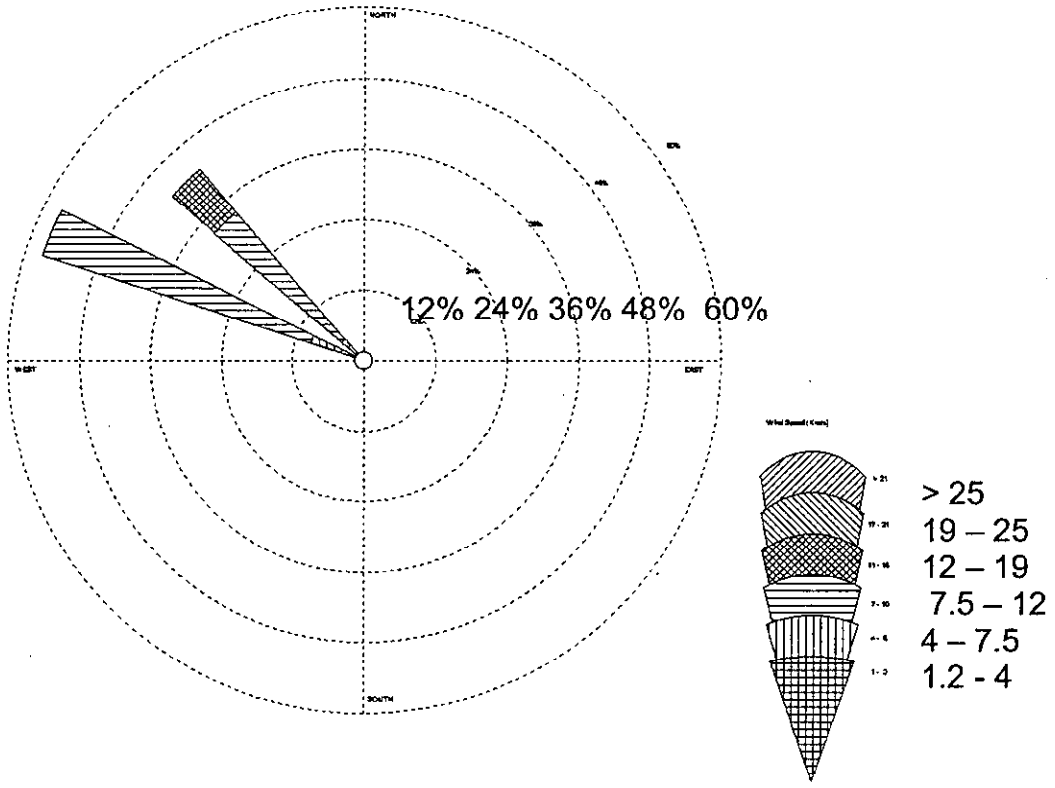
Company Name **ARB**	Orientation **Direction (blowing from)**	Avg. Wind Speed **6.97 Knots**	Sample Date-Time **10/29/02 1500 to 10/30/02 1430**
Display **Wind Speed**	Units **Knots**	Calm Winds **1%**	Sample ID **Background Period 1**

Figure 5
Chloropicrin Application Wind Rose
Background 2



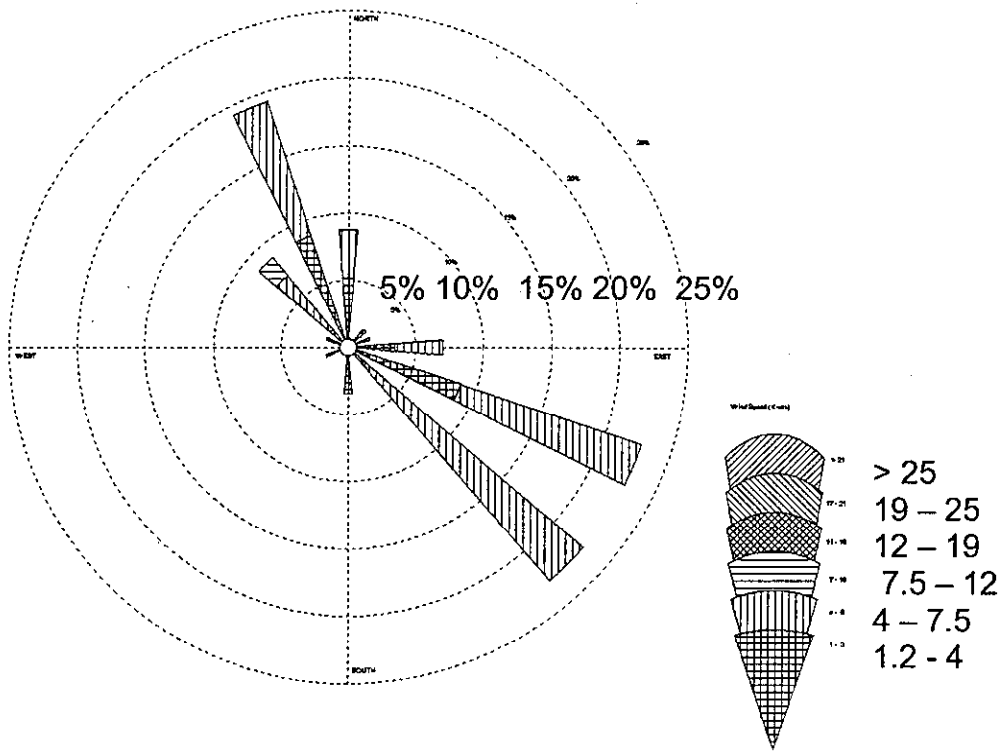
Company Name	Orientation	Avg. Wind Speed	Sample Date-Time
ARB	**Direction (blowing from)**	**4.48 Knots**	**10/30/02 1500 to 10/31/02 1000**
Display	Units	Calm Winds	Sample ID
Wind Speed	**Knots**	**5.26%**	**Background Period 2**

Figure 6
Chloropicrin Application Wind Rose
Period 1



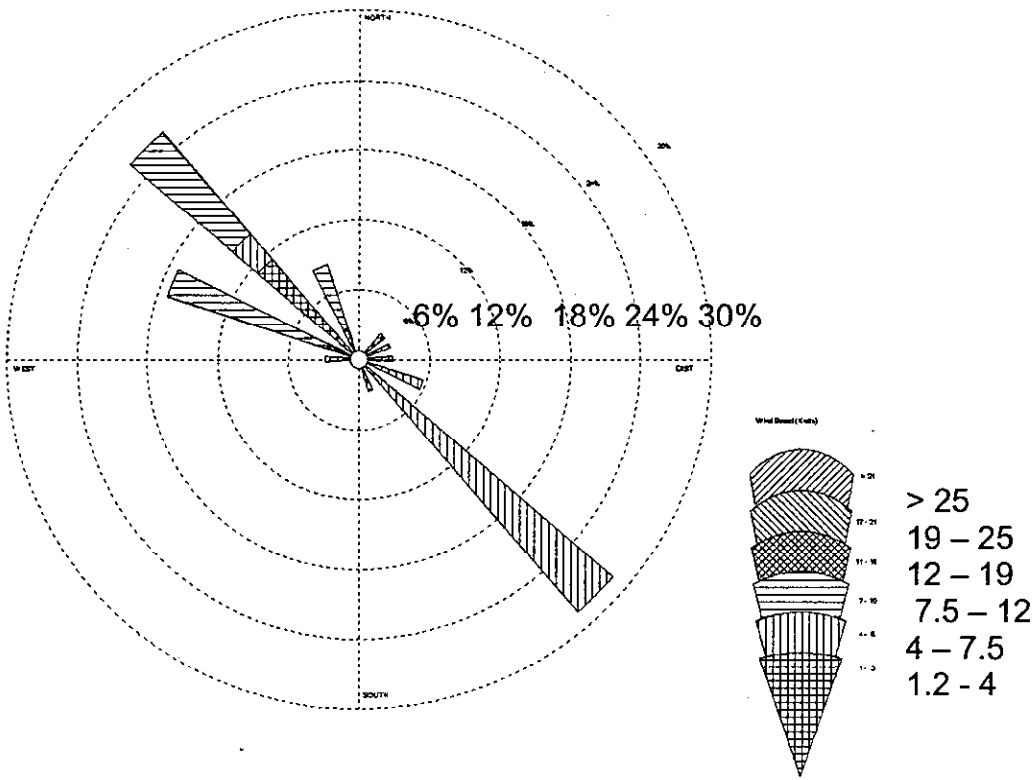
Company Name **ARB**	Orientation **Direction (blowing from)**	Avg. Wind Speed **9.86 Knots**	Sample Date-Time **10/31/02 1200 to 10/31/02 1715**
Display **Wind Speed**	Units **Knots**	Calm Winds **0.0%**	Sample ID **Period 1**

Figure 7
Chloropicrin Application Wind Rose
Period 2



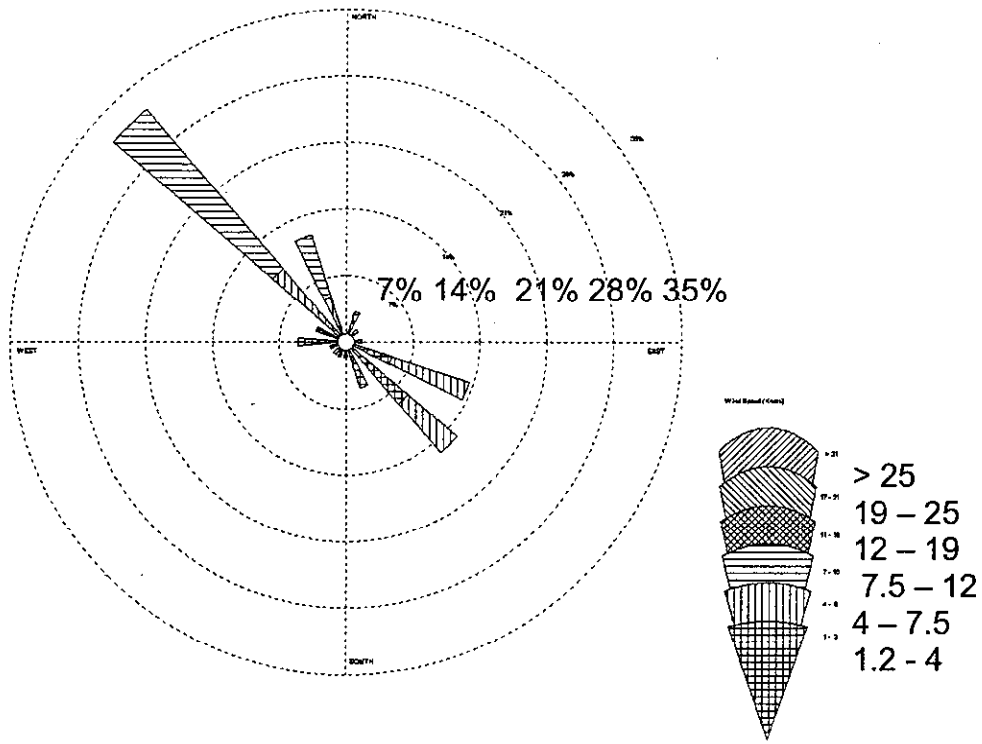
Company Name **ARB**	Orientation **Direction (blowing from)**	Avg. Wind Speed **4.64 Knots**	Sample Date-Time **10/31/02 1715 to 11/1/02 0730**
Display **Wind Speed**	Units **Knots**	Calm Winds **0.0%**	Sample ID **Period 2**

Figure 8
Chloropicrin Application Wind Rose
Period 3



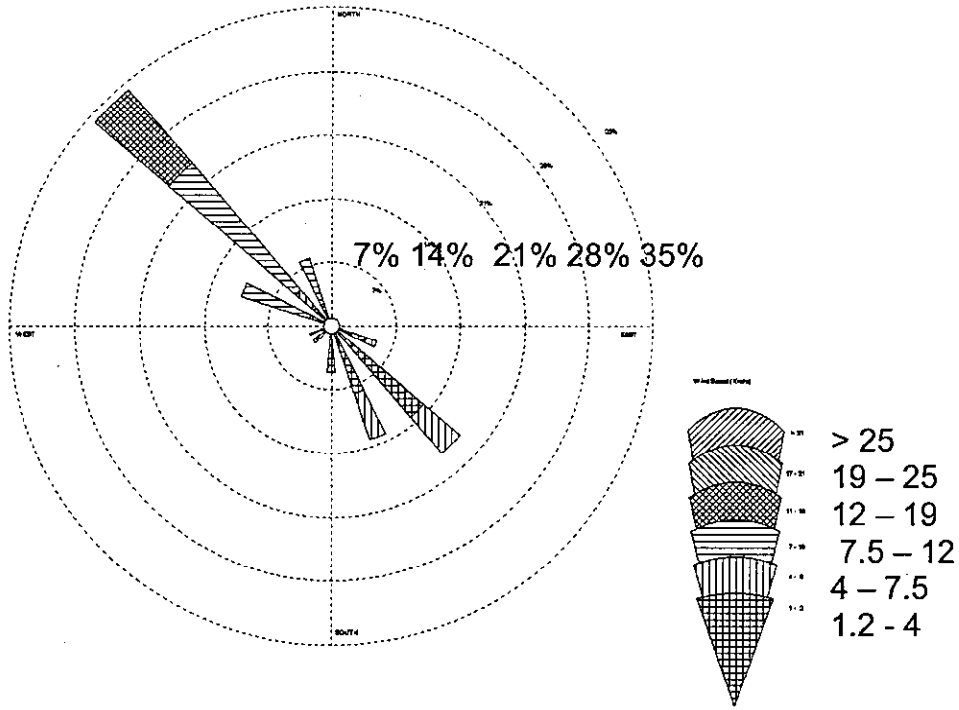
Company Name	Orientation	Avg. Wind Speed	Sample Date-Time
ARB	**Direction (blowing from)**	**6.49 Knots**	**11/1/02 0730 to 11/1/02 1615**
Display	Units	Calm Winds	Sample ID
Wind Speed	**Knots**	**0.0%**	**Period 3**

Figure 9
Chloropicrin Application Wind Rose
Period 4



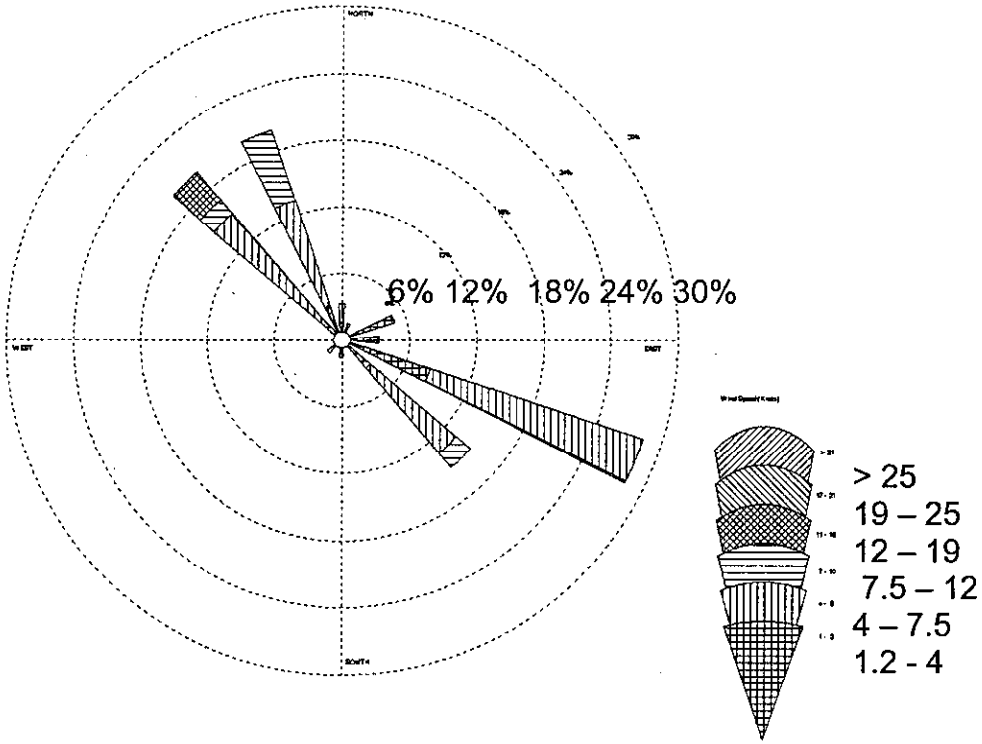
Company Name **ARB**	Orientation **Direction (blowing from)**	Avg. Wind Speed **5.09 Knots**	Sample Date-Time **11/1/02 1615 to 11/2/02 0700**
Display **Wind Speed**	Units **Knots**	Calm Winds **0.0%**	Sample ID **Period 4**

Figure 10
Chloropicrin Application Wind Rose
Period 5



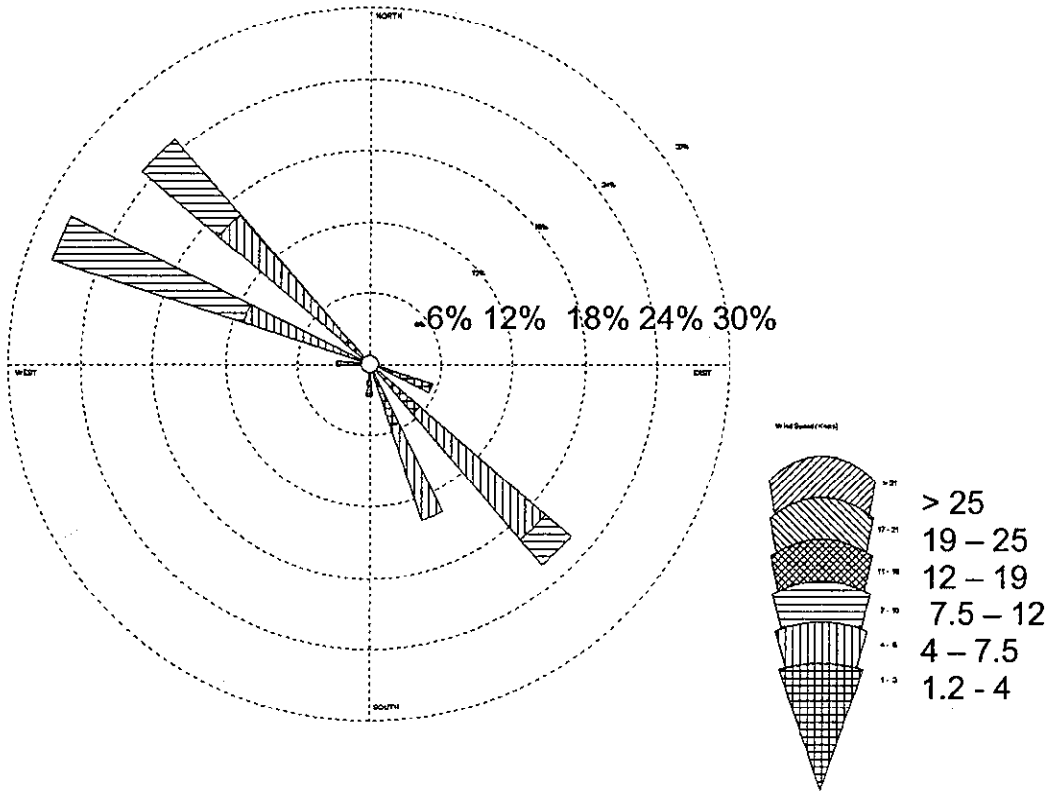
Company Name **ARB**	Orientation **Direction (blowing from)**	Avg. Wind Speed **6.73 Knots**	Sample Date-Time **11/2/02 0700 to 11/2/02 1630**
Display **Wind Speed**	Units **Knots**	Calm Winds **0.0%**	Sample ID **Period 5**

Figure 11
Chloropicrin Application Wind Rose
Period 6



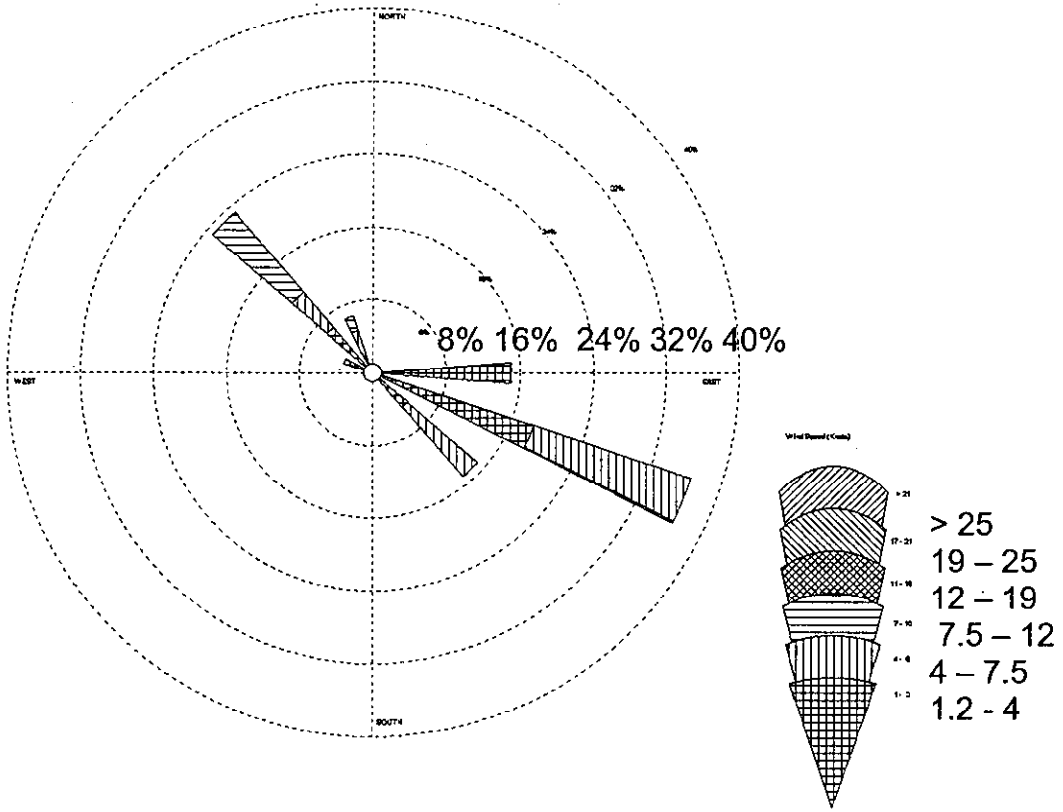
Company Name **ARB**	Orientation **Direction (blowing from)**	Avg. Wind Speed **5.45 Knots**	Sample Date-Time **11/2/02 1630 to 11/3/02 0730**
Display **Wind Speed**	Units **Knots**	Calm Winds **0.0%**	Sample ID **Period 6**

Figure 12
Chloropicrin Application Wind Rose
Period 7



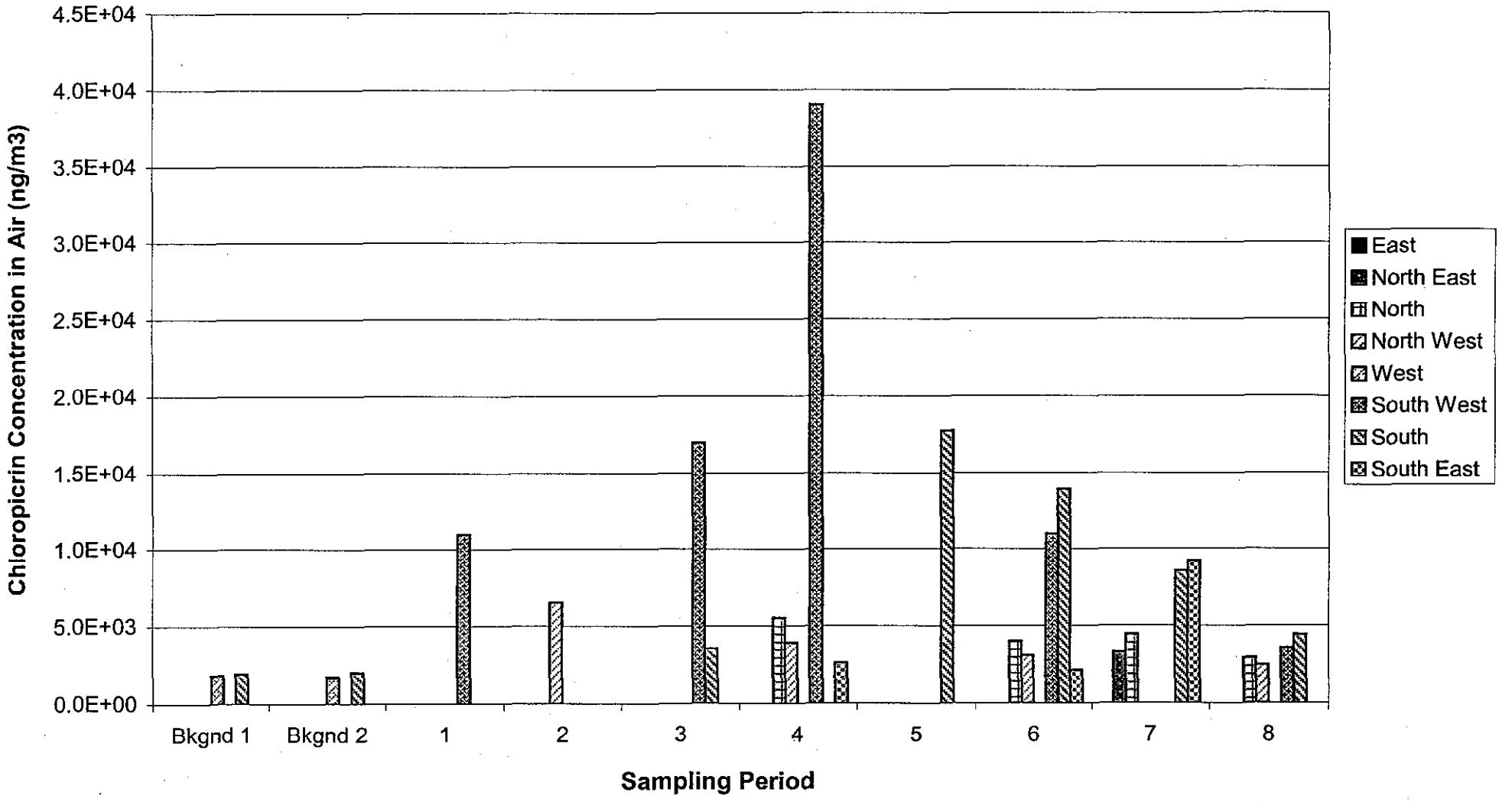
Company Name **ARB**	Orientation **Direction (blowing from)**	Avg. Wind Speed **5.68 Knots**	Sample Date-Time **11/3/02 0730 to 11/3/02 1630**
Display **Wind Speed**	Units **Knots**	Calm Winds **0.0%**	Sample ID **Period 7**

Figure 13
Chloropicrin Application Wind Rose
Period 8



Company Name	Orientation	Avg. Wind Speed	Sample Date-Time
ARB	**Direction (blowing from)**	**4.64 Knots**	**11/3/02 1630 to 11/4/02 0730**
Display	Units	Calm Winds	Sample ID
Wind Speed	**Knots**	**0.0%**	**Period 8**

Figure 14
Chloropicrin Application Monitoring Results



* This chart only presents the results equal to or above the EQL

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

APPENDICES

FOR THE

Report for Air Monitoring Around a Bed Fumigation Application of Chloropicrin Fall 2001

Operations Planning and Assessment Section
Quality Management Branch
Monitoring and Laboratory Division

Project No. P-01-002

Date: March 17, 2003

APPENDIX I

MONITORING PROTOCOL

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Protocol for Air Monitoring Around a Bed Fumigation Application of Chloropicrin

June 2001

Prepared by
Operations Planning and Assessment Section
Quality Management Branch
Monitoring and Laboratory Division

Date: May 24, 2001

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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 Air Monitoring
Around a Bed Fumigation Application
of Chloropicrin
June 2001

I. Introduction

At the request of the California Department of Pesticide Regulation (DPR) (June 28, 2000 Memorandum, Helliker to Lloyd), the Air Resources Board (ARB) staff will determine airborne concentrations of the pesticide chloropicrin around a bed fumigation application, tentatively scheduled to be conducted in June 2001. 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 DPR has requested that a chloropicrin application where methyl bromide is also being used be selected for the monitoring study. The DPR will collect samples for methyl bromide, which will be analyzed by the California Department of Food and Agriculture's pesticide laboratory. This protocol will only address the sampling for chloropicrin (i.e., will not address the DPR sampling/analysis for methyl bromide).

The sampling and analysis will follow the quality assurance guidelines described in Attachment I, "Quality Assurance Plan for Pesticide Air Monitoring" (May 11, 1999 version).

The sampling and analysis will follow the draft procedures outlined in this protocol as well as the procedures described in Attachment II, "Standard Operating Procedure, Sampling and Analysis of Trichloronitromethane (Chloropicrin) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector".

II. Sampling

Chloropicrin samples will be collected on XAD-4 resin sampling cartridges. For chloropicrin, the tubes are 8 mm x 140 mm, XAD-4, with 400 mg in the primary section, and 200 mg in the secondary section (SKC special order). Sample collection is at a flow rate of 90 standard cubic centimeters per minute (sccpm). Subsequent to sampling, the tubes are capped, labeled, placed in a culture tube, and stored and transported in an insulated container with dry ice. The samples are transported (driven) to the ARB laboratory in Sacramento. DPR recommends a target 24-hour estimated quantitation limit (EQL) for chloropicrin of 0.1 ug/m^3.

Caution should be used during field monitoring, transportation, storage, and lab analysis to minimize exposure of samples to sunlight in order to prevent photo degradation of chloropicrin.

Each sample train consists of an adsorbent tube, Teflon fittings and tubing, rain/sun shield, rotameter, train support, and a 12 volt DC vacuum pump (see Figure 1). Each tube is prepared in the field by breaking off each sealed glass end and then immediately inserting the tube into the fitting. The tubes are oriented in the sample train with a small arrow printed on the side of each tube indicating the direction of flow. Rotameters with a range of 0-240 ccpm will be used to control the flow for sampling. The flow rates will be set using a calibrated digital mass flow meter (MFM) before the start of each sampling period. The MFM used for the chloropicrin samplers has a range of 0-100 sccpm. The mass flow meter has been calibrated to standard conditions (1 atm and 25 °C). The flow rate is also checked and recorded, using the MFM, at the end of each sampling period. Samplers will be leak checked prior to each sampling period with the sampling tubes installed. Any change in flow rates will be recorded in the field logbook (see Attachment IV). The pesticide sampling procedures for adsorbent tubes are included as Attachment III. The sampling schedule consists of samples collected during daylight and overnight periods as shown below in Table 1.

Table 1
Application Sampling Schedule

Sample period begins	Sample duration time
Background (pre-application)	24 hours if possible; minimum 12 hours (if <24 hours must meet 24-hour EQL)
During application and post –application	Start of application until 1 hour before sunset
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour before sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour before sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)

In the event that application occurs at night, the alternate day-night schedule will be followed. If the fumigation takes two or more days, samples will be collected during the overnight period separating the applications and the above overnight/daytime schedule will then be followed from the last day of application.

The application monitoring study will be conducted at the location and under the conditions described in Table 2.

Table 2
Application Information

Location:	South side of Via de la Valle Road, Del Mar
Field Size:	21 Acres
Product Applied:	50% methyl bromide, 50% chloropicrin (by weight)
Type of Application:	Bed tarpaulin fumigation
Commodity:	Soil, tomato pre-plant
Application Rate:	175 lbs. each Mebr and chloropicrin per acre
Grower/Applicator:	Leslie Farms/TriCal

DPR staff, along with the San Diego County Agricultural Commissioner's office staff, have coordinated the selection of the study site and the test dates and have obtained permission from the grower (and any other land owners where samplers may be located). Chloropicrin/methyl bromide bed-tarpaulin applications typically proceed at a pace of about one acre per hour or about 10 acres per day per application rig.

A minimum of 8 samplers will be positioned, one on each side of the field and one at each corner. A 9th replicate sampler will be collocated at one position (downwind site). Ideally, samplers should be positioned 200 feet from the field; however, site conditions will dictate the exact placement of samplers.

In regard to field data, the monitoring report will include: 1) a record of the positions of the monitoring equipment with respect to the field, 2) the application start location, 3) the direction of crop rows 4) how the field was divided to treat if over several days, 4) a drawing of the monitoring sites showing the precise location of the meteorological equipment, trees, buildings and other obstacles, 5) 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, 6) 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), and 7) the start and end time of the application.

III. Analysis

The draft sampling and analysis method and validation results for the sampling and analysis of chloropicrin are included as Attachment II. The chloropicrin method will consist of sampling with XAD-4 resin cartridges along with GC analysis with mass selective detector. The method detection limit (MDL) and estimated quantitation limit (EQL) for chloropicrin are 3.96 ng/sample and 19.8 ng/sample, respectively. For a 24-hour sample at 90 sccpm, the MDL and EQL would be 30.5 ng/m^3 and 152 ng/m^3, respectively. The DPR target EQL was 100 ng/m^3. The analyses will be performed by the ARB laboratory in Sacramento.

IV. Field Quality Assurance

Field Quality Control for the application monitoring will include the following:

1) Four field spikes will be obtained by sampling ambient air at the application monitoring site for between 12 and 24 hours. The field spikes will be obtained by sampling ambient air during the background monitoring (i.e., collocated with a background sample at the same environmental and experimental conditions). The spike levels for chloropicrin in the adsorbent tube samples have not yet been determined.

2) Four trip spikes will be prepared at the same level as the field spikes. The trip spikes will be labeled, recorded on the field log-sheet, and transported along with the field spikes and application samples.

3) Four lab spikes will be prepared at the same level as the field and trip spikes. The lab spikes will remain in the laboratory freezer and will be extracted and analyzed along with the field and trip spikes.

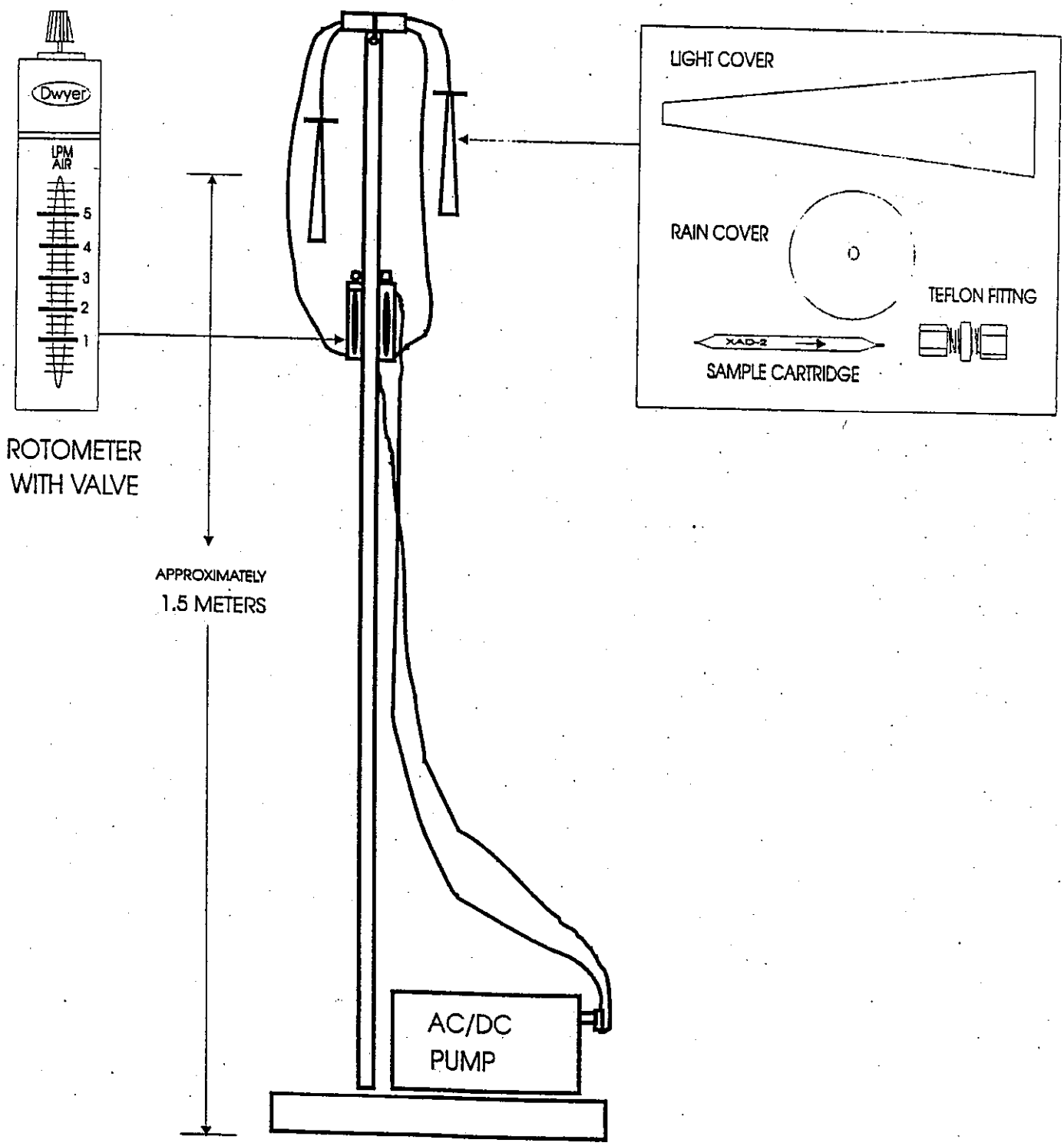
4) Collocated (replicate) samples will be taken for all sampling periods (except the background period) at one sampling location (downwind).

5) A trip blank will be obtained, labeled, recorded on the field log-sheet, and transported along with the field spikes and application samples.

VII. Personnel

ARB sampling personnel will consist of staff from the Air Quality Surveillance Branch of ARB. DPR staff will collect samples for the first two application sampling periods.

FIGURE 1. SAMPLE TREE



Attachment I

Quality Assurance Plan for Pesticide Air Monitoring

State of California
California Environmental Protection Agency
Air Resources Board

QUALITY ASSURANCE PLAN FOR PESTICIDE AIR MONITORING

Prepared by the

Monitoring and Laboratory Division
Engineering and Laboratory Branch

Revised: May 11, 1999

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This Quality Assurance Plan 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.

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QUALITY ASSURANCE PLAN FOR PESTICIDE MONITORING

I. Introduction

At the request of the Department of Pesticide Regulation (DPR), the Air Resources Board (ARB) staff determines the airborne concentrations of specified pesticides following monitoring recommendations established by the DPR. This air monitoring is conducted 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 documentation of airborne concentrations is usually accomplished through two types of monitoring. The first consists of five to eight weeks of **ambient** monitoring in the general area of, and during the season of, peak use of the specified pesticide. The second is monitoring around the perimeter of a field during and for 72 hours after an **application** has occurred. These are referred to as ambient and application monitoring, respectively. To help clarify the differences between these two monitoring programs, ambient and application are highlighted in bold in this document when the information applies specifically to either program. The purpose of this document is to specify quality assurance activities for the sampling and laboratory analysis of the monitored pesticide.

A. Quality Assurance Policy Statement

It is the policy of the ARB to provide DPR with accurate, relevant and timely air monitoring measurements of airborne pesticide concentrations. The goal of this document is to identify procedures that ensure the implementation of this policy.

B. Quality Assurance Objectives

Quality assurance objectives for pesticide monitoring are as follows.

(1) to establish the necessary quality control activities relating to site selection, method validation, analytical standard operating procedures (SOP), sample collection, sampling and analysis protocol, data reduction and final reports, and;
(2) to assess data quality in terms of precision, accuracy and completeness, and;
(3) to design air monitoring strategies to meet the pesticide target (estimated) quantitation levels as provided by the DPR.

II. Air Monitoring

All sampling will be coordinated through communication with the County Agricultural Commissioner's Office. The local Air Quality Management District (AQMD) or Air Pollution Control District (APCD) will be notified prior to any monitoring. Sample collection will be conducted by staff of the Testing Section or staff of the Air Quality Surveillance Branch of the ARB, or an approved ARB contractor.

A. Siting

The location and time-frame for **ambient** and **application** monitoring are based on direction provided by the DPR in their "Use Information and Air Monitoring Recommendation for Pesticide Active Ingredient" documents. These recommendations are based on historical trends (normally 2 to 3 years prior) and are submitted to the ARB by the DPR approximately 1 year in advance of intended monitoring. The recommendations direct ARB to monitor for a pesticide in specific counties during specific use periods. Pesticide use maps (historical) and histograms are used along with close coordination with staff of the County Agricultural Commissioner's Office to predict areas (and times) of use for the pesticide for the upcoming use year. Approximately one month prior to the scheduled monitoring DPR will reevaluate the historical use trends using the most recent pesticide use data available.

For selection of **ambient** monitoring sites, ARB staff work through authorized representatives of school districts, private companies or city, county or state government agencies. The probe (sampler) siting criteria for **ambient** pesticide monitoring were obtained from the U.S. EPA "Ambient Air Quality Surveillance" criteria (40 CFR, Part 58) and are listed in TABLE 1. As per the DPR monitoring recommendations, three to five sites are chosen. The monitoring objective in choosing these sites is to estimate population exposure in relatively high-population areas or in areas frequented by people (e.g., schools or school district offices, fire stations, or other public buildings). Sampling sites should be located near (in regions of) specific agricultural crops as recommended by the DPR. One additional site is chosen and designated to be an urban area "background" site which is located away from any expected applications. Information will be collected for each site and reported to DPR regarding; 1) the proximity of the each sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground. Normally the **ambient** samplers will be located on the roof of a one-story building (e.g., at schools) with the sample cartridge located about 1.5 meters above the roof.

Probe siting criteria for placement of samplers around a pesticide **application** are the same as for **ambient** monitoring tests (TABLE I). A minimum of four samplers are positioned, one on each side of the field. A fifth sampler is collocated at one position, normally the downwind side (based on prevailing breezes). Once monitoring has begun, the sampling stations are not moved, even if the wind direction has changed. Ideally, samplers should be placed at a minimum distance of 20 meters from the perimeter of the field and should be equidistant from the field. *These requirements are nearly impossible to meet because of the physical limitations of most application sites. Twenty meters from a potential application field invariably places the sampler on another landowner's property, in another field where tractors and other equipment must operate, or into another orchard where the siting criteria cannot be met. Fences, canals, roads, ditches, railroad tracks, brush, trees, houses, barns, livestock, parked equipment, uncooperative neighbors, etc. are common obstacles. Monitors are placed as far as possible, up to 20 meters, from the field. Attempts are always made to center the samplers on the face of a side of the field. The sampler is placed to maximize the distance from the field and to avoid obstructions bordering the field. Conditions at the site will dictate the actual placement of monitoring stations.* Information is collected and reported to DPR regarding; 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) the elevation of each sampling station with respect to the field and the orientation of the field with respect to North (identified as true or magnetic North). Determination of an appropriate site for an **application** test is based on the "recommendations" provided by the DPR. Parameters used to choose the site are:

1. crop type,
2. minimum field area of 10 acres,
3. minimum application rate (as directed by the DPR),
4. type of application (normally no preference by the DPR),
5. availability of sites on all four sides of the field which meet the criteria in Table 1 and can be sited 20 meters from the perimeter of the field (quite often this is not possible, i.e., normally 4 sites are chosen but they may not all meet the criteria), and
6. accessibility and security of the sampling sites/equipment.

Monitoring sites (fields) are arranged through communication with, and the voluntary cooperation of, applicators, growers or owners for **application** monitoring. Normally, representatives of the County Agricultural Commissioner's Office will make initial contact with the applicators/growers or will at least provide a list of possible candidates.

TABLE 1. PESTICIDE PROBE SITING CRITERIA SUMMARY

Height Above Ground (Meters)		2-15
Minimum Distance from Supporting Structure (Meters)	Vertical	1
	Horizontal	1
Other Spacing Criteria		1. Should be 20 meters from trees.
		2. Distance from sampler to obstacle, such as buildings, must be at least twice the height the obstacle protrudes above the sampler.
		3. Must have unrestricted air flow 270° around sampler.
		4. Samplers at a collocated site (duplicate for quality assurance) should be 2-4 meters apart if samplers are high flow, >20 liters per minute.

B. Schedule

Samples for **ambient** pesticide monitoring will generally be collected over 24-hour periods on a schedule of 4 samples per week (Monday through Friday) for 5 to 7 weeks. Occasionally the normal schedule will be interrupted due to holidays and make-up samples may be collected over weekends.

Individual **application** monitoring schedules will vary based on the type and length of application but will follow the schedule guidelines outlined below in TABLE 2. Ideally, the

monitoring study will include samples taken before, during and for approximately 72 hours following application.

TABLE 2. GUIDELINES FOR APPLICATION SAMPLING SCHEDULE

Sample period begins:	Sample duration time
Background (pre-application)	Minimum of 12 hours
During application	Length of application time
End of application	1 hour (or up to 1 hour before sunset) [1]
1 hour post-application	2 hours (or up to 1 hour before sunset) [1]
3 hour post-application	3 hours (or up to 1 hour before sunset) [1]
6 hour post-application	6 hours (or up to 1 hour before sunset) [1]
1 hour before sunset	Overnight[2] (until 1 hour after sunrise)
1 hour after sunrise	Daytime (until 1 hour before sunset)
1 hour before sunset	Overnight (until 1 hour after sunrise)
1 hour after sunrise	24-hour (until 1 hour after sunrise)

1 These sample duration times will be adjusted depending on length of application and time of sunset.
2 All overnight samples must include the period from one hour before sunset to one hour after sunrise. If the application extends beyond "1 hour before sunset" then the overnight sample will be started at the end of application.

Occasionally, a pesticide application may occur all day long and over the course of two or more days. In these instances samples are collected during the first daily application, followed by a sample from end of application to 1 hour before sunset, followed by an overnight sample ending at either the start of application or 1 hour after sunrise the next morning (same for second or more application days). Following the end of the application, samples are collected according to the above schedule, starting with the 1-hour sample.

C. Meteorological Monitoring

Data on wind speed and direction, barometric pressure, relative humidity and air temperature will be collected during **application** monitoring by use of an on-site meteorological station. The meteorological data will be acquired using a data logger at a minimum of 15 minute intervals (averages). Meteorological systems will be calibrated as specified in the ARB manual, "Air Monitoring Quality Assurance, Volume II, Standard Operating Procedures for Air Quality Monitoring." Meteorological data are not collected for the **ambient** monitoring programs.

III. Method Validation

A. Method Detection Limit

The method detection limit (MDL) is defined as the lowest concentration at which individual measurement results for a specific analyte are statistically different from a blank (that may be zero) with a specified confidence level for a given method and matrix.

MDL is defined as 3.14 x s; where s is equal to the standard deviation of seven replicate spiked samples (e.g., XAD sample cartridges). The spiked samples are prepared and analyzed in the same way as actual samples. The spikes should be prepared at a concentration that is between one to five times the estimated MDL.

B. Estimated Quantitation Limit

The estimated quantitation limit (EQL) is the recommended lowest level for quantitative decisions based on individual measurements for a given method and representative matrix. This EQL is defined as 5 x MDL.

C. Reproducibility

The reproducibility of the method should be determined by performing five replicates at three different concentrations. The lowest level should be at or near the EQL. The average and standard deviation of each set of replicates should be determined and reported.

D. Extraction Efficiency

Extraction efficiency is defined as the amount of pesticide recovered from a spiked sample. Three replicates at two levels and blank should be extracted with the average and standard deviation determined for the replicates. The average amount divided by the amount added multiplied by 100 will give the percent recovery. Recommended recoveries should be between 70-130%.

E. Sampling Efficiency

Sampling efficiency is determined by spiking a sample with a known amount of pesticide. The spiked sample is placed in a sampler and set to the same flow rate and time that samples are collected. At a minimum three replicate spiked samples at a concentration two times the EQL of the method and a collocated background are collected. The samples are extracted and average recovery and standard deviation of the spike samples are determined.

F. Breakthrough

Breakthrough is determined by using a two stage sampling media (usually a filter or resin). The front stage is spiked with a known quantity of the pesticide. The breakthrough study samples are normally spiked at a relatively high level, e.g., at a level that might be observed

during an application study. If time and resources permit, both low and high level spike studies are run. The backup will be the same filter or resin type and placed in series with the front filter or resin. Air is passed through the sampler at the same flow rate and sample time as a real sample (minimum sample time of 24 hours). The front and backstage are recovered and extracted separately. If breakthrough is observed then the sampling strategy must be reviewed, modified and retested before the start of a sampling project.

G. Freezer Storage Stability

Spiked samples should be stored under the same conditions as the samples and for the anticipated time that the samples are stored. Recoveries are determined. A high (either at a level expected during the application study or at the high end of the calibration curve) and a low (1 to 2 times the EQL) concentration set should be studied. A set consists of three replicate spikes each for 3 time intervals.

IV. Field Sampling Quality Control Procedures

Monitoring programs will include the following quality control procedures:

A. Sample Labels

Sample labels will be affixed either directly to the sampling cartridge or will be placed in the individual sample container (e.g., culture tube or zip-lock bag). The sample labels will include at least the following information.

1. Pesticide name and the ARB project number.
2. Log number
3. Sample I.D.
4. Monitoring Location
5. Sampling end date
6. General comments

B. Log Sheets

Field data log sheets will be used to record the sampling log number, sample I.D., start and stop dates, start and stop times, start and end flow rate, initials of individuals conducting sampling, malfunctions, leak checks (at the beginning and end of each sampling period, see Appendix I), weather conditions (e.g., rain) and any other pertinent data which could influence sample results. Refer to Appendix I for a recommended log sheet format.

C. Chain of Custody Forms

Attached as Appendix II is a recommended format for chain of custody (COC) sheets. A COC sheet must accompany any/all samples during transport, transfer or storage. All exchanges of sample possession must be recorded. The laboratory will keep copies of the COCs and

forward the originals to the project engineer. The original COC sheets must be retained in the pesticide project file.

D. Flow Controller Calibration and Audit

Field flow controllers (rotameter, electronic flow controller or critical orifice) shall be calibrated against a referenced standard prior to a monitoring period. This referenced standard (e.g., digital bubble flowmeter or electronic digital mass flowmeter) must be verified, certified or calibrated with respect to a primary standard at least once per year by the Quality Management and Operations Support Branch (QMOSB) of ARB. Appendix V shows an example of a form to document the flow controller calibration results.

A flow audit of the field air samplers will be conducted by the QMOSB before each pesticide monitoring project. If results of this audit indicate a difference from the calibrated values of more than 10%, then the field flow controllers should be rechecked until they meet this objective. A written report of the QMOSB audit results will be included as an appendix in the final monitoring report.

Sampling flow rates should be checked in the field and noted before and after each sampling period. A separate, certified flow meter (i.e., not the one used in the sample train to control flow) will be used to check the flow. The flow rates should be checked after the initial sampling system leak check and before the "end" sampling system leak check.

E. Background Sampling

A background sample will be taken at all sites (4 sides) prior to an **application** test. The duration of the background sample should be sufficient to achieve the pesticide target 24-hour EQL, as directed by the DPR prior to the test, and must be a minimum of twelve hours and up to 24 hours if scheduling permits. This sample will establish if any of the pesticide being monitored is present in the air prior to the application. It also can indicate if other environmental factors are interfering with the detection of the pesticide of concern during analysis.

While one of the sampling sites for **ambient** monitoring is referred to as an "urban area background," it is not a background sample in the conventional sense because the intent is not to find a non-detectable level or a "background" level prior to a particular event (or application). This site is chosen to represent a low probability of finding the pesticide and a high probability of public exposure if significant levels of the pesticide are detected at this urban background site. Detectable levels of some pesticides may be found at an urban area background site if they are marketed for residential as well as commercial/agricultural use. An example of an urban area background site is the ARB air monitoring station in downtown Fresno.

F. Collocated Samples

For both ambient and application monitoring, the method precision will be demonstrated in part by collecting samples from collocated samplers (replicate analysis of samples also relates to method precision). An additional **ambient** sampler will be collocated at each of the sampling

sites. Normally, collocated samples will be collected at each **ambient** site every Wednesday for each week of sampling. The samplers should be located at least two meters apart if they are high volume samplers (>20 Lpm) in order to preclude airflow interference. This consideration is not necessary for low flow samplers. The collocated sampler for **application** monitoring should be positioned at the downwind sampling site where the highest concentrations are expected. The collocated site is not changed after the study starts.

G. Trip Blanks

A trip blank should be included with each batch of samples submitted for analysis. This will usually require one trip blank for an **application** monitoring study and one trip blank per week for an **ambient** monitoring program. Trip blanks are prepared by opening a sampling cartridge (e.g., breaking the ends of an XAD glass tube) in the field followed by normal labeling and sample transport (i.e., along with the samples).

H. Laboratory, Trip and Field Spikes

The *laboratory, trip and field* spikes are prepared, extracted and analyzed at the same time and they are generally all spiked at the same level. The *laboratory* spikes are immediately placed in the laboratory refrigerator (or freezer) and kept there until extraction and analysis. The *trip* spikes are kept in the freezer until transported to the field. The trip spike samples are kept on dry ice in an ice chest (the same one used for the samples) during transport to and from the field and at all times while in the field except for trip spike sample log-in and labeling. The *field* spikes are stored and transported in the same way as the trip spikes. However, field spikes are obtained by sampling ambient air through the spiked cartridge at the same environmental and experimental conditions as those occurring at the time of the study.

Ambient field spikes are collocated (same location, flow rate and sampling period) with a sample collected at the urban background sampling site (to minimize background concentrations). **Ambient** field spikes are normally prepared at a level of approximately 2 times the EQL, or at a level representative of ambient concentrations.

Application study field spikes are collocated with the background samples collected at the four sides of the application site (i.e., one background and one field spike per side). **Application** field spikes are normally prepared at a level close to expected air concentrations. Field spike results are corrected by subtracting the amount of pesticide residue found in the collocated, unspiked sample before calculation of residue recoveries.

I. Transportation of Samples

All samples will be capped, placed in a sample container (e.g., culture tube or zip-lock bag) and placed in an ice chest on dry ice immediately following sample collection and labeling. The samples will remain on dry ice until transferred to the laboratory and will then be stored in the lab refrigerator or freezer. Any special handling procedures will be identified during the method validation and will be outlined in the SOP.

J. Meteorological Station Calibration

Meteorological station calibration procedures will be performed as specified by the ARB manual, "Air Monitoring Quality Assurance, Volume II, Standard Operating Procedures for Air Quality Monitoring."

K. Preventive Measures

To prevent loss of data, spare pumps and other sampling materials should be kept available in the field by the operator. A periodic check of sampling pumps, meteorological instruments, extension cords, etc., should be made by sampling personnel.

V. Analysis

Method development and analysis of all field samples must be conducted by a fully competent laboratory. To ensure the capability of the laboratory, a systems audit may be performed, upon request, by the ARB Quality Management and Operations Support Branch (QMOSB) prior to the first analysis per a pesticide project. After a history of competence is demonstrated, an audit prior to each pesticide project is not necessary. However, during each pesticide project, the spiked samples discussed above should be provided to the laboratory to demonstrate accuracy and precision. These spiked samples will be prepared by qualified ARB laboratory staff.

If using GC/MS, isotope dilution is the recommended method for quantitation. Isotope dilution is where the isotope analog of the target compound is spiked to the sample prior to sample preparation. The internal standard goes through the same sample and analytical steps that the target analyte does thus compensating for losses during sample preparation and instrument variability during analysis. When no isotope is available an internal standard is recommended. An internal standard is spiked to the sample just prior to analysis. The internal standard compensates for instrument variability. If no suitable internal standard is found then an external standard method may be used.

VI. Analytical Quality Control Procedures

A. Mass Spectrometer Tuning (if MS is used)

A daily tune shall be performed using perfluorotributyl amine (PFTBA). The MS should be calibrated to optimize the MS for the mode of operation and type of pesticide analyzed. Documentation and performance criteria shall be specified in the standard operating procedure. A record of the tune for each batch should kept on file. A daily tune must be performed prior to the analysis of an analysis sequence and every 24 hours during an analysis sequence. If longer intervals between tunes are used, then the stability of the MS must be demonstrated during the method development phase and approved prior to the sample analysis.

B. Calibration

Initial Calibration

At the beginning of method development an initial multi-point calibration curve is performed to demonstrate the calibration range of the pesticide analyzed. A typical multi-point calibration consists of 5 different concentrations with a single replicate at each concentration. The calibration range usually should not exceed 40:1 with the lowest level standard at the EQL unless there is no need to measure values as low as the EQL. Depending on the linear range of the analyte, multi-points with other than 5 levels may be used although a multi-point with less than 3 levels is not permitted. Typically a linear calibration is preferred although a dynamic range using a quadratic is acceptable. For quadratic calibration curves quantitation can only be performed within the calibration range. Sample above the calibration curve must be diluted into the calibration range and reanalyzed.

Daily Calibration

Prior to the analysis of a set of samples a calibration must be performed. This calibration is called the daily calibration. The daily calibration is either a multi-point calibration or a mid-point calibration. The mid-point calibration consists of a single calibration at the mid-point of the initial multi-point calibration curve. If the mid-point is within a prescribed range (i.e., within +/- 20% of the original calibration) as determined from the initial calibration then the original initial calibration is still considered valid and the response is replaced. If the mid-point calibration is outside that range then another multi-point calibration must be performed. A calibration check at the same level is also run. If the mid-point calibration and the midpoint calibration check are within a prescribed range (i.e., +/-20%) of each other then analysis can begin. If the calibration check is outside the specified range then the problem must be rectified before analysis can begin.

C. Reagent Blanks.

A reagent (solvent) blank is performed at least for every batch of reagent used. The reagent blank uses the same solvent that was used for the sample preparation. The blank should be free of interferences. If low level contamination of the pesticide residue is found in the reagent blank (as may happen when using isotope dilution), then a reagent blank will be performed before analysis of each batch of samples. A reagent blank must be analyzed after any sample which results in possible carry-over contamination.

D. Laboratory Control Blank.

A laboratory blank is run with each batch of samples. A laboratory control blank (blank sampling media, e.g., resin cartridge or filter) is prepared and analyzed by the same procedures as used for field samples. Laboratory blank results must be no higher than 20% of the lowest value reported.

E. Laboratory Control Spike.

A laboratory control spike (LCS) is a resin cartridge spiked (at the level of the midpoint of the daily calibration runs) with a known amount of standard. The LCS is prepared and analyzed the same way as the samples. Two LCS are performed for each batch of samples. Laboratory control spikes need to be within 40% (100*difference/average) of each other and have recoveries that are +/-30% of the theoretical spiked value. If in the method development stage it is found that the differences or recoveries are larger, then they must be approved by ARB before the analysis can begin.

F. Calibration Check Samples.

A calibration check sample (CCS) is a mid-point standard run after every tenth sample in an analysis set. The purpose of the CCS is to ensure sample drift is within specified values. The CCS sample must be within +/- 25% of its theoretical value. If the standard is outside this range, then the samples associated with that calibration check sample must be reanalyzed. If in the method development stage it is found that the CCS variation is greater than 25%, then the percent variation limit used for the method must be approved by the ELB Branch Chief before the analysis can begin.

G. Duplicate Analysis.

A duplicate analysis is a sample analyzed in duplicate as a measure of analytical precision. Every tenth sample of an analysis set must be run in duplicate.

H. Standard Operating Procedures

Analytical methods must be documented in a Standard Operating Procedure (SOP) before monitoring begins. The recommended format for the SOP is provided in Appendix III. The SOP will include a discussion of all of the procedures outlined above in this section. The SOP will also include a summary of method development results as outlined in Section III above.

VII. Sampling and Analysis Protocol

Prior to conducting any pesticide monitoring, a sampling and analysis protocol, using this document as a guideline, will be written by the ARB staff. The protocol describes the overall monitoring program, the purpose of the monitoring and includes the following topics:

1. Identification of the sample site locations, if possible.

2. Description of the sampling train and a schematic showing the component parts and their relationship to one another in the assembled train, including specifics of the sampling media (e.g., resin type and volume, filter composition, pore size and diameter, catalog number, etc.).

3. Specification of sampling periods and flow rates.

4. Description of the analytical method (SOP included if possible).

5. Tentative test schedule and expected test personnel.

6. Safety information specific to the pesticide monitored.

Specific sampling methods and activities will also be described in the monitoring plan (protocol) for review by ARB and DPR. Procedures which apply to all sampling projects include: (1) sample log sheets (APPENDIX I), (2) chain of custody forms (APPENDIX II), (3) sunlight and rain shields for sample protection during monitoring, (4) sample storage in an ice chest on dry ice until delivery to the laboratory, (5) trip blanks and, (6) laboratory, trip and field spikes. The protocol should include: equipment specifications (when necessary), special sample handling and an outline of sampling procedures. The protocol should specify any procedures unique to a specific pesticide.

VIII. Final Reports and Data Reduction

The mass of pesticide found in each sample should be reported along with the volume of air sampled (from the field data sheet) to calculate the mass per volume for each sample. For each sampling date and site, concentrations should be reported in a table as ug/m^3 (microgram per cubic meter) or ng/m^3 (nanogram per cubic meter). When the pesticide exists in the vapor phase under ambient conditions, the concentration should also be reported as ppbv (parts per billion, by volume) or the appropriate volume-to-volume units at conditions of 1 atmosphere and 25 °C. Collocated samples should be reported separately as raw data, but then averaged and treated as a single sample for any data summaries. For samples where the end flow rate is different from that set at the start of the sampling period, the average of these two flow rates should be used to determine the total sample volume.

The final report should indicate the dates of sampling as well as the dates of laboratory receipt, extraction and analyses. These data can be compared with the stability studies to determine if degradation of the samples has occurred.

Final reports of all monitoring studies are sent to the Department of Pesticide Regulation, the Office of Environmental Health Hazard Assessment, the Department of Health Services, the Agricultural Commissioner's Office, the local AQMD as well as the applicator and/or the grower. Final reports are available to the public by contacting the ARB Engineering and Laboratory Branch.

A. Ambient Reports

The final report for ambient monitoring should include a map of the monitored area which shows nearby towns or communities and their relationship to the monitoring stations, along with a list of the monitoring locations (e.g., name and address of the business or public building)

including the locations Range/Township/ Section. A site description should be completed for any monitoring site which might have characteristics that could affect the monitoring results (e.g., obstructions). For ambient monitoring reports, information on terrain, obstructions and other physical properties which do not conform to the siting criteria or may influence the data should be described. Information will be collected for each site and reported to DPR regarding; 1) the proximity of the each sampler to treated or potentially treated fields, including the distance and direction, and 2) the distance the sampler is located above the ground.

Ambient data should be summarized for each monitoring location by maximum and second maximum concentration, average ("detected" results are factored in as (MDL+EQL)/2, <MDL results are factored in as MDL/2), total number of samples, number of samples above the estimated quantitation limit (EQL), number of samples "detected" and the number of samples below the MDL. For this purpose, collocated samples are averaged and treated as a single sample.

B. Application Reports

Similarly, a map or sketch indicating the general location (nearby towns, highways, etc.) of the field chosen for application monitoring should be included as well as a detailed drawing of the field itself and the relative positions of the monitors. For application monitoring reports, as much data as possible should be collected about the application conditions (e.g., formulation, application rate, acreage applied, length of application and method of application). This may be provided either through a copy of the Notice of Intent, the Pesticide Control Advisor's (PCA) recommendation or completion of the Application Site Checklist (APPENDIX IV). Meteorological data will be reported in 15 minute averages for the application site during the monitoring period. Meteorological and pesticide air concentration data will also be summarized as wind roses for each application sampling period. The raw meteorological data file will also be transferred to DPR on 1.44 mb floppy disk.

C. Quality Assurance

All quality control and quality assurance samples (blanks, spikes, collocated etc.) analyzed by the laboratory must be reported. Results of all method development and/or validation studies (if not contained in the S.O.P.) will also be reported. The results of any quality assurance activities conducted by an agency other than the analytical laboratory should be included in the report as an appendix. This includes analytical audits, system audits and flow rate audits.

APPENDIX I

SAMPLE FIELD LOG BOOK

SAMPLE FIELD LOG BOOK
Project: Pesticide Air Monitoring
Project #:

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow	End Flow	Start Leak Check	End Leak Check	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Techn. Initial

APPENDIX II

CHAIN OF CUSTODY FORM

CHAIN OF CUSTODY FORM
CALIFORNIA AIR RESOURCES BOARD
MONITORING AND LABORATORY DIVISION
P.O. Box 2815, Sacramento CA 95812
PESTICIDE
CHAIN OF CUSTODY

SAMPLE RECORD

Job #: _____ Date: _____
Sample/Run #: _____ Time: _____
Job Name: _____
Sample Location: _____
Type of Sample: _____
Log #'s: _____

ACTION	DATE	TIME	INITIALS		METHOD OF STORAGE freezer, ice or dry ice
Sample Collected					
			GIVEN BY	TAKEN BY	
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					
Transfer					

LOG #	ID #	

RETURN THIS FORM TO: _____

APPENDIX III

ANALYTICAL STANDARD OPERATING PROCEDURE FORMAT

ELEMENTS TO BE INCLUDED IN LABORATORY STANDARD OPERATING PROCEDURES FOR PESTICIDE AIR ANALYSIS

Engineering and Laboratory Branch
Air Resources Board
April 1999

I. SCOPE

A. Description of scope and detection limits of pesticide(s) to be analyzed.
B. Documents and references upon which method is based.
C. Definitions of any special terms must be given.

II. SUMMARY OF METHOD

A. General description of sampling and analytical procedure. Enough information should be included for an experienced analyst to readily recognize the principles of operation.

III. INTERFERENCES AND LIMITATIONS

A. Comments made here should cover both analytical and sampling problems, known and potential.

IV. EQUIPMENT AND CONDITIONS

A. INSTRUMENTATION: As specific a description as possible. Any modifications or improvements of the basic system must have an accompanying schematic. For chromatographic analysis list columns, flow rates, temperatures, detectors, amplifier ranges and attenuations, sample volumes, etc.
B. AUXILIARY APPARATUS: Provide a description of the function and operating conditions. Include a description of the sampling equipment if the equipment is specific to this method. For example, "Vacuum pump, ACME Model 62, capable of maintaining a 1 CFM Air Flow at 10" vacuum."

V. REAGENTS AND MATERIALS

A. Provide a list of all reagents used and specify purity and/or grade.
B. Describe preparation of any special reagents for analysis and sampling.
C. Specify composition, preparation, and concentrations of stock, intermediate, and working standards.
D. Describe in detail any necessary safety precautions for handling and disposition of chemicals.

VI. PROCEDURES

A. FIELD SAMPLING TECHNIQUES

1. Refer to appropriate Field Sampling S.O.P. for exact details of sampling, chain of custody and sample identification procedures.
2. Describe equipment used.
3. List sampling conditions: materials, flow rates, etc.
4. Describe any potential problems and limitations, with means of controlling such problems.
5. Describe any methods used to split samples for other types of analyses, if necessary.

B. LABORATORY SAMPLE PREPARATION/PRETREATMENT TECHNIQUES

1. Describe (or refer to an appropriate section of a Laboratory Quality Control Manual) a protocol for sample log-in procedures, including document control and sample examination for damage. Any possible hazards due to toxic or flammable chemicals must be clearly identified. Any sample storage requirements, such as immediate refrigeration or protection for light must be noted.
2. Describe any methods used for preconcentration, dilution clean-up filtration, extraction, concentration, etc., after the sample is received from the field.

C. ANAYSIS

1. Describe as clearly as possible the exact instrument configuration and set-up techniques
2. Describe analysis blank and calibration procedure with associated limits on precision and accuracy. Describe analysis of Control Samples and limits of the resulting data. Describe steps taken in an "out-of-control" situation. Specify the format and location of recorded calibration and Control Sample data.
3. Describe sample analysis. Description must include an example of expected data (for example, a sample chromatogram with all components of interest labeled).
4. Give calculation procedures for results. Describe data recording and data submittal.

VII. PERFORMANCE CRITERIA

A. Describe frequency of duplicate analyses, spikes, field blanks, and acceptable limits of each.

B. Describe frequency of multiple standard analyses to check method linearity and detection limit.

C. If confirmatory method is used, refer to specific S.O.P.

VIII. METHOD VALIDATION

Validation testing should provide an assessment of accuracy, precision, interferences, method recovery, method detection limit and estimated quantitation limit. Method documentation should include confirmation testing with another method when possible, and quality control activities necessary to routinely monitor data quality control such as use of control samples, control charts, use of surrogates to verify individual sample recovery, field blanks, lab blanks and duplicate analysis. All data should be properly recorded in a laboratory notebook.

The method should include the frequency of analysis for quality control samples. Analysis of quality control samples are recommended before each day of laboratory analysis and after every tenth sample. Control samples should be found to be within control limits previously established by the lab performing the analysis. If results are outside the control limits, the method should be reviewed, the instrument recalibrated and the control sample reanalyzed.

All quality control studies should be completed prior to sampling and include recovery data from at least three samples spiked at least two concentrations. Instrument variability should be assessed with three replicate injections of a single sample at each of the spiked concentrations. A stability study should be done with triplicate spiked samples being stored under actual conditions and analyzed at appropriate time internals. This study should be conducted for a minimum period of time equal to the anticipated storage period. Prior to each sampling study, a conversion/collection efficiency study should be conducted under field conditions (drawing ambient air through spiked sample media at actual flow rates for the recommended sampling time) with three replicates at two spiked concentrations and a blank. Breakthrough studies should also be conducted to determine the capacity of the adsorbent material if high levels of pesticide are expected or if the suitability of the adsorbent is uncertain. The following data will be included in the SOP.

A. A table describing linearity (correlation coefficients), accuracy (method bias), precision (standard deviations at all levels analyzed), and detection.
B. Data on sampling efficiencies, stability, pertinent breakdown products, break through volumes and desorption efficiencies.
C. Data on storage stability and conditions for samples and standards.
D. References to quality assurance information derived from published and/or interlaboratory sources if available.

APPENDIX IV

APPLICATION CHECKLIST

APPLICATION CHECKLIST

1. Pesticide:
2. County:
3. Crop:
4. Field Address:
5. Field Location (R/T/S):
6. Field Size (acres):
7. Contact Person:
8. Background Monitoring Period:
9. Target EQL Met?:
10. Product Applied:
11. Application Rate:
12. Comments on Tank Mix:
13. Method of Application (ground, air, irrigation, injection, tarping etc.):
14. Start of Application:
15. End of Application:
16. Pattern of Application: (e.g., east to west):
17. Weather Conditions:
18. Met Station Location (and elevation):
19. Any Other Applications in Area:
20. Sampler Elevations:

___ Camera pictures of each sampler from all 4 directions
___ Camcorder video of each sampler in relation to field and surroundings
___ Rotameter #s logged
___ Check dimensions of field with known acreage (43560 ft^2/acre) & compare sides
___ Crops around field labeled on diagram

APPENDIX V

FLOW CONTROLLER CALIBRATION FORM

FLOW CONTROLLER; 1-POINT FLOW CALIBRATION SHEET

Project: _____ Pre: _____ Post: _____ **Project #:** _____ **Date:** _____

Desired Flow Rate: _____ **Calib. by:** _____ (name)

BUBBLEMETER READINGS

Controller ID:					
Controller Set:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
Average:	_____	_____	_____	_____	_____
Deviation:					

Controller ID:					
Controller Set:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
-Readings:	_____	_____	_____	_____	_____
Average:	_____	_____	_____	_____	_____
Deviation:					

Average of Averages _____ : _____

PROCEDURE

1. Set-up sampler as if to collect sample, including filled sample cartridge.
2. Set flow controller to achieve desired flowrate and record controller setting.
3. Observe and record Bubblemeter flow (on form or direct to floppy - Change File name).
4. Reset to zero. Then repeat step 3 two more times.
5. Calculate the average of 3 readings.
6. Repeat steps 1 thru 5 for each Rotameter.
7. Average of Averages and Deviation automatically calculated. Replace any Rotameters that deviate by 10% or more from the Average of Averages.
8. QA Section will get a copy for comparison with their results for the same setups.

Attachment II

Standard Operating Procedure, Sampling and Analysis of Trichloronitromethane (Chloropicrin) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector

California Environmental Protection Agency

Air Resources Board

Draft
Standard Operating Procedure
Sampling and Analysis of Trichloronitromethane (Chloropicrin) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector

Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division

05/10/01 version

Approved by:

Mass Spectrometer: Electron Ionization
Selective Ion Monitoring: trichloronitromethane: 117 (quant. ion 100%), 119 (qual. ion 98%); Tuning: PFTBA on masses 69, 219, 502.

B. Auxiliary Apparatus

1. Precleaned vials, 8 ml capacity with teflon caps.
2. Whatman filters, 0.45 µm
3. Disposable syringes, 3 ml
4. Sonicator
5. GC vials with septum caps.

C. Reagants

1. Dichloromethane, Pesticide grade or better.
2. Trichloronitromethane, Chem Service PS-4, 98.8%
3. XAD-4 resin sorbent tubes, 400/200mg. SKC, Fullerton, CA.

5. ANALYSIS OF SAMPLES

1. A daily manual tune shall be performed using PFTBA. The instrument is tuned using masses: 69, 219, 502. The criterion for the tune are the peak widths at ½ the peak height, 0.60 ± 0.05, and the criteria for relative abundance; 69:100%, 219:100-120%, and 502: 7-12%.

2. It is necessary to analyze a solvent blank with each batch of samples. The blank must be free of interference's. A solvent blank must be analyzed after any sample which may result in possible carry-over contamination.

3. A 5-point calibration curve shall be analyzed with each batch of samples. For the ambient studies the calibration will be 0.5-50.0 ng/mL and for the application studies 50.0-500 ng/mL.

4. A calibration check sample of 7.5 ng/ml is run after the calibration and every 10 samples and at the end of the sample batch. The value of the calibration check must be within $\pm 3\sigma$ (the standard deviation) or ±10% of the expected value whichever is greater. If the calibration check is outside this limit then those samples in the batch after the last calibration check that was within limits need to be reanalyzed.

5. With each batch of samples analyzed, a laboratory blank and a laboratory control spike will be run concurrently. A laboratory blank is XAD-4 extracted and analyzed the same way as the samples. A laboratory control spike is

D. Minimum Detection Limit

The detection limit is based on US EPA MDL calculation. Using the analysis of seven (7) replicates of a low-level matrix spike, the method detection limit (MDL) and the estimated quantitation limit (EQL) for trichloronitromethane is calculated by: MDL = 3.14*(std dev values) where std dev = the standard deviation of the concentration calculated for the seven replicate spikes. For TCNM the MDL is 3.96 ng/sample (1.32 ng/mL). EQL defined as 5*MDL is 19.8 ng/sample (6.60 ng/mL) based on a 3 ml extraction volume. Results are reported to 3 significant figures above the EQL. Results below EQL are reported as DET (detected) and results less than the MDL are reported as ND (nondetect).

E. Collection and Extraction Efficiency (Recovery)

Trichloronitromethane at a low and high level are spiked on XAD4 tubes (3 at each concentration). The spiked tubes are placed on field samplers with airflows of 100 mLpm for 24 hours. The samples are extracted with DCM and prepared as described in section 5 #6-7. The average percent recovery of trichloronitromethane should be ± 20% of the expected value. The recoveries both for the low and high levels are greater than 80.0%.

F. Storage Stability

Storage stability was set up for a 4 week study. Three (3) XAD4 tubes each were spike at the low and high end concentrations. The tubes were stored in the freezer until analyzed. Table 3 shows the recovery analysis for the samples.

G. Breakthrough

The previous analysis of trichloronitromethane (ARB #A5-169-43) was for 4 hour sampling at 1.0 LPM in September/October, 1986. The current study for ambient monitoring for 24 hours will require a low sample flow rate to meet the requested EQL. Table 2 shows the results of several sampling rates. To meet the EQL and minimize breakthrough possibility, the flow rate for the field sampling will be at 100 mLpm.

H. Safety

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure.

Table 2: Breakthrough Analysis

Flows	Average Primary Bed (ng/ml)	% Primary Recovery/ Standard Dev	Average Secondary Bed (ng/ml)	% Secondary Recovery/ Standard Dev
1.0 LPM	186.8	37.4	81.8	16.4
	(n=8)	3.8		2.4
0.5 LPM	111.8	22.4	89.9	18.0
	(n=2)	1.7		0.9
0.2 LPM	362.6	72.5	36.9	7.4
	(n=3)	1.9		1.3
0.1 LPM	408.4	81.7	<MDL	<MDL
	(n=6)	3.8		

Field Samples spiked at 500 ng/ml.

Table 3: Storage Stability Analysis

Date	Days	XAD Blank	L#1	L#2	L#3	H#1	H#2	H#3
4/4/01	0	<MDL	4.91	5.43	5.2	43.12	43.62	43.31
4/13/01	9	<MDL	6.2	6.06	5.94	43.12	49.34	43.65
4/18/01	14	<MDL	6.71	6.5	6.14	54.38	52.4	54.07
4/24/01	20	<MDL	5.18	6.01	4.57	40.72	41.97	39.12
5/2/01	28	<MDL	5.42	4.26	4.07	43.19	42.66	42.11
Average			5.68	5.65	5.18	44.91	46.00	44.45
Stdev			0.75	0.87	0.88	5.40	4.61	5.66
% Recovery			113.68	113.04	103.68	89.812	91.996	88.904

Attachment III

Application Sampling Procedures
For Adsorbent Tubes

Application Sampling Procedures
For Adsorbent Tubes

Overview:
-Collect samples, according to the schedule in Table 1 of this protocol.

-Collect 4 background samples, from each corner sampling position.

-Collocate 1 field spike with each of the 4 background samples.

-Collect a collocated sample from the downwind site for all sampling periods (except the background period).

-Submit 1 trip blank.

-With the trip blank there should be a total of 59 samples collected during the study, plus 4 trip and 4 field spikes.

--All samples are stored either in an ice-chest on dry ice or in a freezer.

-The field log sheet is filled out as the sampling is conducted. All QA samples must be logged onto the log sheet.

-The chain of custody (COC) forms are filled out prior to sample transfer; the originals are transferred with the samples; make and retain copies if desired (not necessary).

Sampling Procedure:
Materials that will be needed to conduct the sampling include:

- -Clip board with log sheets
- -pencils/pens
- -sample labels
- -sample cartridges
- -end caps
- -plastic test tubes
- -zip-lock bags
- -0 to 100 sccpm mass flow meter (MFM) with battery
- -ice chest
- -dry ice

Figure out the route for sampling the 8 locations and try to keep this the same throughout the study.

Preparation and Set-up
On the way to study site, plug the MFM into the battery. It takes the MFMs about 10

minutes to warm up before they can be used. Leave the MFM plugged in until the last sample is taken; unplug when not in use to minimize drop in battery charge. Recharge the batteries once per week to be on the safe side.

Securely attach one adsorbent sample cartridge to the sampling tree. MAKE SURE THE ARROW ON THE CARTRIDGE IS POINTING TOWARDS THE SAMPLE LINE.

Set the rotameter roughly to 100 sccpm. Perform the leak check on each sample line by placing a plastic tube cap over the inlet of the cartridge (with the pump on). The rotameter ball should fall to zero. The leak check should be performed before setting the flows with the MFMs.

Using the 0-100sccpm MFM set the flow rate exactly to 100 sccpm.

Make sure that the rain/sun cover is pulled down over the sample tube.

Fill out the log sheet, including: log #, start date, time, start counter reading, leak check OK, MFM Serial #, any comments and the weather conditions.

Sample collection and Shipment

Measure (do not re-set) the flow rates at the end of the sampling period with the MFM; leak check the sample lines; record the end data on the log sheet.

Remove the sample cartridge and cap the ends. Attach the sample label like a flag on the secondary end of the tube. Make sure that the label does not cover the glass wool separating the primary and secondary beds in the cartridge.

Place the cartridge in the plastic test tube shipping container.

Place all the samples for each period in a zip-lock freezer storage bag and place on dry ice in a cooler.

Collect a trip blank (TB) by breaking the ends off of a tube, capping and labeling as usual and storing along with the rest of the samples. Log the TB into the log sheet.

Attachment IV

Field Log Sheet

SAMPLE FIELD LOG SHEET

Project: ChloropicrinApplication Air Monitoring

XAD-4 Tubes

Log #	Sample ID	Date On/Off	Time On/Off	Start Flow (ccpm)	End Flow (ccpm)	Start Leak Check	End Leak Check	Start Count	End Count	Comments	Weather o=overcast pc=partly c=cloudy k=clear	Initials

APPENDIX II

SAMPLE LABORATORY REPORT

California Environmental Protection Agency

Air Resources Board

Air Sampling Cartridge Method Development and Analytical Results for Application Monitoring Trichloronitromethane (Chloropicrin)

DATE: March 28, 2002
Revision 1

Prepared by
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Northern Laboratory Branch
Monitoring and Laboratory Division

Reviewed and Approved by

Russell Grace, Manager
Special Analysis Section

Project Number: P-01-002

This report has been reviewed by 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 of commercial products constitute endorsement or recommendation for use.

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1.0 INTRODUCTION

The Department of Pesticide Regulation (DPR) requested the Air Resources Board (ARB) to conduct application air monitoring for chloropicrin (trichloronitromethane). This report covers the method development, analytical, and quality assurance results for the XAD-4 cartridge analysis of trichloronitromethane (TCNM). DPR's requested estimated quantiation limits (EQL) for the application is 1.0 micrograms per cubic meter ($\mu g/m^3$).

2.0 METHOD DEVELOPMENT AND STANDARD OPERATING PROCEDURE.

2.1 Overview

The analysis of the samples was on a gas chromatograph/mass selective detector (GC/MSD) operating in the selected ion monitoring (SIM) mode. TCNM was collected on XAD-4 cartridges at a flow rate of 0.1 liters per minute (LPM). The cartridges were extracted with 3 milliliters (mL) of dichloromethane (DCM).

2.2 Instrument Reproducibility

Instrumental reproducibility on the GC/MS used seven individual injections of 1 µl of TCNM at three concentrations. Table 1 shows the results and area responses for TCNM with the average and standard deviation of the determined value at 5, 20, and 50 ng/ml.

2.3 Calibration

For the quantitation of TCNM, the calibration concentrations are 50, 100, 200, 300, and 500 ng/ml. A calibration was run before each analytical sample batch. All the calibration curves are linear with a correlation coefficient (r^2) of 0.995 or greater.

2.4. Minimum Detection Limit (MDL) and Estimated Quantitation Limits (EQL)

For the TCNM application the requested EQL is 1000 ng/m^3. This requested EQL corresponds to an analytical EQL of 150 ng/sample when using a 3 ml extraction volume and a flow rate of 0.1 LPM. The low calibration standard is set at 50 ng/mL, which provides for accurate quantification of samples with concentrations at or above the requested EQL. MDL is designated at five (5) times lower than EQL at 30 ng/sample. This MDL is based upon the requested EQL and may differ from the actual method MDL but better reflects the instrument response at the requested EQL. Please refer to the standard operating procedure (Appendix A) for the actual method MDL.

Staff report results above the EQL to three (3) significant figures; results below the requested EQL but greater than or equal to the MDL, are reported as detected (DET); results less than MDL are reported as <MDL.

2.5. *Collection and Extraction Efficiency (Recovery)*

The recovery for TCNM from the XAD-4 cartridges averaged 93.2± 6.7% based on the laboratory control samples (LCS) analyzed with each sample batch.

2.6. *Storage Stability*

For information on the storage stability studies for TCNM see Appendix A or the CARB report "Air Sampling Cartridge and Analytical Results" for either Monterey or Kern County (Project P-01-004). XAD-4 was spiked at 15 and 150 ng per cartridge. The cartridges are stable for up to 4 weeks.

2.7. *Breakthrough*

Flow rate is a critical factor in the field sampling for TCNM. The flow rate for field sampling is set at 0.1 LPM based on breakthrough results. See Appendix A or the CARB report "Air Sampling Cartridge and Analytical Results" for either Monterey or Kern County (Project P-01-004) for specific data on breakthrough.

3.0 APPLICATION AIR MONITORING SAMPLE RESULTS

The laboratory received a total of 89 XAD-4 cartridges for the analysis of TCNM including four (4) field spikes, four (4) trip spikes, and one (1) trip blank for the monitoring duration of 10/29/01 to 11/03/01. Table 2 presents the results of the analysis for TCNM.

4.0 ANALYTICAL QUALITY CONTROL SAMPLES

4.1 *Laboratory solvent blanks*

Staff analyzes a laboratory solvent blank, DCM, with each analytical sample batch. This is to insure there are no reagent interferences in the analysis. All blanks were less than the MDL.

4.2 *Laboratory spiking solutions*

A spiking solution is analyzed with each analytical batch. Three mls of DCM is spiked with 1.20 μg of TCNM. The results of the analysis of the spiking solution are in Table 3.

4.3 *Laboratory method blanks*

Each analytical batch includes a laboratory method blank. The method blank is an XAD-4 cartridge prepared and analyzed as described in the SOP. Analysis did not detect any TCNM above the MDL in these blanks.

4.4 *Laboratory control samples*

Each analytical batch includes a laboratory control sample (LCS). These are cartridges spiked with TCNM. The LCS is prepared and analyzed as described in the method SOP. The average recovery is 93.2%. The results are reported in Table 4.

4.5 *Calibration check standards*

Following standard operating procedures, a calibration check standard is run after the initial calibration and every tenth (10) sample in an analytical batch. The calibration check standard must be within ± 25% of the target value. If any of the check standards are outside this limit, the associated samples are re-analyzed. The calibration check concentration is 400 ng/ml. All calibration checks standards were within range.

5.0 FIELD, TRIP, AND LABORATORY SPIKES AND TRIP BLANKS

For the application analysis four (4) field spikes, four (4) trip spikes, four (4) laboratory spikes and one (1) trip blank were analyzed during the application testing.

5.1 *Field spikes*

The field spike results are in Table 5. The field spikes are sampled at four (4) locations associated with the designated area for the application. An unspiked collocated sample is run at the same time and is subtracted from the field spike sample to determine the actual spike recovery values. The average percent recovery of the field spikes was 94.3±2.2%.

5.2 *Trip spikes*

Table 6 presents the results of the trip spikes. Trip spikes are spiked cartridges sent into the field but are not placed on samplers. The average recovery was 94.8±1.4%.

5.3 *Laboratory spikes*

Table 7 presents the results of the laboratory spikes. The laboratory spikes are spiked at the same time as the field and trip spikes. These are stored in the refrigerator and analyzed with the respective field and trip spikes. The average recovery of TCNM is 98.7±9.1%.

5.4 *Trip blanks*

Only one (1) trip blank was sent to the laboratory, designated CTB7#62. This cartridge was treated and analyzed as for the field samples. The trip blank result was less than the MDL.

6.0 DISCUSSION

The requested EQL for the application analysis is an order of magnitude greater than that for the ambient monitoring. No problems occurred during the analysis of the TCNM application samples. The average TCNM concentration was 455 ng/sample, with the median at 290 ng/sample. The highest concentration of TCNM was 3.0×10^3 ng/sample at the CSW6#46 site.

Table 1. Instrument Reproducibility TCNM

Amount	TCNM-XAD-4 Area Response	ng/ml
5 ng/ml	184	5.59
	183	5.56
	176	5.35
	165	5.51
	160	5.38
	162	5.43
	148	5.07
Average	**168**	**5.41**
Standard Dev.	**13**	**0.18**
Rel. Standard Dev.	**7.74**	**3.33**
20 ng/ml	764	20.91
	763	20.88
	706	19.42
	700	19.26
	720	19.78
	736	20.19
	724	19.88
Average	**730**	**20.05**
Standard Dev.	**25**	**0.65**
Rel. Standard Dev.	**3.42**	**3.24**
50 ng/ml	1970	51.91
	1903	50.19
	1994	52.53
	1967	51.83
	1885	49.73
	1913	50.45
	1848	48.78
Average	**1926**	**50.77**
Standard Dev.	**53**	**1.35**
Rel. Standard Dev.	**2.75**	**2.66**

From Monterey and Kern Clounty Ambient Report, Project P-01-004

Table 2. Application Monitoring Results of TCNM

Location: CE

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
1	CEB-1	10/29/01	11/19/01	3.27E+01	DET
9	CEB-2	10/30/01	11/19/01	2.51E+01	DET
13	CE-3	10/31/01	11/19/01	<MDL	<MDL
22	CE-4	10/31/01	11/19/01	<MDL	<MDL
31	CE-5	11/1/01	11/21/01	<MDL	<MDL
40	CE-6	11/1/01	11/21/01	<MDL	<MDL
49	CE-7	11/2/01	11/21/01	1.28E+01	DET
63	CE-8	11/2/01	11/26/01	<MDL	<MDL
72	CE-9	11/3/01	11/26/01	1.61E+01	DET
81	CE-10	11/3/01	11/26/01	<MDL	<MDL

Location: CW

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
3	CWB-1	10/29/01	11/19/01	6.51E+01	1.95E+02
11	CWB-2	10/30/01	11/19/01	5.75E+01	1.72E+02
18	CW-3	10/31/01	11/19/01	<MDL	<MDL
27	CW-4	10/31/01	11/19/01	<MDL	<MDL
36	CW-5	11/1/01	11/21/01	<MDL	<MDL
45	CW-6	11/1/01	11/21/01	1.15E+01	DET
54	CW-7	11/2/01	11/21/01	<MDL	<MDL
68	CW-8	11/2/01	11/26/01	<MDL	<MDL
77	CW-9	11/3/01	11/26/01	<MDL	<MDL
86	CW-10	11/3/01	11/26/01	<MDL	<MDL

Table 2. Application Monitoring Results of TCNM

Location: CS

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
5	CSB-1	10/29/01	11/19/01	8.75E+01	2.63E+02
12	CSB-2	10/30/01	11/19/01	6.69E+01	2.01E+02
20	CS-3	10/31/01	11/19/01	1.06E+01	DET
29	CS-4	10/31/01	11/19/01	3.23E+01	DET
38	CS-5	11/1/01	11/21/01	5.73E+01	1.72E+02
47	CS-6	11/1/01	11/21/01	7.78E+01	2.33E+02
56	CS-7	11/2/01	11/21/01	3.05E+02	9.14E+02
70	CS-8	11/2/01	11/26/01	3.77E+02	1.13E+03
79	CS-9	11/3/01	11/26/01	1.35E+02	4.05E+02
88	CS-10	11/3/01	11/26/01	1.20E+02	3.60E+02

Location: CN

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
7	CNB-1	10/29/01	11/19/01	2.61E+01	DET
10	CNB-2	10/30/01	11/19/01	1.74E+01	DET
15	CN-3	10/31/01	11/19/01	<MDL	<MDL
16	CN-3C	10/31/01	11/19/01	<MDL	<MDL
24	CN-4	10/31/01	11/19/01	DET	DET
25	CN-4C	10/31/01	11/19/01	1.03E+01	DET
33	CN-5	11/1/01	11/21/01	<MDL	<MDL
34	CN-5C	11/1/01	11/21/01	<MDL	<MDL
42	CN-6	11/1/01	11/21/01	1.63E+02	4.88E+02
43	CN-6C	11/1/01	11/21/01	1.75E+02	5.24E+02
51	CN-7	11/2/01	11/21/01	3.55E+01	DET
52	CN-7C	11/2/01	11/21/01	3.52E+01	DET
65	CN-8	11/2/01	11/26/01	1.09E+02	3.26E+02
66	CN-8C	11/2/01	11/26/01	1.10E+02	3.29E+02
74	CN-9	11/3/01	11/26/01	7.07E+01	2.12E+02
75	CN-9C	11/3/01	11/26/01	6.51E+01	1.95E+02
83	CN-10	11/3/01	11/26/01	7.98E+01	2.39E+02
84	CN-10C	11/3/01	11/26/01	6.98E+01	2.09E+02

Table 2. Application Monitoring Results of TCNM

Location: CNE

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
14	CNE-3	10/31/01	11/19/01	<MDL	<MDL
23	CNE-4	10/31/01	11/19/01	<MDL	<MDL
32	CNE-5	11/1/01	11/21/01	<MDL	<MDL
41	CNE-6	11/1/01	11/21/01	3.28E+01	DET
50	CNE-7	11/2/01	11/21/01	2.44E+01	DET
64	CNE-8	11/2/01	11/26/01	3.60E+01	DET
73	CNE-9	11/3/01	11/26/01	5.23E+01	1.57E+02
82	CNE-10	11/3/01	11/26/01	2.21E+01	DET

Location: CNW

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
17	CNW-3	10/31/01	11/19/01	<MDL	<MDL
26	CNW-4	10/31/01	11/19/01	2.06E+02	6.17E+02
35	CNW-5	11/1/01	11/21/01	2.43E+01	DET
44	CNW-6	11/1/01	11/21/01	1.15E+02	3.46E+02
53	CNW-7	11/2/01	11/21/01	<MDL	<MDL
67	CNW-8	11/2/01	11/26/01	8.32E+01	2.49E+02
76	CNW-9	11/3/01	11/26/01	<MDL	<MDL
85	CNW-10	11/3/01	11/26/01	6.70E+01	2.01E+02

Table 2. Application Monitoring Results of TCNM

Location: CSW

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
19	CSW-3	10/31/01	11/19/01	1.02E+02	3.06E+02
28	CSW-4	10/31/01	11/19/01	4.73E+01	DET
37	CSW-5	11/1/01	11/21/01	2.52E+02	7.57E+02
46	CSW-6	11/1/01	11/21/01	9.99E+02	3.00E+03
55	CSW-7	11/2/01	11/21/01	<MDL	<MDL
69	CSW-8	11/2/01	11/26/01	2.73E+02	8.18E+02
78	CSW-9	11/3/01	11/26/01	2.81E+01	DET
87	CSW-10	11/3/01	11/26/01	9.65E+01	2.90E+02

Location: CSE

Log Number	Sample ID	Date Sampled	Date Analyzed	TCNM ng/ml	TCNM ng/sample
21	CSE-3	10/31/01	11/19/01	<MDL	<MDL
30	CSE-4	10/31/01	11/19/01	2.09E+01	DET
39	CSE-5	11/1/01	11/21/01	<MDL	<MDL
48	CSE-6	11/1/01	11/21/01	6.72E+01	2.02E+02
57	CSE-7	11/2/01	11/21/01	3.94E+01	DET
71	CSE-8	11/2/01	11/26/01	5.71E+01	1.71E+02
80	CSE-9	11/3/01	11/26/01	1.45E+02	4.34E+02
89	CSE-10	11/3/01	11/26/01	3.72E+01	DET

Application Monitoring Notes

If analytical result is ≥ MDL and < requested EQL it is reported in the table as detected (DET). Levels ≥ EQL are reported as the actual measured value and are reported to three significant figures.

MDL = 30 ng/sample
EQL = 150 ng/sample

Table 3: Laboratory Spiking Solution Results

Date	Amount, ng/ml	%Recovery
11/19	354.7	88.7
11/21	324.7	81.2
11/26	334.5	83.6
Average		84.5
Standard Deviation		3.8

Table 4: Laboratory Control Sample Results

Date	Amount, ng/ml	%Recovery
11/19	373.8	93.5
11/21	345.2	86.3
11/26	399.0	99.7
Average		93.2
Standard Deviation		6.7

Table 5: Field Spike Results

Date	Sample Identification	Amount, ng/ml	%Recovery	Background Identification
11/19	CEBFS1#2	364.8	91.2	CEB1#1
11/19	CWBFS1#4	384.4	96.1	CWB1#3
11/19	CSBFS1#6	378.5	94.6	CSB1#5
11/19	CNBFS1#8	381.1	95.3	CNB1#7
Average		381.3	94.3	
Standard Deviation		2.9	2.2	

Field spike results are corrected for the unspiked collocated sample.

Table 6: Trip Spike Results

Date	Sample Identification	Amount ng/ml	%Recovery
11/21	CTS1#58	377.0	94.3
11/21	CTS2#59	387.6	96.9
11/21	CTS3#60	375.5	93.9
11/21	CTS4#61	376.8	94.2
Average		379.9	94.8
Standard Deviation		6.6	1.4

Table 7: Laboratory Spike Results

Date	Sample Identification	Amount ng/ml	%Recovery
11/19	Lab Spike #1	375.5	93.9
11/21	Lab Spike #2	353.7	88.4
11/26	Lab Spike #3	417.6	104.4
11/26	Lab Spike #4	432.1	108.0
Average		401.2	98.7
Standard Deviation		41.8	9.1

Appendix A:

Standard Operating Procedure for TCNM Analysis

California Environmental Protection Agency

Air Resources Board

Standard Operating Procedure
Sampling and Analysis of Trichloronitromethane (Chloropicrin) in Application and Ambient Air using Gas Chromatography/Mass Selective Detector

Special Analysis Section
Northern Laboratory Branch
Monitoring and Laboratory Division

06/25/01 version

Approved by:

Russell Grace, Manager
Special Analysis Section

1. SCOPE

The current method is for the analysis of trichloronitromethane (TCNM) using a gas chromatograph/mass selective detector. The procedure is for the analysis of application and ambient air monitoring of TCNM using XAD-4 resin tubes. The Department of Pesticide Regulation (DPR) asked the Air Resources Board (ARB) to analyze for TCNM during agricultural/structural application with a requested quantitation limit of 1.0 $\mu g/m^3$ and ambient monitoring with a quantitation limit of 0.1 $\mu g/m^3$.

2. SUMMARY OF METHOD

Resin tubes, XAD-4, are placed on the sampler for 24 hours at a flowrate of 0.1 liters per minute (LPM or 100 mLPM). The samples are stored in an ice chest or refrigerator until extracted with 3 ml of dichloromethane (DCM). The injection volume is 1 µl. A gas chromatograph with a mass selective detector in the selected ion monitoring (SIM) mode is used for analysis.

3. INTERFERENCES/LIMITATIONS

Interferences may be caused by contaminants in solvents, reagents, glassware and other processing apparatus that can lead to discrete artifacts or elevated baselines. A method blank, including both solvent and resin, must be analyzed with each batch of samples to detect any possible interferences.

4. EQUIPMENT AND CONDITIONS

A. Instrumentation:

Hewlett-Packard 6890 Series gas chromatograph
Hewlett-Packard 5973 Network mass selective detector
Hewlett-Packard 6890 Enhanced Parameters ALS

MS Transfer line: 280°C
Injector: 210°C, Splitless, Liner 4 mm straight liner with glass wool.
Column: Restek Rtx-200, 60 meter, 320 µm i.d., 1.5 µm film thickness.

GC Temperature Program: Oven initial 40°C, hold 4 min. Ramp to 220°C @ 12°C/min., hold 1 min., ramp to 240°C @ 20°C/min., hold 2.0 min.
Retention time: TCNM 11.93 min.

Splitter open @ 1.0 min.
Flows: Column: He, 1.6 ml/min, 9.1psi. (velocity: 32cm/sec)
Splitter: 50 ml/min.
Mass Spectrometer: Electron Ionization

Selective Ion Monitoring: trichloronitromethane: 117 (quant. ion 100%), 119 (qual. ion 98%); Tuning: PFTBA on masses 69, 219, 502.

B. Auxiliary Apparatus

1 Precleaned vials, 8 ml capacity with teflon caps.
2 Whatman filters, 0.45 μm
3 Disposable syringes, 3 ml
4 Sonicator
5 GC vials with septum caps.

C. Reagants

1 Dichloromethane, Pesticide grade or better.
2 Trichloronitromethane, Chem Service PS-4, 98.8%
3 XAD-4 resin sorbent tubes, 400/200mg. SKC, Fullerton, CA.

5. ANALYSIS OF SAMPLES

1 A daily manual tune shall be performed using PFTBA. The instrument is tuned using masses: 69, 219, 502. The criterion for the tune are the peak widths at ½ the peak height, 0.60 ± 0.05, and the criteria for relative abundance; 69:100%, 219:100-120%, and 502: 7-12%.

2 It is necessary to analyze a solvent blank with each batch of samples. The blank must be free of interferences. A solvent blank must be analyzed after any sample which may result in possible carry-over contamination.

3 A 5-point calibration curve shall be analyzed with each batch of samples. For the ambient studies the calibration will be 0.5-50.0 ng/mL and for the application studies 50.0-500 ng/mL.

4 A calibration check sample of 7.5 ng/ml is run after the calibration and every 10 samples and at the end of the sample batch. The value of the calibration check must be within $\pm 3\sigma$ (the standard deviation) or ±10% of the expected value whichever is greater. If the calibration check is outside this limit, then those samples in the batch after the last calibration check that was within limits need to be reanalyzed.

5 With each batch of samples analyzed, a laboratory blank and a laboratory control spike will be run concurrently. A laboratory blank is XAD-4 extracted and analyzed the same way as the samples. A laboratory control spike is XAD-4 spiked with a known amount of standard. The laboratory control sample is extracted and analyzed the same way as the samples. Laboratory

control samples should have recoveries that are greater than or equal to 70% of the theoretical spiked value.

6 Score and snap the sample resin tube, transfer the front bed of the resin tube into a 8 ml vial. (Save the back-up bed for future analysis if necessary.) Rinse the tube with 3.0 ml of DCM into the extraction vial. Cap and place the vial in the sonicator for 1 hour.

7 Filter the samples using 0.45 μm filter attached to a 3 ml syringe directly into a GC vial and cap securely.

8 The atmospheric concentration is calculated according to:

Conc (ng/m^3) = Extract Conc (ng/ml) X 3 ml / Air Volume Sampled (m^3)

6. QUALITY ASSURANCE

A. Instrument Reproducibility

The reproducibility of the instrument and analytical method was established by analyzing five (5) 1.0 μl injections of trichloronitromethane standard at three concentrations (low, mid, and high). The low, mid and high concentrations were 5, 20 and 50 ng/ml, respectively.

B. Calibration

A five-point calibration curve is made ranging from 5.0 ng/ml to 50.0 ng/ml for ambient and 50 ng/ml to 500 ng/ml for application.

C. Calibration Check

A calibration check sample is run after the calibration, after every 10 samples and at the end of the sample batch to verify the system is in calibration. The value of the check must be within $\pm 3\sigma$ (the standard deviation) or $\pm 10\%$ of the expected value whichever is larger. If the calibration check is outside the limit, then those samples in the batch after the last calibration check that was within the limit need to be reanalyzed.

D. Minimum Detection Limit

The detection limit is based on US EPA MDL calculation. Using the analysis of seven (7) replicates of a low-level matrix spike, the method detection limit (MDL) and the estimated quantitation limit (EQL) for trichloronitromethane is calculated by: MDL = 3.14*(std dev values) where std dev = the standard deviation of the concentration calculated for the seven replicate spikes. For TCNM the MDL is 3.96 ng/sample (1.32 ng/mL). EQL, defined as 5*MDL, is 19.8 ng/sample (6.60

ng/mL) based on a 3 ml extraction volume. Results are reported to 3 significant figures. Results below EQL but above the MDL are reported as DET (detected) and results less than the MDL are reported as ND (nondetect).

E. Collection and Extraction Efficiency (Recovery)

Trichloronitromethane at a low and high level are spiked on XAD-4 tubes (3 at each concentration). The spiked tubes are placed on field samplers with airflows of 100 mLpm for 24 hours. The samples are extracted with DCM and prepared as described in section 5, #6-7. The average percent recovery of trichloronitromethane should be ± 20% of the expected value. The recoveries both for the low and high levels are greater than 80.0%.

F. Storage Stability

Storage stability was set up for a 4-week study. Three (3) XAD-4 tubes each were spiked at the low and high-end concentrations. The tubes were stored in the freezer until analyzed. At the low-end concentrations (5 ng/ml), the recovery for the three spikes averaged 106.8 percent, ranging from 103.68 to 113.68 percent. The average percent recovery peaked after fourteen days and was at the lowest after 28 days. At the high end (50 ng/ml), the recovery for the three spikes averaged 90.237 percent, ranging from 88.904 to 91.996 percent. The average percent recovery peaked at 14 days and was at the lowest at 20 days.

G. Breakthrough

The previous analysis of trichloronitromethane (ARB #A5-169-43) was for 4 hour sampling at 1.0 LPM in September/October, 1986. The current study for ambient monitoring for 24 hours will require a low sample flow rate to meet the requested EQL. A breakthrough analysis study was conducted. The flow rates tested were 1.0, 0.5, 0.2 and 0.1 Lpm. To meet the EQL and minimize breakthrough possibility, the flow rate for the field sampling will be at 100 mLpm.

H. Safety

This procedure does not address all of the safety concerns associated with chemical analysis. It is the responsibility of the analyst to establish appropriate safety and health practices. For hazard information and guidance refer to the material safety data sheets (MSDS) of any chemicals used in this procedure.

APPENDIX III

NOTICE OF INTENT TO APPLY RESTRICTED MATERIALS

TE OF CALIFORNIA
PARTMENT OF FOOD AND AGRICULTURE
SURGERY

NOTICE OF INTENT TO APPLY RESTRICTED MATERIALS

300749

COUNTY NO.	SECTION	TOWNSHIP	RANGE	BASE & MERIDIAN	APP. METHOD	PERMITTEE/PROPERTY OPERATOR	APPLICATOR NAME AND ADDRESS
27	5	15 N	04 W	H	AIR ☐ GROUND ☐ OTHER ☐	Gilmore Farms	Santa Maria Valley Fume Box 6285 Santa Maria CA

OPERATOR ID/PERMIT NO.: 27-S 205A

SITE IDENTIFICATION NUMBER: 020281

TOTAL PLANTED ACRES/UNITS: 67

LOCATION: Cummings Ranch NE Blisol + Hartnell

BLOCK ID (IF APPLICABLE): 15/16

DATE/TIME APPLIED PROPOSED	DATE/TIME APPLIED ACTUAL	TOTAL ACRES/UNITS TREATED PROPOSED	TOTAL ACRES/UNITS TREATED ACTUAL	COMMODITY/SITE TREATED
10/22		20		Prop Land Bare Soil

CHEM. NO.	MANUFACTURER/NAME OF PRODUCT APPLIED	EPA/CALIF. REG. NO. FROM LABEL	RATE	DILUTION	TARGET PEST
3850	Amerbrom Methyl Bromide	8622-39	250	—	Weeds
	Method 6450	4B (III)			
	OBZ = 870				
	IBZ = 240				

DAYS REENTRY: 7

DAYS PREHARVEST: 90

APPLIED/SUPERVISED BY: London/Zack

ENVIRONMENTAL CHANGES/COMMENTS:

SUBMITTED BY: L Mays

DATE: 10/18

TIME:

PCA NAME: London

RECEIVED BY:

BOX NO.:

DATE:

☐ APPROVED
☐ DENIED

N: 0/50 spinach
W: 0/50
TREATMENT AREA
S: 0/50
E: 0/50

ADJACENT CROPS, SCHOOLS, DWELLINGS, ETC.

(1) CAC

Submit to AGRICULTURAL COMMISSIONER at least 24 hours before application.

83-126X (REV. 3/90)

Steve: Ambient 18-23 return, Application depart: depends on appli. time 26th down + back

Andy: 24-29 return

Alan: 26 or 25-29 return

EPA registration
8622-39-AA

Amerbrom, Inc

DPR Reg. stamp

324-0399

APPENDIX IV

CHLOROPICRIN APPLICATION METEOROLOGICAL DATA

Chloropicrin Application Meteorological Data

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT

Export data for station : Chavez Farm

Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
10/29/2001	14:45	4.4	342	13.2	65	765.5	52
10/29/2001	15:00	9.4	312	18.2	62	762.1	9
10/29/2001	15:15	8.3	316	18.1	62	762.2	6
10/29/2001	15:30	8.5	319	18.1	61	762.3	6
10/29/2001	15:45	9.0	332	18.1	60	762.1	6
10/29/2001	16:00	8.3	335	18.0	60	761.8	6
10/29/2001	16:15	6.7	323	17.9	60	761.8	6
10/29/2001	16:45	6.3	334	17.9	60	761.3	7
10/29/2001	17:00	4.8	327	17.8	61	761.1	5
10/29/2001	17:15	4.6	287	17.6	62	761.1	39
10/29/2001	17:30	5.4	254	16.7	68	761.0	6
10/29/2001	17:45	4.8	255	16.2	69	761.0	5
10/29/2001	18:00	4.2	255	16.1	69	760.8	5
10/29/2001	18:15	2.5	233	15.9	68	760.6	15
10/29/2001	18:30	1.6	153	15.7	69	760.7	22
10/29/2001	18:45	1.2	246	15.8	68	760.6	64
10/29/2001	19:00	1.4	157	15.9	67	760.5	31
10/29/2001	19:15	0.8	72	15.8	68	760.4	97
10/29/2001	19:30	3.8	254	15.4	69	760.5	14
10/29/2001	19:45	4.0	286	15.6	67	760.5	4
10/29/2001	20:00	2.6	355	15.2	68	760.4	45
10/29/2001	20:15	4.7	57	14.9	72	760.0	7
10/29/2001	20:30	1.8	27	15.2	69	760.0	31
10/29/2001	20:45	3.5	274	15.2	69	760.0	7
10/29/2001	21:00	3.9	282	15.2	69	760.2	10
10/29/2001	21:15	3.2	34	14.8	72	760.1	45
10/29/2001	21:30	6.5	67	14.4	76	759.7	7
10/29/2001	21:45	2.9	68	14.8	73	759.5	56
10/29/2001	22:00	2.2	231	14.9	73	759.8	23
10/29/2001	22:15	1.7	209	14.2	76	759.8	21
10/29/2001	22:30	3.3	178	14.1	76	759.8	23
10/29/2001	22:45	4.4	122	14.3	75	759.5	15
10/29/2001	23:00	3.5	142	14.4	75	759.5	25
10/29/2001	23:15	1.2	71	14.3	76	759.4	52
10/29/2001	23:30	1.6	44	14.2	76	759.3	88
10/29/2001	23:45	3.1	113	14.3	76	759.0	10
10/29/2001	24:00:00	4.2	124	14.2	76	758.8	18
10/30/2001	0:15	4.6	163	14.7	74	758.8	19
10/30/2001	0:30	5.6	157	15.1	72	758.7	12
10/30/2001	0:45	5.2	134	15.1	72	758.8	17

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
10/30/2001	1:00	4.7	114	15.4	69	758.5	10
10/30/2001	1:15	4.1	148	15.5	68	758.5	13
10/30/2001	1:30	4.0	127	15.7	67	758.3	14
10/30/2001	1:45	3.2	148	15.9	66	758.3	22
10/30/2001	2:00	5.3	134	16.0	67	758.2	10
10/30/2001	2:15	5.6	136	16.1	66	758.2	5
10/30/2001	2:30	5.4	129	16.0	67	758.1	6
10/30/2001	2:45	5.1	132	16.1	66	757.9	8
10/30/2001	3:00	4.2	126	16.4	65	757.5	8
10/30/2001	3:15	3.6	128	16.4	65	757.5	6
10/30/2001	3:30	3.3	147	16.3	66	757.8	6
10/30/2001	3:45	5.7	97	15.9	68	758.0	17
10/30/2001	4:00	7.7	97	16.2	68	757.9	9
10/30/2001	4:15	7.5	118	16.4	68	757.8	7
10/30/2001	4:30	7.6	134	16.3	69	757.7	6
10/30/2001	4:45	10.8	137	16.3	69	757.4	6
10/30/2001	5:00	9.9	143	16.2	70	757.3	8
10/30/2001	5:15	12.1	154	15.6	75	757.6	7
10/30/2001	5:30	14.4	149	15.3	77	757.1	9
10/30/2001	5:45	15.7	163	15.0	80	757.7	8
10/30/2001	6:00	16.4	155	15.0	81	757.8	7
10/30/2001	6:15	14.7	148	14.6	85	757.8	7
10/30/2001	6:30	14.2	146	14.5	87	757.8	6
10/30/2001	6:45	14.4	144	14.5	86	757.9	7
10/30/2001	7:00	15.0	146	14.5	88	757.9	7
10/30/2001	7:15	9.2	170	14.6	87	758.3	19
10/30/2001	7:30	9.5	157	14.8	86	758.7	10
10/30/2001	7:45	8.4	147	14.8	87	758.6	8
10/30/2001	8:00	10.3	155	14.8	87	758.9	14
10/30/2001	8:15	6.5	141	14.8	88	758.9	18
10/30/2001	8:30	9.9	135	14.8	88	758.8	13
10/30/2001	8:45	10.2	128	14.8	88	758.9	11
10/30/2001	9:00	10.3	120	14.9	88	758.9	12
10/30/2001	9:15	6.3	131	15.0	89	758.9	15
10/30/2001	9:30	9.9	132	15.4	86	759.0	13
10/30/2001	9:45	6.0	123	15.6	87	758.8	10
10/30/2001	10:00	8.3	132	15.8	86	758.9	9
10/30/2001	10:15	7.5	139	16.0	86	758.9	8
10/30/2001	10:30	8.3	135	16.5	86	758.8	8
10/30/2001	10:45	9.1	133	17.0	85	758.9	8
10/30/2001	11:00	9.1	142	17.5	84	758.9	12

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
10/30/2001	11:15	8.3	145	18.0	83	758.8	16
10/30/2001	11:30	8.1	172	17.9	83	758.8	9
10/30/2001	11:45	7.5	166	18.0	83	758.7	11
10/30/2001	12:00	6.6	183	18.6	80	758.6	12
10/30/2001	12:15	4.5	199	19.0	79	758.6	21
10/30/2001	12:30	3.5	224	19.2	77	758.7	20
10/30/2001	12:45	7.6	289	19.1	78	758.7	11
10/30/2001	13:00	15.2	278	18.6	81	758.6	11
10/30/2001	13:15	18.9	284	18.9	79	758.6	11
10/30/2001	13:30	18.4	292	17.3	82	758.9	7
10/30/2001	13:45	17.2	292	17.1	79	758.9	8
10/30/2001	14:00	15.1	299	17.1	79	759.1	10
10/30/2001	14:15	13.0	291	16.8	79	759.0	7
10/30/2001	14:30	13.8	293	17.1	78	758.8	7
10/30/2001	14:45	13.3	310	17.7	76	758.9	8
10/30/2001	15:00	12.6	315	17.6	75	759.2	8
10/30/2001	15:15	12.4	320	17.4	76	759.5	9
10/30/2001	15:30	10.8	322	17.2	75	759.5	11
10/30/2001	15:45	10.7	311	17.4	74	759.6	11
10/30/2001	16:00	10.0	309	17.4	73	759.7	11
10/30/2001	16:15	9.2	319	17.0	74	759.8	10
10/30/2001	16:30	8.1	311	16.9	74	759.8	9
10/30/2001	16:45	8.2	304	16.8	73	759.8	9
10/30/2001	17:00	7.3	315	16.4	74	759.8	6
10/30/2001	17:15	5.8	327	16.2	75	759.8	7
10/30/2001	17:30	4.7	342	15.7	78	759.7	5
10/30/2001	17:45	4.9	5	15.2	81	759.7	10
10/30/2001	18:00	5.4	16	15.0	81	759.6	4
10/30/2001	18:15	5.1	28	15.0	81	759.6	7
10/30/2001	18:30	4.2	16	15.1	80	759.6	9
10/30/2001	18:45	3.9	358	15.4	79	759.7	12
10/30/2001	19:00	2.4	338	15.0	81	759.8	23
10/30/2001	19:15	1.0	347	14.8	82	759.8	26
10/30/2001	19:30	0.8	195	14.2	85	759.8	75
10/30/2001	19:45	1.6	334	14.4	85	759.7	28
10/30/2001	20:00	3.6	19	14.2	84	759.7	9
10/30/2001	20:15	3.4	30	14.3	82	759.7	8
10/30/2001	20:30	3.5	16	14.5	81	759.8	19
10/30/2001	20:45	3.9	5	14.8	81	759.7	10
10/30/2001	21:00	3.6	354	14.5	82	759.7	49
10/30/2001	21:15	2.0	220	13.6	87	759.8	22

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Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
10/30/2001	21:30	2.7	233	13.7	86	759.8	25
10/30/2001	21:45	4.3	214	12.7	87	759.9	7
10/30/2001	22:00	1.8	197	12.4	89	759.9	54
10/30/2001	22:15	3.7	60	12.2	90	759.9	14
10/30/2001	22:30	3.4	86	12.9	87	759.9	9
10/30/2001	22:45	2.5	63	13.2	86	759.8	11
10/30/2001	23:00	3.2	32	13.0	87	759.8	7
10/30/2001	23:15	3.0	13	13.3	86	759.7	7
10/30/2001	23:30	3.2	4	13.5	85	759.7	8
10/30/2001	23:45	2.6	334	12.7	86	759.7	28
10/30/2001	24:00:00	1.8	331	12.4	85	759.7	19
10/31/2001	0:15	1.3	324	11.8	86	759.6	37
10/31/2001	0:30	2.4	268	11.0	90	759.6	39
10/31/2001	0:45	3.5	288	10.4	92	759.7	16
10/31/2001	1:00	4.5	294	11.3	91	759.8	3
10/31/2001	1:15	3.2	342	11.2	91	759.7	49
10/31/2001	1:30	1.9	48	10.7	92	759.6	34
10/31/2001	1:45	0.7	135	10.8	92	759.6	24
10/31/2001	2:00	2.2	109	10.5	92	759.6	12
10/31/2001	2:15	3.0	93	10.1	94	759.5	5
10/31/2001	2:30	3.9	82	10.3	93	759.4	12
10/31/2001	2:45	3.5	114	10.0	94	759.3	6
10/31/2001	3:00	3.6	149	9.8	92	759.2	18
10/31/2001	3:15	3.8	175	9.2	92	759.2	9
10/31/2001	3:30	2.9	154	9.3	93	759.2	4
10/31/2001	3:45	3.0	143	9.5	92	759.2	8
10/31/2001	4:00	4.4	128	9.6	92	759.2	7
10/31/2001	4:15	5.4	117	9.6	92	759.1	5
10/31/2001	4:30	3.6	83	9.6	91	759.3	19
10/31/2001	4:45	2.4	88	10.0	91	759.3	11
10/31/2001	5:00	1.3	89	9.5	90	759.3	20
10/31/2001	5:15	1.0	176	8.9	93	759.4	69
10/31/2001	5:30	1.8	224	8.6	93	759.4	10
10/31/2001	5:45	2.0	186	8.2	94	759.5	40
10/31/2001	6:00	4.0	130	8.2	94	759.5	6
10/31/2001	6:15	4.7	125	8.2	94	759.4	8
10/31/2001	6:30	4.2	116	8.4	94	759.5	7
10/31/2001	6:45	4.4	115	8.6	93	759.5	6
10/31/2001	7:00	3.4	119	9.0	92	759.5	11
10/31/2001	7:15	2.8	112	8.9	92	759.6	13
10/31/2001	7:30	3.9	160	9.8	91	759.7	14

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Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
10/31/2001	7:45	5.2	167	9.8	90	760.0	7
10/31/2001	8:00	5.8	157	10.6	89	760.3	6
10/31/2001	8:15	7.7	157	11.3	86	760.5	6
10/31/2001	8:30	7.5	152	11.8	85	760.7	6
10/31/2001	8:45	6.1	148	12.4	85	760.9	9
10/31/2001	9:00	6.2	151	13.0	83	761.1	10
10/31/2001	9:15	6.1	149	13.6	82	761.2	10
10/31/2001	9:30	4.9	160	14.1	81	761.5	9
10/31/2001	9:45	3.9	148	14.4	80	761.6	14
10/31/2001	10:00	3.2	160	14.9	77	761.8	24
10/31/2001	10:15	2.1	133	15.5	76	761.9	54
10/31/2001	10:30	2.2	56	16.1	75	762.1	59
10/31/2001	10:45	3.1	340	16.3	73	762.3	16
10/31/2001	11:00	3.4	324	16.8	72	762.3	21
10/31/2001	11:15	3.7	317	17.4	69	762.4	14
10/31/2001	11:30	4.4	303	18.1	66	762.4	20
10/31/2001	11:45	5.1	320	18.4	65	762.4	22
10/31/2001	12:00	6.2	312	18.7	63	762.3	16
10/31/2001	12:15	7.0	310	19.1	60	762.3	14
10/31/2001	12:30	7.4	307	19.3	58	762.2	11
10/31/2001	12:45	7.9	317	19.4	61	762.0	14
10/31/2001	13:00	8.5	294	19.6	61	761.9	13
10/31/2001	13:15	8.3	309	19.5	63	761.8	14
10/31/2001	13:30	9.6	292	19.4	64	761.4	11
10/31/2001	13:45	11.7	293	19.4	64	761.3	8
10/31/2001	14:00	12.1	306	18.9	66	761.3	8
10/31/2001	14:15	11.5	295	18.7	67	761.2	8
10/31/2001	14:30	11.6	300	18.4	67	761.1	12
10/31/2001	14:45	11.0	312	17.9	70	761.0	10
10/31/2001	15:00	11.8	322	17.3	73	761.0	7
10/31/2001	15:15	13.3	319	16.4	76	761.1	6
10/31/2001	15:30	12.3	316	15.1	82	761.2	7
10/31/2001	15:45	11.6	327	14.3	86	761.2	6
10/31/2001	16:00	8.7	326	13.9	88	761.1	8
10/31/2001	16:15	9.5	305	13.8	88	761.0	9
10/31/2001	16:30	9.3	312	13.4	89	761.0	9
10/31/2001	16:45	9.5	303	13.2	89	760.7	10
10/31/2001	17:00	9.5	299	12.9	90	760.5	7
10/31/2001	17:15	8.7	326	12.6	91	760.3	9
10/31/2001	17:30	7.0	326	12.5	93	760.1	7
10/31/2001	17:45	6.2	326	12.6	93	760.0	14

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Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
10/31/2001	18:00	6.8	337	12.5	91	760.0	10
10/31/2001	18:15	6.8	342	12.4	91	760.0	6
10/31/2001	18:30	5.4	337	12.4	91	760.0	11
10/31/2001	18:45	5.5	341	12.4	91	760.0	12
10/31/2001	19:00	5.3	315	12.3	91	759.9	17
10/31/2001	19:15	6.6	351	12.1	92	759.8	10
10/31/2001	19:30	5.8	349	12.0	92	759.7	10
10/31/2001	19:45	4.9	360	12.0	92	759.7	6
10/31/2001	20:00	4.6	350	11.8	94	759.6	15
10/31/2001	20:15	3.7	331	11.6	96	759.6	18
10/31/2001	20:30	4.0	343	11.6	97	759.7	13
10/31/2001	20:45	3.1	350	11.6	97	759.8	11
10/31/2001	21:00	2.8	335	11.6	97	759.8	19
10/31/2001	21:15	3.6	351	11.6	97	759.9	10
10/31/2001	21:30	3.2	342	11.5	97	759.9	19
10/31/2001	21:45	2.7	2	11.4	97	760.0	19
10/31/2001	22:00	2.3	310	11.3	97	759.9	56
10/31/2001	22:15	2.0	242	11.2	97	759.9	32
10/31/2001	22:30	1.7	304	11.1	97	759.9	35
10/31/2001	22:45	1.3	84	11.1	98	759.8	44
10/31/2001	23:00	1.9	192	10.9	98	759.7	64
10/31/2001	23:15	2.2	183	10.9	99	759.7	51
10/31/2001	23:30	2.7	138	10.9	99	759.7	36
10/31/2001	23:45	3.1	118	10.9	99	759.7	26
10/31/2001	24:00:00	3.3	109	10.8	99	759.7	12
11/01/2001	0:15	3.1	125	10.5	99	759.7	13
11/01/2001	0:30	4.8	124	10.1	99	759.7	10
11/01/2001	0:45	5.7	98	9.6	99	759.7	7
11/01/2001	1:00	6.2	101	9.5	99	759.7	6
11/01/2001	1:15	5.1	117	9.5	100	759.7	9
11/01/2001	1:30	5.6	131	9.7	100	759.7	7
11/01/2001	1:45	5.5	137	9.8	100	759.6	8
11/01/2001	2:00	6.1	140	9.9	100	759.6	8
11/01/2001	2:15	6.4	134	9.9	100	759.4	9
11/01/2001	2:30	6.0	118	9.5	100	759.3	9
11/01/2001	2:45	7.1	133	9.6	100	759.3	9
11/01/2001	3:00	6.7	133	9.9	100	759.2	10
11/01/2001	3:15	6.2	139	9.7	100	759.1	8
11/01/2001	3:30	6.6	138	9.5	100	759.1	8
11/01/2001	3:45	7.1	142	9.5	100	759.0	7
11/01/2001	4:00	6.7	130	9.4	100	759.0	6

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Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/01/2001	4:15	7.1	136	9.2	100	759.1	9
11/01/2001	4:30	5.6	145	9.1	100	759.1	7
11/01/2001	4:45	4.9	137	9.0	100	759.1	9
11/01/2001	5:00	6.1	126	8.8	100	759.1	7
11/01/2001	5:15	5.2	123	8.8	100	759.2	9
11/01/2001	5:30	4.2	122	8.5	100	759.1	7
11/01/2001	5:45	3.5	123	8.4	100	759.2	8
11/01/2001	6:00	4.2	127	8.4	101	759.2	18
11/01/2001	6:15	3.4	118	8.3	101	759.4	13
11/01/2001	6:30	4.0	120	8.2	102	759.5	9
11/01/2001	6:45	3.0	72	7.7	102	759.6	16
11/01/2001	7:00	1.8	69	7.6	103	759.6	7
11/01/2001	7:15	1.4	351	7.8	102	759.7	44
11/01/2001	7:30	2.9	164	8.2	100	759.8	35
11/01/2001	7:45	4.6	137	8.2	99	759.9	10
11/01/2001	8:00	5.5	146	8.3	99	760.1	9
11/01/2001	8:15	5.6	142	8.5	99	760.2	7
11/01/2001	8:30	6.1	141	8.9	100	760.3	8
11/01/2001	8:45	6.0	145	9.5	99	760.4	10
11/01/2001	9:00	7.3	149	10.2	95	760.5	8
11/01/2001	9:15	7.0	149	10.9	91	760.6	9
11/01/2001	9:30	7.4	142	11.8	86	760.7	9
11/01/2001	9:45	6.8	143	12.8	83	760.7	10
11/01/2001	10:00	6.6	133	13.9	80	760.7	13
11/01/2001	10:15	6.4	124	14.4	76	760.8	9
11/01/2001	10:30	5.1	126	15.1	73	760.9	22
11/01/2001	10:45	4.0	98	15.8	72	761.0	19
11/01/2001	11:00	3.0	78	16.5	70	761.0	26
11/01/2001	11:15	2.5	50	17.1	67	761.1	37
11/01/2001	11:30	2.4	325	17.5	67	761.2	44
11/01/2001	11:45	3.7	327	17.9	66	761.2	13
11/01/2001	12:00	2.8	354	18.3	63	761.3	30
11/01/2001	12:15	2.8	319	19.0	62	761.2	31
11/01/2001	12:30	3.0	313	19.3	60	761.2	31
11/01/2001	12:45	4.9	320	19.9	59	761.0	23
11/01/2001	13:00	5.0	301	20.2	57	761.0	18
11/01/2001	13:15	5.8	288	20.6	54	760.9	24
11/01/2001	13:30	8.6	300	20.8	57	760.8	17
11/01/2001	13:45	11.0	299	20.5	61	760.7	11
11/01/2001	14:00	11.9	295	19.7	63	760.6	9
11/01/2001	14:15	11.4	298	18.9	64	760.5	9

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Export data for station : Chavez Farm
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Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/01/2001	14:30	10.6	309	18.1	68	760.4	10
11/01/2001	14:45	11.4	316	17.1	70	760.3	7
11/01/2001	15:00	10.4	319	16.4	73	760.1	9
11/01/2001	15:15	9.6	328	16.0	75	760.0	9
11/01/2001	15:30	9.0	338	15.6	76	759.9	9
11/01/2001	15:45	8.9	347	15.4	77	759.7	8
11/01/2001	16:00	8.5	345	15.4	77	759.6	6
11/01/2001	16:15	8.8	344	15.5	76	759.6	5
11/01/2001	16:30	7.9	336	15.6	77	759.5	7
11/01/2001	16:45	7.5	335	15.2	77	759.4	9
11/01/2001	17:00	7.7	326	15.0	77	759.4	7
11/01/2001	17:15	7.7	336	14.8	78	759.3	4
11/01/2001	17:30	7.9	327	14.3	80	759.3	7
11/01/2001	17:45	9.3	322	13.4	85	759.2	5
11/01/2001	18:00	8.9	321	12.2	89	759.1	6
11/01/2001	18:15	9.7	327	11.4	95	759.1	6
11/01/2001	18:30	9.0	315	11.4	96	758.9	8
11/01/2001	18:45	8.1	333	11.4	97	758.8	12
11/01/2001	19:00	8.6	353	11.4	98	758.7	6
11/01/2001	19:15	8.6	344	11.3	98	758.7	7
11/01/2001	19:30	9.1	339	11.3	98	758.7	7
11/01/2001	19:45	8.3	334	11.3	98	758.7	8
11/01/2001	20:00	8.8	342	11.3	98	758.7	7
11/01/2001	20:15	8.0	339	11.2	98	758.7	7
11/01/2001	20:30	6.8	334	11.2	98	758.8	8
11/01/2001	20:45	5.7	320	11.2	98	758.9	8
11/01/2001	21:00	6.4	327	11.2	97	759.0	8
11/01/2001	21:15	5.8	332	11.3	96	759.1	9
11/01/2001	21:30	5.8	341	11.4	96	759.1	8
11/01/2001	21:45	6.1	342	11.4	95	759.0	13
11/01/2001	22:00	4.9	352	11.2	96	759.0	11
11/01/2001	22:15	4.2	339	11.2	97	759.1	14
11/01/2001	22:30	3.0	333	11.2	97	759.0	19
11/01/2001	22:45	3.2	304	11.2	95	759.0	22
11/01/2001	23:00	3.6	286	11.0	96	759.0	9
11/01/2001	23:15	3.4	272	11.0	96	759.0	13
11/01/2001	23:30	2.1	295	11.0	97	759.0	35
11/01/2001	23:45	2.0	27	10.7	96	759.0	72
11/01/2001	24:00:00	3.1	23	10.4	98	758.9	6
11/02/2001	0:15	2.3	31	10.5	99	758.9	14
11/02/2001	0:30	1.9	160	10.4	99	759.0	64

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/02/2001	0:45	2.0	270	10.4	99	759.0	51
11/02/2001	1:00	1.9	220	10.4	99	759.1	57
11/02/2001	1:15	2.5	182	10.4	100	759.1	49
11/02/2001	1:30	2.8	142	10.3	100	759.1	18
11/02/2001	1:45	1.4	244	10.3	100	759.1	61
11/02/2001	2:00	1.9	86	10.2	100	759.0	23
11/02/2001	2:15	3.8	125	10.1	100	758.9	12
11/02/2001	2:30	4.1	123	10.0	100	758.7	18
11/02/2001	2:45	4.6	135	9.7	100	758.6	13
11/02/2001	3:00	4.0	127	9.6	99	758.4	16
11/02/2001	3:15	3.7	103	9.5	99	758.3	8
11/02/2001	3:30	3.4	105	9.4	99	758.3	8
11/02/2001	3:45	3.5	101	9.5	99	758.3	7
11/02/2001	4:00	4.5	115	9.7	99	758.2	7
11/02/2001	4:15	4.5	120	9.7	99	758.2	12
11/02/2001	4:30	4.3	120	9.5	99	758.2	12
11/02/2001	4:45	4.1	115	9.5	99	758.3	10
11/02/2001	5:00	4.4	132	9.7	99	758.3	13
11/02/2001	5:15	4.3	119	9.6	99	758.3	8
11/02/2001	5:30	3.5	130	9.5	99	758.4	13
11/02/2001	5:45	3.0	144	9.5	99	758.5	13
11/02/2001	6:00	3.5	162	9.5	99	758.6	24
11/02/2001	6:15	4.1	197	9.2	99	758.8	9
11/02/2001	6:30	3.6	163	9.1	99	758.9	12
11/02/2001	6:45	4.4	140	9.1	99	758.9	9
11/02/2001	7:00	4.6	131	9.1	99	759.0	10
11/02/2001	7:15	3.6	156	9.1	99	759.1	16
11/02/2001	7:30	3.9	144	9.0	99	759.3	27
11/02/2001	7:45	3.6	116	8.9	99	759.3	15
11/02/2001	8:00	3.4	133	8.9	99	759.4	13
11/02/2001	8:15	3.3	159	9.2	99	759.5	15
11/02/2001	8:30	3.5	136	9.2	99	759.6	20
11/02/2001	8:45	2.3	183	9.4	99	759.7	44
11/02/2001	9:00	3.0	137	9.6	99	759.8	20
11/02/2001	9:15	4.0	119	9.9	99	759.8	18
11/02/2001	9:30	5.2	138	10.6	97	759.8	15
11/02/2001	9:45	5.7	155	11.5	91	759.7	10
11/02/2001	10:00	5.4	156	12.4	86	759.8	13
11/02/2001	10:15	3.7	171	13.3	82	760.0	21
11/02/2001	10:30	3.5	164	14.2	79	760.1	22
11/02/2001	10:45	2.7	148	15.0	75	760.3	33

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/02/2001	11:00	2.7	219	15.6	73	760.6	30
11/02/2001	11:15	2.5	246	16.3	70	760.9	44
11/02/2001	11:30	2.3	301	16.9	68	761.0	41
11/02/2001	11:45	3.8	339	17.4	67	760.9	23
11/02/2001	12:00	4.1	322	18.0	65	760.9	22
11/02/2001	12:15	5.4	289	18.4	64	760.8	20
11/02/2001	12:30	8.6	290	18.5	67	760.9	15
11/02/2001	12:45	9.9	303	17.9	70	760.9	12
11/02/2001	13:00	11.3	297	17.5	71	760.9	10
11/02/2001	13:15	10.8	300	17.2	72	760.9	11
11/02/2001	13:30	10.3	308	16.9	72	760.7	11
11/02/2001	13:45	10.7	301	16.8	71	760.7	8
11/02/2001	14:00	8.9	315	16.7	72	760.6	14
11/02/2001	14:15	9.4	327	16.8	73	760.6	11
11/02/2001	14:30	9.9	329	16.5	74	760.6	10
11/02/2001	14:45	10.0	340	16.4	74	760.6	9
11/02/2001	15:00	9.6	337	16.3	73	760.5	10
11/02/2001	15:15	11.5	324	16.1	73	760.5	8
11/02/2001	15:30	13.2	321	15.2	79	760.6	8
11/02/2001	15:45	13.6	323	13.6	84	760.5	8
11/02/2001	16:00	13.7	325	13.0	87	760.5	10
11/02/2001	16:15	13.9	326	12.4	89	760.6	8
11/02/2001	16:30	12.5	324	12.1	90	760.6	7
11/02/2001	16:45	12.6	308	12.0	90	760.5	8
11/02/2001	17:00	11.6	320	11.8	91	760.4	13
11/02/2001	17:15	10.5	335	11.8	91	760.4	9
11/02/2001	17:30	8.9	331	11.9	91	760.3	8
11/02/2001	17:45	7.5	317	11.9	90	760.3	8
11/02/2001	18:00	6.3	335	12.0	90	760.3	14
11/02/2001	18:15	7.0	341	12.1	89	760.3	8
11/02/2001	18:30	6.8	333	12.1	88	760.3	8
11/02/2001	18:45	6.7	332	12.0	88	760.3	13
11/02/2001	19:00	6.7	351	12.0	89	760.2	8
11/02/2001	19:15	6.3	325	11.9	89	760.2	9
11/02/2001	19:30	7.2	322	11.8	90	760.2	9
11/02/2001	19:45	7.4	342	11.9	90	760.2	6
11/02/2001	20:00	8.5	339	11.9	90	760.3	7
11/02/2001	20:15	8.3	341	11.9	90	760.3	9
11/02/2001	20:30	7.4	341	11.9	90	760.3	8
11/02/2001	20:45	6.9	314	11.9	90	760.3	9
11/02/2001	21:00	5.8	313	11.7	91	760.4	10

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/02/2001	21:15	5.0	311	11.6	91	760.4	7
11/02/2001	21:30	5.0	314	11.7	91	760.5	8
11/02/2001	21:45	4.2	323	11.6	91	760.6	15
11/02/2001	22:00	3.6	348	11.6	92	760.7	11
11/02/2001	22:15	4.0	356	11.6	92	760.7	14
11/02/2001	22:30	2.9	338	11.6	92	760.7	31
11/02/2001	22:45	2.5	306	11.6	92	760.7	43
11/02/2001	23:00	1.6	20	11.5	92	760.6	43
11/02/2001	23:15	2.2	93	11.5	92	760.5	30
11/02/2001	23:30	2.5	138	11.4	93	760.5	39
11/02/2001	23:45	1.7	184	11.3	93	760.4	41
11/02/2001	24:00:00	2.5	136	11.3	93	760.4	48
11/03/2001	0:15	2.1	234	11.2	94	760.5	55
11/03/2001	0:30	1.3	78	11.2	94	760.6	49
11/03/2001	0:45	2.7	108	11.3	93	760.7	32
11/03/2001	1:00	2.4	114	11.2	93	760.7	19
11/03/2001	1:15	2.9	124	11.1	93	760.7	23
11/03/2001	1:30	2.8	119	11.0	94	760.7	19
11/03/2001	1:45	3.9	104	10.8	95	760.6	8
11/03/2001	2:00	4.8	113	10.6	96	760.6	8
11/03/2001	2:15	4.2	112	10.3	98	760.6	9
11/03/2001	2:30	2.2	77	10.3	98	760.6	16
11/03/2001	2:45	2.4	70	10.4	98	760.6	15
11/03/2001	3:00	3.7	84	10.3	98	760.6	9
11/03/2001	3:15	4.5	117	10.3	99	760.6	15
11/03/2001	3:30	5.3	109	10.1	98	760.6	8
11/03/2001	3:45	5.6	117	10.1	99	760.5	8
11/03/2001	4:00	6.5	125	10.2	99	760.4	8
11/03/2001	4:15	7.6	140	10.2	98	760.4	10
11/03/2001	4:30	7.2	138	10.2	98	760.5	13
11/03/2001	4:45	6.9	137	10.3	97	760.5	10
11/03/2001	5:00	6.7	135	10.2	97	760.5	7
11/03/2001	5:15	6.7	134	10.2	98	760.5	10
11/03/2001	5:30	6.4	132	10.1	98	760.5	11
11/03/2001	5:45	6.4	122	9.8	98	760.5	12
11/03/2001	6:00	5.4	125	9.7	99	760.6	16
11/03/2001	6:15	5.0	107	9.5	99	760.6	10
11/03/2001	6:30	5.4	116	9.6	99	760.7	8
11/03/2001	6:45	5.0	114	9.7	99	760.8	9
11/03/2001	7:00	4.6	111	9.6	100	760.9	9
11/03/2001	7:15	6.2	135	9.7	100	761.0	18

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/03/2001	7:30	7.5	131	9.8	100	761.0	10
11/03/2001	7:45	7.6	132	9.7	99	761.2	9
11/03/2001	8:00	7.4	142	9.8	98	761.4	12
11/03/2001	8:15	6.5	150	9.8	96	761.5	11
11/03/2001	8:30	5.2	152	10.0	94	761.7	11
11/03/2001	8:45	4.3	151	10.1	93	761.8	18
11/03/2001	9:00	3.8	142	10.5	91	762.0	25
11/03/2001	9:15	3.1	142	10.9	89	762.1	31
11/03/2001	9:30	2.2	123	11.3	88	762.2	54
11/03/2001	9:45	3.4	152	12.1	85	762.3	22
11/03/2001	10:00	4.7	137	12.8	82	762.4	21
11/03/2001	10:15	4.3	145	13.4	79	762.6	17
11/03/2001	10:30	4.6	142	14.5	74	762.6	21
11/03/2001	10:45	2.6	124	14.9	73	762.6	62
11/03/2001	11:00	2.9	189	15.8	69	762.6	36
11/03/2001	11:15	2.4	151	16.2	68	762.6	52
11/03/2001	11:30	2.4	270	16.7	68	762.6	49
11/03/2001	11:45	3.0	318	17.0	68	762.7	16
11/03/2001	12:00	4.6	307	17.6	66	762.7	16
11/03/2001	12:15	6.6	302	17.9	67	762.6	14
11/03/2001	12:30	8.2	301	17.8	70	762.6	14
11/03/2001	12:45	8.1	308	17.6	70	762.5	12
11/03/2001	13:00	9.8	300	17.0	74	762.4	9
11/03/2001	13:15	9.5	301	16.7	76	762.3	11
11/03/2001	13:30	8.8	306	16.3	77	762.3	12
11/03/2001	13:45	8.4	310	16.1	77	762.1	12
11/03/2001	14:00	7.9	311	16.3	77	762.0	14
11/03/2001	14:15	7.6	297	16.3	77	761.9	11
11/03/2001	14:30	6.8	307	16.3	76	761.7	12
11/03/2001	14:45	5.6	313	16.4	76	761.6	13
11/03/2001	15:00	5.6	318	16.8	75	761.5	15
11/03/2001	15:15	5.2	300	17.2	74	761.4	18
11/03/2001	15:30	5.0	315	17.3	73	761.4	16
11/03/2001	15:45	5.9	311	17.3	73	761.4	12
11/03/2001	16:00	6.7	314	17.1	73	761.3	10
11/03/2001	16:15	7.9	319	16.7	74	761.3	6
11/03/2001	16:30	9.4	318	15.7	77	761.2	5
11/03/2001	16:45	11.6	320	14.2	82	761.2	5
11/03/2001	17:00	11.8	325	12.5	90	761.2	7
11/03/2001	17:15	11.6	323	11.9	94	761.2	6
11/03/2001	17:30	10.0	320	12.0	95	761.1	11

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/03/2001	17:45	8.8	323	11.9	95	761.0	9
11/03/2001	18:00	9.8	334	11.9	96	760.9	11
11/03/2001	18:15	7.5	321	11.9	96	760.9	11
11/03/2001	18:30	8.5	329	11.8	97	760.8	11
11/03/2001	18:45	7.4	326	11.6	98	760.8	13
11/03/2001	19:00	6.7	331	11.6	98	760.8	16
11/03/2001	19:15	5.1	312	11.5	98	760.8	8
11/03/2001	19:30	4.0	323	11.5	99	760.7	11
11/03/2001	19:45	4.1	343	11.6	100	760.6	18
11/03/2001	20:00	3.1	344	11.7	100	760.6	24
11/03/2001	20:15	2.4	322	11.7	100	760.6	22
11/03/2001	20:30	2.5	316	11.6	100	760.5	28
11/03/2001	20:45	2.7	324	11.6	100	760.6	26
11/03/2001	21:00	1.9	290	11.5	100	760.6	22
11/03/2001	21:15	1.2	292	11.5	100	760.6	45
11/03/2001	21:30	2.4	116	11.4	100	760.6	47
11/03/2001	21:45	2.6	124	11.4	100	760.5	18
11/03/2001	22:00	3.1	125	11.4	100	760.5	19
11/03/2001	22:15	2.3	145	11.2	100	760.4	32
11/03/2001	22:30	2.5	109	11.0	100	760.4	15
11/03/2001	22:45	3.4	115	10.6	100	760.4	15
11/03/2001	23:00	3.0	99	10.5	100	760.3	11
11/03/2001	23:15	3.2	118	10.4	100	760.3	14
11/03/2001	23:30	3.5	110	10.3	100	760.2	9
11/03/2001	23:45	4.2	125	10.4	100	760.1	12
11/03/2001	24:00:00	4.6	129	10.5	100	760.0	9
11/04/2001	0:15	4.3	134	10.4	100	759.9	11
11/04/2001	0:30	2.2	103	10.4	100	759.9	27
11/04/2001	0:45	3.0	103	10.3	100	759.8	21
11/04/2001	1:00	5.1	133	10.2	100	759.7	17
11/04/2001	1:15	3.5	133	10.1	100	759.7	19
11/04/2001	1:30	2.1	93	10.1	100	759.6	17
11/04/2001	1:45	2.6	127	9.9	100	759.6	23
11/04/2001	2:00	3.1	116	9.8	100	759.6	20
11/04/2001	2:15	3.3	106	9.7	100	759.5	9
11/04/2001	2:30	4.5	123	9.7	100	759.4	8
11/04/2001	2:45	4.1	123	9.8	100	759.2	12
11/04/2001	3:00	3.0	103	9.6	100	759.1	16
11/04/2001	3:15	1.8	115	9.5	100	759.1	42
11/04/2001	3:30	3.2	106	9.5	99	759.0	11
11/04/2001	3:45	4.1	119	9.3	99	759.0	15

Export Filename : C:\MICROMET\CHLRPC\EXPORT\01102901.TXT
Export data for station : Chavez Farm
Printing Date : 2002/04/22

Date	Time	WS (KNT)	WD (Deg)	AT (C)	RH (%RH)	BP (mmHg)	Sigma (Deg)
11/04/2001	4:00	5.0	124	9.0	100	758.9	11
11/04/2001	4:15	5.0	118	8.8	100	758.9	13
11/04/2001	4:30	3.6	109	8.4	100	758.9	16
11/04/2001	4:45	3.7	123	8.4	100	758.9	13
11/04/2001	5:00	4.3	124	8.3	100	758.7	12
11/04/2001	5:15	4.5	131	8.5	100	758.6	12
11/04/2001	5:30	4.8	136	8.5	100	758.6	11
11/04/2001	5:45	4.4	130	8.5	100	758.6	8
11/04/2001	6:00	5.3	131	8.7	100	758.6	13
11/04/2001	6:15	5.8	133	8.5	100	758.6	6
11/04/2001	6:30	6.6	125	8.2	100	758.6	10
11/04/2001	6:45	6.4	129	8.4	100	758.6	6
11/04/2001	7:00	4.0	135	8.6	99	758.6	16
11/04/2001	7:15	1.5	85	8.8	96	758.5	76
11/04/2001	7:30	2.2	312	9.5	91	758.6	42
11/04/2001	7:45	2.2	187	10.0	90	758.8	58
11/04/2001	8:00	3.1	179	10.8	88	759.2	22
11/04/2001	8:15	8.3	146	11.3	85	759.6	8
11/04/2001	8:30	9.5	140	11.8	87	759.7	7
11/04/2001	8:45	10.0	131	12.8	85	759.9	7
11/04/2001	9:00	10.6	132	14.2	77	759.9	8
11/04/2001	9:15	8.8	137	15.1	72	759.9	8

APPENDIX V

CHLOROPICRIN APPLICATION FIELD LOG SHEETS

CARTRIDGE LOG SHEET

Project: Chloropicrin Application Air Monitoring in Monterey or Santa Cruz County

Project #: P-01-002 On Flow: 90 ±2ccm Off Flow: 90 ccm ±10%

Log #	Sample Name	Sampler ID Number	Date On / Off	Time On / Off	Counter On / Off	Flow On / Off	Leak On / Off	Comments	Weather K,P,C,F&R On / Off	Initials On / Off
001	CEB-1	MI-1	10/29/01	1519	98.9	✓90	NA		C	SR
			10/30/01	1340	77 121.3	77		1 Bat. change	C	JRR
002	CEBFS-1	MF-1	10/29/01	1522	393.7	90	NA		C	SR
			10/30/01	1243	416.0	80		1 Bat. change	C	JRR
003	CWB-1	ME-1	10/29/01	1532	98.2	✓90	NA		C	JRR
			10/30/01	1353	120.5	70		1 Bat. change	C	MR
004	CWBFS-1	MA-1	10/29/01	1535	186.1	90	NA		C	JRR
			10/30/01	1357	208.5	4		1 Bat. change	C	JRR
005	CSB-1	MB-1	10/29/01	1545	71.2	90	NA		C	SR
			10/30/01	1414	93.7	87		1 Bat. change	C	JRR
006	CSBFS-1	MJ-1	10/29/01	1547	31.2	90	NA		C	SR
			10/30/01	1417	53.7	79		1 Bat. change	C	JRR
007	CNB-1	MH-1	10/29/01	1600	84.6	90	NA		C	SR
			10/30/01	1433	107.2	86		1 Bat. change	C	JRR
008	CNBFS-1	MC-1	10/29/01	1602	167.7	90	NA		C	SR
			10/30/01	1435	190.3	89		1 Bat. change	C	JRR
009	CEB-2	MF-1	10/30/01	1452	416.1	90	12.3	2 Bats. old	C	JRR
			10/31/01	0938	434.8	85	11.0		K	AR
010	CNB-2	MC-1	10/30/01	1506	190.3	90	12.8	2 Bats. old @0905 CHANGED BAT OLD 11.4 NEW 12.8	C	JRR
			10/31/01	0951	209.0	88	12.6		K	AR
011	CWB-2	ME-1	10/30/01	1525	120.5	90	12.1	2 Bats. old @ 1363/0832 replaced	C	JRR
			10/31/01	1002	137.8	86	12.4	Bat./Not running @ 5.2V1/87cc	K	AR
012	CSB-2	MB-1	10/30/01	1537	93.1	90	12.5	2 Bats. old @0917 CHANGED BAT OLD 11.3 NEW 13.1 FLOW WAS 88 NOW 94	C	JRR
			10/31/01	1012	112.2	91	12.6		K	AR
013	CEB-3	MI-1	10/31/01	1159	439.0 ~~451.8~~	90	12.8	APPLICATION START TIME 1204	K	AR
			10/31/01	1626	439.4	94	12.2	CAP REMOVED AT 1159	C	AR
014	CNE-3	MD-1	10/31/01	1157	121.3	✓90	12.7		K	AR
			10/31/01	1640	126.0	80	12.4		C	AR
015	CN-3	MC-1	10/31/01	1205	209.0	90	12.7		K	AR
			10/31/01	1651	213.8	94	12.4		C	AR
016	CN-3C	MH-1	10/31/01	1206	107.2	90	12.7		K	AR
			10/31/01	1656	112.0	95	12.7		C	AR
017	CNW-3	MG-1	10/31/01	1217	19.7	90	12.7		K	AR
			10/31/01	1709	24.6	82	12.6		C	AR
018	CW-3	ME-1	10/31/01	1226	137.8	✓90	12.7		K	AR
			10/31/01	1722	142.7	77	12.3		C	AR

MFM Used # 2000-119

Weather codes: K = Clear, P = Partly Cloudy, C = ≥67% Cloudy, F = Fog, and R = Rain (any)

CARTRIDGE FIELD LOG SHEET

Project: Chloropicrin Application Air Monitoring in Monterey or Santa Cruz County

Project #: P-01-002 On Flow: 90 ±2ccm Off Flow: 90 ccm ±10%

Log #	Sample Name	Sampler ID Number	Date On / Off	Time On / Off	Counter On / Off	Flow On / Off	Leak On / Off	Comments	Weather K,P,C,F&R On / Off	Initials On / Off
019	CSW-3	MJ-1	10/31/01	1235	53.7	✓ 90	12.7		K	AK
			10/31/01	1740	58.8	100	12.3		C	AK
020	CS-3	MB-1	10/31/01	1240	112.2	90	12.9		K	AK
			10/31/01	1750	117.4	93	12.6		C	AK
021	CSE-3	MA-1	10/31/01	1246	208.5	✓ 90	12.6		K	AK
			10/31/01	1800	213.7	100	12.6		C	AK
022	CE-4	MF-1 / ~~ME-1~~	10/31/01	1628	439.4	90	12.9	✓	C	AK
			11/1/01	~~1808~~ 0828	453.7	90	12.0		K	AK
023	CNE-4	MD-1	10/31/01	1643	126.0 ~~24.6~~	90	12.8		C	AK
			11/1/01	0700	140.3	95	12.2		K	AK
024	CN-4	MC-1	10/31/01	1653	213.8	✓ 90	13.0		C	AK
			11/1/01	0711	228.1	48	12.8		K	AK
025	CN-4C	MH-1	10/31/01	1656	112.0	90	13.0		C	AK
			11/1/01	0717	126.3	84	12.8		K	AK
026	CNW-4	MG-1	10/31/01	1513	24.6	90	13.1	HELICOPTER WOULD NOT ALLOW US IN AREA DUE TO SPRAYING	C	AK
			11/01/01	0842	40.0	89	12.8	SAMPLE PULLED AT END OF SEQUENCE.	K	AK
027	CW-4	ME-1	10/31/01	1725	142.7	✓ 90	13.15	✓	C	AK
			11/1/01	0735	156.9	Ø	12.7	Moisture Out of Sequence due to Spray Arid	K	AK
028	CSW-4	MJ-1	10/31/01	1744	58.8	90	13.1		C	AK
			11/1/01	0755	73.0	84	12.5	✓	F	AK
029	CS-4	MB-1	10/31/01	1754	117.4	90	13.2	✓ ~~AK~~	C	AK
				0803	131.6	93	12.3		F	AK
030	CSE-4	MA-1	10/31/01	1803	213.7	✓ 90	13.0	✓	C	AK
			11/1/01	0815	227.9	53.0	12.6		K	AK
~~031~~	~~CNE-4~~	MD-1	10/31/01	1643	126.0	90	12.8	✓	C	AK
			11/01/01	~~0700~~	140.3	95	12.2	SEE LINE 023	K	AK
~~032~~	~~CN-4~~	MC-1	10/31/01	1653	213.8	90	13.0	✓	C	AK
			11/1/01	0711	228.1	48	12.8	SEE LINE 024	K	AK
~~033~~	~~CN-4C~~	MH-1	10/31/01	1656	112.0	90	13.0		C	AK
			11/1/01	0717	126.3	84	12.8	✓ SEE LINE 025	K	AK
031	CE-5	MF-1	11/1/01	0655	453.7	✓ 90	12.9		K	AK
			11/1/01	1533	462.4	76	11.4	✓	K	AK
032	CNE-5	MD-1	11/1/01	0702	140.3	90	12.7		K	AK
			11/1/01	1548	149.0	84	11.8	✓	K	AK
033	CN-5	MC-1	11/1/01	0715	228.1	90	13.1	✓	K	AK
			11/1/01	1603	236.9	84	11.7	✓	K	AK

MFM Used # 20005345

Weather codes: K = Clear, P = Partly Cloudy, C = ≥67% Cloudy, F = Fog, and R = Rain (any)

CARTRIDGE FIELD LOG SHEET

Project: Chloropicrin Application Air Monitoring in Monterey or Santa Cruz County

Project #: P-01-002 On Flow: 90 ±2ccm Off Flow: 90 ccm ±10%

Log #	Sample Name	Sampler ID Number	Date On / Off	Time On / Off	Counter On / Off	Flow On / Off	Leak On / Off	Comments	Weather K,P,C,F&R On / Off	Initials On / Off
034	CN-5C	mH-1	11/1/01	0720	126.4	90	13.3	APPLICATION STARTED 0730 DAY 2	K	AR
			11/1/01	1609	135.2	87	12.3		K	AR
035	CNW-5	mG-1	11/1/01	0846	40.1	90	13.3	Delayed on due to aerial spraying to N adj. field	K	AR
			11/1/01	1623	47.7	83	12.0		K	AR
036	CW-5	mE-2	11/1/01	0738	156.9	90	12.9	Start out of sequence due to aerial spray	F	AR
		~~mE-1~~	11/1/01	1626	165.8	50	11.6	Chgd to mE-2 due to moisture	K	AR
037	CSW-5	mJ-1	11/1/01	0757	73.1	90	12.7	✓	F	AR
			11/1/01	1653	81.9	77	9.6		K	AR
038	CS-5	mB-1	11/1/01	0807	131.6	90	13.4	✓	K	AR
			11/1/01	1702	140.5	87	11.9		K	AR
039	CSE-5	mA-1	11/1/01	0823	227.9	90	12.9		K	AR
			11/1/01	1712	236.8	85	11.3		K	AR
040	CE-6	mF-1	11/1/01	1535	462.4	90	12.6	- Installed Plastic Bag Rain Shield All	K	AR
			11/2/01	0633	477.4	89	~~12.4~~ 11.6	Saw Aerial Spraying ✓ 11/2	F	AR
041	CNE-6	mD-1	11/1/01	1553	149.0	90	12.4		K	AR
			11/2/01	0802	165.2	98	11.4		F	AR
042	CN-6	mC-1	11/1/01	1607	236.9	90	13.0	✓	K	AR
			11/2/01	0826	253.2	91	12.3	○	F	AR
043	CN-6C	mH-1	11/1/01	1613	135.2	90	13.0		K	AR
			11/2/01	0827	151.4	91.5	12.5	○	F	AR
044	CNW-6	mG-1	11/1/01	1627	47.7	90	12.8	⊕	K	AR
			11/2/01	0848	64.0	94	12.0		C	AR
045	CW-6	mE-2	11/1/01	1641	165.8	90	12.9		K	AR
			11/2/01	0652	180.0	89	11.8		F	AR
046	CSW-6	mJ-1	11/1/01	1657	81.9	90	12.9		K	AR
			11/2/01	0710	96.1	88	11.7		F	AR
047	CS-6	mB-1	11/1/01	1706	140.5	90	13.1	Found tube on ground diffs for James	K	AR
			11/2/01	0719	154.7	85	11.8		F	AR
048	CSE-6	mA-1	11/1/01	1718	236.8	90	13.1	DAY 2	K	AR
			11/2/01	0734	251.0	94	12.2	APPLICATION STOPPED AT ~~#5~~ 1730	F	AR
049	CE-7	mF-1	11/2/01	0635	477.4	90	12.9	DAY 3 APPLICATION WAS IN PROGRESS AT 0630. ALSO HELICOPTER SPRAYING CNE + CN SITES AT 0630	F	AR
			11/2/01	1528	486.2	81	—		K	AR
050	CNE-7	mD-1	11/2/01	0806	165.2	90	13.3		F	AR
			11/2/01	1545	172.8	86	12.0		K	AR
051	CN-7	mC-1	11/2/01	0833	253.2	90	12.7		F	AR
			11/2/01	1558	260.6	86	12.1	FIELD SMELLED OF FUNGICIDE	K	AR

MFM Used # 20005345 Page 3 of 6

Weather codes: K = Clear, P = Partly Cloudy, C = ≥67% Cloudy, F = Fog, and R = Rain (any)

CARTRIDGE FIELD LOG SHEET

Project: Chloropicrin Application Air Monitoring in Monterey or Santa Cruz County

Project #: P-01-002 On Flow: 90 ±2ccm Off Flow: 90 ccm ±10%

Log #	Sample Name	Sampler ID Number	Date On / Off	Time On / Off	Counter On / Off	Flow On / Off	Leak On / Off	Comments	Weather K,P,C,F&R On / Off	Initials On / Off
052	CN7-C	MH-1	11/2/01	0836	151.4	90	13.1		F	AR
			11/2/01	1603	158.9	88	12.3	FIELD SMELLED OF FUNGICIDE	C	[illegible]
053	CNW-7	MG-1	11/2/01	0853	64.01	90	13.6		C	[illegible]
			11/2/01	1612	71.5	89	12.5		C	[illegible]
054	CW-7	ME-2	11/2/01	0657	180.0	90	12.9		F	[illegible]
			11/2/01	1630	189.6	85	11.6		C	[illegible]
055	CSW-7	MJ-1	11/2/01	0713	96.1	✓ 90	13.3		F	[illegible]
			11/2/01	1645	105.2	Ø		Ø Flow due to irrigation	C	[illegible]
056	CB-7	MB-1	11/2/01	0724	154.7	90	12.9		F	[illegible]
			11/2/01	1656	164.2	88	12.1		C	[illegible]
057	CSE-7	MA-1	11/2/01	0737	251.0	90	13.3		F	[illegible]
			11/2/01	1703	260.5	82	12.3		C	[illegible]
058	CTS-1	NA	11/2/01	0930	N/A	N/A	N/A	TRIP SPIKE	K	[illegible]
			11/2/01	0930						
059	CTS-2	NA	11/2	0930				" "		
			11/2	0930						
060	CTS-3	NA	11/2	0930				" "		
			11/2	0930						
061	CTS-4	NA	11/2	0930				" "		
			11/2/01	0930	N/A	N/A	N/A		K	[illegible]
062	CTB-7	NA	11/2/01	0980	NA	NA	NA	TRIP BLANK	K	AR
			—	—	—	—	—			
063	CE-8	MF-1	11/2/01	1538	486.2	90	12.7		K	AR
			11/3/01	0636	501.2	84	11.6		F	[illegible]
064	CNE-8	MD-1	11/2/01	1549	172.8	90	12.9		K	[illegible]
			11/3/01	0650	187.8	94	12.1		F	[illegible]
065	CN-8	MC-1	11/2/01	1601	260.6	90	12.8		C	[illegible]
			11/3/01	0704	275.6	90	12.2		F	[illegible]
066	CN-8C	MH-1	11/2/01	1606	158.9	90	12.9		C	[illegible]
			11/3/01	0708	173.9	91	12.4		F	[illegible]
067	CNW-8	MG-1	11/2/01	1620	71.5	90	12.8 ✓		C	[illegible]
			11/3/01	0723	86.5	90	12.1		C	[illegible]
068	CW-8	MG-2	11/2/01	1634	189.6	90	13		C	[illegible]
			11/3/01	0736	204.6	85	11.9		C	[illegible]
069	CSW-8	MJ-1	11/2/01	1650	105.7	✓ 90	13.1		C	[illegible]
			11/3/01	0752	120.7	85	11.4			[illegible]

MFM Used # 20005345 Page 4 of 6

Weather codes: K = Clear, P = Partly Cloudy, C = ≥67% Cloudy, F = Fog, and R = Rain (any)

CARTRIDGE [illegible]D LOG SHEET

Project: Chloropicrin Application Air Monitoring in Monterey or Santa Cruz County

Project #: P-01-002 On Flow: 90 ±2ccm Off Flow: 90 ccm ±10%

Log #	Sample Name	Sampler ID Number	Date On / Off	Time On / Off	Counter On / Off	Flow On / Off	Leak On / Off	Comments	Weather K,P,C,F&R On / Off	Initials On / Off
070	CS-8	MB-1	11/2/01	1659	164.2	90	13.1	✓	C	[illegible]
			11/3/01	0801	179.3	89	12.3		C	[illegible]
071	CSE-8	MA-1	11/2/01	1709	260.5	90	13.1		C	[illegible]
			11/3/01	0810	275.5	93	11.9		C	[illegible]
072	CE-9	ME-1	11/3/01	0641	501.2	90	12.8	Aerial spraying field due East of site	F	[illegible]
			11/3/01	1535	510.1	81	16.5		C	[illegible]
073	CNE-9	MD-1	11/3/01	0655	187.9	90	13.3		F	[illegible]
			11/3/01	1545	196.7	82	11.8		K	[illegible]
074	CN-9	MC-1	11/3/01	0707	275.7	90	13.2		F	[illegible]
			11/3/01	1555	284.4	82	11.8		K	[illegible]
075	CN-9C	MH-1	11/3/01	0711	173.9	90	12.9		F	[illegible]
			11/8/01	1558	182.7	87	11.8		K	[illegible]
076	CNW-9	MG-1	11/3/01	0727	86.5	90	12.9		C	[illegible]
			11/3/01	1609	95.2	85	11.8		K	[illegible]
077	C~~N~~W-9	ME-1	11/3/01	0740	204.6	90	13.0		C	[illegible]
			11/3/01	1623	213.3	82	11.5		F	[illegible]
078	CSW-9	MJ-1	11/3/01	0755	120.7	90	13.2	TUBE BROKE ON REMOVAL	C	[illegible]
			11/3/01	1638	129.4	86	11.6		K	[illegible]
079	CS-9	MB-1	11/3/01	0803	179.3	90	13.2		C	[illegible]
			11/3/01	1649	188.0	88	11.7		K	[illegible]
080	CSE-9	MA-1	11/3/01	0814	275.5	90	13.3		C	[illegible]
			11/3/01	1658	284.2	90	12.0		K	[illegible]
081	CE-10	MF-1	11/3/01	1537	510.1	90	12.7	✓	K	[illegible]
			11/4/01	0654	525.4	89	11.5		K	[illegible]
082	CNE-10	MD-1	11/3/01	1547	196.7	90	12.6		K	[illegible]
			11/4/01	0703	211.9	99	11.4		K	[illegible]
083	CN-10	MC-1	11/3/01	1557	284.4	90	12.6		K	[illegible]
			11/4/01	0710	299.6	92	11.8		K	[illegible]
084	CN-10C	MH-1	11/3/01	1601	182.7	90	13.0		K	[illegible]
			11/4/01	0712	197.9	94	12.0		K	[illegible]
085	CNW-10	MG-1	11/3/01	1611	95.2	90	12.6		K	[illegible]
			11/4/01	0724	110.4	94	11.7		K	[illegible]
086	CW-10	ME-1	11/3/01	1625	213.3	90	12.8		K	[illegible]
			11/4/01	0734	228.4	84	11.5		K	[illegible]
087	CSW-10	MJ-1	11/3/01	1642	129.4	90	12.9		K	[illegible]
			11/4/01	0746	144.5	86	11.1		K	[illegible]
088	CS-10	MB-1	11/3/01	1653	188.0	90	13.1		K	[illegible]
			11/4/01	0759	203.1	89	11.5		K	[illegible]

MFM Used # 2000 5745

Weather codes: K = Clear, P = Partly Cloudy, C = ≥67% Cloudy, F = Fog, and R = Rain (any)

89	CSE-10	MA-1	11/3/01	1702	299.3	89	~~12.0~~ 13.1v	K
			11/4/01	0807	284.2	90	11.7	K

APPENDIX VI

METHOD VALIDATION DATA

Winston H. Hickox
Agency Secretary

Air Resources Board

Alan C. Lloyd, Ph.D.
Chairman
1001 I Street • P.O. Box 2815 • Sacramento, California 95812 • www.arb.ca.gov

Gray Davis
Governor

MEMORANDUM

TO: Kevin Mongar
Operations Planning and Assessment Section

FROM: Russell Grace, Manager
Special Analysis Section

DATE: August 6, 2001

SUBJECT: METHOD VALIDATION DATA

The Special Analysis Section provides laboratory support for the pesticide air monitoring program implemented by the ARB at the request of the Department of Pesticide Regulation. One of the responsibilities of the SAS is laboratory analytical method development. By way of this memo, we are providing you with the method validation data generated in the development of analytical methods for 1,3-dichloropropene (DCP or Telone), methyl isothiocyanate (MITC), methyl isocyanate (MIC), and trichloronitromethane (TCNM) for the 2001 monitoring season. The attached tables contain the currently available data generated to determine the method detection limits (MDLs), estimated quantitation limits (EQLs), reproducibility, recovery, and sample stability.

All of the available method validation findings were summarized in the standard operating procedures (SOPs) for each of the target analytes. These SOPs were previously provided to you.

If you have any questions, please contact Terry Houston at 322-2365 or me at 322-0223.

Enclosures
cc: Jeff Cook
Michael Poore
Terry Houston

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Website: http://www.arb.ca.gov.

California Environmental Protection Agency

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1,3-DICHLOROPROPENE (DCP OR TELONE)

METHOD DETECTION LIMIT

Column is Restek Rtx 200, 60 m x 320 u 1.5 u film	c-DCP (ng/ml)		t-DCP (ng/ml)	
	01/23/01	01/24/01	01/23/01	01/24/01
	5.13	6.12	4.90	5.91
	5.28	6.27	4.79	5.96
	5.26	6.01	4.82	5.87
	5.13	5.86	4.61	5.68
	5.04	5.92	4.87	5.8
	4.86	5.82	4.36	5.58
	5.00	5.65	4.51	5.72
Average	5.10	5.95	4.69	5.79
Standard Deviation	0.15	0.20	0.20	0.14
MDL c-DCP/t-DCP	**2.0 ng/ml**			
EQL (5xMDL) X3ml	**10.0 ng/ml** **30.0 ng/sample**			

DCP Standard is 48% cis and 49% trans isomers.

INSTRUMENT REPRODUCIBILITY

Amount (ng/ml)	Area response	ng/ml	Area response	ng/ml
10 (4.8/4.9)	684	4.72	628	4.74
	672	4.62	629	4.75
	681	4.69	681	5.17
	680	4.68	692	5.26
	684	4.72	669	5.08
Average	680	4.69	660	5.00
Standard Dev.	4.9	0.04	29.7	0.24
Coeff. Of Variation	0.7%	0.8%	4.5%	4.8%
40 (19.2/19.6)	2584	19.06	2472	19.69
	2599	19.18	2431	19.36
	2535	18.69	2394	19.06
	2530	18.66	2396	19.08
	2528	18.64	2405	19.15
Average	2555	18.85	2420	19.27
Standard Dev.	33.7	0.25	32.8	0.26
Coeff. Of Variation	1.3%	1.3%	1.3%	1.3%
100 (48.0/49.0)	6559	49.08	6282	50.58
	6581	49.25	6217	50.05
	6582	49.26	6292	50.66
	6604	49.42	6294	50.68
	6558	48.72	6284	49.77
Average	6577	49.15	6274	50.5
Standard Dev.	19.1	0.27	32.2	0.41
Coeff. Of Variation	0.3%	0.5%	0.5%	0.8%

METHYL ISOTHIOCYANATE (MITC)

METHOD DETECTION LIMIT

Column is Restek Rtx 200, 60 m x 320 u 1.5 u film	23 January 2001 µg/ml	24 January 2001 µg/ml
	1.35	0.55
	1.34	0.55
	1.32	0.54
	1.33	0.53
	1.34	0.53
	1.33	0.51
	1.31	0.52
Average	1.33	0.53
Standard deviation	0.01	0.01
MDL	**0.04 ug/ml**	
EQL (5xMDL) X3ml	**0.20 ug/ml 0.60 ug/sample**	

INSTRUMENT REPRODUCIBILITY

Amount (µg/ml)	area response	µg/ml
0.5 µg/ml	241768	0.57
	236231	0.56
	237966	0.56
	236467	0.56
	232177	0.55
Average	236922	0.56
Standard Dev.	3456	0.007
Coeff. of Variation	1.3%	1.5%
2.0 µg/ml	899037	2.12
	893388	2.10
	883264	2.08
	887269	2.09
	865564	2.04
Average	885762	2.09
Standard Dev.	12641	0.030
Coeff. of Variation	1.4%	1.4%
5.0 µg/ml	2216399	5.22
	2210700	5.20
	2202629	5.18
	2205529	5.19
	2200708	5.18
Average	2207193	5.19
Standard Dev.	6378	0.017
Coeff. of Variation	0.3%	0.3%

METHYL ISOCYANATE (MIC)

METHOD DETECTION LIMIT

18 May 2001	ug/ml
	0.005
	0.005
	0.004
	0.003
	0.004
	0.003
	0.005
Average	0.004
Stdev	0.001
MDL= 3.14 * stdev	**0.003 ug/ml**
EQL= 5 x MDL	**0.015 ug/ml**
x 3 ml	**0.42 ug/sample**

INSTRUMENT REPRODUCIBILITY

Amount (µg/ml)	µg/mL	area response
0.013 µg/mL	0.013	1.838
	0.012	1.867
	0.012	1.879
	0.012	1.854
	0.012	1.913
Average	0.012	1.870
Standard Deviation	0.0	0.028
0.078 µg/mL	0.075	11.912
	0.075	11.827
	0.075	11.882
	0.076	11.967
	0.075	11.866
Average	0.075	11.891
Standard Deviation	0.0	0.052
0.260 µg/mL	0.261	41.254
	0.255	40.253
	0.256	40.455
	0.257	40.603
	0.278	43.821
Average	0.261	41.277
Standard Deviation	0.010	1.471

METHYL ISOCYANATE (MIC) cont.

EXTRACTION STUDIES

	Spiked Amount (ug/ml)	Recovery (ug/ml)
2-PP+MIC	0.2	0.157
		0.210
		0.205
		0.169
	1.0	0.922
		0.850
XAD7+CAN+MIC	0.2	0.200
		0.133
	1.0	0.095
		0.921
		0.701
		0.598
XAD7 Spikes (in vial)	0.1	0.057
		0.066
	0.2	0.141
		0.134
		0.135
		0.129
	1.0	0.647
		0.645
		0.554
		0.568
	1.5	1.49
		1.42
Field Spikes	0.015	0.003
		0.003
		0.003
	0.1	0.028
		0.058
	0.2	0.119
		0.072
		0.105
		0.099
	1.0	0.475
		0.470
		0.516
		0.501
	1.5	1.29
		0.8

TRICHLORONITROMETHANE (TCNM or CHLOROPICRIN)

METHOD DETECTION LIMIT

16 April 2001	ng/ml
	5.25
	5.92
	5.25
	5.59
	6.14
	6.19
	5.28
Average	5.66
Standard Deviation	0.42
MDL= 3.14 * stdev	1.32 ng/ml
EQL= 5 x MDL	6.6 ng/ml
x 3 ml	19.8 ng/sample

INSTRUMENT REPRODUCIBILITY

	ng/ml	area response
5 ng/ml	5.59	184
	5.56	183
	5.35	176
	5.51	165
	5.38	160
	5.43	162
	5.07	148
Average	5.41	168
Standard Deviation	0.18	13
20 ng/ml	20.9	764
	20.9	763
	19.4	706
	19.3	700
	19.8	720
	20.2	736
	19.9	724
Average	20.0	730
Standard Deviation	0.7	25
50 ng/ml	51.9	1970
	50.2	1903
	52.5	1994
	51.8	1967
	49.7	1885
	50.4	1913
	48.8	1848
Average	50.8	1926
Standard Deviation	1.4	53

TRICHLORONITROMETHANE (TCNM or CHLOROPICRIN) cont.

BREAKTHROUGH ANALYSIS

Flows	Average Primary Bed (ng/ml)	% Primary Recovery/ Standard Dev	Average Secondary Bed (ng/ml)	% Secondary Recovery/ Standard Dev
1.0 LPM	186.8 (n=8)	37.4 3.8	81.8	16.4 2.4
0.5 LPM	111.8 (n=2)	22.4 1.7	89.9	18.0 0.9
0.2 LPM	362.6 (n=3)	72.5 1.9	36.9	7.4 1.3
0.1 LPM	408.4 (n=6)	81.7 3.8	<MDL	<MDL

Field Samples spiked at 500 ng/ml.

STORAGE STABILITY ANALYSIS

Date	Days	XAD Blank	L#1	L#2	L#3	H#1	H#2	H#3
4/4/01	0	<MDL	4.91	5.43	5.2	43.12	43.62	43.31
4/13/01	9	<MDL	6.2	6.06	5.94	43.12	49.34	43.65
4/18/01	14	<MDL	6.71	6.5	6.14	54.38	52.4	54.07
4/24/01	20	<MDL	5.18	6.01	4.57	40.72	41.97	39.12
5/2/01	28	<MDL	5.42	4.26	4.07	43.19	42.66	42.11
Average			5.68	5.65	5.18	44.91	46.00	44.45
Stdev			0.75	0.87	0.88	5.40	4.61	5.66
% Recovery			113.68	113.04	103.68	89.812	91.996	88.904