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New Continuous Monitoring Technologies for Vapor Intrusion,

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Chapter 13

NEW CONTINUOUS MONITORING TECHNOLOGIES FOR VAPOR INTRUSION, REMEDIATION AND SITE ASSESSMENT

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ABSTRACT

Typically, site investigation is carried out by using handheld or transportable field instruments coupled with offsite lab analyses. When using field instruments, the data generated represents a snapshot in time and space. Often, as with a PID or FID, data is presented as a total of contaminates present at that time and place. More sophisticated field equipment such as GC/MS can provide speciation, but still suffer from poor spatial and temporal resolution.

As an alternative, investigators can choose methods such as Summa canisters that sample for a fixed period, say 24 hours, followed by lab analysis. The data generated provides speciation but the concentrations represent an average for the sampling period.

Investigators are aware that environmental conditions such as pressure, temperature, water level and air movement substantially affect concentrations on a range of timescales, therefore uncertainty will always exist when using methods that lack temporal resolution.

The presentation describes instrumentation that provides real time continuous data both down hole and ambient for multiple parameters such as VOCs, methane, oxygen, carbon dioxide, hydrogen sulfide and carbon monoxide together with atmospheric and borehole pressure. Data is presented from field work carried out by, among other, the Maine DEP, for applications such as vapor intrusion, recovery well monitoring and landfill gas migration.

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A comparison between spot sampling and continuous monitoring raises questions about the value of limited spot sampling.

Keywords: GasClam, vapor, soil gas, monitoring

1. INTRODUCTION

The Maine Department of Environmental Protection (MEDEP), Division of Response Services provides initial response actions for oil and hazardous materials releases. Air monitoring is an important component for both the initial response and follow on work at the site particularly for residential petroleum releases from home heating oil tanks.

Conditions in a home or occupied building can change considerably over the course of a day and certainly over longer periods of time because of human activity (doors opening), number of people in the house, weather, household chemicals and smoking. Spot sampling with a handheld instrument (PID or FID for example) does not give a good representation of the overall condition/progress of the site. With the GasClam, we can also observe data from times when residents have complained that the vapors were elevated but MEDEP was not there to observe reported vapor conditions. We can look back at the GasClam data and quiz owners, residents, contractors etc with more specific questions concerning certain times which the gas clam data had abnormalities or spikes.

Air testing with canisters cannot provide time stamped data; even a 24 hour summa test only gives one result, averaged over the collection period, for each parameter analyzed. This is not to say that air testing with canisters does not have a place, it does, especially when there are unidentified contaminants. The GasClam can give us real time data or numerous data points over time at sites with known contaminants more effectively than many other methods.

We also use the GasClam to monitor recovery wells where contaminated soil cannot be excavation due to structures, piping or other physical limitations. The data from recovery wells indicates hydrocarbon degradation/attenuation probably due to microbiological activity consuming the hydrocarbons. (Discussion of microbiological activity is beyond the scope of this paper.) We have been using the GasClam for nine months at numerous sites both short and long term; some of the sites are outlined in the Data section.

2. MATERIALS AND METHODS

The GasClam was designed to operate remotely, specifically in monitoring wells. The GasClam purchased monitors and records the following: CH_4, O_2, CO, CO_2, H_2S, VOCs, atmospheric pressure, borehole pressure, pressure difference, temperature and water level. The instrument is intrinsically safe and operates on two D-cell batteries for a month or longer (dependent upon sampling rate). The case (housing) is constructed of high quality stainless steel and fits into a 2 inch borehole. In addition to petroleum sites, the GasClam is designed to monitor landfill gases, brownfields, coal mines and carbon capture and storage.

Some technical info on the GasClam includes a memory able to record 65,000 time/date stamped readings. It weighs 13.2 lbs or 7 kg. The overall length is 33.5 inches (85 cm), with the borehole tube length of 30.75 inches (78 cm). The borehole tube diameter is 1.75 inches and the head diameter is 4.25 inches. We have no problems locating a place for it at sites for collection of data.

3. CASES AND DATA

3.1 Calais, Maine

An apartment complex had a 1,000 gallon underground storage tank (UST) supplying #2 fuel to two furnaces in the basement of the apartment building. The 1,000 gallon UST was 33 years old and 13 years out of compliance; it was discovered leaking when the building owner smelled petroleum vapors in the basement and then observed free product in the basement drain which runs under the center of the building longitudinally. Liquid from this drain ultimately ends up in the city wastewater facility. The leak was discovered in the middle of the winter; the apartment building is supplied with public water and sewer making vapor intrusion into the occupied spaces the primary concern.

The UST was located on the exterior side of the foundation wall where the communal laundry room is located. An inlet to the building's drainage system was located in the middle of the laundry room allowing petroleum vapors to enter the room. A total of five connected drains were spaced approximately 25 feet apart within the basement were observed; free product was found throughout the basement drain system. During the initial MEDEP's visit the PID results were mostly in the 1-3 part-per-million (ppm) in the breathing zone (approximately 4-5 feet above the floor). PID readings just above the drains were between 80-120 ppm.

Initial actions included removing the remaining product from the UST and taking it out of service. Two 275 gallon above ground tanks (ASTs) were installed inside the basement to supply the furnaces. The owner then agreed to have the drain pipe cleaned. We installed the GasClam to get a better understanding of vapors in the basement especially before and after the drain cleaning. The removal of the UST was going to occur after the ground thawed. The drains could not be sealed due to groundwater seeping through cracks in the foundation walls and floor. Water was flowing even during MEDEP's initial visit.

The GasClam was installed in a secured room adjacent to the laundry room. It was placed in this room mostly due to security concern. The GasClam was placed 5.5 feet above the floor and it was programmed to sample once every 60 minutes (Figure 1).

Initial readings for the first 24 hours indicated VOC readings between 1-4 ppm, with an average of 2 ppm. On the second day at the 1400 hrs sampling time the VOC reading jumped to 10 ppm and gradually subsided to 2 ppm over the next four hours. After discussions with the owner we were able to determine this peak in VOC's was when the owner performed cleaning of the building's drains. Communication between the owner and MEDEP were difficult at best.

We had asked the owner to call the MEDEP a day or two prior to the cleaning so that we could observe and oversee the drain cleaning, that did not occur. Nonetheless, GasClam allowed MEDEP to observe the effects of the drain cleaning in the data; it also showed that VOCs declined within a few hours to pre cleaning levels. Within three days of the drain cleaning VOC levels dropped to zero and remained zero for the following month, at this point the GasClam was removed from this site.

3.2 Orono, Maine

An AST developed a small pinhole leak in the bottom of the tank. It appeared to have leaked slowly (drips) over a year or so and then finally gave way, discharging approximately 25 gallons onto the dirt cellar. The house is large, greater than 5,000 square feet, and is greater than 100 years old. The foundation is fieldstone with a small amount of concrete/mortar. The house is on public water and sewer.

The AST was located next to the fieldstone foundation wall. One of the rental's kitchens is directly overhead on first floor and a sunken living room (compared to kitchen) is approximately 20 feet away with a french door separating the basement from living room. Vapors were noticed in the kitchen and living room shortly after the spill by the owner.

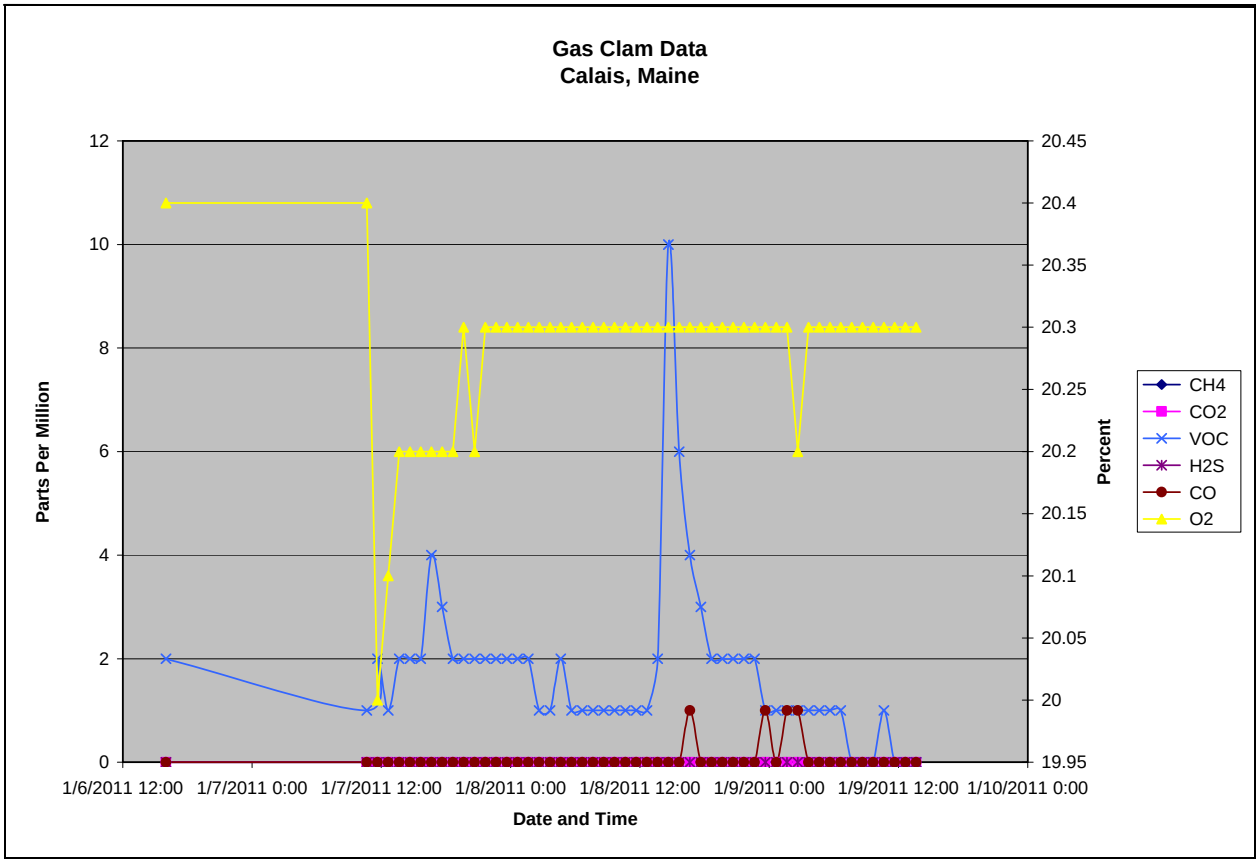

Figure 1. GasClam Data, Specifically O2, CO and VOC recorded at the Calais Maine site

Soil was impacted underneath the tank and around the tank, including under the fieldstone basement wall. Clay was found approximately 2-4 inches beneath surface layer of dirt/organic debris, oil also soaked into wood and debris in the cellar.

A wood floor area, approximately 5 feet by 5 feet, was impacted by the oil. Additional debris and materials in the basement were also contaminated and the majority of them were removed for proper disposal. Some debris impacted by oil was bagged and left for the owner to sort through, prior to removal. After the AST was removed, a small amount of soil, approximately 800 pounds, was removed from beneath the AST. It appeared that oil migrated towards the fieldstone basement wall. Due to the condition of the foundation wall contaminated soil was left undisturbed near and under the fieldstone foundation wall.

After removal of most of the contaminated material, 6 mil plastic was laid over the contaminated soil and up against the fieldstone wall and secured in place. Venting to the outside with a fan was an option but the owner was not 100% in line with approval with the installation of a fan and it would have required some creative pipe work since the closest window was almost into the living room. It was agreed to see if the poly would keep vapors suppressed until summer when windows could be opened.

Initially PID readings with Ion Science Phocheck 3000 were in the 9-15 ppm range next to the AST in the basement. PID readings on the first floor were below 3 ppm. Subsequent visits with Phocheck indicated readings below 1 ppm on the first floor and 4-7 ppm in basement until plastic on floor was disturbed or work was performed. Readings would then escalated back into the 9-15 ppm range.

Even though the owner insisted there were no issues in the house, PID readings indicated a potential for indoor vapor issues. The GasClam was installed approximately 7 feet from the AST and approximately 5.5 feet above the floor and programmed to sample every 60 minutes.

The GasClam showed a slow decline in VOC's, although when there were disturbances in the basement it caused elevated VOC readings for many hours afterward (Figure 2). Site visits generally resulted in higher VOC reading which was observed on the PID. Just walking on the poly caused an elevated reading on the PID and readings would stay at those levels for several hours. The GasClam data gave a better representation of the conditions of the basement over the long term, highlighting short term changes.

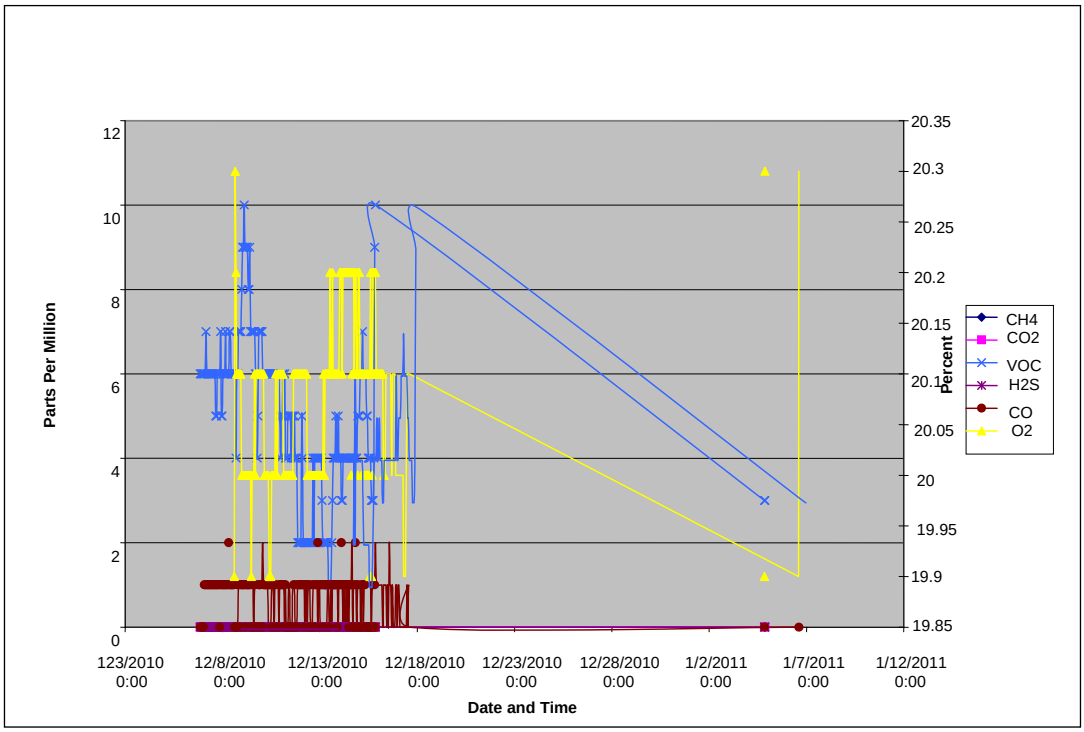

Figure 2. GasClam Data, specifically O2, CO and VOC, recorded at the Orono Maine Site

3.3 Bangor Gardens

The house was built in the 1950s or early 1960s as military base housing. The house is a single level on a concrete slab with neither a crawl space nor a basement. When the house was built a 275 gallon fuel oil tank was buried approximately 6 feet below grade. The UST was removed in late 1980s and a 275 gallon above ground oil storage tank (AST) was installed in the garage. The old UST supply line was connected to the new AST supply line approximately halfway between the garage and house. The entire supply line was buried with no secondary containment. The house is supplied by public water and sewer.

In early fall, approximately 250 gallons of #2 heating fuel leaked over a couple days. A patch of dead grass was observed in the back yard and was above the fitting connecting the old UST supply line and the newer AST supply line. It appears this connection had been leaking for some time and finally failed completely discharging the tank's contents.

MEDEP excavated approximately 3 cubic yards of contaminated soil to a depth of 6 feet. The concrete pad/bollard for the former UST was found at this depth. Free product was found collecting in the bottom of the excavation. A

recovery well was installed and the excavation was backfilled. The recovery well is a 15 inch black culvert pipe installed vertically into the excavation. Numerous ½ inch holes were drilled into the culvert and erosion fabric was wrapped around the exterior. A loose culvert cap was installed on top of the recovery well. Stone, 1.5 inch, was backfilled around the culvert until approximately 1 foot below grade. Soil was then placed and the area was seeded.

A shed, attached garage and house were all within 5 feet of the excavation. Soils were highly contaminated at a depth of 6 feet below the surface. Free product flowed in from the direction of the house at the 6 foot depth. Vapors entering the house were the main concern at this site. The old supply line was located under the house from the excavation, a potential pathway. The owner already had existing health issues, specifically respiratory problems. No vapor issues from the spilled oil were observed in the house and a request to place the GasClam inside the house for a few weeks was denied by the owner. An initial PID sweep of the living area nearest to the spill indicated no vapor issues at that time. According to the owner there have been no vapor issues since.

Approximately 25-30 gallons of free product has been collected in the past year, mostly through the use of absorbent pads from the recovery well. Collection of free product is still ongoing, albeit at a much lower collection rate. The oil collected currently is weathered, has a faded yellow appearance compared the initial dark red appearance. The GasClam has been installed at various times of the past year to record conditions within the recovery well. The GasClam was programmed to sample every 60 minutes.

Interesting data has been recorded with the GasClam at this site (Figure 3). Data from the GasClam has shown O_2 declining; lowest recorded data point was 10.1%. O_2 levels stayed above 16% consistently during cool or cold periods. During warmer periods, generally when temperatures are greater than 19 degrees Celsius, O_2 levels would drop below 16%. When O_2 levels dropped below 15% it was usually for less than 5 hours. In general, the lowest O_2 readings were observed during daylight hours.

There was one period, June 9th, 2011, where O_2 levels dropped below 15% for approximately 12 hours and included the 10.1% data point. The highest Methane, 1.8 ppm, and highest CO_2, 8.7 ppm, reading occurred at that same hour reading as the 10.1% O_2 reading. The recorded temperature was 21 degrees Celsius at that data point. VOC's also had one of the highest readings at 114 ppm. VOC readings were initially recorded between 437 and 565 ppm for a 26 hour period in mid October, 2010. They have dropped off substantially since and are usually under 100 ppm.

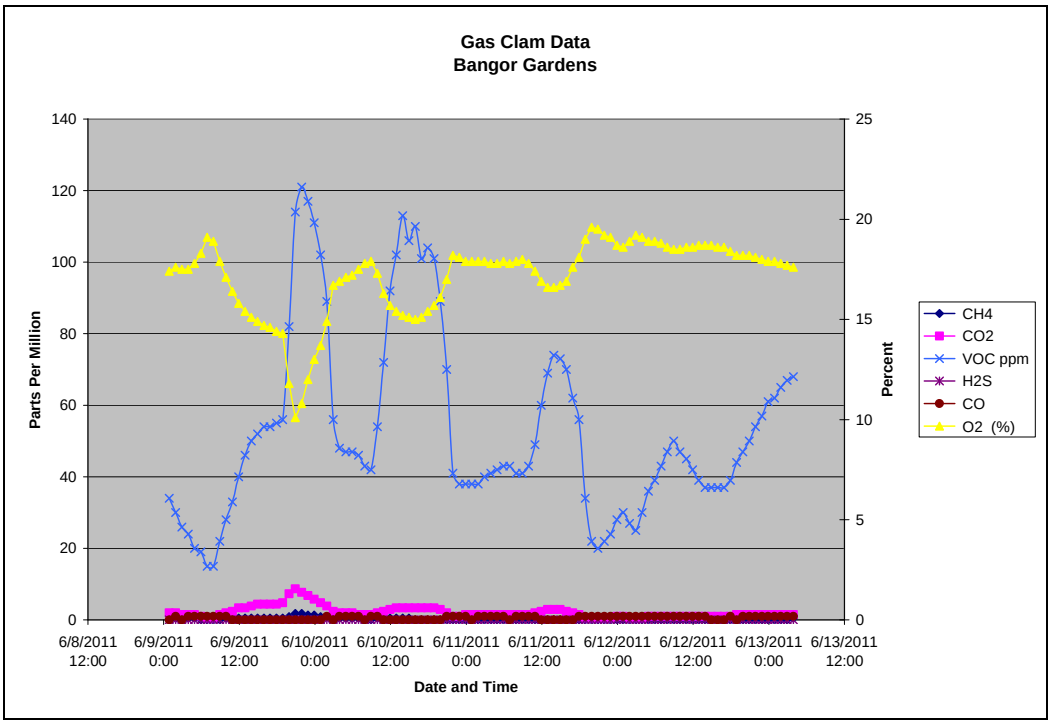

Figure 3. GasClam Data, specifically O2, CO2, CH4, and VOC, recorded at the Bangor Gardens Site

CO_2 levels overall would generally increase as O_2 levels declined and also hits of methane were recorded at these low O_2 periods. Carbon Monoxide (CO) consistently stayed between 0-2 ppm, with an average of less than 1 ppm. H_2S was detected three times (1 ppm) by the GasClam over the entire dataset.

During the most recent installation of the GasClam at this site it was observed that there were no hits of methane and VOCs were low, under 76 ppm with many readings in the 10-20 ppm range over a two week period. CO_2 levels fluctuated between 0-7.8 ppm; in general, the highest and lowest CO_2 readings occurred in the afternoon or evening. This was an unexpected observation considering the prior data. It was discovered through talking with the owner that she had just had a water leak fixed under her house. This would explain why there was water in the bottom of the well when in the past it was usually dry during times of minor precipitation. Public water draining into this area in a steady flow may have also caused some mortality of the petroleum eating bacteria. The water may have transported free product away from the well also since VOC data has been at the all time low since data collected started at this site and has been lower than spring and early summer readings.

With the current data from the GasClam, large decline of free product recovered from recovery well and oil recovered currently being very weathered, this site will be closed.

4. DISCUSSION

Maine DEP has been undergoing a major revision of the petroleum cleanup guidelines. The changes are broad and include sampling, field instrument use and bases cleanup decisions, after free product cleanup, on risk assessments, including risks to human health. Using the GasClam for continuous monitoring and data collection at petroleum sites has proved to be useful in making decisions about the risk of vapor intrusion and future cleanup actions.

5. APPENDIX I

Table 1. GasClam Raw Data Collected at the Calais Maine Site

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole	Atmospheric	Different Pressure	Temperature (celsius)
01/06/2011 16:01	0	0	20.4	2	0	0	993	996	-3	22.3
01/07/2011 10:39	0	0	20.4	1	0	0	996	999	-3	13.2
01/07/2011 11:39	0	0	20	2	0	0	995	998	-3	14.8
01/07/2011 12:39	0	0	20.1	1	0	0	993	997	-4	15.6
01/07/2011 13:39	0	0	20.2	2	0	0	993	997	-4	15.8
01/07/2011 14:39	0	0	20.2	2	0	0	993	997	-4	15.9
01/07/2011 15:39	0	0	20.2	2	0	0	993	997	-4	15.9
01/07/2011 16:39	0	0	20.2	4	0	0	993	996	-3	15.8
01/07/2011 17:39	0	0	20.2	3	0	0	992	996	-4	15.9
01/07/2011 18:39	0	0	20.2	2	0	0	992	996	-4	16.1

Table 1. GasClam Raw Data Collected at the Calais Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole	Atmospheric	Different Pressure	Temperature (celsius)
01/07/2011 19:39	0	0	20.3	2	0	0	992	995	-3	16.1
01/07/2011 20:39	0	0	20.2	2	0	0	991	995	-4	16.3
01/07/2011 22:39	0	0	20.3	2	0	0	991	994	-3	16.3
01/07/2011 23:39	0	0	20.3	2	0	0	990	994	-4	16.3
01/08/2011 0:39	0	0	20.3	2	0	0	990	994	-4	16.2
01/08/2011 1:39	0	0	20.3	2	0	0	990	993	-3	16.4
01/08/2011 2:39	0	0	20.3	1	0	0	989	993	-4	16.3
01/08/2011 3:39	0	0	20.3	1	0	0	990	993	-3	16.2
01/08/2011 4:39	0	0	20.3	2	0	0	989	993	-4	16.3
01/08/2011 5:39	0	0	20.3	1	0	0	990	993	-3	16.3
01/08/2011 6:39	0	0	20.3	1	0	0	990	994	-4	16.4
01/08/2011 7:39	0	0	20.3	1	0	0	990	994	-4	16.4

Table 1. GasClam Raw Data Collected at the Calais Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole	Atmospheric	Different Pressure	Temperature (celsius)
01/08/2011 8:39	0	0	20.3	1	0	0	991	994	-3	16.3
01/08/2011 9:39	0	0	20.3	1	0	0	991	995	-4	16.1
01/08/2011 11:39	0	0	20.3	1	0	0	990	994	-4	16.3
01/08/2011 12:39	0	0	20.3	1	0	0	991	994	-3	16.3
01/08/2011 13:39	0	0	20.3	2	0	0	991	994	-3	16.3
01/08/2011 14:39	0	0	20.3	10	0	0	990	994	-4	16.4
01/08/2011 15:39	0	0	20.3	6	0	0	991	995	-4	16.2
01/08/2011 16:39	0	0	20.3	4	0	1	991	995	-4	16
01/08/2011 17:39	0	0	20.3	3	0	0	991	995	-4	16.3
01/08/2011 18:39	0	0	20.3	2	0	0	990	994	-4	16.3
01/08/2011 19:39	0	0	20.3	2	0	0	990	994	-4	16.4
01/08/2011 20:39	0	0	20.3	2	0	0	989	993	-4	16.1

Table 1. GasClam Raw Data Collected at the Calais Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole	Atmospheric	Different Pressure	Temperature (celsius)
01/08/2011 21:39	0	0	20.3	2	0	0	989	992	-3	16.1
01/08/2011 22:39	0	0	20.3	2	0	0	988	992	-4	16.2
01/08/2011 23:39	0	0	20.3	1	0	1	988	992	-4	16.1
01/09/2011 1:39	0	0	20.3	1	0	1	986	991	-5	16.2
01/09/2011 2:39	0	0	20.2	1	0	1	985	989	-4	16.1
01/09/2011 3:39	0	0	20.3	1	0	0	985	990	-5	16.2
01/09/2011 4:39	0	0	20.3	1	0	0	985	990	-5	16.1
01/09/2011 5:39	0	0	20.3	1	0	0	985	989	-4	16.2
01/09/2011 6:39	0	0	20.3	1	0	0	985	990	-5	16.2
01/09/2011 7:39	0	0	20.3	0	0	0	985	989	-4	16.2
01/09/2011 8:39	0	0	20.3	0	0	0	985	989	-4	16.2
01/09/2011 9:39	0	0	20.3	0	0	0	985	989	-4	16.1

Table 1. GasClam Raw Data Collected at the Calais Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole	Atmospheric	Different Pressure	Temperature (celsius)
01/09/2011 10:39	0	0	20.3	1	0	0	984	989	-5	16.4
01/09/2011 11:39	0	0	20.3	0	0	0	984	989	-5	16.4
01/09/2011 12:39	0	0	20.3	0	0	0	985	989	-4	16.3
01/09/2011 13:39	0	0	20.3	0	0	0	986	990	-4	16.4

Table 2. GasClam Raw Data Collected at the Orono Maine Site

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/8/2010 14:33	0	0	19.9	6	0	0	987	991	-4	18.3
12/8/2010 15:33	0	0	20.3	6	0	0	988	992	-4	14
12/8/2010 16:33	0	0	20.2	6	0	0	989	994	-5	12.4
12/8/2010 17:33	0	0	20.1	6	0	0	990	995	-5	11.8
12/8/2010 18:33	0	0	20.1	6	0	0	991	996	-5	11.6
12/8/2010 19:33	0	0	20.1	6	0	1	992	997	-5	11.3
12/8/2010 20:33	0	0	20.1	6	0	1	993	997	-4	11.1
12/8/2010 21:33	0	0	20.1	7	0	1	994	998	-4	10.8
12/8/2010 22:33	0	0	20.1	6	0	1	995	998	-3	10.6
12/8/2010 23:33	0	0	20	6	0	1	995	999	-4	10.4
12/9/2010 0:33	0	0	20	6	0	1	996	999	-3	10.2
12/9/2010 1:33	0	0	20	6	0	1	996	1	0	-4

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/9/2010 2:33	0	0	20	6	0	1	997	1	0	-3
12/9/2010 3:33	0	0	20	6	0	1	997	1	0	-3
12/9/2010 4:33	0	0	20	6	0	1	998	1	1	-3
12/9/2010 5:33	0	0	20	6	0	1	998	1	2	-4
12/9/2010 6:33	0	0	20	6	0	1	999	1	2	-3
12/9/2010 7:33	0	0	20	6	0	1	1	0	1	3
12/9/2010 8:33	0	0	20	6	0	1	1	1	1	4
12/9/2010 9:33	0	0	20	5	0	1	1	1	1	5
12/9/2010 10:33	0	0	20	5	0	1	1	1	1	4
12/9/2010 11:33	0	0	19.9	6	0	1	1	1	1	4
12/9/2010 12:33	0	0	20	6	0	1	1	1	1	4
12/9/2010 13:33	0	0	20	6	0	1	1	2	1	5

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/9/2010 14:33	0	0	20	6	0	0	1	3	1	5
12/9/2010 16:33	0	0	20	5	0	1	1	5	1	7
12/9/2010 17:33	0	0	20.1	5	0	1	1	6	1	9
12/9/2010 18:33	0	0	20.1	6	0	1	1	8	1	10
12/9/2010 19:33	0	0	20.1	6	0	1	1	8	1	10
12/9/2010 20:33	0	0	20.1	6	0	1	1	9	1	11
12/9/2010 21:33	0	0	20.1	7	0	1	1	10	1	12
12/9/2010 22:33	0	0	20.1	6	0	1	1	11	1	13
12/9/2010 23:33	0	0	20.1	6	0	1	1	11	1	13
12/10/2010 0:33	0	0	20.1	6	0	1	1	12	1	14
12/10/2010 1:33	0	0	20.1	6	0	2	1	13	1	14
12/10/2010 2:33	0	0	20.1	7	0	1	1	14	1	15

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/10/2010 3:33	0	0	20	7	0	1	1	15	1	16
12/10/2010 4:33	0	0	20	6	0	1	1	15	1	16
12/10/2010 5:33	0	0	20	6	0	1	1	15	1	16
12/10/2010 6:33	0	0	20	6	0	1	1	16	1	17
12/10/2010 7:33	0	0	20	6	0	1	1	16	1	17
12/10/2010 8:33	0	0	20	6	0	0	1	17	1	18
12/10/2010 9:33	0	0	19.9	6	0	0	1	17	1	18
12/10/2010 10:33	0	0	19.9	4	0	0	1	16	1	18
12/10/2010 11:33	0	0	19.9	6	0	0	1	16	1	17
12/10/2010 12:33	0	0	20	6	0	1	1	15	1	16
12/10/2010 13:33	0	0	20	7	0	1	1	15	1	16
12/10/2010 14:33	0	0	20	7	0	1	1	15	1	16

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/10/2010 15:33	0	0	20	7	0	0	1	15	1	16
12/10/2010 16:33	0	0	20	7	0	1	1	15	1	16
12/10/2010 17:33	0	0	20.1	8	0	1	1	15	1	16
12/10/2010 18:33	0	0	20	9	0	1	1	15	1	16
12/10/2010 19:33	0	0	20	9	0	1	1	14	1	15
12/10/2010 20:33	0	0	20.1	10	0	1	1	13	1	14
12/10/2010 21:33	0	0	20.1	9	0	0	1	12	1	14
12/10/2010 22:33	0	0	20.1	9	0	1	1	12	1	13
12/10/2010 23:33	0	0	20.1	9	0	1	1	11	1	13
12/11/2010 0:33	0	0	20.1	9	0	1	1	11	1	12
12/11/2010 1:33	0	0	20.1	8	0	1	1	10	1	12
12/11/2010 2:33	0	0	20.1	8	0	1	1	10	1	12

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/11/2010 3:33	0	0	20	9	0	1	1	9	1	11
12/11/2010 4:33	0	0	20	7	0	0	1	8	1	10
12/11/2010 5:33	0	0	20	7	0	1	1	8	1	10
12/11/2010 6:33	0	0	20	7	0	0	1	8	1	10
12/11/2010 7:33	0	0	20	7	0	0	1	8	1	10
12/11/2010 8:33	0	0	20	7	0	0	1	8	1	10
12/11/2010 9:33	0	0	20	7	0	1	1	8	1	10
12/11/2010 10:33	0	0	20	6	0	1	1	8	1	10
12/11/2010 11:33	0	0	20	6	0	0	1	7	1	9
12/11/2010 12:33	0	0	20	4	0	0	1	7	1	9
12/11/2010 13:33	0	0	20	5	0	0	1	7	1	9
12/11/2010 14:33	0	0	20	7	0	1	1	8	1	9

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/11/2010 15:33	0	0	20.1	7	0	1	1	8	1	10
12/11/2010 16:33	0	0	20.1	7	0	1	1	8	1	10
12/11/2010 17:33	0	0	20.1	7	0	0	1	9	1	10
12/11/2010 19:33	0	0	20.1	6	0	0	1	10	1	12
12/11/2010 20:33	0	0	20.1	6	0	1	1	10	1	12
12/11/2010 21:33	0	0	20.1	6	0	1	1	11	1	12
12/11/2010 22:33	0	0	20.1	6	0	1	1	10	1	12
12/11/2010 23:33	0	0	20.1	6	0	1	1	11	1	12
12/12/2010 0:33	0	0	20.1	6	0	1	1	11	1	13
12/12/2010 1:33	0	0	20.1	6	0	1	1	11	1	13
12/12/2010 2:33	0	0	20.1	6	0	1	1	11	1	13
12/12/2010 3:33	0	0	20.1	6	0	1	1	11	1	13

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/12/2010 4:33	0	0	20.1	6	0	1	1	10	1	12
12/12/2010 5:33	0	0	20.1	6	0	0	1	10	1	12
12/12/2010 6:33	0	0	20.1	6	0	1	1	10	1	12
12/12/2010 7:33	0	0	20.1	6	0	1	1	11	1	13
12/12/2010 8:33	0	0	20	6	0	0	1	10	1	11
12/12/2010 9:33	0	0	20	6	0	1	1	9	1	11
12/12/2010 10:33	0	0	20	6	0	1	1	8	1	9
12/12/2010 11:33	0	0	20	6	0	1	1	5	1	7
12/12/2010 12:33	0	0	20	6	0	0	1	3	1	5
12/12/2010 13:33	0	0	20	6	0	0	1	1	1	4
12/12/2010 14:33	0	0	20	6	0	0	1	0	1	3
12/12/2010 15:33	0	0	20	6	0	1	998	1	2	-4

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/12/2010 16:33	0	0	20	5	0	1	996	1	0	-4
12/12/2010 17:33	0	0	20	4	0	1	995	999	-4	11.5
12/12/2010 18:33	0	0	20	5	0	1	993	997	-4	11.7
12/12/2010 19:33	0	0	20	5	0	1	991	995	-4	11.8
12/12/2010 20:33	0	0	20	6	0	1	989	993	-4	11.8
12/12/2010 21:33	0	0	20	5	0	0	986	991	-5	11.9
12/12/2010 22:33	0	0	20	6	0	1	985	990	-5	11.9
12/12/2010 23:33	0	0	20	4	0	1	983	988	-5	12.2
12/13/2010 0:33	0	0	20	4	0	0	980	986	-6	12.4
12/13/2010 1:33	0	0	20	4	0	0	978	984	-6	12.5
12/13/2010 2:33	0	0	20	5	0	0	976	982	-6	12.6
12/13/2010 3:33	0	0	20	5	0	0	974	980	-6	12.6

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/13/2010 4:33	0	0	20.1	5	0	0	973	979	-6	12.8
12/13/2010 5:33	0	0	20	5	0	0	972	979	-7	12.9
12/13/2010 6:33	0	0	20.1	4	0	0	972	979	-7	13.2
12/13/2010 7:33	0	0	20.1	5	0	0	972	979	-7	13.4
12/13/2010 8:33	0	0	20.1	5	0	0	972	979	-7	13.6
12/13/2010 9:33	0	0	20.1	4	0	1	972	978	-6	13.8
12/13/2010 10:33	0	0	20.1	5	0	1	972	979	-7	14
12/13/2010 11:33	0	0	20.1	4	0	0	970	976	-6	14.3
12/13/2010 12:33	0	0	20.2	4	0	0	970	977	-7	13.9
12/13/2010 13:33	0	0	20.1	4	0	1	969	976	-7	13.9
12/13/2010 14:33	0	0	20.1	2	0	0	969	976	-7	14.3
12/13/2010 15:33	0	0	20.2	2	0	1	969	976	-7	13.2

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/13/2010 16:33	0	0	20.1	2	0	1	968	975	-7	13.6
12/13/2010 17:33	0	0	20.1	2	0	1	969	976	-7	13.9
12/13/2010 18:33	0	0	20.1	2	0	1	967	974	-7	14.1
12/13/2010 19:33	0	0	20.1	5	0	1	965	972	-7	14.3
12/13/2010 20:33	0	0	20.1	4	0	1	965	973	-8	14.4
12/13/2010 21:33	0	0	20.1	2	0	1	964	972	-8	14.6
12/13/2010 22:33	0	0	20.1	2	0	0	964	972	-8	14.6
12/13/2010 23:33	0	0	20.1	2	0	1	963	971	-8	14.5
12/14/2010 0:33	0	0	20.2	2	0	1	965	972	-7	14.4
12/14/2010 1:33	0	0	20.2	2	0	1	966	973	-7	14.4
12/14/2010 2:33	0	0	20.2	2	0	1	967	974	-7	14.3
12/14/2010 3:33	0	0	20.1	2	0	1	967	974	-7	14.2

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/14/2010 4:33	0	0	20.2	2	0	0	967	975	-8	14.2
12/14/2010 5:33	0	0	20.2	2	0	1	968	975	-7	14.1
12/14/2010 6:33	0	0	20.2	2	0	0	969	976	-7	14.1
12/14/2010 7:33	0	0	20.2	2	0	0	970	977	-7	13.9
12/14/2010 8:33	0	0	20.2	2	0	1	971	978	-7	13.9
12/14/2010 9:33	0	0	20.2	4	0	0	972	979	-7	13.9
12/14/2010 10:33	0	0	20.2	2	0	1	973	979	-6	13.9
12/14/2010 11:33	0	0	20.2	4	0	0	973	980	-7	13.8
12/14/2010 12:33	0	0	20.2	4	0	1	974	980	-6	13.6
12/14/2010 13:33	0	0	20.2	4	0	1	974	981	-7	13.6
12/14/2010 14:33	0	0	20.2	4	0	1	975	982	-7	13.8
12/14/2010 15:33	0	0	20.2	4	0	2	976	982	-6	13.7

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/14/2010 16:33	0	0	20.2	4	0	0	977	983	-6	13.8
12/14/2010 17:33	0	0	20.2	4	0	1	978	984	-6	13.9
12/14/2010 18:33	0	0	20.1	4	0	1	978	984	-6	13.9
12/14/2010 19:33	0	0	20.2	4	0	1	978	984	-6	13.8
12/14/2010 20:33	0	0	20.2	3	0	1	978	984	-6	13.8
12/14/2010 21:33	0	0	20.1	2	0	0	978	983	-5	13.6
12/14/2010 22:33	0	0	20.1	2	0	1	976	983	-7	13.5
12/14/2010 23:33	0	0	20.2	2	0	1	976	983	-7	13.3
12/15/2010 0:33	0	0	20.2	2	0	1	978	983	-5	13.1
12/15/2010 1:33	0	0	20.1	2	0	1	978	984	-6	12.8
12/15/2010 2:33	0	0	20.1	2	0	0	976	982	-6	12.6
12/15/2010 3:33	0	0	20.1	2	0	1	976	982	-6	12.4

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/15/2010 4:33	0	0	20.1	1	0	1	976	982	-6	12.3
12/15/2010 5:33	0	0	20.1	1	0	0	976	982	-6	12.1
12/15/2010 6:33	0	0	20.1	1	0	1	977	983	-6	11.9
12/15/2010 7:33	0	0	20.1	1	0	1	977	983	-6	11.8
12/15/2010 8:33	0	0	20.1	2	0	1	978	984	-6	11.8
12/15/2010 9:33	0	0	20.1	3	0	1	979	985	-6	12.3
12/15/2010 10:33	0	0	20.1	4	0	1	979	985	-6	13.3
12/15/2010 11:33	0	0	20.1	4	0	1	980	985	-5	13.6
12/15/2010 12:33	0	0	20.1	4	0	1	979	985	-6	13.4
12/15/2010 13:33	0	0	20.1	5	0	1	980	986	-6	13.4
12/15/2010 14:33	0	0	20.2	4	0	1	980	986	-6	13.3
12/15/2010 15:33	0	0	20.1	4	0	0	981	987	-6	13.5

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/15/2010 16:33	0	0	20.1	5	0	1	981	987	-6	14.4
12/15/2010 17:33	0	0	20.2	4	0	1	982	987	-5	14.3
12/15/2010 18:33	0	0	20.2	4	0	1	982	988	-6	13.8
12/15/2010 19:33	0	0	20.2	4	0	1	984	988	-4	13.3
12/15/2010 20:33	0	0	20.2	3	0	2	984	989	-5	12.9
12/15/2010 21:33	0	0	20.1	3	0	1	984	989	-5	12.4
12/15/2010 22:33	0	0	20.1	4	0	1	984	989	-5	12.1
12/15/2010 23:33	0	0	20.1	4	0	1	984	989	-5	11.9
12/16/2010 0:33	0	0	20.1	4	0	1	984	989	-5	11.7
12/16/2010 1:33	0	0	20.1	4	0	1	985	990	-5	11.3
12/16/2010 2:33	0	0	20.1	4	0	1	985	990	-5	10.9
12/16/2010 3:33	0	0	20.1	4	0	1	986	991	-5	10.7

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/16/2010 4:33	0	0	20.1	4	0	1	987	992	-5	10.4
12/16/2010 5:33	0	0	20.1	4	0	0	987	992	-5	10.2
12/16/2010 6:33	0	0	20	4	0	1	988	993	-5	9.9
12/16/2010 7:33	0	0	20	4	0	1	989	993	-4	9.9
12/16/2010 8:33	0	0	20	4	0	1	989	994	-5	11.1
12/16/2010 9:33	0	0	20.1	4	0	1	990	995	-5	11.9
12/16/2010 10:33	0	0	20.1	4	0	0	990	994	-4	11.9
12/16/2010 11:33	0	0	20.1	4	0	1	990	994	-4	12.1
12/16/2010 12:33	0	0	20.1	4	0	0	990	994	-4	12.2
12/16/2010 13:33	0	0	20.1	6	0	2	990	994	-4	11.2
12/16/2010 14:33	0	0	20.1	4	0	1	991	995	-4	10.7
12/16/2010 15:33	0	0	20.1	4	0	1	992	996	-4	10.7

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/16/2010 16:33	0	0	20	5	0	0	992	997	-5	11.3
12/16/2010 17:33	0	0	20.1	5	0	1	993	997	-4	11.6
12/16/2010 18:33	0	0	20.1	5	0	0	993	997	-4	11.4
12/16/2010 19:33	0	0	20.1	6	0	0	993	997	-4	11
12/16/2010 20:33	0	0	20.1	6	0	0	993	997	-4	10.5
12/16/2010 21:33	0	0	20	6	0	1	992	997	-5	10.2
12/16/2010 22:33	0	0	20	7	0	1	992	997	-5	10
12/16/2010 23:33	0	0	20	6	0	0	992	997	-5	9.8
12/17/2010 0:33	0	0	20	6	0	1	992	996	-4	9.6
12/17/2010 1:33	0	0	20	6	0	1	992	997	-5	9.4
12/17/2010 2:33	0	0	20	6	0	0	992	997	-5	9.3
12/17/2010 3:33	0	0	20	5	0	0	992	996	-4	9.2

Table 2. GasClam Raw Data Collected at the Orono Maine Site (continued)

Date and Time	CH_4	CO_2	O_2	VOC	H_2S	CO	Borehole Pressure	Atmospheric Pressure	Differential pressure	Temperature (^{o}Celsius)
12/17/2010 4:33	0	0	20	5	0	0	991	996	-5	9.1
12/17/2010 5:33	0	0	20	4	0	0	991	996	-5	8.9
12/17/2010 6:33	0	0	20	4	0	0	991	996	-5	8.8
12/17/2010 7:33	0	0	19.9	4	0	0	992	996	-4	8.8
12/17/2010 8:33	0	0	19.9	4	0	0	992	997	-5	9.3
12/17/2010 9:33	0	0	19.9	3	0	0	992	997	-5	10.4
12/17/2010 10:33	0	0	20	3	0	0	992	997	-5	12.5
12/17/2010 11:33	0	0	20.1	3	0	1	992	996	-4	12.8
12/17/2010 12:33	0	0	20.1	4	0	0	992	996	-4	12.9
12/17/2010 13:33	0	0	20.1	9	0	1	992	997	-5	12.8
12/17/2010 14:33	0	0	20.1	10	0	0	993	997	-4	12.5
1/6/2011 14:16	0	0	19.9	3	0	0	993	996	-3	22.5
1/6/2011 14:51	0	0	20.3	3	0	0	993	996	-3	23

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/09/2011 0:54	0	2	17.4	34	0	0	999	62.1	0.04	29.71
06/09/2011 1:54	0.5	2	17.6	30	0	1	999	62.1	0	29.72
06/09/2011 2:54	0.5	1.5	17.5	26	0	0	998	62.1	0	29.69
06/09/2011 3:54	0.5	1.5	17.5	24	0	1	999	62.1	0	29.7
06/09/2011 4:54	0.5	1.5	17.8	20	0	1	999	61	0	29.72
06/09/2011 5:54	0	1	18.3	19	0	1	1	61	0	29.75
06/09/2011 6:54	0	0.5	19.1	15	0	1	1	60.1	0.13	29.77
06/09/2011 7:54	0	0.5	18.9	15	0	1	1	61	0.64	29.78
06/09/2011 8:54	0	1.5	17.9	22	0	1	1	64	0	29.75
06/09/2011 9:54	0.5	2	17.1	28	0	1	1	68	0	29.74
06/09/2011 10:54	0.5	2.4	16.4	33	0	0	999	75	0	29.71
06/09/2011 11:54	0.5	3.4	15.8	40	0	0	999	80.1	0	29.72

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/09/2011 12:54	0.5	3.4	15.4	46	0	0	998	84	0	29.69
06/09/2011 13:54	0.5	3.9	15.1	50	0	0	998	84	0	29.68
06/09/2011 14:54	0.5	4.4	14.9	52	0	0	999	86	0	29.7
06/09/2011 15:54	0.5	4.4	14.7	54	0	0	998	82	0	29.69
06/09/2011 16:54	0.5	4.4	14.6	54	0	0	997	82.9	0	29.66
06/09/2011 17:54	0.5	4.4	14.4	55	0	0	998	75.9	0	29.67
06/09/2011 18:54	0.5	4.8	14.3	56	0	0	998	73.9	0	29.68
06/09/2011 19:54	0.9	7.3	11.8	82	0	0	1	66	0	29.77
06/09/2011 20:54	1.8	8.7	10.1	114	0	0	1	68	0	29.75
06/09/2011 21:54	1.8	7.7	10.8	121	0	0	1	68	0	29.76
06/09/2011 22:54	1.4	6.8	12	117	0	0	1	66.9	0	29.76
06/09/2011 23:54	1.4	5.8	13	111	0	0	1	66.9	0	29.76

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/10/2011 0:54	0.9	4.8	13.7	102	0	0	1	66.9	0	29.78
06/10/2011 1:54	0.9	3.9	14.9	89	0	1	1	64.9	0	29.79
06/10/2011 2:54	0.5	2.4	16.7	56	0	0	1	62.1	0.06	29.81
06/10/2011 3:54	0.5	2	16.9	48	0	1	1	63	0.02	29.83
06/10/2011 4:54	0.5	2	17.1	47	0	1	2	62.1	0	29.85
06/10/2011 5:54	0.5	2	17.2	47	0	1	3	62.1	0	29.89
06/10/2011 6:54	0.5	1.5	17.5	46	0	1	4	62.1	0	29.91
06/10/2011 7:54	0.5	1.5	17.8	43	0	0	5	62.1	0	29.94
06/10/2011 8:54	0	1.5	17.9	42	0	1	5	64	0	29.95
06/10/2011 9:54	0.5	2	17.3	54	0	1	6	66	0	29.96
06/10/2011 10:54	0.5	2.4	16.3	72	0	0	7	68	0	29.98
06/10/2011 11:54	0.5	2.9	15.7	92	0	0	7	70	0	29.98

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/10/2011 12:54	0.5	3.4	15.4	102	0	0	7	71.1	0	29.97
06/10/2011 13:54	0.5	3.4	15.2	113	0	0	7	73	0	29.97
06/10/2011 14:54	0.5	3.4	15.1	106	0	0	7	73	0	29.97
06/10/2011 15:54	0	3.4	15	110	0	0	7	73.9	0	29.98
06/10/2011 16:54	0	3.4	15.1	101	0	0	7	73	0	29.98
06/10/2011 17:54	0	3.4	15.4	104	0	0	8	73.9	0	30
06/10/2011 18:54	0	3.4	15.7	101	0	0	8	72	0	30
06/10/2011 19:54	0	2.9	16.1	89	0	0	9	68	0	30.03
06/10/2011 20:54	0	2	17	70	0	1	9	64.9	0	30.06
06/10/2011 21:54	0	1	18.2	41	0	1	10	63	0	30.08
06/10/2011 22:54	0	1	18.1	38	0	1	10	60.1	0	30.08
06/10/2011 23:54	0	1.5	17.9	38	0	1	11	60.1	0	30.1

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/11/2011 0:54	0	1.5	17.9	38	0	0	12	55.9	0	30.12
06/11/2011 1:54	0	1.5	17.9	38	0	1	12	53.1	0	30.13
06/11/2011 2:54	0	1.5	17.9	40	0	1	13	55	0	30.14
06/11/2011 3:54	0	1.5	17.8	41	0	1	13	54	0	30.14
06/11/2011 4:54	0	1.5	17.8	42	0	1	13	54	0	30.14
06/11/2011 5:54	0	1.5	17.9	43	0	1	14	55	0	30.17
06/11/2011 6:54	0	1.5	17.8	43	0	0	14	57.9	0	30.17
06/11/2011 7:54	0	1.5	17.9	41	0	1	14	60.1	0	30.17
06/11/2011 8:54	0	1.5	18	41	0	1	14	64	0	30.19
06/11/2011 9:54	0	1.5	17.8	43	0	1	14	66.9	0	30.18
06/11/2011 10:54	0	2	17.4	49	0	1	14	68	0	30.17
06/11/2011 11:54	0	2.4	16.9	60	0	0	13	69.1	0	30.15

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/11/2011 12:54	0	2.9	16.6	69	0	0	13	71.1	0	30.14
06/11/2011 13:54	0	2.9	16.6	74	0	0	13	70	0	30.13
06/11/2011 14:54	0	2.9	16.7	73	0	0	13	69.1	0	30.13
06/11/2011 15:54	0	2.4	16.9	70	0	0	13	64.9	0	30.13
06/11/2011 16:54	0	2	17.6	62	0	0	13	61	0	30.14
06/11/2011 17:54	0	1.5	18.1	56	0	1	13	60.1	0	30.14
06/11/2011 18:54	0	0.5	19	34	0	1	13	59	0	30.13
06/11/2011 19:54	0	0.5	19.6	22	0	1	13	57.9	0	30.14
06/11/2011 20:54	0	0.5	19.5	20	0	1	13	57	0	30.14
06/11/2011 21:54	0	0.5	19.2	22	0	1	13	57	0	30.14
06/11/2011 22:54	0	0.5	19.1	24	0	1	12	55	0	30.12
06/11/2011 23:54	0	1	18.7	28	0	1	11	55	0	30.12

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/12/2011 0:54	0	1	18.6	30	0	1	11			
06/12/2011 1:54	0	0.5	18.9	27	0	1	11	53	0.41	30.02
06/12/2011 2:54	0	0.5	19.2	25	0	1	11	AVG	Total	AVG
06/12/2011 3:54	0	0.5	19.1	30	0	1	10			
06/12/2011 4:54	0	1	18.9	36	0	1	10			
06/12/2011 5:54	0	1	18.9	39	0	1	10			
06/12/2011 6:54	0	1	18.8	43	0	1	10			
06/12/2011 7:54	0	1	18.6	47	0	1	10			
06/12/2011 8:54	0	1	18.5	50	0	1	10			
06/12/2011 9:54	0	1	18.5	47	0	1	9			
06/12/2011 10:54	0	1	18.6	45	0	1	9			
06/12/2011 11:54	0	1	18.6	42	0	1	9			

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site (continued)

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/12/2011 12:54	0	1	18.7	39	0	1	8			
06/12/2011 13:54	0	1	18.7	37	0	1	7			
06/12/2011 14:54	0	1	18.7	37	0	0	7			
06/12/2011 15:54	0	1	18.6	37	0	0	7			
06/12/2011 16:54	0	1	18.6	37	0	0	6			
06/12/2011 17:54	0	1	18.4	39	0	1	5			
06/12/2011 18:54	0	1.5	18.2	44	0	0	5			
06/12/2011 19:54	0	1.5	18.2	47	0	1	4			
06/12/2011 20:54	0	1.5	18.2	50	0	1	4			
06/12/2011 21:54	0	1.5	18.1	54	0	1	3			
06/12/2011 22:54	0	1.5	18	57	0	1	4			
06/12/2011 23:54	0	1.5	17.9	61	0	1	3			

Table 3. GasClam Raw Data Collected at the Bangor Gardens Site

Date and Time	CH_4	CO_2	O_2 (%)	VOC ppm	H_2S	CO	Atmospheric Pressure	Temp (°F)	Precip	Sea Level Pressure
06/13/2011 0:54	0	1.5	17.9	62	0	1	2	57	0.02	29.96
06/13/2011 1:54	0	1.5	17.8	65	0	1	2	AVG	Total	AVG
06/13/2011 2:54	0	1.5	17.7	67	0	1	2			
06/13/2011 3:54	0.5	1.5	17.6	68	0	1	1			