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ENVIRONMENT

Mr. Dave Morgan
Air Quality Division
State Office Building, 6th Floor
350 Ottawa Avenue NW, Unit 10
Grand Rapids, MI 49503-2341

Subject:
Stack Test Report, Bodycote Thermal Processing, Grand Rapids, Michigan
Permit No. 98-13

Date:
May 5, 2014

Contact:
Vasco Roma

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248-994-2292

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Our ref:
CM010633.0001

Dear Mr. Morgan:

In accordance with Condition V.1 of Permit No. 98-13, enclosed please find the Network Environmental Inc. (Network) report of stack testing conducted at the Bodycote Thermal Processing (Bodycote) Grand Rapids, Michigan facility on March 5th and 6th, 2014.

Although the total measured batch emissions appear to exceed the volatile organic compound (VOC) emission factor in the facility's current permit, the analysis presented in this letter demonstrates that, when emissions from oil quenching are assessed separately from natural gas combustion emissions, the results comply with Michigan's air toxic Rule 225. As a result of this analysis, Bodycote proposes to submit an application to modify the facility's permit to address emissions associated with these two different processes separately.

Background

A Permit-to-Install (PTI) application was submitted to the Michigan Department of Environmental Quality (MDEQ) on July 11, 2013 and, as a result of subsequent discussions with MDEQ, an interim emission factor of 0.3 pounds of VOC per ton of metal (lb/ton) was ultimately proposed for furnaces EUHEATTREATIQ13 through EUHEATTREATIQ15, and the vacuum furnace (EUHEATTREATIQ5). Based on air dispersion modeling conducted by MDEQ, the proposed emission factor resulted in ambient air impacts below the 50 micrograms per cubic meter ($\mu g/m^3$) Initial Threshold Screening Level (ITSL) for oil emissions. Emissions from natural gas combustion associated with the rest of the metal heat treating process were determined not to result in ambient impacts above the screening or risk levels for natural gas combustion products using MDEQ's conservative Allowable Emission Rate Methodology and Air Matrix Methodology.

The PTI was issued on October 24, 2013 (Permit No. 98-13) and, as required by Condition V.1 of the permit, stack testing was conducted on March 5 and 6, 2014 within 180 days of issuance of the permit with the objective of verifying the proposed emission factor. Stack testing was conducted on EUHEATTREATIQ13 as a representative line for the non-vacuum furnaces, and on the EUHEATTREATIQ5 vacuum furnace. The enclosed Network stack test report is being submitted to the MDEQ within 60 days of the last date of the test in accordance with Condition V.1 of the permit.

Process Description

EUHEATTREATIQ13 - EUHEATTREATIQ15

Metal parts are heat treated in natural gas-fired integral quench furnaces. Parts are first introduced in the heat treating area of the furnaces where they are exposed to high temperatures in an oxygen-free nitrogen and/or hydrocarbon atmosphere achieved by the injection of methanol, natural gas, anhydrous ammonia, or nitrogen. The injected gases are expected to be consumed almost completely in the process as a result of the elevated temperatures inside the furnaces. Any remaining gases are oxidized in flame curtains lit by pilot flames located on the furnace doors. Following the heat treatment step, the metals parts are quenched in oil in integrated dip tanks. No gases are injected during quenching. The pilot flames remain lit during quenching and provide a measure of control for the oil quenching emissions.

EUHEATTREATIQ5

In EUHEATTREATIQ5, metal parts are exposed to high temperatures in an oxygen-free atmosphere achieved through vacuum. The furnace is heated using electric burners. No gases are injected into this unit and no pilot flames are used. No emissions are generated during the actual heat treating process. The only emissions generated from this unit result from the quenching of the metal parts in oil. Oil quenching emissions are trapped inside the furnace until the end of the batch, when the furnace doors are opened and emissions vent through the unit's hood and stack.

Stack Test Process Data

Table 1 below provides a summary of key process data for the two batches for which stack testing was conducted.

Table 1. Stack Testing Process Information

Parameter	EUHEATTREATIQ13 (3/5/2014)	EUHEATTREATIQ5 (3/6/2014)
Batch start time	11:42 AM	9:03 AM
Quench start time[1]	6:19 PM	1:02 PM
Quench stop time[1]	7:14 PM	1:05 PM
Batch stop time	7:37 PM	1:05 PM
Methane bag sample collection times	11:55 AM, 2:46 PM, and 6:34 PM	10:26 AM and 12:34 PM
Production batch sequence number	1303051405	0503061401
Total metal weight[2] (lbs.)	1,339	553

Notes:

[1] For EUHEATTREATIQ5, the actual oil quenching occurs while the furnace doors are closed (furnace under vacuum) with no emissions until the doors are opened at the end of the batch. As such, the quench start time in the table above represents the time when the furnace doors were opened to remove the treated metal parts and emissions from quenching were vented through the hood and stack for the unit. The quench end time represents the batch stop time when the furnace doors were closed again, thereby signifying the end of emissions from the vacuum furnace.

[2] Includes basket and grid weight for EUHEATTREATIQ13, and basket, tray, and spacer weight for EUHEATTREATIQ5. Note that, for purposes of demonstrating compliance with the metal throughput permit limits, the total metal weight (i.e., including baskets, grids, trays, and spacers) is also used.

Stack Testing Results

EUHEATTREATIQ13

The hourly Total Hydrocarbon (THC) mass emission rates for EUHEATTREATIQ13 are presented in the enclosed stack test report and summarized in Table 2 below. Only those emissions measured after 6:19 PM (i.e., approximately half way into hour 7), when the metal parts were first dipped in the oil, represent oil quenching

emissions. The remainder of the emissions is comprised of natural gas combustion emissions from both injected gas combustion and combustion of pilot fuel gas.

Oil quenching emissions were the limiting factor during the recent permitting action for the facility in terms of demonstrating compliance with Michigan's air toxic Rule 225. In order to quantify oil quenching emissions separately from natural gas combustion emissions, raw THC concentration data were reviewed (see Attachment 1 for annotated raw data and Figure 1 for a chart of raw THC measurements throughout the batch) to determine the fraction of THC emissions that occurred during quenching. For hour 7, it was determined that approximately 57% of the total emissions occurred during quenching. With regards to hour 8, and although the metal parts were removed from the oil tank approximately half way into this hour and left to drain for the remainder of the batch, it was conservatively assumed that 100% of the measured emissions for this hour represented oil quenching emissions. Figure 2 provides measurements of different process parameters throughout the EUHEATTREATIQ13 batch, including the rate of natural gas injection (light blue line). It is noteworthy that increases in the natural gas injection rate often corresponded to increases in the measured THC concentrations (for example, at approximately 11:50am, 12:30pm, 18:20pm, and 19:30pm), further supporting the fact that a significant amount of the measured emissions result from natural gas combustion and not oil quenching.

Finally, Total Non-Methane Hydrocarbon (TNMHC) emissions were calculated based on methane analyses of two bag samples collected during the non-quenching phase and one bag sample collected during the quenching phase (see the enclosed Network Environmental Inc. report or the annotated raw data in Attachment 1 for the results of the methane analyses). The average ratio of methane to THC emissions for the two samples collected during the non-quenching phase was approximately 57% and the ratio of methane to THC emissions for the one sample collected during the quenching phase was approximately 37%.

Table 2 below presents the results of the calculation of the quenching and non-quenching TNMHC emissions, and corresponding emission factors (pound per ton of metal processed), for the EUHEATTREATIQ13 stack test.

Table 2. EUHEATTREATIQ13 Stack Test Results and Emission Factor Calculation

Hour	THC (lb/hr)	Quench Emissions[1] (%)	Quench TNMHC[2] (lb/hr)	Non Quench TNMHC[3] (lb/hr)
1	0.146	0%	0	0.06
2	0.154	0%	0	0.07
3	0.097	0%	0	0.04
4	0.157	0%	0	0.07
5	0.166	0%	0	0.07
6	0.110	0%	0	0.05
7	0.102	57%	0.04	0.02
8	0.136	100%	0.09	0
		Total lb./batch[4]	0.1	0.4
		Total lb/ton metal[5]	0.2	0.6

Notes:

[1] Determined based on raw THC measurements during quenching (i.e., starting at 6:19 PM in hour 7 through the end of hour 8).

[2] Based on THC measurements multiplied by the percentage values in the Quench Emissions column and by 100% minus a methane to THC ratio of approximately 37%.

[3] Based on THC measurements multiplied by 100% minus the percentage values in the Quench Emissions column and by 100% minus an average methane to THC ratio of approximately 57%.

[4] Sum of lb/hr values for all eight hours.

[5] Sum of lb/hr values for all eight hours divided by the treated metal weight (1,339 lbs = 0.6695 tons).

EUHEATTREATIQ5

The measured hourly THC mass emission rates for EUHEATTREATIQ5 are presented in the enclosed stack test report and summarized in Table 3 below. Similar to EUHEATTREATIQ13, only a portion of the measured emissions correspond to oil quenching. Heat treating of metal parts in this unit is conducted at high temperatures under vacuum with no gas injection or combustion. Emissions from this process occur only when the furnace doors are opened at the end of the batch. The low level of emissions measured for the EUHEATTREATIQ5 batch prior to the opening of the doors, which ranged from approximately 3 to 8 ppm of THC, are believed to represent plant background emissions from nearby non-vacuum furnaces, which are being vented through the hood and stack for EUHEATTREATIQ5.

To quantify oil quenching emissions vs. plant background emissions, raw THC concentration data for EUHEATTREATIQ5 were reviewed (see Attachment 2 for annotated raw data and Figure 3 for a chart of raw THC measurements throughout the batch) to determine the fraction of THC emissions that occurred following the opening of the doors and until the doors were closed again (i.e., from 1:02 PM to 1:05 PM in hour 4). Based on a review of the data, it was determined that approximately 75% of the hour 4 emissions occurred after the door was opened.

Finally, TNMHC emissions were calculated based on analytical results from two bag samples collected during the batch (see the enclosed Network Environmental Inc. report or the annotated raw data in Attachment 2 for the results of the methane analyses). The results from these two samples represent the methane content in the plant background emissions. Because it was not possible to time the collection of a third bag sample with the limited period of time during which the furnace doors were open and emissions were being vented, no methane concentration data is available for these emissions. However, it is safe to assume that the methane in plant background continued to be emitted throughout the entire process and, therefore, the two samples collected prior to the opening of the doors were used to estimate the methane content of emissions following the opening of the doors as well. Based on this analysis, it was determined that the average ratio of methane to THC emissions before and after the opening of the doors was 40% and 0.7%, respectively.

Table 3 below presents the results of the calculation of the quenching and non-quenching TNMHC emissions, including corresponding emission factors (pound per ton of metal processed), for the EUHEATTREATIQ5 stack test.

Table 3. EUHEATTREATIQ5 Stack Test Results and Emission Factor Calculation

Hour	THC (lb/hr)	Quench Emissions[1] (%)	Quench TNMHC[2] (lb/hr)	Non Quench TNMHC[3] (lb/hr)
1	0.003	0%	0	0.002
2	0.003	0%	0	0.002
3	0.003	0%	0	0.002
4	0.120	75%	0.09	0.02
		Total lb/batch[4]	0.09	0.02
		Total lb/ton metal[5]	0.3	0.1

Notes:

[1] Determined based on raw THC measurements during quenching (i.e., starting at 1:02 PM in hour 4 through the end of the batch).

[2] Based on THC measurements multiplied by the percentage values in the Quench Emissions column and by 100% minus an average methane to THC ratio of approximately 0.7%.

[3] Based on THC measurements multiplied by 100% minus the percentage values in the Quench Emissions column and by 100% minus an average methane to THC ratio of approximately 40%.

[4] Sum of lb/hr values for all four hours.

[5] Sum of lb/hr values for all four hours divided by the treated metal weight (553 lbs = 0.277 tons).

Rule 225 Compliance Demonstration

Oil Quenching Emissions

As detailed above, oil quenching emissions from EUHEATTREATIQ13 and EUHEATTREATIQ5 are at or below the current permit emission factor of 0.3 lb/ton of metal. This emission factor was demonstrated to comply with Michigan's air toxic Rule 225 during the most recent permitting action for the facility and, therefore, no further demonstration of compliance is required for the oil quenching emissions.

Natural Gas Combustion Emissions

To demonstrate compliance with Rule 225 for the non-quench emissions from natural gas combustion, a conservative total TNMHC emission rate associated with natural gas combustion from all four permitted units was calculated based on the maximum non-quenching hourly TNMHC emission rate for EUHEATTREATIQ13 multiplied by three (to account for the three non-vacuum furnaces) plus the maximum non-quenching hourly TNMHC emission rate for EUHEATTREATIQ5. As discussed above, the EUHEATREATIQ5 natural gas combustion emissions represent plant background emissions but were conservatively included in this analysis.

United States Environmental Protection Agency (USEPA) AP-42 emission factors for external natural gas combustion were then used to estimate emission rates for speciated natural gas combustion pollutants. The emission rates were determined by calculating the ratios between AP42 emission factors for speciated pollutants and the AP42 emission factor for VOC, and multiplying those ratios by the total TNMHC emission rate (see Attachment 3, Tables 1 and 2). Finally, MDEQ's conservative Allowable Emission Rate Methodology and Air Matrix Methodology were used to demonstrate compliance with Rule 225 for all natural gas combustion pollutants (see Attachment 3, Tables 3 and 4).

Closing

Based on the analysis detailed above, emissions from the Bodycote Grand Rapids, Michigan facility comply with the requirements specified in Permit No. 98-13 as well as MDEQ's Rule 225 when oil quenching emissions and natural gas emissions, as determined based on stack test measurements, are evaluated separately. The facility's current permit provides a single VOC limit, which was demonstrated to comply with the ITSL for oil emissions. As a result of the present analysis, Bodycote proposes to submit an application to modify the facility's permit so that emissions associated with oil quenching are addressed separately from natural gas combustion to accurately reflect and regulate actual emissions from the facility's metal heat treating processes.

Please feel free to contact Vasco Roma at (248) 994-2292 or Vasco.Roma@arcadis-us.com should you have any questions.

Sincerely,

ARCADIS U.S., Inc.

Vasco Roma
Project Environmental Scientist

Peter Rosen
Principal Engineer

Enclosures (7)

Copies:
Ms. Karen Kajiya-Mills, MDEQ
Mr. Scot Garner, Bodycote
Mr. Tom Anderson, Bodycote

FIGURE 1
Chart of Raw THC Data for EUHEATTREATIQ13

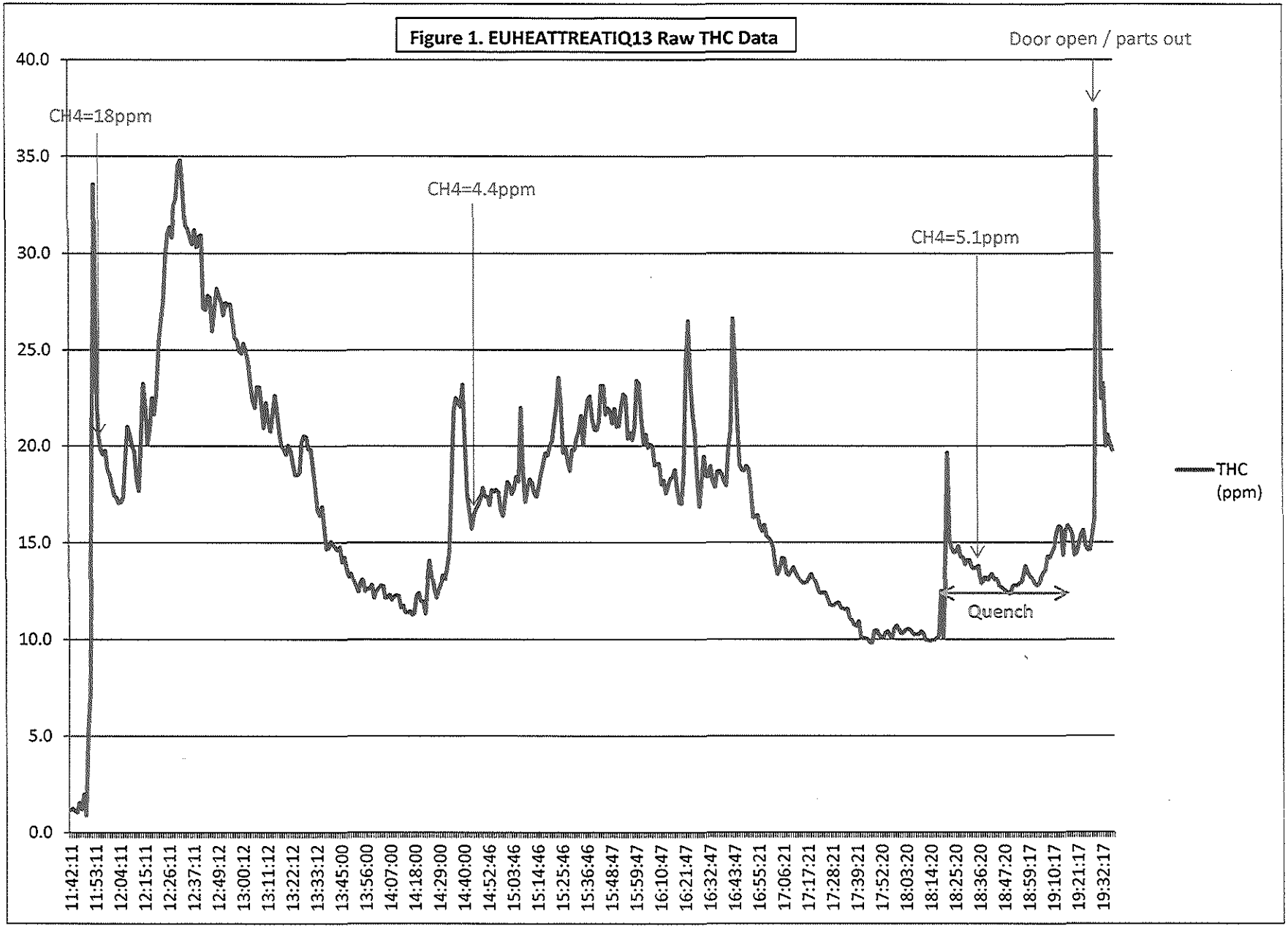
Figure 1. EUHEATTREATIQ13 Raw THC Data
Door open / parts out
CH4=18ppm
CH4=4.4ppm
CH4=5.1ppm
Quench
THC (ppm)
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
11:42:11
11:53:11
12:04:11
12:15:11
12:26:11
12:37:11
12:49:12
13:00:12
13:11:12
13:22:12
13:33:12
13:45:00
13:56:00
14:07:00
14:18:00
14:29:00
14:40:00
14:52:46
15:03:46
15:14:46
15:25:46
15:36:46
15:48:47
15:59:47
16:10:47
16:21:47
16:32:47
16:43:47
16:55:21
17:06:21
17:17:21
17:28:21
17:39:21
17:52:20
18:03:20
18:14:20
18:25:20
18:36:20
18:47:20
18:59:17
19:10:17
19:21:17
19:32:17

FIGURE 2
Chart of Process Parameters for EUHEATTREATIQ13

Figure 2. EUHEATTREAT IQ13 Process Parameters

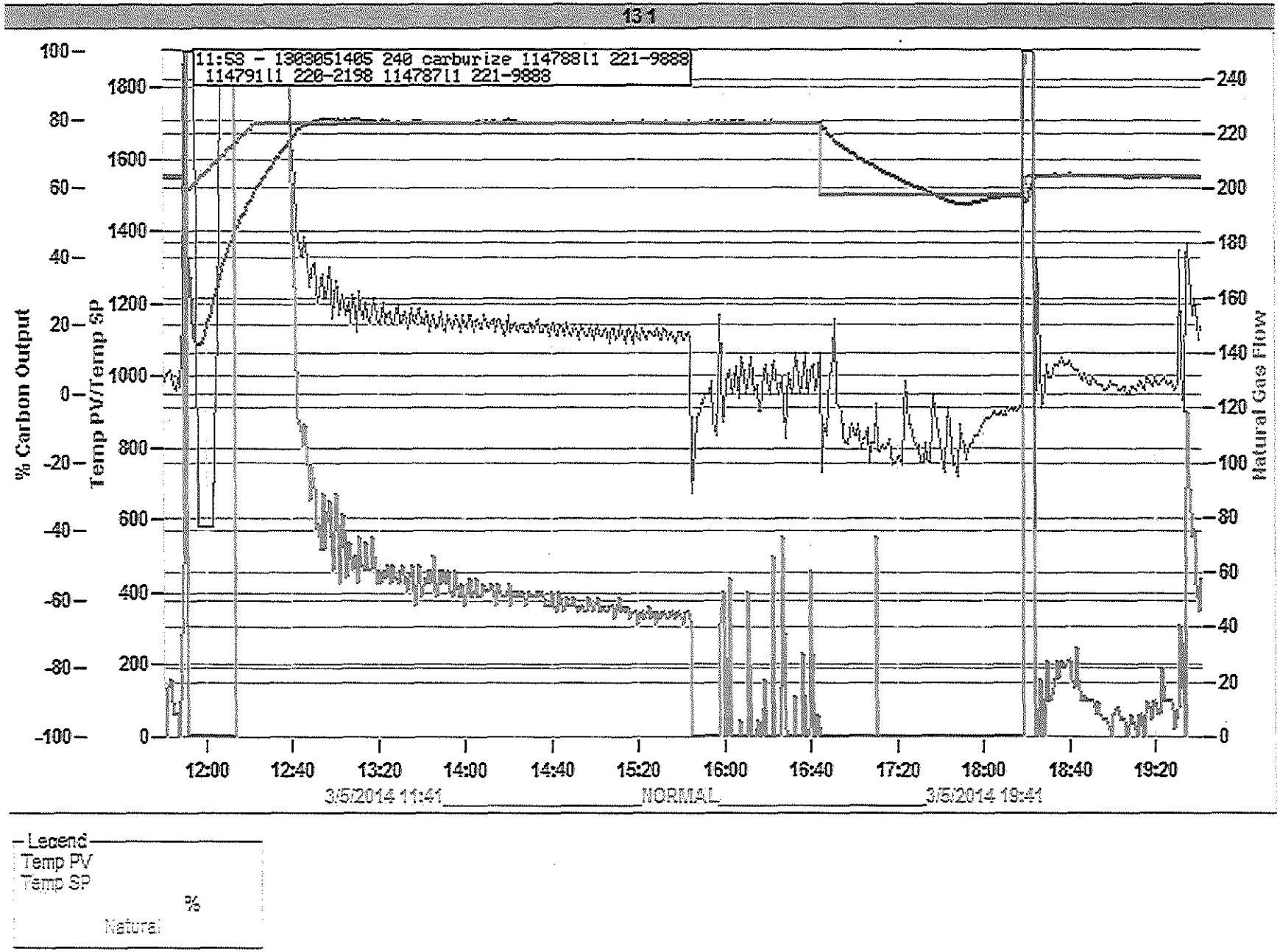

FIGURE 3
Chart of Raw THC Data for EUHEATTREATIQ5

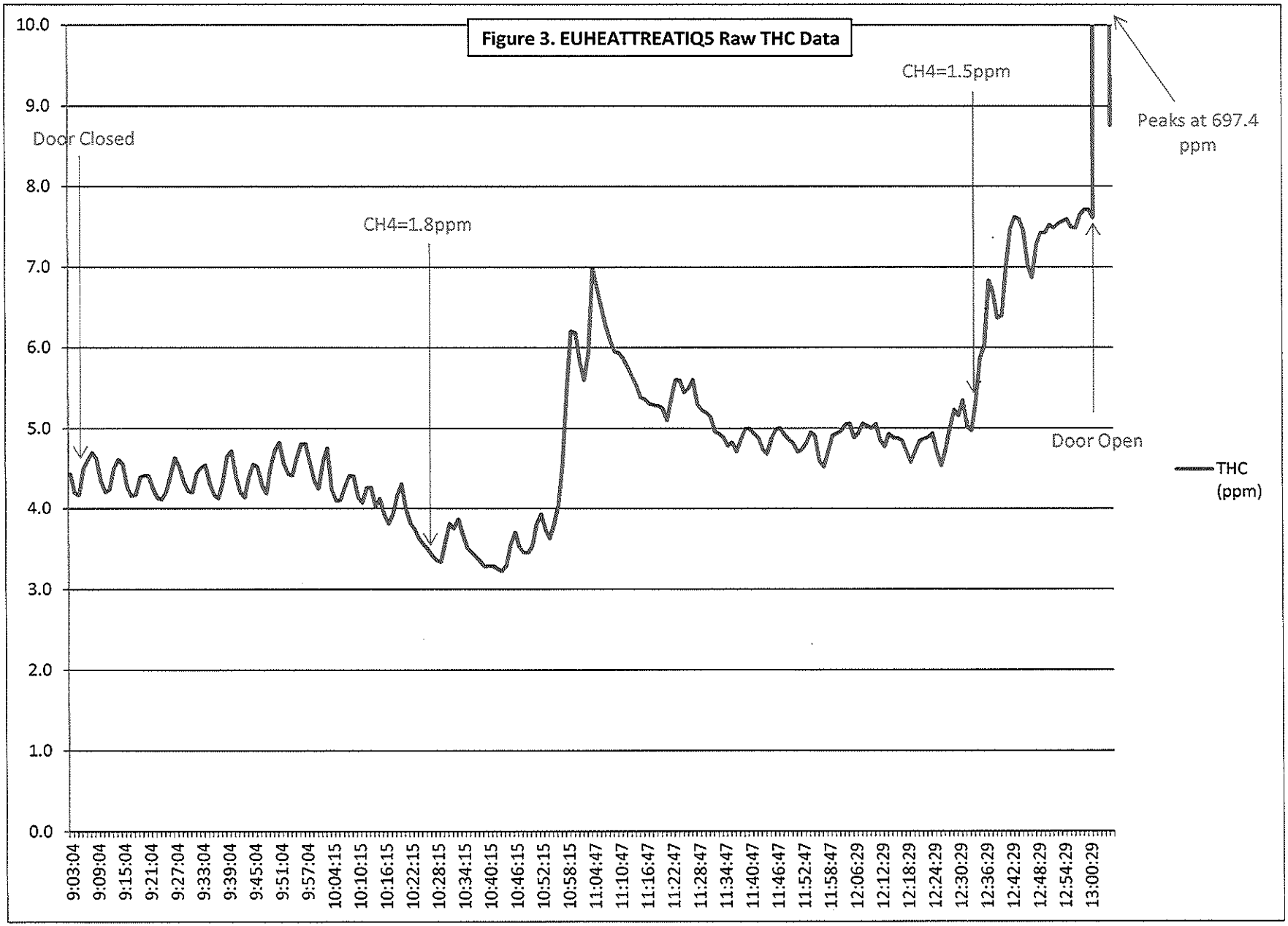
Figure 3. EUHEATTREATIQ5 Raw THC Data
CH4=1.5ppm
Peaks at 697.4 ppm
Door Closed
CH4=1.8ppm
Door Open
THC (ppm)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
9:03:04
9:09:04
9:15:04
9:21:04
9:27:04
9:33:04
9:39:04
9:45:04
9:51:04
9:57:04
10:04:15
10:10:15
10:16:15
10:22:15
10:28:15
10:34:15
10:40:15
10:46:15
10:52:15
10:58:15
11:04:47
11:10:47
11:16:47
11:22:47
11:28:47
11:34:47
11:40:47
11:46:47
11:52:47
11:58:47
12:06:29
12:12:29
12:18:29
12:24:29
12:30:29
12:36:29
12:42:29
12:48:29
12:54:29
13:00:29

ATTACHMENT 1
Raw THC Concentration Data for EUHEATTREATIQ13

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
1	11:42:11	1.1	Batch start
	11:43:11	1.2	
	11:44:11	1.1	
	11:45:11	1.0	
	11:46:11	1.5	
	11:47:11	1.2	
	11:48:11	2.0	
	11:49:11	0.9	
	11:50:11	5.4	
	11:51:11	7.2	
	11:52:11	20.9	
	11:53:11	33.6	
	11:54:11	23.1	
	11:55:11	20.5	CH4 sample (ppm): 18
	11:56:11	19.8	
	11:57:11	19.5	
	11:58:11	19.8	
	11:59:11	18.8	
	12:00:11	18.5	
	12:01:11	18.0	
	12:02:11	17.4	
	12:03:11	17.3	
	12:04:11	17.0	
	12:05:11	17.0	
	12:06:11	17.3	
	12:07:11	19.3	
	12:08:11	21.0	
	12:09:11	20.6	
	12:10:11	20.0	
	12:11:11	19.7	
	12:12:11	18.2	
	12:13:11	17.7	
	12:14:11	20.1	
	12:15:11	23.3	
	12:16:11	22.1	
	12:17:11	20.1	
	12:18:11	20.9	
	12:19:11	22.5	
	12:20:11	21.6	
	12:21:11	22.8	
	12:22:11	25.3	
	12:23:11	26.4	
	12:24:11	27.5	
	12:25:11	29.9	
	12:26:11	31.0	
	12:27:11	31.4	
	12:28:11	30.8	
	12:29:11	32.5	
	12:30:11	32.8	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	12:31:11	34.6	
	12:32:11	34.8	
	12:33:11	33.3	
	12:34:11	31.4	
	12:35:11	31.3	
	12:36:11	30.8	
	12:37:11	30.5	
	12:38:11	31.2	
	12:39:11	30.3	
	12:40:11	30.9	
	12:41:11	30.9	
2	12:43:12	27.2	
	12:44:12	27.1	
	12:45:12	27.8	
	12:46:12	27.7	
	12:47:12	26.0	
	12:48:12	27.2	
	12:49:12	28.2	
	12:50:12	27.8	
	12:51:12	27.5	
	12:52:12	26.8	
	12:53:12	27.4	
	12:54:12	27.3	
	12:55:12	27.4	
	12:56:12	26.6	
	12:57:12	25.6	
	12:58:12	25.5	
	12:59:12	25.0	
	13:00:12	24.8	
	13:01:12	25.3	
	13:02:12	24.9	
	13:03:12	24.4	
	13:04:12	23.3	
	13:05:12	22.4	
	13:06:12	22.0	
	13:07:12	23.1	
	13:08:12	23.1	
	13:09:12	22.2	
	13:10:12	20.9	
	13:11:12	22.3	
	13:12:12	21.3	
	13:13:12	20.7	
	13:14:12	21.6	
	13:15:12	22.6	
	13:16:12	21.8	
	13:17:12	20.6	
	13:18:12	20.0	
	13:19:12	19.8	
	13:20:12	19.5	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	13:21:12	20.0	
	13:22:12	19.7	
	13:23:12	19.1	
	13:24:12	18.5	
	13:25:12	18.5	
	13:26:12	18.6	
	13:27:12	20.2	
	13:28:12	20.5	
	13:29:12	20.5	
	13:30:12	19.8	
	13:31:12	19.8	
	13:32:12	18.8	
	13:33:12	17.8	
	13:34:12	16.6	
	13:35:12	16.4	
	13:36:12	16.9	
	13:37:12	15.8	
	13:38:12	14.7	
	13:39:12	14.7	
	13:40:12	15.1	
	13:41:12	14.9	
	13:42:12	14.7	
3	13:44:00	14.6	
	13:45:00	14.8	
	13:46:00	14.0	
	13:47:00	14.3	
	13:48:00	13.7	
	13:49:00	13.3	
	13:50:00	13.4	
	13:51:00	13.0	
	13:52:00	12.8	
	13:53:00	12.5	
	13:54:00	13.0	
	13:55:00	13.1	
	13:56:00	12.5	
	13:57:00	12.6	
	13:58:00	12.6	
	13:59:00	12.9	
	14:00:00	12.1	
	14:01:00	12.5	
	14:02:00	12.7	
	14:03:00	12.8	
	14:04:00	12.8	
	14:05:00	12.1	
	14:06:00	12.2	
	14:07:00	12.3	
	14:08:00	12.0	
	14:09:00	12.2	
	14:10:00	12.3	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	14:11:00	12.3	
	14:12:00	11.7	
	14:13:00	11.8	
	14:14:00	11.4	
	14:15:00	11.4	
	14:16:00	11.5	
	14:17:00	11.3	
	14:18:00	11.3	
	14:19:00	12.3	
	14:20:00	12.4	
	14:21:00	12.0	
	14:22:00	12.0	
	14:23:00	11.3	
	14:24:00	13.0	
	14:25:00	14.1	
	14:26:00	13.3	
	14:27:00	12.6	
	14:28:00	12.1	
	14:29:00	12.6	
	14:30:00	12.9	
	14:31:00	13.3	
	14:32:00	13.1	
	14:33:00	13.7	
	14:34:00	14.5	
	14:35:00	18.0	
	14:36:00	21.8	
	14:37:00	22.5	
	14:38:00	22.3	
	14:39:00	22.0	
	14:40:00	23.2	
	14:41:00	20.3	
	14:42:00	17.5	
	14:43:00	16.6	
4	14:45:46	15.7	
	14:46:46	16.4	CH4 sample (ppm): 4.4
	14:47:46	16.8	
	14:48:46	16.9	
	14:49:46	17.3	
	14:50:46	17.8	
	14:51:46	17.4	
	14:52:46	17.4	
	14:53:46	16.9	
	14:54:46	17.7	
	14:55:46	17.6	
	14:56:46	17.7	
	14:57:46	17.6	
	14:58:46	16.7	
	14:59:46	16.4	
	15:00:46	17.2	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	15:01:46	18.1	
	15:02:46	18.0	
	15:03:46	17.5	
	15:04:46	17.8	
	15:05:46	18.4	
	15:06:46	18.2	
	15:07:46	22.0	
	15:08:46	18.7	
	15:09:46	17.1	
	15:10:46	17.8	
	15:11:46	18.3	
	15:12:46	18.1	
	15:13:46	17.5	
	15:14:46	17.4	
	15:15:46	17.9	
	15:16:46	18.5	
	15:17:46	19.0	
	15:18:46	19.6	
	15:19:46	19.5	
	15:20:46	20.0	
	15:21:46	20.3	
	15:22:46	21.2	
	15:23:46	22.0	
	15:24:46	23.6	
	15:25:46	22.2	
	15:26:46	19.6	
	15:27:46	20.0	
	15:28:46	19.1	
	15:29:46	18.7	
	15:30:46	19.8	
	15:31:46	19.8	
	15:32:46	20.4	
	15:33:46	20.8	
	15:34:46	21.6	
	15:35:46	20.0	
	15:36:46	21.5	
	15:37:46	22.4	
	15:38:46	22.6	
	15:39:46	21.4	
	15:40:46	20.8	
	15:41:46	20.8	
	15:42:46	21.2	
	15:43:46	23.2	
	15:44:46	23.1	
5	15:46:47	21.6	
	15:47:47	22.0	
	15:48:47	21.8	
	15:49:47	21.2	
	15:50:47	22.0	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	15:51:47	21.0	
	15:52:47	21.0	
	15:53:47	22.0	
	15:54:47	22.7	
	15:55:47	22.6	
	15:56:47	20.4	
	15:57:47	20.7	
	15:58:47	20.3	
	15:59:47	20.9	
	16:00:47	23.4	
	16:01:47	23.3	
	16:02:47	21.5	
	16:03:47	20.1	
	16:04:47	20.6	
	16:05:47	19.9	
	16:06:47	20.1	
	16:07:47	20.0	
	16:08:47	19.0	
	16:09:47	19.0	
	16:10:47	19.1	
	16:11:47	18.0	
	16:12:47	18.2	
	16:13:47	17.5	
	16:14:47	17.9	
	16:15:47	18.3	
	16:16:47	18.4	
	16:17:47	18.8	
	16:18:47	17.8	
	16:19:47	17.0	
	16:20:47	17.0	
	16:21:47	18.7	
	16:22:47	24.3	
	16:23:47	26.5	
	16:24:47	23.4	
	16:25:47	21.7	
	16:26:47	20.6	
	16:27:47	18.4	
	16:28:47	16.8	
	16:29:47	18.2	
	16:30:47	19.5	
	16:31:47	18.4	
	16:32:47	18.4	
	16:33:47	18.9	
	16:34:47	18.1	
	16:35:47	17.9	
	16:36:47	18.7	
	16:37:47	18.7	
	16:38:47	18.5	
	16:39:47	18.2	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	16:40:47	17.9	
	16:41:47	19.9	
	16:42:47	20.9	
	16:43:47	26.6	
	16:44:47	24.3	
	16:45:47	21.5	
6	16:47:21	19.0	
	16:48:21	18.7	
	16:49:21	18.7	
	16:50:21	19.0	
	16:51:21	18.8	
	16:52:21	17.7	
	16:53:21	16.3	
	16:54:21	16.3	
	16:55:21	16.4	
	16:56:21	15.9	
	16:57:21	15.6	
	16:58:21	15.9	
	16:59:21	15.3	
	17:00:21	15.2	
	17:01:21	15.1	
	17:02:21	14.8	
	17:03:21	13.9	
	17:04:21	13.4	
	17:05:21	13.7	
	17:06:21	14.2	
	17:07:21	14.2	
	17:08:21	13.4	
	17:09:21	13.3	
	17:10:21	13.5	
	17:11:21	13.7	
	17:12:21	13.5	
	17:13:21	13.3	
	17:14:21	13.1	
	17:15:21	12.9	
	17:16:21	12.9	
	17:17:21	13.0	
	17:18:21	13.2	
	17:19:21	13.4	
	17:20:21	13.1	
	17:21:21	12.9	
	17:22:21	12.5	
	17:23:21	12.4	
	17:24:21	12.4	
	17:25:21	12.4	
	17:26:21	12.2	
	17:27:21	11.8	
	17:28:21	11.7	
	17:29:21	11.8	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	17:30:21	11.9	
	17:31:21	11.9	
	17:32:21	11.6	
	17:33:21	11.6	
	17:34:21	11.6	
	17:35:21	11.6	
	17:36:21	11.1	
	17:37:21	11.0	
	17:38:21	10.7	
	17:39:21	10.7	
	17:40:21	10.9	
	17:41:21	10.1	
	17:42:21	10.1	
	17:43:21	10.1	
	17:44:21	10.0	
	17:45:21	9.8	
	17:46:21	9.8	
7	17:49:20	10.4	
	17:50:20	10.5	
	17:51:20	10.3	
	17:52:20	10.1	
	17:53:20	10.1	
	17:54:20	10.3	
	17:55:20	10.4	
	17:56:20	10.2	
	17:57:20	10.1	
	17:58:20	10.6	
	17:59:20	10.7	
	18:00:20	10.5	
	18:01:20	10.3	
	18:02:20	10.4	
	18:03:20	10.5	
	18:04:20	10.5	
	18:05:20	10.5	
	18:06:20	10.4	
	18:07:20	10.2	
	18:08:20	10.3	
	18:09:20	10.3	
	18:10:20	10.4	
	18:11:20	10.3	
	18:12:20	10.0	
	18:13:20	10.0	
	18:14:20	9.9	
	18:15:20	10.0	
	18:16:20	10.0	
	18:17:20	10.1	
	18:18:20	10.2	
	18:19:20	12.5	Quench start
	18:20:20	10.1	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	18:21:20	13.5	
	18:22:20	19.6	
	18:23:20	15.2	
	18:24:20	14.7	
	18:25:20	14.5	
	18:26:20	14.5	
	18:27:20	14.8	
	18:28:20	14.3	
	18:29:20	14.2	
	18:30:20	13.9	
	18:31:20	14.1	
	18:32:20	14.1	
	18:33:20	13.8	
	18:34:20	13.7	CH4 sample (ppm): 5.1
	18:35:20	13.7	
	18:36:20	13.8	
	18:37:20	12.9	
	18:38:20	13.1	
	18:39:20	13.2	
	18:40:20	13.1	
	18:41:20	13.3	
	18:42:20	13.4	
	18:43:20	13.1	
	18:44:20	13.2	
	18:45:20	12.8	
	18:46:20	12.7	
	18:47:20	12.6	
	18:48:20	12.5	
8	18:50:17	12.4	
	18:51:17	12.4	
	18:52:17	12.7	
	18:53:17	12.8	
	18:54:17	12.8	
	18:55:17	12.9	
	18:56:17	13.0	
	18:57:17	13.3	
	18:58:17	13.8	
	18:59:17	13.5	
	19:00:17	13.3	
	19:01:17	13.2	
	19:02:17	12.9	
	19:03:17	12.8	
	19:04:17	12.9	
	19:05:17	13.2	
	19:06:17	13.4	
	19:07:17	13.6	
	19:08:17	14.3	
	19:09:17	14.2	
	19:10:17	14.5	

Raw THC Data for EUHEATTREATIQ13

Run	Time	THC (ppm)	Notes
	19:11:17	14.8	
	19:12:17	15.5	
	19:13:17	15.9	
	19:14:17	15.8	Quench end / Start drain
	19:15:17	14.4	
	19:16:17	15.6	
	19:17:17	15.9	
	19:18:17	15.7	
	19:19:17	15.4	
	19:20:17	14.4	
	19:21:17	14.4	
	19:22:17	14.9	
	19:23:17	15.4	
	19:24:17	15.6	
	19:25:17	14.9	
	19:26:17	14.6	
	19:27:17	14.6	
	19:28:17	15.4	
	19:29:17	16.3	
	19:30:17	37.4	
	19:31:17	30.8	Parts out
	19:32:17	22.5	
	19:33:17	23.3	
	19:34:17	20.0	
	19:35:17	20.6	
	19:36:17	20.1	
	19:37:17	19.8	Batch end

ATTACHMENT 2
Raw THC Concentration Data for EUHEATTREATIQ5

Raw THC Data for EUHEATTREATIQ5

Run	Time	THC (ppm)	Notes
1	9:03:04	4.4	
	9:04:04	4.2	
	9:05:04	4.2	
	9:06:04	4.5	Door closed / parts in
	9:07:04	4.6	
	9:08:04	4.7	
	9:09:04	4.6	
	9:10:04	4.3	
	9:11:04	4.2	
	9:12:04	4.2	
	9:13:04	4.5	
	9:14:04	4.6	
	9:15:04	4.6	
	9:16:04	4.3	
	9:17:04	4.2	
	9:18:04	4.2	
	9:19:04	4.4	
	9:20:04	4.4	
	9:21:04	4.4	
	9:22:04	4.2	
	9:23:04	4.1	
	9:24:04	4.1	
	9:25:04	4.2	
	9:26:04	4.4	
	9:27:04	4.6	
	9:28:04	4.5	
	9:29:04	4.3	
	9:30:04	4.2	
	9:31:04	4.2	
	9:32:04	4.4	
	9:33:04	4.5	
	9:34:04	4.5	
	9:35:04	4.3	
	9:36:04	4.2	
	9:37:04	4.1	
	9:38:04	4.3	
	9:39:04	4.7	
	9:40:04	4.7	
	9:41:04	4.4	
	9:42:04	4.2	
	9:43:04	4.1	
	9:44:04	4.4	
	9:45:04	4.6	
	9:46:04	4.5	
	9:47:04	4.3	
	9:48:04	4.2	
	9:49:04	4.5	
	9:50:04	4.7	
	9:51:04	4.8	
	9:52:04	4.6	

Raw THC Data for EUHEATTREATIQ5

Run	Time	THC (ppm)	Notes
	9:53:04	4.4	
	9:54:04	4.4	
	9:55:04	4.6	
	9:56:04	4.8	
	9:57:04	4.8	
	9:58:04	4.6	
	9:59:04	4.3	
	10:00:04	4.2	
	10:01:04	4.6	
	10:02:04	4.8	
2	10:04:15	4.2	
	10:05:15	4.1	
	10:06:15	4.1	
	10:07:15	4.3	
	10:08:15	4.4	
	10:09:15	4.4	
	10:10:15	4.1	
	10:11:15	4.1	
	10:12:15	4.3	
	10:13:15	4.3	
	10:14:15	4.0	
	10:15:15	4.1	
	10:16:15	3.9	
	10:17:15	3.8	
	10:18:15	3.9	
	10:19:15	4.2	
	10:20:15	4.3	
	10:21:15	4.0	
	10:22:15	3.8	
	10:23:15	3.7	
	10:24:15	3.6	
	10:25:15	3.6	
	10:26:15	3.5	CH4 sample (ppm): 1.8
	10:27:15	3.4	
	10:28:15	3.4	
	10:29:15	3.3	
	10:30:15	3.6	
	10:31:15	3.8	
	10:32:15	3.7	
	10:33:15	3.9	
	10:34:15	3.7	
	10:35:15	3.5	
	10:36:15	3.5	
	10:37:15	3.4	
	10:38:15	3.3	
	10:39:15	3.3	
	10:40:15	3.3	
	10:41:15	3.3	
	10:42:15	3.3	
	10:43:15	3.2	

Raw THC Data for EUHEATTREATIQ5

Run	Time	THC (ppm)	Notes
	10:44:15	3.3	
	10:45:15	3.6	
	10:46:15	3.7	
	10:47:15	3.5	
	10:48:15	3.5	
	10:49:15	3.5	
	10:50:15	3.5	
	10:51:15	3.8	
	10:52:15	3.9	
	10:53:15	3.7	
	10:54:15	3.6	
	10:55:15	3.8	
	10:56:15	4.0	
	10:57:15	4.5	
	10:58:15	5.5	
	10:59:15	6.2	
	11:00:15	6.2	
	11:01:15	5.8	
	11:02:15	5.6	
	11:03:15	5.9	
3	11:04:47	7.0	
	11:05:47	6.7	
	11:06:47	6.5	
	11:07:47	6.3	
	11:08:47	6.1	
	11:09:47	5.9	
	11:10:47	5.9	
	11:11:47	5.9	
	11:12:47	5.8	
	11:13:47	5.6	
	11:14:47	5.5	
	11:15:47	5.4	
	11:16:47	5.4	
	11:17:47	5.3	
	11:18:47	5.3	
	11:19:47	5.3	
	11:20:47	5.2	
	11:21:47	5.1	
	11:22:47	5.4	
	11:23:47	5.6	
	11:24:47	5.6	
	11:25:47	5.4	
	11:26:47	5.5	
	11:27:47	5.6	
	11:28:47	5.3	
	11:29:47	5.2	
	11:30:47	5.2	
	11:31:47	5.1	
	11:32:47	5.0	
	11:33:47	4.9	

Raw THC Data for EUHEATTREATIQ5

Run	Time	THC (ppm)	Notes
	11:34:47	4.9	
	11:35:47	4.8	
	11:36:47	4.8	
	11:37:47	4.7	
	11:38:47	4.9	
	11:39:47	5.0	
	11:40:47	5.0	
	11:41:47	4.9	
	11:42:47	4.9	
	11:43:47	4.7	
	11:44:47	4.7	
	11:45:47	4.9	
	11:46:47	5.0	
	11:47:47	5.0	
	11:48:47	4.9	
	11:49:47	4.9	
	11:50:47	4.8	
	11:51:47	4.7	
	11:52:47	4.7	
	11:53:47	4.8	
	11:54:47	5.0	
	11:55:47	4.9	
	11:56:47	4.6	
	11:57:47	4.5	
	11:58:47	4.7	
	11:59:47	4.9	
	12:00:47	4.9	
	12:01:47	5.0	
	12:02:47	5.0	
	12:03:47	5.1	
4	12:06:29	4.9	
	12:07:29	4.9	
	12:08:29	5.1	
	12:09:29	5.0	
	12:10:29	5.0	
	12:11:29	5.0	
	12:12:29	4.8	
	12:13:29	4.8	
	12:14:29	4.9	
	12:15:29	4.9	
	12:16:29	4.9	
	12:17:29	4.8	
	12:18:29	4.7	
	12:19:29	4.6	
	12:20:29	4.7	
	12:21:29	4.8	
	12:22:29	4.9	
	12:23:29	4.9	
	12:24:29	4.9	
	12:25:29	4.7	

Raw THC Data for EUHEATTREATIQ5

Run	Time	THC (ppm)	Notes
	12:26:29	4.5	
	12:27:29	4.7	
	12:28:29	5.0	
	12:29:29	5.2	
	12:30:29	5.2	
	12:31:29	5.3	
	12:32:29	5.0	
	12:33:29	5.0	
	12:34:29	5.4	CH4 sample (ppm): 1.5
	12:35:29	5.9	
	12:36:29	6.0	
	12:37:29	6.8	
	12:38:29	6.7	
	12:39:29	6.4	
	12:40:29	6.4	
	12:41:29	7.0	
	12:42:29	7.5	
	12:43:29	7.6	
	12:44:29	7.6	
	12:45:29	7.5	
	12:46:29	7.0	
	12:47:29	6.9	
	12:48:29	7.3	
	12:49:29	7.4	
	12:50:29	7.4	
	12:51:29	7.5	
	12:52:29	7.5	
	12:53:29	7.5	
	12:54:29	7.6	
	12:55:29	7.6	
	12:56:29	7.5	
	12:57:29	7.5	
	12:58:29	7.6	
	12:59:29	7.7	
	13:00:29	7.7	
	13:01:29	7.6	
	13:02:29	697.4	Door open
	13:03:29	271.7	
	13:04:29	30.8	
	13:05:29	8.8	Batch end

ATTACHMENT 3

Rule 225 Compliance Demonstration for Natural Gas Combustion Emissions

Table 1. Emission Factors for External Natural Gas Combustion

Pollutant	CAS	Emission Factor[a] (lb/MMcf)	HAP?	TAC?	Carcinogen or R336.1226 High Concern Toxic?
VOC	--	5.5	--	--	--
Formaldehyde	50-00-0	7.50E-02	Y	Y	Y
Benzo(a)pyrene	50-32-8	1.20E-06	Y	Y	Y
Dibenzo(a,h)anthracene	53-70-3	1.20E-06	Y	Y	Y
3-Methylchloranthrene	56-49-5	1.80E-06	Y	Y	Y
Benz(a)anthracene	56-55-3	1.80E-06	Y	Y	Y
7,12-Dimethylbenz(a)anthracene	57-97-6	1.60E-05	Y	Y	Y
Benzene	71-43-2	2.10E-03	Y	Y	Y
Ethane	74-84-0	3.10E+00	N	N	N
Propane	74-98-6	1.60E+00	N	N	N
Acenaphthene	83-32-9	1.80E-06	Y	Y	N
Phenanathrene	85-01-8	1.70E-05	Y	Y	Y
Fluorene	86-73-7	2.80E-06	Y	Y	N
Naphthalene	91-20-3	6.10E-04	Y	Y	N
2-Methylnaphthalene	91-57-6	2.40E-05	Y	Y	Y
Butane	106-97-8	2.10E+00	N	Y	N
Toluene	108-88-3	3.40E-03	Y	Y	N
Pentane	109-66-0	2.60E+00	N	Y	N
Hexane	110-54-3	1.80E+00	Y	Y	N
Anthracene	120-12-7	2.40E-06	Y	Y	N
Pyrene	129-00-0	5.00E-06	Y	Y	N
Benzo(g,h,i)perylene	191-24-2	1.20E-06	Y	Y	N
Indeno(1,2,3-cd)pyrene	193-39-5	1.80E-06	Y	Y	Y
Benzo(b)fluoranthene	205-99-2	1.80E-06	Y	Y	Y
Fluoranthene	206-44-0	3.00E-06	Y	Y	N
Benzo(k)fluoranthene	207-08-9	1.80E-06	Y	Y	Y
Acenaphthylene	208-96-8	1.80E-06	Y	Y	N
Chrysene	218-01-9	1.80E-06	Y	Y	Y
Lead	7439-92-1	0.0005	Y	N	N
Manganese	7439-96-5	3.80E-04	Y	Y	Y
Mercury	7439-97-6	2.60E-04	Y	Y	Y
Molybdenum	7439-98-7	1.10E-03	N	Y	N
Nickel	7440-02-0	2.10E-03	Y	Y	Y
Arsenic	7440-38-2	2.00E-04	Y	Y	Y
Barium	7440-39-3	4.40E-03	N	Y	N
Beryllium	7440-41-7	1.20E-05	Y	Y	Y
Cadmium	7440-43-9	1.10E-03	Y	Y	Y
Chromium	7440-47-3	1.40E-03	Y	Y	Y
Cobalt	7440-48-4	8.40E-05	Y	Y	N
Copper	7440-50-8	8.50E-04	N	Y	N
Vanadium	7440-62-2	2.30E-03	N	Y	N
Zinc	7440-66-6	2.90E-02	N	Y	N
Selenium	7782-49-2	2.40E-05	Y	Y	N
Dichlorobenzene	25321-22-6	1.20E-03	Y	Y	Y

Notes:

[a] From AP-42, Chapter 1, Section 4 (July 1998). Emission factors for NOx and CO for small (< 100 MMBtu/hr) uncontrolled boilers.

Table 2. Hourly Natural Gas Combustion Emissions from Furnaces EUHEATTREATIQ5 and EUHEATTREATIQ13 - EUHEATTREATIQ15

Pollutant	Emissions[a]			R226(a) Exempt?
	lb/hr/furnace (IQ13-IQ15)	lb/hr/furnace (IQ5)	lb/hr total	
VOC	0.07	0.02	0.2	N/A
Formaldehyde	9.71E-04	2.48E-04	3.16E-03	N
Benzo(a)pyrene	1.55E-08	3.96E-09	5.06E-08	N
Dibenzo(a,h)anthracene	1.55E-08	3.96E-09	5.06E-08	N
3-Methylchloranthrene	2.33E-08	5.95E-09	7.59E-08	N
Benz(a)anthracene	2.33E-08	5.95E-09	7.59E-08	N
7,12-Dimethylbenz(a)anthracene	2.07E-07	5.29E-08	6.74E-07	N
Benzene	2.72E-05	6.94E-06	8.85E-05	N
Ethane	4.01E-02	1.02E-02	1.31E-01	N/A
Propane	2.07E-02	5.29E-03	6.74E-02	N/A
Acenaphthene	2.33E-08	5.95E-09	7.59E-08	Y
Phenanathrene	2.20E-07	5.62E-08	7.17E-07	N
Fluorene	3.63E-08	9.25E-09	1.18E-07	Y
Naphthalene	7.90E-06	2.02E-06	2.57E-05	Y
2-Methylnaphthalene	3.11E-07	7.93E-08	1.01E-06	N
Butane	2.72E-02	6.94E-03	8.85E-02	N
Toluene	4.40E-05	1.12E-05	1.43E-04	Y
Pentane	3.37E-02	8.59E-03	1.10E-01	N
Hexane	2.33E-02	5.95E-03	7.59E-02	N
Anthracene	3.11E-08	7.93E-09	1.01E-07	Y
Pyrene	6.47E-08	1.65E-08	2.11E-07	Y
Benzo(g,h,i)perylene	1.55E-08	3.96E-09	5.06E-08	Y
Indeno(1,2,3-cd)pyrene	2.33E-08	5.95E-09	7.59E-08	N
Benzo(b)fluoranthene	2.33E-08	5.95E-09	7.59E-08	N
Fluoranthene	3.88E-08	9.91E-09	1.26E-07	Y
Benzo(k)fluoranthene	2.33E-08	5.95E-09	7.59E-08	N
Acenaphthylene	2.33E-08	5.95E-09	7.59E-08	Y
Chrysene	2.33E-08	5.95E-09	7.59E-08	N
Lead	6.47E-06	1.65E-06	2.11E-05	N/A
Manganese	4.92E-06	1.26E-06	1.60E-05	N
Mercury	3.37E-06	8.59E-07	1.10E-05	N
Molybdenum	1.42E-05	3.63E-06	4.64E-05	Y
Nickel	2.72E-05	6.94E-06	8.85E-05	N
Arsenic	2.59E-06	6.61E-07	8.43E-06	N
Barium	5.70E-05	1.45E-05	1.85E-04	Y
Beryllium	1.55E-07	3.96E-08	5.06E-07	N
Cadmium	1.42E-05	3.63E-06	4.64E-05	N
Chromium	1.81E-05	4.63E-06	5.90E-05	N
Cobalt	1.09E-06	2.78E-07	3.54E-06	Y
Copper	1.10E-05	2.81E-06	3.58E-05	Y
Vanadium	2.98E-05	7.60E-06	9.69E-05	Y
Zinc	3.76E-04	9.58E-05	1.22E-03	Y
Selenium	3.11E-07	7.93E-08	1.01E-06	Y
Dichlorobenzene	1.55E-05	3.96E-06	5.06E-05	N

Notes:

[a] VOC pound per hour represents max hourly rate determined during March 2014 stack test. Other pollutant emissions determined based on VOC emission rate prorated based on AP-42 emission factors. Lb/hr total represents combined emissions from IQ13-IQ15 and IQ5.

Table 3. Rule 225 Compliance Demonstration for Combustion Emissions per Rule 227(1)(a)

Chemical Name	CAS No.	Screening Level			AQD Screening Level?	AQD Footnote	Allowable Emission Rate (AER)				Proposed Emission Rate (ER)			Is Proposed Emission Rate less than AER?		R226(a) Exempt?
							ITSL		IRSL or SRSL							
		ITSL µg/m³	ITSL Avg Time	IRSL or SRSL µg/m³			lbs per month, 24-hr, 8-hr or 1-hr	Max lbs per hour	lbs per month	Max lbs per hour	Rate	Rate Units	Max Hourly ER lbs/hour	Screening Level Specific ER	Max Hourly Rate	
Formaldehyde	50-00-0	30	24-hr		Y		3.6	1.5			7.59E-02	lbs/24-hr	3.16E-03	yes	yes	N
Formaldehyde	50-00-0			0.08	Y				3.2	0.0432	2.31E+00	lbs/month	3.16E-03	yes	yes	N
Benzo(a)pyrene	50-32-8			0.0005	Y	5			0.02	0.00027	3.69E-05	lbs/month	5.06E-08	yes	yes	N
Dibenzo(a,h)anthracene (PAH)	53-70-3					5					3.69E-05	lbs/month	5.06E-08			N
3-Methylchloranthrene (PAH)	56-49-5					5					5.54E-05	lbs/month	7.59E-08			N
Benz(a)anthracene (PAH)	56-55-3					5					5.54E-05	lbs/month	7.59E-08			N
7,12-Dimethylbenz(a)anthracene (PAH)	57-97-6					5					4.92E-04	lbs/month	6.74E-07			N
Benzene	71-43-2	30	24-hr		Y		3.6	1.5			2.12E-03	lbs/24-hr	8.85E-05	yes	yes	N
Benzene	71-43-2	30	annual		Y		1200	16.2			6.46E-02	lbs/month	8.85E-05	yes	yes	N
Benzene	71-43-2			0.1	Y				4	0.054	6.46E-02	lbs/month	8.85E-05	yes	yes	N
Ethane	74-84-0															N/A
Propane	74-98-6															N/A
Acenaphthene	83-32-9															Y
Phenanthrene	85-01-8			0.1	Y				4	0.054	5.23E-04	lbs/month	7.17E-07	yes	yes	N
Fluorene	86-73-7															Y
Naphthalene	91-20-3															Y
2-Methylnaphthalene	91-57-6			10	Y				400	5.4	7.38E-04	lbs/month	1.01E-06	yes	yes	N
Butane	106-97-8	23800	8-hr		Y	22	476	476			7.08E-01	lbs/8-hr	8.85E-02	yes	yes	N
Toluene	108-88-3															Y
Pentane	109-66-0	17700	8-hr		Y		354	354			8.77E-01	lbs/8-hr	1.10E-01	yes	yes	N
Hexane	110-54-3	700	24-hr		Y		84	35			1.82E+00	lbs/24-hr	7.59E-02	yes	yes	N
Anthracene	120-12-7															Y
Pyrene	129-00-0															Y
Benzo(g,h,i)perylene	191-24-2															Y
Indeno(1,2,3-cd)pyrene (PAH)	193-39-5					5					5.54E-05	lbs/month	7.59E-08			N
Benzo(b)fluoranthene (PAH)	205-99-2					5					5.54E-05	lbs/month	7.59E-08			N
Fluoranthene	206-44-0															Y
Benzo(k)fluoranthene (PAH)	207-08-9					5					5.54E-05	lbs/month	7.59E-08			N
Acenaphthylene	208-96-8															Y
Chrysene (PAH)	218-01-9					5					5.54E-05	lbs/month	7.59E-08			N
Lead	7439-92-1															N/A
Manganese	7439-96-5			0.05	Y				2	0.027	1.17E-02	lbs/month	1.60E-05	yes	yes	N
Mercury[b]	7439-97-6					7										N
Molybdenum	7439-98-7															Y
Nickel	7440-02-0			0.0042	Y				0.168	0.002268	6.46E-02	lbs/month	8.85E-05	yes	yes	N
Arsenic	7440-38-2			0.0002	Y				0.008	0.000108	6.15E-03	lbs/month	8.43E-06	yes	yes	N
Barium	7440-39-3															Y
Beryllium	7440-41-7	0.02	24-hr		Y		0.0024	0.001			1.21E-05	lbs/24-hr	5.06E-07	yes	yes	N
Beryllium	7440-41-7			0.0004	Y				0.016	0.000216	3.69E-04	lbs/month	5.06E-07	yes	yes	N
Cadmium	7440-43-9			0.0006	Y				0.024	0.000324	3.38E-02	lbs/month	4.64E-05	no	yes	N
Chromium[c]	7440-47-3	0.008	24-hr		Y		0.00096	4E-04			1.42E-03	lbs/24-hr	5.90E-05	no	yes	N

Table 3. Rule 225 Compliance Demonstration for Combustion Emissions per Rule 227(1)(a)

Chemical Name	CAS No.	Screening Level			AQD Screening Level?	AQD Footnote	Allowable Emission Rate (AER)				Proposed Emission Rate (ER)			Is Proposed Emission Rate less than AER?		R226(a) Exempt?
							ITSL		IRSL or SRSL							
		ITSL µg/m³	ITSL Avg Time	IRSL or SRSL µg/m³			lbs per month, 24-hr, 8-hr or 1-hr	Max lbs per hour	lbs per month	Max lbs per hour	Rate	Rate Units	Max Hourly ER lbs/hour	Screening Level Specific ER	Max Hourly Rate	
Chromium[c]	7440-47-3			0.0008	Y				0.0332	0.0004482	4.31E-02	lbs/month	5.90E-05	no	yes	N
Cobalt	7440-48-4															Y
Copper	7440-50-8															Y
Vanadium	7440-62-2															Y
Zinc	7440-66-6															Y
Selenium	7782-49-2															Y
Dichlorobenzene[d]	25321-22-6	300	24-hr		Y		36	15			1.21E-03	lbs/24-hr	5.06E-05	yes	yes	N
Dichlorobenzene[d]	25321-22-6			0.14	Y				5.6	0.0756	3.69E-02	lbs/month	5.06E-05	yes	yes	N
PAH	--			0.0005	Y	5			0.02	0.00027	2.16E-03	lbs/month	2.96E-06	yes	yes	N

Notes

[a] Conservatively assumes IRSL for TCDD, which is more toxic dioxin compound.

[b] As indicated in MDEQ's Air Toxics webpage, mercury emissions are evaluated on a case-by-case basis. Estimated mercury emissions from the furnaces are negligible (1.01×10^{-5} pounds per hour).

[c] Conservatively assumes screening levels for hexavalent chromium mist. SRSL used.

[d] Conservatively assumes ITSL for 1,2-dichlorobenzene and IRSL for 1,4-dichlorobenzene.

Table 4. Rule 225 Compliance Demonstration for Combustion Emissions per Rule 227(1)(b)

Chemical Name	CAS No.	Screening Level			AQD Screening Level?	AQD Footnote	Proposed Emission Rate (ER) (lbs/hr)	See Table 22 of Rule 227(3) Units = feet					Max Emission Rate (ER) (lbs/hr)		Is Proposed ER less than ITSL Max ER?	Is Proposed ER less than IRSL or SRSL Max ER?
		ITSL µg/m³	ITSL Avg Time	IRSL or SRSL µg/m³				H_s	H_b	Prop Line Dist	H_s/H_b	Table 22 ANNUAL Ambient Impact Ratio (AIR)	ITSL	IRSL or SRSL		
Cadmium				0.0006	Y		4.64E-05	38	24	25	1.5833	0.11		7E-05		yes
Chromium		0.008	24-hr		Y		5.90E-05	38	24	25	1.5833	0.11	8E-05		yes	
Chromium				0.0008	Y		5.90E-05	38	24	25	1.5833	0.11		9E-05		yes