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## **FIGURE**

- 1 Site Map Showing Air Sampling Locations

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- 1 Summary of June 21, 2010 Air Sampling Time, Pressure and Temperature Field Measurements
- 2 Summary of June 21, 2010 Air Sampling Analytical Results for Chloroform, Carbon Tetrachloride and Trichloroethylene
- 3 Summary of June 21, 2010 Air Sampling and Comparison of Site Data

## **APPENDIX**

- A Laboratory Report (included on CD)



## 3.0 SAMPLING AND ANALYSIS RESULTS

### 3.1 Air Sample Test Results

This section presents a brief description of the indoor, outdoor, and ambient air results for each sampling location (e.g., building, facility, or outdoor area). A summary of chemical analytical results for all samples is presented in Table 2, and laboratory analytical reports are presented in Appendix A.

#### 3.1.1 Unit Building 3

Seven indoor air samples were collected and analyzed for the target analytes: six samples (including one duplicate) were collected from office spaces, and one was collected from the Unit Building floor area. Chloroform concentrations in the office space samples ranged from 1.149 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to 1.997  $\mu\text{g}/\text{m}^3$ . TCE concentrations ranged from 3.154  $\mu\text{g}/\text{m}^3$  to 15.782  $\mu\text{g}/\text{m}^3$ . Carbon tetrachloride was not detected above its laboratory reporting limit (RL) in three of the six office samples, and ranged from 0.733  $\mu\text{g}/\text{m}^3$  to 0.857  $\mu\text{g}/\text{m}^3$  in the other three. Target analytes were below the RLs in the floor area sample, and chloroform and carbon tetrachloride were also below their respective method detection limits (MDLs).

One outdoor building air intake sample was also collected and analyzed for the target analytes, with no constituent detected above the RLs.

#### 3.1.2 Administration Building

Chloroform, carbon tetrachloride, and TCE were detected at concentrations of 0.53  $\mu\text{g}/\text{m}^3$ , 1.12  $\mu\text{g}/\text{m}^3$ , 2.827  $\mu\text{g}/\text{m}^3$ , respectively, in the one indoor air sample collected. Constituents were below their corresponding RLs in the two building air intake samples, except for chloroform, which was present in one sample at a concentration of 0.618  $\mu\text{g}/\text{m}^3$ .

#### 3.1.3 Wash/Change House

Chloroform, carbon tetrachloride and TCE were detected in the one indoor air sample collected at concentrations of 3.417  $\mu\text{g}/\text{m}^3$ , 0.793  $\mu\text{g}/\text{m}^3$ , 0.601  $\mu\text{g}/\text{m}^3$ , respectively. Chloroform and TCE were both below their respective RLs in the building air intake sample, while carbon tetrachloride was detected at a concentration of 0.815  $\mu\text{g}/\text{m}^3$ .



### **3.1.4 Boron Production Facility**

The indoor air sample from the control room contained chloroform, carbon tetrachloride, and TCE concentrations of 0.843, 0.79, and 0.572  $\mu\text{g}/\text{m}^3$ , respectively. The sample from the supervisor's office contained these constituents at 0.759, 1.018, and 0.655  $\mu\text{g}/\text{m}^3$ , respectively.

### **3.1.5 Laboratory**

Two indoor air samples from two adjacent offices within the laboratory were collected and analyzed for the target analytes. TCE was below its RL in both samples, while chloroform concentrations ranged from 1.773 to 2.388  $\mu\text{g}/\text{m}^3$ , and carbon tetrachloride concentrations ranged from 1.35 to 1.413  $\mu\text{g}/\text{m}^3$ .

No constituent was detected above the RLs in the one outdoor building air intake sample, and TCE was also not detected above its MDL.

### **3.1.6 Field Office Trailer**

Chloroform and carbon tetrachloride were detected at concentrations of 1.332  $\mu\text{g}/\text{m}^3$  and 1.437  $\mu\text{g}/\text{m}^3$ , respectively, in the one indoor air sample collected, while TCE was below its RL. In the one outdoor building air intake sample, all constituents were below their corresponding RLs, with TCE also below its MDL.

### **3.1.7 Steam Plant**

Carbon tetrachloride was detected at a concentration of 0.857  $\mu\text{g}/\text{m}^3$  in the one indoor air sample collected, while both chloroform and TCE were below their corresponding RLs.

### **3.1.8 Between Unit Buildings 4 and 5**

In the one outdoor air sample collected, TCE was detected at a concentration of 1.024  $\mu\text{g}/\text{m}^3$ , and both chloroform and carbon tetrachloride were below their corresponding RLs.

### **3.1.9 West of the Laboratory**

One outdoor air sample was collected and analyzed for the target analytes, with no constituent detected above RL. TCE was also below its MDL.



**TABLE 1**  
**Summary of June 21, 2010 Air Sampling Time, Pressure**  
**and Temperature Field Measurements**

Location	Type	Sample ID	Canister #	Flow Orifice #	Start Time	Start Pressure ("Hg)	Pressure ("Hg) (Temperature) - 10:30-11:00 AM	Pressure ("Hg) (Temperature) - 1:30-2:00 PM	End time	End Pressure ("Hg)	Sample Duration (hr:min)	Notes
Unit 3 Bldg.	I (8-hour)	IA-U3-O1-001 (Scott's office)	213	2617	8:50 AM	28	24	17 (79 F)	4:25 PM	12	7:35	central AC running, not occupied - door open
	I (8-hour)	IA-U3-O3-001 (James's office)	784	2546	8:51 AM	28	17	9 (79 F)	4:23 PM	3	7:32	central AC running, occupied - door open
	I (8-hour)	IA-U3-O4-001 (John 's office)	515	2622	8:52 AM	26.5	22.5	16 (79 F)	4:38 PM	11	7:46	central AC running, occupied
	I (8-hour)	IA-U3-O5-001 (back room)	519	2618	8:55 AM	29	24	17 (79 F)	4:39 PM	12	7:44	central AC running, vacant
	I (8-hour)	IA-U3-O2-001 (Robin 's office)	407	2623	9:03 AM	24	20	15 (79 F)	4:51 PM	9	7:48	central AC running, occupied
	I (8-hour)	IA-U3-O2-002 (Robin 's office)	990	2595	9:04 AM	28	22	19 (79 F)	4:52 PM	11	7:48	central AC running, occupied
	I (8-hour)	IA-U3-UF-001 (Unit Floor)	184	2608	9:06 AM	24	20	15	4:57 PM	11	7:51	central AC running, open area
	O (10 hour)	OA-U3-AI-001 (office proximate air intake)	769	1	8:20 AM	26	23	18	6:16 PM	13	9:56	elevated temperature <sup>1</sup>
Admin	I (8-hour)	IA-AB-O1-001 (Mike's office)	606	2559	8:40 AM	30	23	18	4:25 PM	11.5	7:45	central HVAC running, occasionally occupied
	O (10 hour)	OA-AB-AI-001 (ambient)	157	32	8:59 AM	29	29	29	6:34 PM	16	9:35	issue with canister <sup>2</sup>
	O (8 hour)	OA-AB-AI-002 (ambient)	661	2567	11:37 AM	29	29	28	6:48 PM	17	7:11	started in repsonse to canister 157 issues
Wash House	I (8-hour)	IA-WH-SA-001 (shower)	647	2538	8:45 AM	28	20	15 (85 F)	4:34 PM	8	7:49	elevated humidity due to showers, central AC in adjacent change room running
	O (10 -hour)	OA-WH-AI-001 (air proximate intake)	650	25	8:43 AM	27	23	19	6:30 PM	11	9:47	elevated temperature <sup>1</sup>
Boron Production	I (8-hour)	IA-BP-CR-001 (control room)	783	2542	9:05 AM	26	22 (85 F)	14 (81 F)	4:58 PM	7	7:53	wall AC running, occasionally occupied
	I (8-hour)	IA-BP-SO-001 (supervisor's office)	2965	2611	9:08 AM	29	26 (80 F)	17 (84 F)	5:01 PM	10	7:53	central AC running, occasionally occupied
Laboratory	I (8-hour)	IA-LB-O1-001 (Olga's office)	698	2599	9:19 AM	28	23 (84 F)	16 (84 F)	5:12 PM	10	7:53	doors open, no Window-AC running
	I (8-hour)	IA-LB-O2-001 (Craig's office)	759	2590	9:21 AM	27	25 (82 F)	18 (82 F)	5:13 PM	12.5	7:52	doors open, no Window-AC running
	O (10 hour)	OA-LB-AI-001 (office proximate air intake)	214	2015	8:03 AM	25	20 (88 F)	16 (85 F)	6:12 PM	10	10:09	
Field Office	I (8-hour)	IA-FO-O1-001 (trailer office)	687	2580	9:19 AM	27	24	14 @ 2:55 PM	5:04 PM	10	7:45	wall HVAC running, occasionally occupied
	O (10 hour)	OA-FO-AI-001 (trailer proximate air intake)	662	2064	7:53 AM	29	26 (90 F)	22 @ 2:55 PM	6:09 PM	16	10:16	elevated temperature <sup>1</sup>
Steam Plant	I (8-hour)	IA-SP-CR-001 (control room)	685	2614	9:12 AM	30+	25 (77 F)	20 (86 F)	5:05 PM	14	7:53	central AC running, occupied
Between Unit Bldgs. 4-5	O (10 hour)	OA-U4-U5-001 (ambient)	732	31	9:12 AM	27	25	19	6:40 PM	11	9:28	
West of Laboratory	O (10 hour)	OA-UW-00-001 (upwind/ambient)	708	2061	8:11 AM	30+	27 (92 F)	23 (105 F)	6:14 PM	16	10:03	location 50 ft west of laboratory, elevated temperature <sup>1</sup>

**Notes:**

1 - moved throughout day due to direct sun light exposure and elevated temperature  
2 - flow controllers loose, flow adjusted at 3 pm to 10 ccm using digital flowmeter  
I - Indoor Sample  
O - Outdoor Sample

F - Temperature measured in Fahrenheit  
" Hg - Pressure measured in inches of mercury  
hr: min - hours and minutes

**TABLE 2**  
**Summary of June 21, 2010 Air Sampling Analytical Results for**  
**Chloroform, Carbon Tetrachloride and Trichloroethylene**

Location	Type	Sample ID	Canister #	Chloroform ( $\mu\text{g}/\text{m}^3$ )	Carbon Tetrachloride ( $\mu\text{g}/\text{m}^3$ )	TCE ( $\mu\text{g}/\text{m}^3$ )	Comment
Unit 3 Bldg.	I (8-hour)	IA-U3-O1-001 (Scott's office)	213	1.65	0.857	14.729	
	I (8-hour)	IA-U3-O3-001 (James's office)	784	1.328	0.47 J	3.154	
	I (8-hour)	IA-U3-O4-001 (John's office)	515	1.203	0.466 J	12.514	
	I (8-hour)	IA-U3-O5-001 (back room)	519	1.149	0.299 J	11.802	
	I (8-hour)	IA-U3-O2-001 (Robin's office)	184	1.296	0.733	6.389	
	I (8-hour)	IA-U3-O2-002 (Robin's office)	990	1.997	0.838	15.782	duplicate
	I (8-hour)	IA-U3-UF-001 (Unit Floor)	407	< 0.57	< 0.737	0.195 J	
	O (10 hour)	OA-U3-AI-001 (office proximate air intake)	769	0.204 J	0.55 J	0.393 J	
Admin	I (8-hour)	IA-AB-O1-001 (Mike's office)	606	0.53	1.12	2.827	
	O (10 hour)	OA-AB-AI-001 (ambient)	157	0.209 J	0.683 J	0.209 J	
	O (8 hour)	OA-AB-AI-002 (ambient)	661	0.618	0.774 J	0.531 J	
Wash House	I (8-hour)	IA-WH-SA-001 (shower)	647	3.417	0.793	0.601	
	O (10 -hour)	OA-WH-AI-001 (proximate air intake)	650	0.402 J	0.815	0.428 J	
Boron Production	I (8-hour)	IA-BP-CR-001 (control room)	783	0.843	0.79	0.572	
	I (8-hour)	IA-BP-SO-001 (supervisor's office)	2965	0.759	1.018	0.655	
Laboratory	I (8-hour)	IA-LB-O1-001 (Olga's office)	698	2.388	1.413	0.144 J	
	I (8-hour)	IA-LB-O2-001 (Craig's office)	759	1.773	1.35	0.209 J	
	O (10 hour)	OA-LB-AI-001 (office proximate air intake)	214	0.341 J	0.584 J	< 0.65	
Field Office	I (8-hour)	IA-FO-O1-001 (trailer office)	687	1.332	1.437	0.214 J	
	O (10 hour)	OA-FO-AI-001 (trailer proximate air intake)	662	0.217 J	0.717 J	< 0.656	
Steam Plant	I (8-hour)	IA-SP-CR-001 (control room)	685	0.367 J	0.857	0.491 J	
Between Unit Bldgs. 4-5	O (10 hour)	OA-U4-U5-001 (ambient)	732	0.147 J	0.384 J	1.024	
West of Laboratory	O (10 hour)	OA-UW-00-001 (upwind/ambient)	708	0.43 J	0.232 J	< 0.598	

Notes:

I - Indoor Sample

O - Outdoor Sample

J - estimated below Reporting Limit (> Method Detection Limit)

$\mu\text{g}/\text{m}^3$  - Micrograms per cubic meter

TCE: Trichloroethylene

**TABLE 3**  
**Summary of June 21, 2010 Air Sampling and Comparison of Site Data**

	chloroform (ug/m <sup>3</sup> )	carbon tetrachloride (ug/m <sup>3</sup> )	TCE (ug/m <sup>3</sup> )
Occupational Exposure Limit <sup>1</sup>	49,000	31,000	53,000
commercial concentration (1 x 10 <sup>-5</sup> risk) <sup>2</sup>	5.3	8.3	62.5
commercial concentration (1 x 10 <sup>-6</sup> risk)	0.53	0.83	6.25
EPA reported mean indoor building concentration <sup>3</sup>	0.59	0.93	0.76
EPA reported ambient concentration <sup>4</sup>	0.2	not provided	0.01 to 3.9
<b>Site Data:</b>			
mean outdoor concentrations	0.321	0.592	0.442
range outdoor concentrations	0.147-0.618	0.232-0.815	0.211-1.024
mean indoor concentrations	1.353	0.856	4.685
range indoor concentrations	0.367-3.42	0.299-1.47	0.144-15.8

Notes:

ug/m<sup>3</sup> Micrograms per cubic meter

<sup>1</sup> ACGIH 8-hour Threshold Limit Value

<sup>2</sup> Commercial indoor air comparison level calculated based on Inhalation Unit Risk (IUR) as provided in NDEP BCL table, and commercial exposure assumptions per equation 8 of EPA Risk Assessment Guidance (Part F, Supplemental Guidance for Inhalation Risk Assessment), January 2009. Commercial assumptions include 8 hours /day, 250 days per year and 25 year exposure duration. Air concentrations calculated for a range of risk levels (1 x 10<sup>-5</sup> and 1 x 10<sup>-6</sup>)

<sup>3</sup> EPA Building Assessment Survey Evaluation Study. [http://www.epa.gov/iaq/base/voc\\_master\\_list.html#Not](http://www.epa.gov/iaq/base/voc_master_list.html#Not)

<sup>4</sup> EPA Technology Transfer Network Air Toxics Web Site. <http://www.epa.gov/tth/atw/hlthef/tri-ethy.html>

Note: mean values calculated using 1/2 limit of detection for the five values reported as non-detect