California Environmental Protection Agency

Air Resources Board

State of California
California Environmental Protection Agency
AIR RESOURCES BOARD

Report on Air Monitoring for Methyl Iodide during an Application

Prepared by

Megan McKay, Air Pollution Specialist
Special Purpose Monitoring Section
Air Quality Surveillance Branch
Monitoring and Laboratory Division

November 15, 2010

Monitoring Report Approval

Report Title: Report on Air Monitoring for Methyl Iodide during an Application

Project Lead: Megan McKay, Air Pollution Specialist

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

Signatures:

Mac McDougall, Manager Special Purpose Monitoring Section	Date
Kenneth R. Stroud, Chief Air Quality Surveillance Branch	Date

Executive Summary

Report on Air Monitoring for Methyl Iodide during an Application

The California Air Resources Board (ARB) staff monitored during an application of methyl iodide at the request of the California Department of Pesticide Regulation (DPR). The ARB is required "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.

Methyl iodide is a pre-plant biocide used to control insects, plant parasitic nematodes, soil borne pathogens, and weed seeds. Methyl iodide is a soil fumigant pesticide which is proposed to be used as a replacement for methyl bromide. The DPR recently approved several field research studies of this pesticide although it has not been registered for use in California.

The field site for the application of methyl iodide was determined by the DPR. The application field is located near Spence Rd, Salinas, CA 93908 (Figure 1), Monterey County. At the DPRs request, this monitoring exercise was only for method development purposes. The DPR specifically requested no meteorology equipment be included during monitoring.

A total of 20 field samples and eight (8) field quality control samples were collected during October 27-29, 2009, from four (4) locations around an approximately one (1) acre field measuring 426 ft x 96 ft. Samples were collected utilizing Tisch Environmental TE-323 Canister Samplers which allow samples of ambient air to be captured in six (6)-liter Silco canisters.

Results for background period samples were reported at less than the analytical method detection limit of 0.02 ppb. During the 12-hour application period samples ranged from less than 0.02 to 81 ppb, while during the first 12-hour post-application period samples ranged from 1.6 to 27 ppb, and during the second 12-hour post-application period samples ranged from 2.0 to 7.8 ppb.

Table of Contents

Appendices:

1. Introduction

At the request of the California Department of Pesticide Regulation (DPR), (December 15, 2008 Memorandum, Warmerdam to Goldstene) the Air Resources Board (ARB) staff monitored one (1) application site for methyl iodide (CH_3I). This monitoring study was performed during an application of methyl iodide. Monitoring was requested by the DPR to fulfill the requirements of AB 1807/3219 (Food and Agricultural Code, Division 7, Chapter 3, Article 1.5, Section 14022(c)) 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. Monitoring was conducted to coincide with the use of methyl iodide as a selective soil fumigant.

Methyl iodide is a pre-plant biocide used to control insects, plant parasitic nematodes, soil borne pathogens, and weed seeds. Methyl iodide is a fumigant pesticide which is proposed to be used as a replacement for methyl bromide. The DPR recently approved several field research studies of this pesticide although it has not been registered for use in California.

The field site for the application of methyl iodide was determined by the DPR. The application field is located near Spence Rd, Salinas, CA 93908 (Figure 1), Monterey County on a plot controlled the USFDA. For this application, methyl iodide was applied to a 426 x 96 ft plot. The method of application was a drip application to tarped beds. The rate of application was 300 lb/acre of Midas Gold-EC, which based on label information equates to approximately 99 lb/acre of methyl iodide, plus 185 lb/acre of Chloropicrin and 16 lb/acre of emulsifier.

At the DPRs request, this monitoring exercise was only for method development and comparison purposes. The DPR specifically requested no meteorology equipment be included during monitoring, nor did they request monitoring for chloropicrin.

A total of 20 field samples and eight (8) field quality control samples were collected, during October 27-29, 2009, from four (4) locations around a one (1) acre field. Samples were collected utilizing Tisch Environmental TE-323 Canister Samplers, which allowed samples of ambient air to be captured in six (6)-liter Silco canisters.

Samples were transported to the ARB Monitoring and Laboratory Division and then analyzed using a Wasson ECE Instrumentation cryogenic sample concentrator and an Agilent 6890 GC with an Agilent 5973 MS operated in the single ion monitoring mode (SIM).

2. Sampling Sites

Figure 1, “Methyl Iodide Location Map,” presents a Google map-view image of the area surrounding the application field.

Four (4) sampling locations were positioned around the application parameter of the field. Samplers were located at the approximate midpoint of each side of the field. Two (2) additional samplers were collocated at the predominately downwind position, one (1) for collocated sampling, the other (1) for spikes. During the background period the winds were observed to be from the north thus the samplers (2) used for both the collocated sample and the spike sampler were positioned at the south side. The location of each sampler during the Background, Application and Post-Application sampling periods are referred to in Figure 2.

Figure 1: Methyl Iodide Location Map. Red marker labeled A indicates Spence Rd, Salinas, CA 93908. In this Google map view, the tarped beds outline the application field from the surrounding fields.

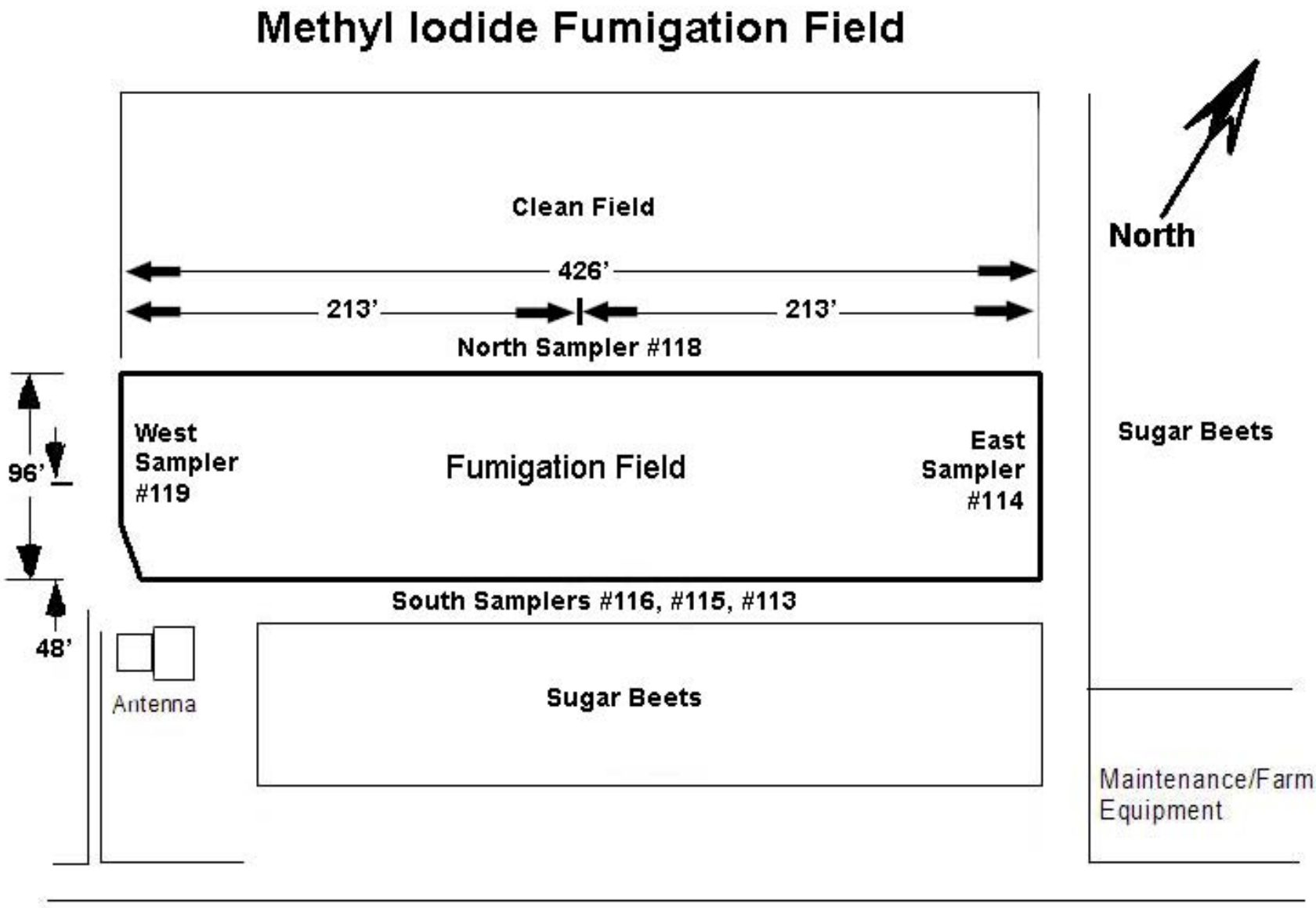

Figure 2
Methyl Iodide Fumigation Site Drawing with Sampler Locations Indicated

3. Methods

During this study, six (6) Tisch Environmental TE-323 canister samplers were used. These samplers enabled field staff to program equipment for unattended start and stop activation which reduces field staff exposure to methyl iodide gas during the fumigation process. Each sampler can accommodate up to three (3) canisters for sequential sampling. Because the TE-323 sampler can only be configured to sample three (3) canisters with each setup, the study was divided into two (2) sampling episodes: Background & Fumigation. However for simplicity, the Fumigation sampling episode was broken into Application, first Post-Application, and second Post-Application; each referring to only one (1) 12-hour period sampled into one (1) canister at each location. The sampling schedule is outlined in Table 1.

Table 1
Sampling Schedule

Sample period:	Sample duration time:
Background ~17:00 10/27 - ~5:00 10/28	Six (6) canisters (total) – 12 hours each
Trip and Field Spikes and Blanks	Four (4) canisters (total) – two (2) spikes, two (2) blanks
Application ~6:30 10/28 - ~18:30 10/28	Six (6) canisters (total) – 12 hours each
Post-Application 1 ~18:30 10/28 - ~ 6:30 10/29	Six (6) canisters (total) – 12 hours each
Post-Application 2 ~6:30 10/29 - ~ 18:30 10/29	Six (6) canisters (total) – 12 hours each

Samples were collected by pressurizing ambient air into an evacuated (-30” Hg) six (6)-liter Silco canister. While canisters can be filled up to one (1) atmosphere above ambient, the final target pressure is approximately 10 psig. The inlet heights were placed at approximately 1.5 meters above the ground.

Field and trip spikes were prepared by the laboratory by injecting a known concentration of methyl iodide gas into a cleaned and evacuated Silco canister. The field spikes (four (4) total) were positioned in parallel with the primary samples. The field spikes were removed and handled identically to the other samples. The trip spikes (two (2) total) were transported and analyzed along with the field spike. The trip spike is treated the same as a field spike with exception that it is not installed onto a sampler and not sampled.

While the TE-323 pulls approximately three (3) lpm through the inlet, only a regulated portion of the air is forced into the sample canister. During sampling of the 12-hour background period, this regulated sampling flow rate target was 17.4 milliliters per minute. The flow rate target was then adjusted to 16.0 milliliters per minute for the 12-hour application and two (2) post-application periods. Due to the methodology of using sequential samples and not wanting staff to be exposed during the actual application, the flow rate was only measured before the first (1st) 12-hour application period started and after the second (2nd) 12-hour post-application period finished. This is documented in Table 2 "Sampling Information", where there is only one (1) "Start" and "End" of the "Mass Flow Meter Display" for each sampler for the complete fumigation, ie. before the application and after the 2nd post-application time.

Because the DPR was co-sampling with cartridges and needed time to physically change the sample media and move around the field for each of the sampling periods, they requested that the sampling period start times be staggered by 10 minutes between each location. The sampling time started at the East location and moved counter-clockwise, around the field in 10 minute increments.

The ARB staff ensured that after the sampling period finished, the exposed canisters were closed and capped. All sample period information was documented on the tracking sheet and attached to the exposed canisters, and all sample information was recorded on the field sample field log sheet. The canisters were placed in shipping boxes and returned to the ARB Monitoring and Laboratory Division for analysis. Samples were analyzed using a Wasson ECE Instrumentation cryogenic sample concentrator and an Agilent 6890 GC with an Agilent 5973 MS operated in the single ion monitoring mode (SIM). The laboratory established a method detection limit (MDL) of 0.015 ppb and an estimated quantitation limit (EQL) of 0.13 ppb.

Background sampling: Four (4) primary samples, one (1) collocated sample and one (1) field spike sample were deployed prior to methyl iodide fumigation. The four (4) primary samplers were placed approximately five (5) feet away from each side of the field. The collocated sampler and field spike sampler were placed at the downwind south side of the field. Background air sampling started October 27, 2009, at 17:00 PST for the East sample (17:10 PST for the North sample, 17:20 PST for the West sample, and 17:30 PST for the South samples) and ended October 28, 2009, at 5:00 PST for the East sample (to 5:30 PST for the South samples). The background sample duration was a 12-hour period. One (1) trip spike and one (1) trip blank accompanied the background samples to the field and back to the Laboratory. Refer to Figure 2.

The following three (3) sequential fumigation samples are broken into an application and two (2) post-application 12-hour periods.

Application sampling: The actual field fumigation process started on October 28, 2009, at 7:30 PST first with only water, and then at 8:20 PST the Midas EC Gold fumigant chemical was mixed into the water. The fumigant delivery finished at 11:00 PST, while the watering continued till 11:30 PST (see Figure 3). One (1) trip spike and one (1) trip blank accompanied the application and post-application samples to and from the field. Sampling on the East side

commenced at 6:30 PST to insure all staggered sampling would capture the full fumigation period during the first 12-hour sample. The actual chemical fumigation lasted approximately two (2) hours and 40 minutes, while the full watering time (pre-application water, application water, and final post-application water) was four (4) hours. The rate of application was 300 lb/acre of Midas Gold-EC, which based on label information equates to approximately 99 lb/acre of methyl iodide, plus 185 lb/acre of Chloropicrin and 16 lb/acre of emulsifier.

First Post-application sampling: Samplers automatically switched from the application sample to the first-post application sample. Due to the DPRs need to physically change their samples, this sampling time was staggered by 10 minutes counter clock wise starting with the East site. Sampling for the first post-application sample on the East side commenced at 18:30 PST, Oct 28, 2009.

Second Post-application sampling: Samplers automatically switched from the first post-application sample to the second post-application sample. Due to the DPRs need to physically change their samples, this sampling time was staggered by 10 minutes counter clock wise starting with the East site. Sampling for the second post-application sample on the East side commenced at 6:30 PST, Oct 29, 2009.

Figure 3: Display of drip application to tarped beds.
The Midas EC Gold (ie the fumigant including methyl iodide) is located in the large orange cylinder sitting on a scale. The scale lets the applicator know how much fumigant is used. The water (and chemicals) flow through the green hose into the previously tarped beds.

Samplers were placed five (5) feet away from the center of each side of the field. The collocated and spike samplers were placed on the downwind south location. The samplers were configured to fill each canister consecutively, with a sampling duration of 12 hours each. Please refer to Figure 2.

One (1) additional trip spike and one (1) field blank traveled to the field along with the canisters used for the fumigation sampling and were returned to the Laboratory after field sampling was completed. Both the field blank and spike canisters were at the site during the application, first post-application, and second post-application sampling periods.

Every attempt was made to shield all sampled canisters from direct sunlight to help reduce sampled methyl iodide losses. Samples were transported to Sacramento upon completion of

the study. The samples were not exposed to extreme conditions or subjected to rough handling that might affect sample integrity.

The calibration certificate for the Mass Flow Meter [MFM] used is presented in Appendix E Calibration/Certification Report.

For details of the monitoring method, please refer to Appendix B Sampling Protocol for Methyl Iodide Application Monitoring (dated October 22, 2009).

There were several significant deviations from this protocol during the actual monitoring. The first is that the samplers were placed at only five (5) feet from the edge of the field rather than 25 feet. This was due to the fact that at 25 feet the samplers would be in the middle of the access road. Rather than move to 30 feet, the DPR requested we move to five (5) feet to help ensure the capture of methyl iodide in the samples for method development purposes.

The second deviation was to stagger start times for each sampler to accommodate the time it took the DPR staff to physically get around the field to change their sample media.

Site/Sample Identification

The methyl iodide application sampling sites were named accordingly for the background, application, and post-application as follows:

Site Naming Examples:
Letter Abbreviations as follows

N-F-1 = North side Fumigation Period 1	N = North Side
W-F-1-CO = Collocated Fumigation West side Period 1	W = West Side
S-F-3 = South side Fumigation Period 3	S = South Side
	E = East Side
	CO= Collocated
	F = Fumigation
	FS = Field Spike
	TS = Trip Spike
	TB = Trip Blank
	BK= Background Sample

Note: Now Fumigation Period 1 is equivalent to application,
Fumigation Period 2 is equivalent to first post-application, and
Fumigation Period 3 is equivalent to second post-application.

Corrected average flow is calculated by:
Corrected flow = [(Start Mass Flow display + End Mass Flow display)/2] *slope + intercept

Table 2
Sampling Information Sheet

Log #	Sample Name	Sampler ID Number	Canister ID Number	PST Date & Time		Sampler Elapsed	Canister Vacuum Display		Mass Flow Meter Display		Corrected Average Flow	Comment Number
				Start	End	Time	Start	End	Start	End		
001	E-BK	114	1127	10/27/09 17:00	10/28/09 5:00	Not recorded	-29.5 inHg	21.0 psi	17.4 sccm	21.2 sccm	22.9 sccm	-
002	E-F-1	114	1171	10/28/09 6:30	10/28/09 18:30	719.59	-28.0 inHg	11.0 psi	16.0 sccm	-	-	-
003	E-F-2	114	1055	10/28/09 18:30	10/29/09 6:30	719.58	-29.0 inHg	11.0 psi	-	-	-	-
004	E-F-3	114	1074	10/29/09 6:30	10/28/09 18:30	719.59	-27.0 inHg	11.0 psi	-	11.9 sccm	17.2 sccm	-
005	N-BK	118	2811	10/27/09 17:10	10/28/09 5:10	Not recorded	-29.5 inHg	17.5 psi	16.0 sccm	21.0 sccm	22.0 sccm	-
006	N-F-1	118	1113	10/28/09 6:40	10/28/09 18:40	719.59	-28.0 inHg	7.0 psi	16.0 sccm	-	-	-
007	N-F-2	118	1060	10/28/09 18:40	10/29/09 6:40	720.00	-30.0 inHg	7.0 psi	-	-	-	-
008	N-F-3	118	2809	10/29/09 6:40	10/29/09 18:40	719.59	-29.0 inHg	6.0 psi	-	13.9 sccm	18.2 sccm	-
009	W-BK	119	1149	10/27/09 17:20	10/28/09 5:20	Not recorded	-30.0 inHg	15.5 psi	15.9 sccm	22.2 sccm	22.6 sccm	-
010	W-F-1	119	1102	10/28/09 6:50	10/28/09 18:50	719.58	-30.0 inHg	8.0 psi	16.0 sccm	-	-	1
011	W-F-2	119	1087	10/28/09 18:50	10/29/09 6:50	697.36	-30.0 inHg	1.0 psi	-	-	-	1

MFM Used #: 20005345 Slope: 1.073 Intercept: 2.194

Comments:

1= battery failure, not full flow or run times, fixed for second (2nd) post-application sample

2= final flow check did not resonate correctly, pump not running well, better after running for a while which resulted in higher flows that slowly drifted back to initial flow value

A dash (-) is used to indicate a value that was not measured in the above table. In some cases it was because there is no relevant information. In others it is because no measurement was actually taken. Recall from “Method” section, there is only one (1) Start and End readings for each sampler during the full fumigation time; the start was taken before the application sample, and the end was taken after the second post-application sample.

See Appendix D for more information.

Table 2 Continued
Sampling Information Sheet

Log #	Sample Name	Sampler ID Number	Canister ID Number	PST Date & Time		Sampler Elapsed	Canister Vacuum Display		Mass Flow Meter Display		Corrected Average Flow	Comment Number
				Start	Time	Time	Start	End	Start	End		
012	W-F-3	119	1169	10/29/09 6:50	10/29/09 18:50	710.36	-30.0 inHg	9.0 psi	-	16.6 sccm	19.7 sccm	1
013	S-BK	113	1177	10/27/09 17:30	10/28/09 5:30	Not recorded	-31.0 inHg	20.5 psi	16.1 sccm	19.8 sccm	21.5 sccm	-
014	S-F-1	113	1165	10/28/09 7:00	10/28/09 19:00	719.58	-30.0 inHg	11.0 psi	16.0 sccm	-	-	-
015	S-F-2	113	1083	10/28/09 19:00	10/29/09 7:00	719.58	-29.5 inHg	12.0 psi	-	-	-	-
016	S-F-3	113	1142	10/29/09 7:00	10/29/09 19:00	719.58	-30.0 inHg	10.0 psi	-	14.3 sccm	18.4 sccm	-
017	S-CO-BK	115	1067	10/27/09 17:30	10/28/09 5:30	Not recorded	-31.0 inHg	18.5 psi	17.3 sccm	19.1 sccm	21.7 sccm	-
018	S-CO-F-1	115	1075	10/28/09 7:00	10/28/09 19:00	719.59	-30.0 inHg	15.0 psi	16.0 sccm	-	-	2
019	S-CO-F-2	115	1088	10/28/09 19:00	10/29/09 7:00	719.59	-29.5 inHg	11.0 psi	-	-	-	2
020	S-CO-F-3	115	1064	10/29/09 7:00	10/29/09 19:00	719.56	-30.0 inHg	13.0 psi	-	14.5 sccm	18.6 sccm	2
021	S-FS-BK	116	1057	10/27/09 17:30	10/28/09 5:30	Not recorded	-28.0 inHg	16.5 psi	16.0 sccm	17.3 sccm	20.1 sccm	-
022	S-FS-F-1	116	1172	10/28/09 7:00	10/28/09 19:00	719.58	-27.0 inHg	14.0 psi	16.0 sccm	-	-	-

MFM Used#: 20005345 Slope: 1.073 Intercept: 2.194

Comments:
1= battery failure, not full flow or run times, fixed for second (2nd) post-application sample

2= final flow check did not resonate correctly, pump not running well, better after running for a while which resulted in higher flows that slowly drifted back to initial flow value

A dash (-) is used to indicate a value that was not measured in the above table. In some cases it was because there is no relevant information. In others it is because no measurement was actually taken. Recall from “Method” section, there is only one (1) Start and End readings for each sampler during the full fumigation time; the start was taken before the application sample, and the end was taken after the second post-application sample.

See Appendix D for more information.

Table 2 Continued
Sampling Information Sheet

Log #	Sample Name	Sampler ID Number	Canister ID Number	PST Date & Time		Sampler Elapsed Time	Canister Vacuum Display		Mass Flow Meter Display		Corrected Average Flow	Comment Number
				Start	Time		Start	End	Start	End		
023	S-FS-F-2	116	1135	10/28/09 19:00	10/29/09 7:00	719.58	-28.0 inHg	11.0 psi	-	-	-	-
024	S-FS-F-3	116	1186	10/29/09 7:00	10/29/09 19:00	719.58	-29.0 inHg	13.0 psi	-	13.1 sccm	17.8 sccm	-
025	TS-BK	-	1146	-	-	-	-28.5 inHg	-	-	-	-	-
026	TB	-	1071	-	-	-	-	-	-	-	-	-
027	TS-F	-	1173	-	-	-	-28.4 inHg	-	-	-	-	-
028	FB	-	1101	-	-	-	-	-	-	-	-	-

MFM Used #: 20005345 Slope: 1.073 Intercept: 2.194

Comments:

1= battery failure, not full flow or run times, fixed for second (2nd) post-application sample

2= final flow check did not resonate correctly, pump not running well, better after running for a while which resulted in higher flows that slowly drifted back to initial flow value

A dash (-) is used to indicate a value that was not measured in the above table. In some cases it was because there is no relevant information. In others it is because no measurement was actually taken. Recall from “Method” section, there is only one (1) Start and End readings for each sampler during the full fumigation time; the start was taken before the application sample, and the end was taken after the second post-application sample.

See Appendix D for more information.

4. Results

The monitoring results of collected samples are presented in Table 3 “Monitoring Results for Samples and Collocated Samples.” For additional information on these results, please refer to Appendix C.

All background period samples were reported at less than the analytical method detection limit of 0.02 ppb. The first 12-hour application period samples ranged from less than 0.02 to 81 ppb. The first 12-hour post-application period samples ranged from 1.6 to 27 ppb. The second 12-hour post-application period samples ranged from 2.0 to 7.8 ppb.

All quality control information is located in Section 5. “Quality Control.”

Due to the high levels of methyl iodide obtained, 14 samples required dilution by the lab for measurement.

No other anomalous events occurred.

Table 3
Monitoring Results for Samples and Collocated Samples

Log Number	Sample Identification	Total Dilution Factor	Methyl Iodide MDL (ppb)	Methyl Iodide Results (ppb)
1	E-BK	1.00	0.02	<0.02
2	E-F-1	31.88	0.48	13
3	E-F-2	8.00	0.12	6.2
4	E-F-3	8.00	0.12	4.1
5	N-BK	1.00	0.02	<0.02
6	N-F-1	1.00	0.02	<0.02
7	N-F-2	72.82	1.10	27
8	N-F-3	8.00	0.12	3.7
8d	N-F-3d	8.00	0.12	3.8
9	W-BK	1.00	0.02	<0.02
10	W-F-1	38.37	0.58	21
11	W-F-2	8.00	0.12	1.6
12	W-F-3	4.00	0.06	2.0
13	S-BK	1.00	0.02	<0.02
14	S-F-1	104.36	1.57	64
15	S-F-2	45.98	0.69	13
16	S-F-3	34.13	0.51	7.5
16d	S-F-3d	34.13	0.51	7.8
17	S-CO-BK	1.00	0.02	<0.02
18	S-CO-F-1	118.23	1.78	81*
19	S-CO-F-2	26.17	0.39	15*
20	S-CO-F-3	30.60	0.46	7.2*

Quality Control Samples (Collocated Samples and Duplicate Analyses)

Samples flagged for low battery charge caused less than expected final canister pressure.

* Samples flagged due to final flow rate checked initially unstable.

d Sample ID numbers followed by the letter d are duplicate analyses for the samples with the corresponding number.

5. Quality Control

Quality Control samples collected from the field consisted of blanks, collocations, duplicates and spikes. The following summarize the Quality Control results of these samples. For more detailed information see Tables Four (4) through Seven (7) and Appendix C.

For the following tables:

Percent Recovery = (Actual Recovery/Spiked Concentration)*100

Due to rounding of results, calculated values may not match values presented in table.

Relative %Difference = (Result A - Result B)/ (Average of Result A and B)* 100

Due to rounding of results, calculated values may not match values presented in table.

Blanks (Table 4): During this study one (1) trip blank and one (1) field blank were analyzed. Methyl iodide was <0.02ppb, i.e. less than the method detection limit (MDL), for both blanks.

Collocation (Table 5): During the background period, both primary and secondary samples were both <0.02ppb. The application period showed a relative difference of -23% between the primary and the secondary sample. For the first post-application was relative difference was -10% and the second post-application period relative difference was 4%.

Duplicates (Table 6): Three (3) samples were duplicated for this project. The duplicate are defined as a second analysis from the same canister in succession. The relative percent difference ranged from -4% to 2%.

Spikes (Table 7): The background period trip spike recovery was reported at 96%. The background period field spike recovery was reported at 102%. The application trip spike was recovered at 98%.

The three (3) field spikes collected during the application and post-application periods were not considered to be recoverable due to the high levels of methyl iodide detected in the samples for all three (3) 12-hour periods. The results of the spiked application and post-application samples ranged from 28 to 257 times greater than the original spike concentration [8.32 – 82.15 ppb versus the spiked level 0.30 – 0.32 ppb].

Six (6) samples were flagged. Three (3) were due to potential battery issues during sampling (Log # 10-12), most likely affecting sample Log # 11. Three (3) samples were flagged due to possible sampler malfunction (Log # 18-20) (Table 2) associated with an initially unstable final flow check. These potential problems imply the air sample might not have been flowing evenly for the full period of measurement into the sampling canisters.

Table 4
Blanks Results

Quality Control Type	Log Number	Sample Identification	Methyl Iodide concentration (ppb)	Spiked Concentration (ppb)	Percent Recovery
Trip Blank	26	TB	<0.02	--	--
Field Blank	28	FB	<0.02	--	--

Percent Recovery = (Actual Recovery/Spiked Concentration)*100
Due to rounding of results, calculated values may not match values presented in table.

Table 5
Collocated Sample Results

Log Number	Sample Identification	Methyl Iodide concentration (ppb)	Relative Percent Difference
13	S-BK	<0.02	N/A
17	S-CO-BK	<0.02	
14	S-F-1	63.85	-23.29
18	S-CO-F-1	80.68	
15	S-F-2	13.17	-9.89
19	S-CO-F-2	14.54	
16	S-F-3	7.51	3.94
20	S-CO-F-3	7.22	

Relative %Difference = (Result A-Result B)/ (Average of Result A and B)* 100
Due to rounding of results, calculated values may not match values presented in table.

Table 6
Analytical Duplicate Results

Log Number	Sample Identification	Methyl Iodide concentration (ppb)	Relative Percent Difference
8 8d	N-F-3 N-F-3d	3.66 3.76	-2.48
16 16d	S-F-3 S-F-3d	7.51 7.83	-4.23
24 24d	S-FS-F-3 S-FS-F-3d	8.45 8.32	1.60

Relative %Difference = (Result A-Result B)/ (Average of Result A and B)* 100
Due to rounding of results, calculated values may not match values presented in table.

Table 7
Field Spikes & Laboratory Quality Control Sample Results

Quality Control Type	Log Number	Sample Identification	Spiked Concentration (ppb)	Methyl Iodide concentration (ppb)	Percent Recovery
Field Spike	21	S-FS-BK	0.27	0.28	102.26
	22	S-FS-F-1	0.32	82.15	N/A
	23	S-FS-F-2	0.30	14.37	N/A
	24	S-FS-F-3	0.30	8.45	N/A
	24d	S-FS-F-3d	0.30	8.32	N/A
Trip Spike	25	TS-BK	0.40	0.39	95.93
	27	TS-F	0.41	0.40	98.17
Lab Spike	NA	NA	0.42	0.37	88.93

Percent Recovery = (Actual Recovery/Spiked Concentration)*100
Due to rounding of results, calculated values may not match values presented in table.

6. Discussion

All five (5) background field sample results and one (1) application sample result were less than the MDL. All of the other field samples were above the 0.10 ppb EQL requested by the DPR. The values ranged from 1.6 to 81 ppb. The highest results came from the samples taken during the application period on the south side of the field.