Environment

Submitted to:
Covanta Hennepin Energy Resource Company
Minneapolis, MN

Submitted by:
AECOM
Westford, MA
60144287
December 2010

National Ambient Air Quality Standard Modeling for the Capacity Optimization Project

Hennepin Energy Resource Company
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Hennepin Energy Resource Company Minneapolis, Minnesota

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1.0 Introduction

1.1 Project Overview

The Hennepin Energy Resource Center (HERC) facility is a mass-burn municipal waste combustor with a design combustion capacity of 1,212 tons per day of municipal solid waste in two identical combustion units. Steam produced from combustion is used to turn a 39-megawatt turbine/generator. The facility sells approximately 35 megawatts of electricity (the power usage of approximately 26,000 single family homes) to Xcel Energy. The HERC facility has operated continuously since startup in October 1989. The facility was designed and built by Blount Projects and includes the following major equipment for combustion and air emissions control: two excess-air grate-fired waterwall furnaces, two dry scrubbers for acid gas neutralization, a reverse-air fabric filter baghouse to capture particulates, select non-catalytic reduction of nitrogen oxides, and an activated carbon injection system for capture of gaseous mercury. The HERC facility is owned by Hennepin County and operated by Covanta Hennepin Energy Resource Company, LP. (CHERC)

CHERC is proposing to remove the state-only annual limit on fuel usage of 365,000 tons per year and allow the facility to process MSW at its maximum capacity of 442,380 tons per year. The purpose of this modeling analysis is to demonstrate that HERC facility with the proposed change in annually permitted fuel use will comply with National Ambient Air Quality Standards (NAAQS).

1.2 Report Organization

The modeling report consists of the following sections and appendices:

Section 2 - Source Description and Emissions

Section 3- Dispersion Modeling Methodology

Section 4- Ambient Air Quality Impact Methods and Results

Appendix A Emissions Estimation Spreadsheets

Appendix B GEP Analysis

2.0 Source Characterization

2.1 Facility Overview

The HERC facility is a mass-burn municipal waste combustor with a design combustion capacity of 1,212 tons per day of municipal solid waste in two identical combustion units. Steam produced from combustion is used to turn a 39-megawatt turbine/generator. The facility includes the following major equipment for combustion and air emissions control: two excess-air grate-fired waterwall furnaces, two dry scrubbers for acid gas neutralization, a reverse-air fabric filter baghouse to capture particulates, select non-catalytic reduction of nitrogen oxides, and an activated carbon injection system for capture of gaseous mercury.

The location of the HERC facility is shown in Figure 2-1.

2.2 Emission Estimates

The following paragraphs discuss the method used to calculate emissions for each emission unit.

2.2.1 MSW Combustion Units

The exhaust flow rate is directly proportional to the steam flow rate. The original design steam flow rate for the HERC is 171,380 pounds of steam per hour. The exhaust flow rate corresponding to that steam flow rate was calculated using actual stack test data from 2008 and 2009. During those stack tests, both exhaust flow rate and steam flow rate were measured. These stack tests were chosen because they were conducted at a short term fuel use rate of greater than 50.5 tons per hour. Using the stack test data, the design exhaust flow rate was calculated to be 63,735 dry standard cubic feet of exhaust at 7% oxygen content (dscfm @ 7% O_2)per combustion unit. The design exhaust flow rate was used to calculate the annual average hourly emission rates.

In accordance with the provisions of New Source Performance Standard Subpart Cb, the maximum steam flow rate allowed at HERC is 195,000 pounds of steam per hour. Using the exhaust flow rate to steam flow rate ratio the short term maximum allowable exhaust flow rate was calculated to be 72,519 dscfm @ 7% O_2 per unit. The maximum allowable flow rate was used to calculate the short term hourly emission rates. This method provides a high estimate of the maximum hourly emission rate as the HERC facility has never produced 195,000 lb steam /hour.

For the pollutants that have a regulatory or permit limit, the maximum allowable emission concentration was multiplied by the short term or long terms exhaust flow rate to calculate a pound per hour emission rate. This pound per hour emission rate was then converted to a gram per second rate for use in the NAAQS model.

Additional calculation methods were applied to NO_2 emissions for use in modeling the 1-hour NO_2 impacts. The in-stack conversion ratio of NO_X to NO_2 was calculated based on the results of performance test data at a similar Covanta MSW combustor. That data showed that the actual in-stack conversion ratio was 10%.

2.2.2 Lime, Carbon, and Ash Silos

The emission rate from the lime, carbon, and fly ash silos were calculated by multiplying the throughput by a published emission factor and the control efficiency of the control device (fabric filter). For these sources, $PM_{2.5}$ was assumed to be equal PM_{10}. This represents a conservative estimate for the $PM_{2.5}$ emission rates.

2.2.3 Plant Roads

PM, PM_{10}, and $PM_{2.5}$ emissions were calculated for truck traffic on the paved plant roads. Three separate road segments were identified for specific truck traffic, 1) MSW delivery, 2) Ash and metal removal, and 3) chemical delivery.

MSW delivery occurs every day of the week, however, actual delivery volumes are greater on weekdays. Segment 1 includes haul out of non-processable waste. Ash and metal haul out also occurs every day of the week. As with MSW delivery, haul out rates are higher on weekdays. Chemical delivery includes lime, carbon, and boiler/process chemicals. Chemical delivery generally occurs only on weekdays.

Short term (daily) emission rates were calculated based on maximum daily truck volumes. Annual emissions were based on the maximum annual haul rate for HERC and the average weight of the trucks.

2.2.4 Cooling Towers

Particulate matter emissions from the cooling towers were calculated by multiplying the maximum water recirculation rate by the concentration of Total Dissolved Solids (TDS), the manufacturers specified drift rate. The TDS concentration was determined from multiple samples collected at the HERC facility. PM_{10} and $PM_{2.5}$ emissions were calculated using the respective ratios from the California SCAQMD CEIDARS Table.

2.3 Source Parameters

The combustion unit stack parameters to be used in the air modeling conducted for the criteria pollutants are presented in Table 2-1. For the particulate modeling the ancillary source stack parameters are provided in Table 2-2.

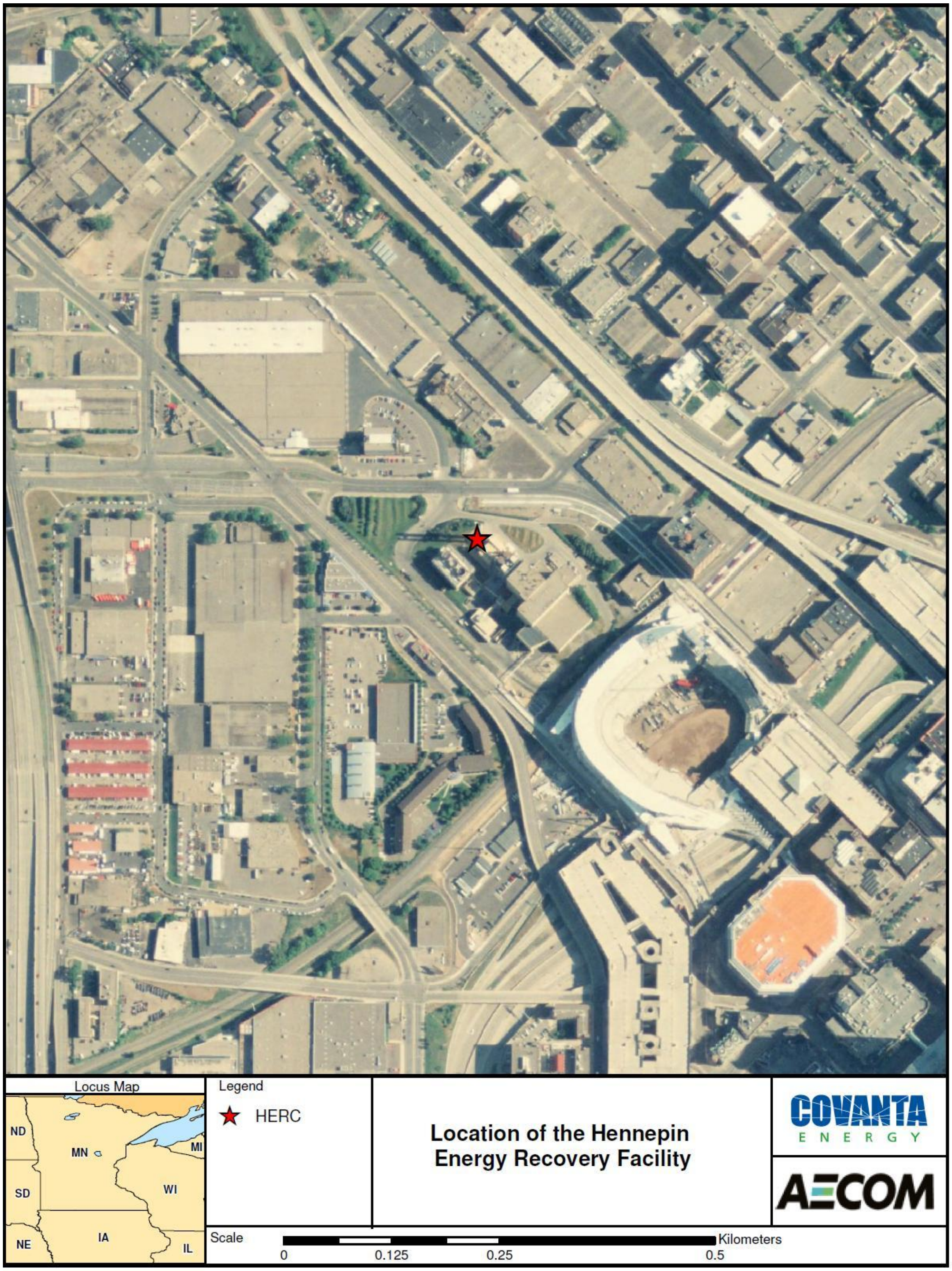
Table 2-1 Combustion Units Stack Parameters

Source ID	Description	X (m)	Y (m)	Ht (m)	Exit Temp (K)	Short-Term Exit Velocity (m/s)	Short-Term ACFM	Annual Exit Velocity (m/s)	Annual ACFM	Diameter (m)
EU-001	Unit 1	477892.09	4980961.16	65.84	399.82	28.01	171876.77	24.62	151057.65	1.92
EU-002	Unit 2	477897.77	4980965.70	65.84	399.82	28.01	171876.77	24.62	151057.65	1.92

Table 2-2 Ancillary Units Stack Parameters

Source ID	Description	X (m)	Y (m)	Ht (m)	Exit Temp (K)	Horizontal or Vertical Stack	Exit Velocity (m/s)	Diameter (m)
EU-003	Lime Silo - Pebble Lime	477928.78	4980933.00	25.30	Ambient	Horizontal	1.00E-04	0.18
EU-004	Fly Ash Silo	477918.57	4980888.42	14.94	Ambient	Horizontal	1.00E-04	0.18
EU-005	Lime Silo - Dolomitic Lime	477926.74	4980953.76	15.54	Ambient	Horizontal	1.00E-04	0.15
EU-006	Activated Carbon Silo	477931.51	4980949.34	17.37	Ambient	Horizontal	1.00E-04	0.13
EU-007	Combined Ash Handling	477898.05	4980871.34	14.02	Ambient	Horizontal	1.00E-04	0.91
EU-008	Cooling Tower	477857.31	4980940.49	22.56	Ambient	Vertical	3.25	9.14
EU-009	Cooling Tower	477865.48	4980931.98	22.56	Ambient	Vertical	3.25	9.14
EU-010	Cooling Tower	477872.29	4980923.14	22.56	Ambient	Vertical	3.25	9.14

Figure 2-1 Facility Location



3.0 Air Dispersion Modeling Methodology

3.1 Overview of Analysis Methodology

The latest version of U.S. EPA's AERMOD model (Version 09292) was used in the analysis as discussed further below. AERMOD was applied with the regulatory default options, as recommended by U.S. EPA and MPCA. AERMOD was applied with 5-years of recent hourly meteorological data (2004-2008), consisting of surface observations from Minneapolis-St. Paul Airport and concurrent upper air data from Chanhassen, MN as directed by the MPCA.

Modeled impacts from the facility sources were added to representative background data provided in MPCA Standardized Air Modeling spreadsheet (SAM09097.xls) for comparison to the NAAQS. Representative ambient background concentrations are provided in Table 3-1.

All model input and output files were provided to the MPCA on CDROM.

3.2 Building Downwash

Aerodynamic downwash was simulated following EPA guidance, accounting for the influence of CHERC buildings and structures and the nearby Target Field. A detailed description of the building downwash considerations is provided in the risk assessment conducted for the Twins ballpark (*Air Dispersion Modeling and Risk Assessment for the Hennepin Energy Recovery Center, Hennepin County, Minnesota (Revised)* AECOM Document, No. 03433-001-600R, June 2007). Figure 3-1 shows the buildings and structures in the near-field included in the analysis. Appendix B provides details of the GEP analysis.

3.3 Dispersion Environment

The application of AERMOD requires characterization of the local (within 3 km) dispersion environment as either urban or rural, based on a US EPA-recommended procedure that characterizes an area by prevalent land use. This land use approach classifies an area according to 12 land use types. In this scheme, areas of industrial, commercial, and compact residential land use are designated urban. According to US EPA modeling guidelines (Appendix W, Section 7.2.3, November 9, 2005), if more than 50% of an area within a three-kilometer radius of the proposed facility is classified as rural, then rural dispersion coefficients are to be used in the dispersion modeling analysis. Conversely, if more than 50% of the area is urban, urban dispersion coefficients are used.

For this analysis, an aerial photo of the HERC facility area was reviewed. Visual inspection of the map shows that the 3-km area surrounding the HERC facility (see Figure 3-2) is predominantly urban. Therefore, the "URBANOPT" option was specified with a population of 382,618 and the default surface roughness of 1.0 meters.

3.4 Terrain Considerations

The U.S. EPA and MPCA modeling guidelines require that the differences in terrain elevations between the stack top, plume centerline and model receptor locations be considered in the modeling analyses. There are three types of terrain:

- simple terrain – locations where the terrain elevation is at or below the exhaust height of the stacks to be modeled;
- intermediate terrain – locations where the terrain is between the top of the stack and the modeled exhaust "plume" centerline (this varies as a function of plume rise, which in turn, varies as a function of meteorological condition);
- complex terrain – locations where the terrain is above the plume centerline.

Based on a review of USGS topographical maps, the study area consists of all three terrain types. As discussed further below, terrain elevations were developed for the model receptors based on National Elevation Dataset (NED) data.

3.5 Meteorological Data

If at least one year of onsite meteorological data is not available, five years of meteorological data from the nearest representative National Weather Service station are required to conduct the dispersion and deposition modeling. For this application, five years (2004-2008) of surface meteorological data from Minneapolis-St. Paul Airport and concurrent upper air data from Chanhassen, MN was used. The MPCA conducted the processing of the data with AERMET (ver. 06341), the U.S. EPA's meteorological processor for AERMOD, and provided AERMOD-ready data for use in this modeling analysis. The AERMET files incorporated yearly averaged moisture conditions for the Bowen ratio and surface characteristics were determined by AERSURFACE (ver. 08009) using default settings. The pre-processed meteorological data was provided by Melissa Sheffer at MPCA.

3.6 Receptor Data and Processing

Within a defined study area, AERMOD requires specification of receptor locations, at which the model computes air concentrations and deposition rates.

The modeling domain included the area within 50 kilometers of the HERC facility. This domain was sufficient to resolve the maximum modeled impacts and covered the watersheds associated with the water bodies likely to receive the highest facility impacts.

The modeling analysis utilized a comprehensive Polar receptor grid as recommended in the MPCA guidance (October 2004) with the following distances and spacing:

- Discrete receptors every 10 m along fence line;
- Polar grid with 36 directions and distances of 25m to 250m every 25m;
- Polar grid with 36 directions and distances of 300m to 500m every 50m;
- Polar grid with 36 directions and distances of 600m to 1000m every 100m;
- Polar grid with 36 directions and distances of 1200m to 2000m every 200m;
- Polar grid with 36 directions and distances of 1200m to 2000m every 200m;
- Polar grid with 36 directions and distances of 2500m to 4500m every 500m;
- Polar grid with 36 directions and distances of 5000m to 9000m every 1000m; and
- Polar grid with 36 directions and distances of 10000m to 50000m every 10000m.

Figure 3-3 shows the 50km Polar Grid.

In addition, flagpole receptors were placed at each building listed in Table 3-2. These represent nearby public open air spaces (including including open-air decks, stadium decks, rooftop terraces and parking ramps) within 1 mile of the HERC facility. According to MPCA modeling guidance, "*FLAGPOLE receptors should clearly focus on elevated areas likely to see plume "hits". Short structures and lower portions of tall structures may use ground-level receptors only – this is reasonable for building downwash area (building cavity and near wake regions) with relatively uniform vertical concentrations. This means using ground-level receptors instead of multi-level FLAGPOLE receptors if FLAGPOLE receptors are less than key stack heights – a nominal breakpoint height of 20 m may be reasonable for most FLAGPOLE receptors in most areas".* Although a four story building is less than 20 meters tall, to be conservative, residences of four or more stories were included as flagpole receptors.

Based on referenced examples in MPCA guidance, each identified building has a flagpole receptor at:

- Ground level;
- 25% of the building height;
- 50% of the building height;
- 75% of the building height; and
- Rooftop

For building with 4-6 stories, the 25%-75% of building height locations are less than 20 meters. Therefore for these building receptors were placed at ground level and rooftop only.

Receptors were also distributed along the tiers of the Target Center Stadium. Figure 3-4 shows the location of the 67 flagpole and 281 stadium receptors, with flagpole labels referencing the ID numbers in Table 3-2.

Receptor terrain elevations and receptor information required by AERMOD were developed through application of the receptor/terrain processor AERMAP (Version 09040). AERMAP were applied with the National Elevation Dataset (NED) from USGS[1].

3.7 Model Options for 1-hr NO_2

EPA's Guideline on Air Quality Models ("GAQM"; USEPA, 2005) provides a tiered approached for modeling NO_2 that provide for increased levels of refinement:

- 100% conversion of NO to NO_2;
- Assume 75% conversion of NO to NO_2 (national default for the annual average Ambient Ratio Method, or ARM);
- Use the ozone limiting method (OLM). This approach computes the available moles of ozone to combine with the moles of NO, but this is done using the molar concentration of NO at the ground (receptor); and

[1] http://seamless.usgs.gov/

- Use the Plume Volume Molar Ratio Method (PVMRM). This approach is similar to the OLM approach, except that the moles of ozone available to combine with the in-plume moles of NO are restricted to the plume cross-sectional area at each downwind distance considered.

These last two options require the use of hourly ozone data measured concurrently with the meteorological data.

Preliminary modeling results indicated that a refined approach was required for the 1-hr NO_2 analysis. EPA documents on the various NO_2 modeling procedures (available at: http://www.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod) indicate that, overall, the PVMRM option appears to provide a more realistic treatment of the conversion of NO to NO_2 as a function of distance downwind from the source than OLM or the other NO_2 screening options.

Consistent with recent guidance provided by USEPA, the application of AERMOD with the PVMRM option is no longer considered a "preferred model" and, therefore, requires justification. Per USEPA's recommendations in the GAQM, alternative modeling techniques should be justified in accordance with provisions discussed below:

1. The model has received a scientific peer review.

The following references document scientific peer review of PVMRM:

- *Hanrahan, P.L., 1999a. The Plume Volume Molar Ratio Method for Determining NO_2/NO^x Ratios in Modeling – Part I: Methodology. J. Air & Waste Manage. Assoc., 49, 1324–1331.*

- *Hanrahan, P.L., 1999b. The Plume Volume Molar Ratio Method for Determining NO_2/NO_x Ratios in Modeling – Part II: Evaluation Studies. J. Air & Waste Manage. Assoc., 49, 1332-1338.*

- *MACTEC, 2005. Evaluation of Bias in AERMOD-PVMRM. Final Report, Alaska DEC Contract No. 18-9010-12. MACTEC Federal Programs, Inc., Research Triangle Park, NC*

Hanrahan 1999a documents the details of the PVMRM methodology and provides some discussion and comparison of PVMRM to the ARM and OLM methods. Hanrahan 1999b presents an evaluation of PVMRM's performance against six different databases. The performance evaluations showed that PVMRM realistically estimates the NO_2 fraction at near field receptors yet still provides conservative estimates so that air quality standards can be protected. Although the databases evaluated in Hanrahan 1999b represented dramatically different conditions, PVMRM consistently predicted concentrations close to the measured values.

MACTEC 2005 documents analysis of performance evaluation results for the PVMRM option in AERMOD to determine if PVMRM produces biased or unbiased results. The report examined evaluation results from two aircraft studies and two long-term field studies, as well as comparisons between AERMOD-PVMRM and other refined chemically reactive plume models. The AERMOD-PVMRM algorithm was judged to provide unbiased estimates of the NO_2/NO_x ratio based on criteria that are comparable to, or more rigorous than, evaluations performed for other refined dispersion models implying unbiased performance.

2. The model can be demonstrated to be applicable to the problem on a theoretical basis.

For this aspect of the alternative model justification, the June 28, 2010 USEPA Clarification Memo discusses "the chemical environment into which the source's plume is to be emitted" as a factor to consider. Although the EPA memo does not identify the areas (if any) that would not qualify as being applicable, it is worth noting that the area surrounding the HERC facility is characterized as an urban area. The background concentrations of ozone and other pollutants are typical, and there is no indication from EPA that the conclusions for the applicability and appropriateness of the PVMRM approach would not apply to this area.

As noted above, Hanrahan 1999a documents the details of the PVMRM methodology and provides some discussion and comparison of PVMRM to the ARM and OLM methods. Also discussed in Hanrahan 1999a is a comparison to OLM which is a simplified approach that assumes O_3 and NO react to form NO_2 in proportion to ground level concentrations. PVMRM is more refined and uses a molar approach consistent with actual reactions, and the calculations are done "in-plume" rather than at ground-level. Because PVMRM better simulates the NO to NO_2 conversion chemistry during plume expansion it is particularly well suited for near-field receptors and, therefore, for the HERC application where the maximum modeled NO_x concentrations occur near the stacks due to building downwash affects. In addition, unlike OLM, PVMRM is designed to work with either single or multiple plumes as is the case for the HERC application which involves 2 combustion units.

3. The data bases which are necessary to perform the analysis are available and adequate.

Hourly ozone data

PVMRM requires the use of hourly ozone data that is concurrent with the meteorological data. MPCA provided an O_3 database for this project (email from Melissa Sheffer/MPCA to B. Stormwind/AECOM dated 5/19/10). AECOM understands that MPCA developed the 5-year (2004-2008) hourly data base from 18 available ozone monitors located in Minnesota by using the highest ozone concentration measured over all monitors for each hour in the data base. Of these monitors, only two, the Blaine and Voyageurs monitors are operated year round; the remaining 16 monitors are operated during ozone season months. The monitor locations are shown in Figure 3-5. As shown in Figure 3-5, these monitors are generally located in urban areas therefore the O_3 measurements should be representative of the modeling extent surrounding the HERC facility.

Hourly meteorological data

As indicated above, 5-years of hourly meteorological data, 2004-2008, consisting of surface observations from Minneapolis-St. Paul Airport and concurrent upper air data from Chanhassen, MN was used. The data were processed and provided by the MPCA using AERMET and AERSURFACE.

NO_2/NO_x Equilibrium Ratio and In-stack NO_2/NO_x ratio

The PVMRM option requires specification of the NO_2/NO_x equilibrium ratio and the in-stack thermal conversion ratio. The default equilibrium ratio for the NO_2/NO_x ratio in AERMOD of 0.90 will be used. An in-stack NO_2/NO_x ratio of 0.10 for the HERC combustion units was applied. This was conservatively based on 2008 quarterly stack testing at the Covanta Lee resource recovery facility in Fort Myers, Florida, which reported an average NO_2/NO_x ratio of 0.063%, with quarterly values ranging from 0.051 to 0.076.

4. **Appropriate performance evaluations of the model have shown that the model is not biased toward underestimates**.

As noted above, Hanrahan 1999b presents an evaluation of PVMRM's performance against six different databases. The performance evaluations showed that PVMRM realistically estimates the NO_2 fraction at close-in receptors yet still provides conservative estimates so that air quality standards can be protected. Although the databases evaluated in Hanrahan 1999b represented dramatically different conditions, PVMRM consistently predicted close to the measured values. One evaluation study reported in Hanrahan 1999b was conducted with aircraft NO_2/NO_x measurements that included six cases of power plants operating on coal, four cases operating on oil, and two operating on natural gas. These different fuels provided a good variety for evaluation of PVMRM and the NUPUC application which involves a coal fired boiler, two gas fired boilers, and two gas fired combustion turbines. As reported by Hanrahan 1999b, "in general, the PVMRM has a tendency to over predict the NO_2/NO_x ratio, with few under predictions. At the same time, it can still predict close-in ratios relatively well. It also shows that the fuel type is not important".

In addition, MACTEC 2005 documents performance evaluation results for AERMOD-PVMRM to determine if PVMRM produces biased or unbiased results. The AERMOD-PVMRM algorithm was judged to provide unbiased estimates of the NO_2/NO_x ratio based on criteria that are comparable to, or more rigorous than, evaluations performed for other refined dispersion models implying unbiased performance.

3.8 Model Options for all other Criteria Pollutants

For all the criteria pollutants except 1-hr NO_2, AERMOD was applied with the USEPA recommended default options.

Table 3-1 Representative Ambient Background Data

Pollutant	Averaging Period	Background (µg/m3)
CO	1	3565.00
	8	2760.00
NO_2	1	-
	ANN	17.00
PM_{10}	24	47.00
	ANN	27.00
$PM_{2.5}$	24	26.00
	ANN	10.00
SO_2	1	110.00
	3	86.00

	24	34.00
	ANN	5.00

Source: MPCA Standardized Air Modeling spreadsheet (SAM09097.xls)

Table 3-2 Flagpole Receptors

ID	Name	Address	Stories	Height (m)	X (m)	Y (m)
1	Fifth Street Towers II	150 5th Street South	36	153.47	478869.38	4980333.24
2	Accenture Tower	325-333 7th Street South	33	138.53	478902.27	4979907.78
3	W Minneapolis - The Foshay	821-837 Marquette Avenue	32	136.55	478584.64	4979928.61
4	Marquette Place	1314-1318 Marquette Avenue	36	131.67	478188.34	4979448.05
5	The Churchill	109-111 Marquette Avenue	33	120.70	479102.46	4980840.81
6	One Ten Grant	110 West Grant Street	32	117.04	477887.81	4979517.85
7	Fifth Street Towers I	100-116 5th Street South	26	108.36	478816.16	4980359.52
8	Symphony Place Apartments	1113-1125 Marquette Avenue	26	95.10	478366.24	4979632.96
9	Hotel Ivy + Residence	201 11th Street South	25	91.92	478501.44	4979597.52
10	Centre Village	413-433 7th Street South	26	84.43	479012.05	4979840.77
11	Loring Green East	1201 Yale Place	23	84.12	478005.65	4979709.29
12	The Crossings	250 2nd Avenue South	19	69.49	479015.72	4980573.48
13	The Tower of 1200 on the Mall	1225 LaSalle Avenue	23	62.79	478060.35	4979633.23
14	Loring Green West	75 13th Street South	17	62.18	477912.70	4979622.74
15	Riverwest	401 1st Street South	20	59.89	479443.52	4980640.75
16	Crowne Plaza Northstar Hotel	618 2nd Avenue South	18	53.65	478748.59	4980122.02
17	Parkview Apartments	1201 12th Avenue North	12	43.89	476565.43	4981754.97
18	Loring Municipal Ramp	1330-1336 Nicollet Mall	11	40.23	478016.26	4979468.08
19	Six Quebec	601-617 Marquette Avenue	9	37.06	478709.51	4980202.69
20	730 Lofts	730 4th Street North	10	34.14	477923.72	4981328.67
21	730 Lofts	730 4th Street North	10	34.14	477923.72	4981328.67
22	1200 on the Mall	1200 Nicollet Mall	9	32.92	478134.94	4979675.52
23	1200 on the Mall	1200 Nicollet Mall	9	32.92	478134.94	4979675.52
24	4th Avenue Parking Ramp	501-521 4th Avenue South	9	32.92	479091.09	4980089.23

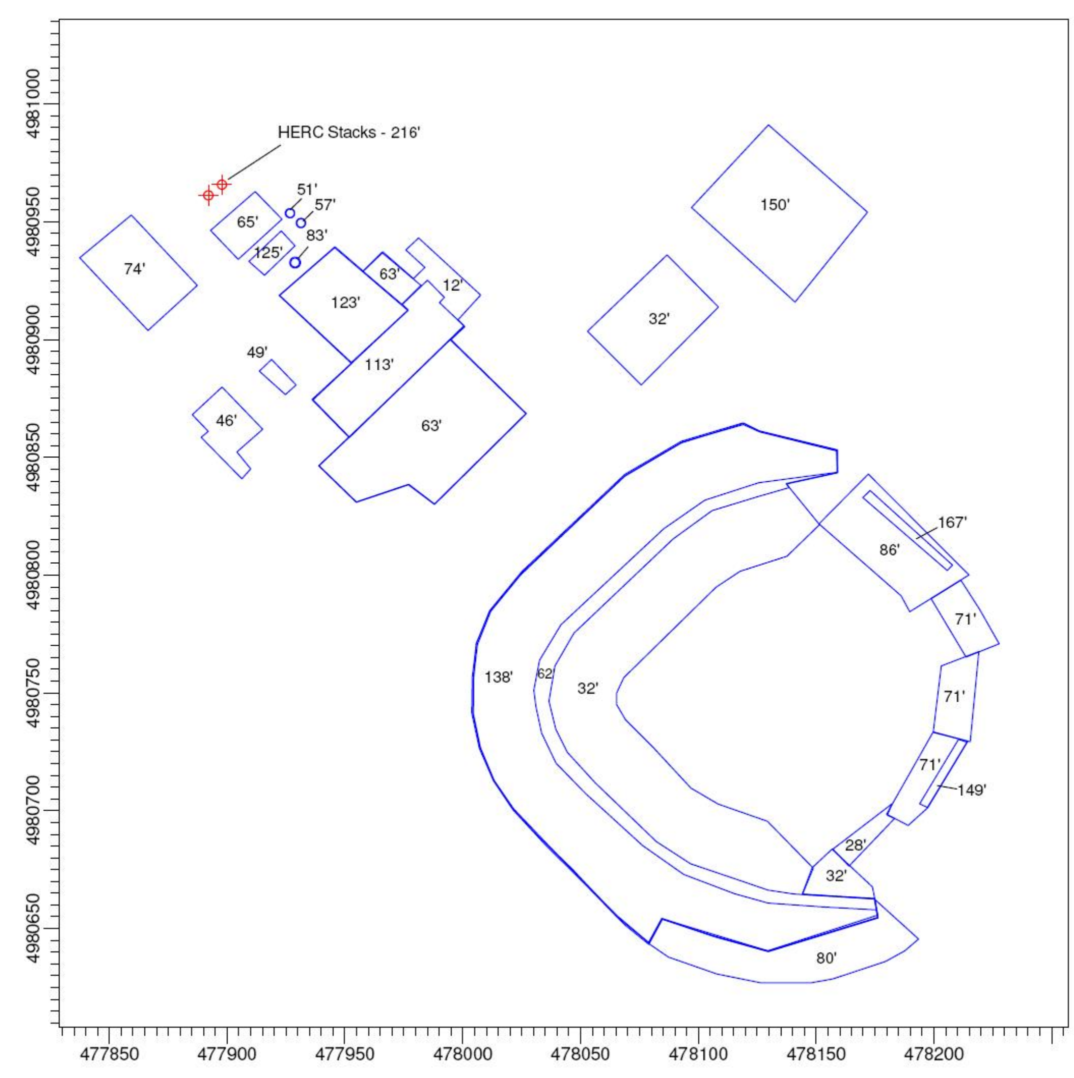
ID	Name	Address	Stories	Height (m)	X (m)	Y (m)
25	Park and Shop	19-27 7th Street South	9	32.92	478374.26	4980255.58
26	Rock Island Lofts	101-111 4th Avenue North	8	29.26	478606.51	4981279.58
27	Heritage Landing	401-415 1st Street North	8	29.26	478565.21	4981330.71
28	Loring Way	210 West Grant Street	8	29.26	477783.65	4979497.99
29	4th Street North Garage	318-336 2nd Avenue North	8	29.26	478352.71	4970867.85
30	Leamington Municipal Ramp	200-220 11th Street South	8	29.26	478576.18	4979662.25
31	Marquette Parking Ramp	1101-1111 Marquette Avenue	8	29.26	478427.93	4979617.20
32	Government Center Municipal Parking Ramp	415-417 5th Street South	8	29.26	479132.48	4980063.43
33	Bookmen Stacks	345 6th Avenue North	9	29.03	478113.77	4981138.28
34	Bookmen Stacks	345 6th Avenue North	9	29.03	478113.77	4981138.28
35	720 Lofts	720 4th Street North	8	28.65	477986.48	4981263.13
36	720 Lofts	720 4th Street North	8	28.65	477986.48	4981263.13
37	5th Avenue Lofts	401-429 2nd Street North	7	26.82	478453.32	4981252.66
38	5th Avenue Lofts	401-429 2nd Street North	7	26.82	478453.32	4981252.66
39	Lindsay Lofts	408 1st Street North	7	25.60	478580.69	4981408.64
40	Lindsay Lofts	408 1st Street North	7	25.60	478580.69	4981408.64
41	Harvester Lofts	612-618 Washington Avenue North	7	25.60	478225.02	4981395.84
42	Harvester Lofts	612-618 Washington Avenue North	7	25.60	478225.02	4981395.84
43	Jerry Haaf Memorial Parking Ramp	418-444 4th Street South	7	25.60	479266.82	4980274.17
44	5th Street Parking Garage/Transit Building	500-530 2nd Avenue North	7	25.60	478246.71	4980679.37
45	Hennepin Avenue Parking Ramp	17-25 1st Street North	7	25.60	478872.37	4980976.43
46	413 Nicollet Mall	401-413 Nicollet Mall	7	25.60	478748.05	4980482.94
47	Minneapolis Club Parking Ramp	714-730 3rd Avenue South	7	25.60	478785.64	4979952.04
48	Eitel Building City Apartments, North Building	1360 Spruce Place	6	25.60	477812.94	4979394.58

ID	Name	Address	Stories	Height (m)	X (m)	Y (m)
49	Bassett Creek Lofts	901 3rd Street North	6	21.95	477815.67	4981522.45
50	Bassett Creek Lofts	901 3rd Street North	6	21.95	477815.67	4981522.45
51	Bookmen Lofts (eastern portion)	517-519 3rd Street North	6	21.95	478175.99	4981166.73
52	Bookmen Lofts (eastern portion)	517-519 3rd Street North	6	21.95	478175.99	4981166.73
53	Bookmen Lofts (western portion)	523-529 3rd Street North	6	21.95	478158.73	4981190.00
54	Bookmen Lofts (western portion)	523-529 3rd Street North	6	21.95	478158.73	4981190.00
55	Park Plaza Apartments I	525-527 Humboldt Avenue North	6	21.95	476428.20	4980968.98
56	Park Plaza Apartments I	525-527 Humboldt Avenue North	6	21.95	476428.20	4980968.98
57	Park Plaza Apartments II	505-507 Humboldt Avenue North	6	21.95	476430.43	4980889.32
58	Park Plaza Apartments III	1315 Olson Memorial Highway	6	21.95	476580.49	4981024.96
59	Mar-Ten Ramp	921-933 Marquette Avenue	6	21.95	478501.41	4979822.80
60	University of St. Thomas Parking Ramp	1100-1118 Harmon Place	6	21.95	477997.97	4979930.27
61	Hawthorne Transportation Center	29-33 9th Street North	6	21.95	478068.09	4980278.17
62	9th Street North Parking Garage/Transit Building	101-125 9th Street North	6	21.95	478071.72	4980464.12
63	Gateway Ramp	400-428 3rd Street South	6	21.95	479301.88	4980388.70
64	Midtown Parking Ramp	11-19 4th Street South	6	21.95	478622.93	4980507.36
65	Herschel Lofts	748 3rd Street North	6	21.34	478003.16	4981435.82
66	Herschel Lofts	748 3rd Street North	6	21.34	478003.16	4981435.82
67	River Station	645 1st St N	4	14.63	478348.85	4981435.86

Figure 3-1 Buildings Included in Downwash Analysis (near-field view) Showing Building Height (distances in meters)

PROJECT TITLE:

Buildings Included in BPIP Analysis
NEAR VIEW



COMMENTS:	SOURCES: **2**	COMPANY NAME:	
	RECEPTORS: **0**	MODELER:	ENSR AECOM
		SCALE: 1:2,612 (0 – 0.05 km)	
		DATE: **12/11/2006**	PROJECT NO.: **03433-001**

ISC-AERMOD View - Lakes Environmental Software J:\Indl_Service\Project Files\Hennepin County, MN\Modeling\Lakes\GEP2.isc

Figure 3-2 3km Area Surrounding the HERC Facility

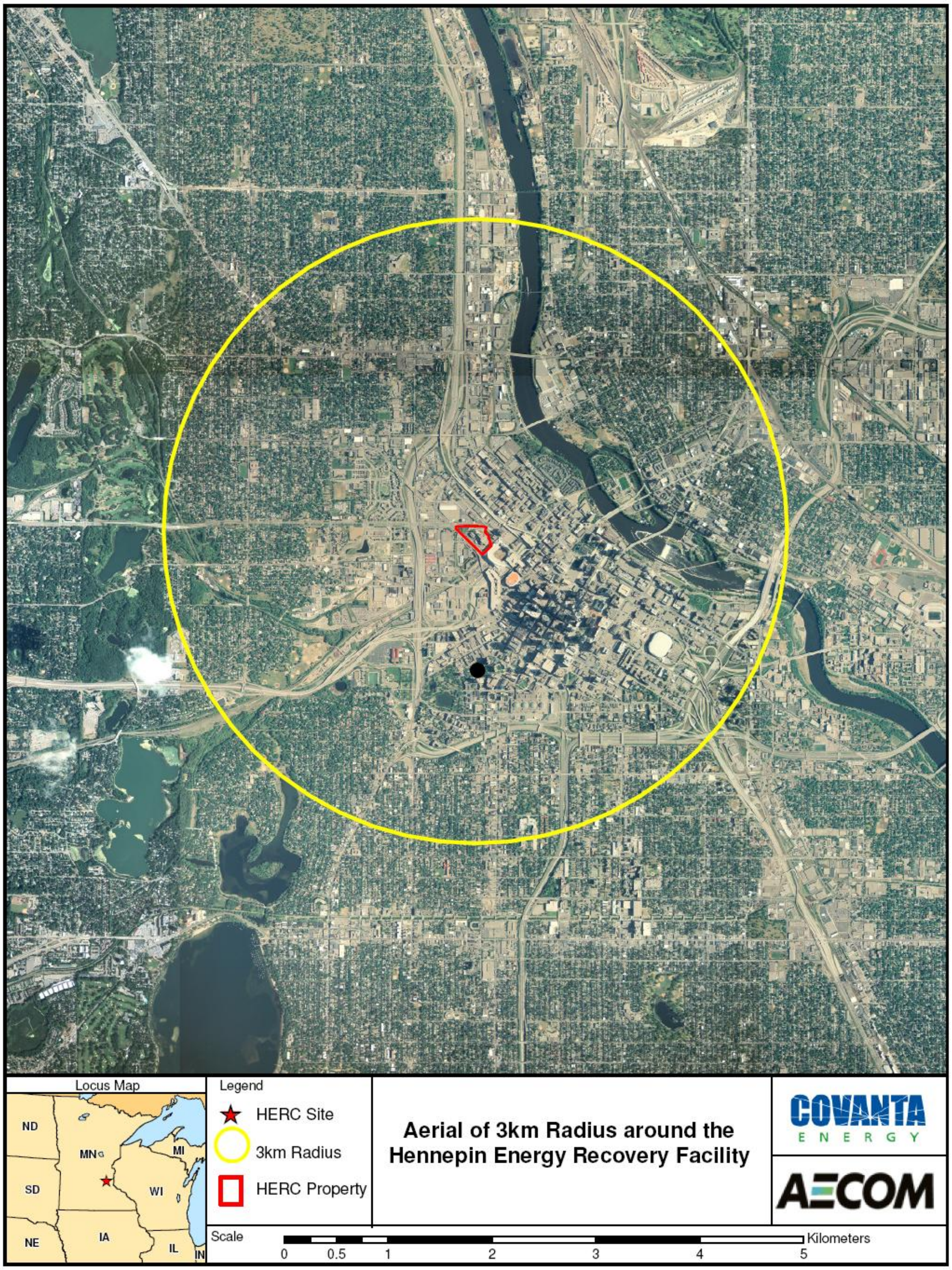


Figure 3-3 50km Polar Grid

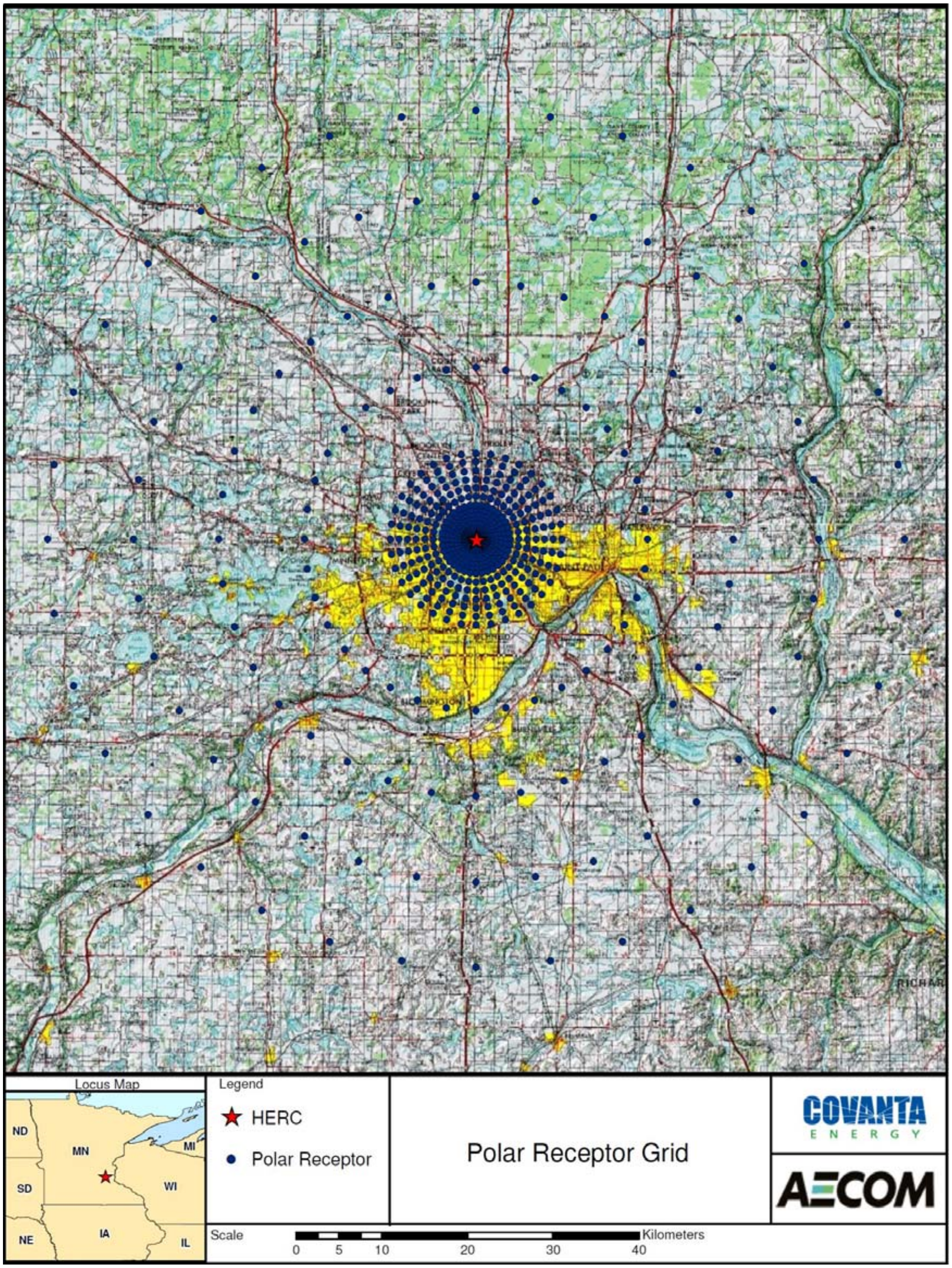


Figure 3-4 Location of the Flagpole Receptors. (**Flagpole labels reference the ID numbers in Table 3-2**)

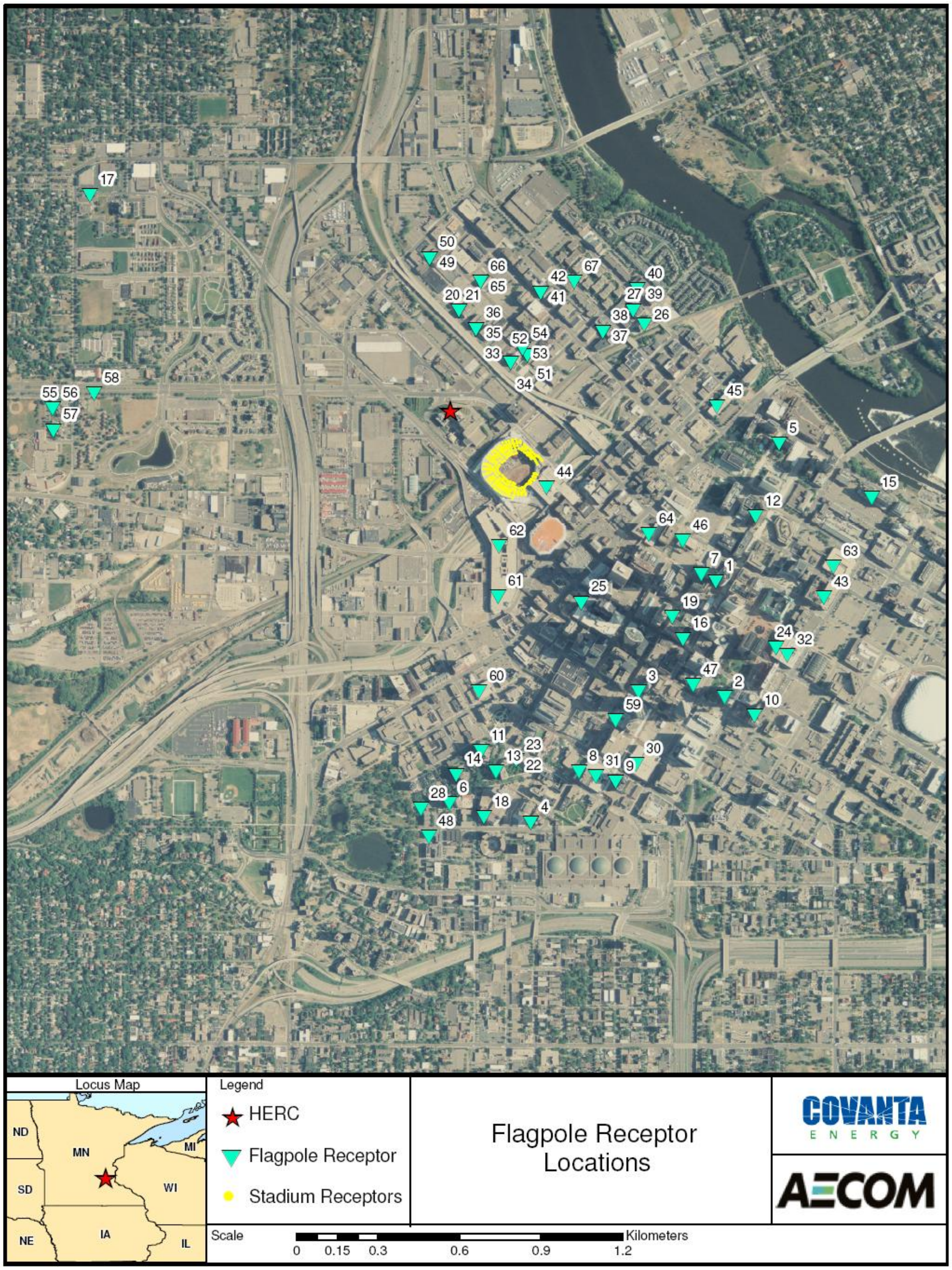
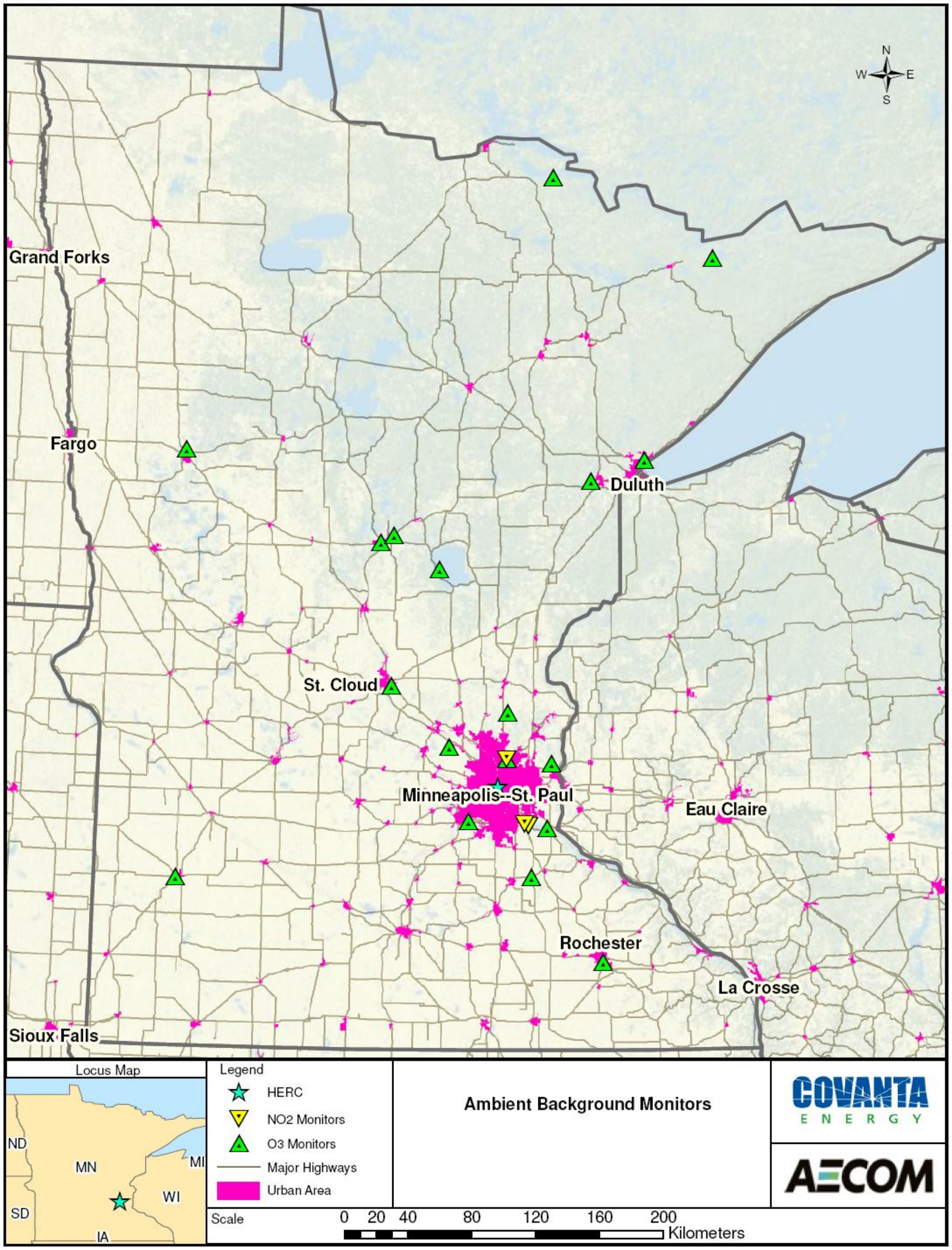


Figure 3-5 Location of MPCA NO_2 and O_3 Monitors



4.0 Ambient Air Quality Analysis Results

4.1 Overview of Modeling Analysis

AERMOD was applied with the 5-years of meteorological data to determine the modeled impacts associated with the Project sources. For all pollutants and averaging periods, with the exception of 1 hour NO_2 and 24 hour $PM_{2.5}$, the maximum impact was added to the representative ambient background concentration and compared to the NAAQS.

4.2 1-hour NO_2 Model Analysis

Currently, USEPA has not released a new version of AERMOD or post-processor capable of the calculations required for the 1-hour NO_2 compliance demonstration. However, AECOM has developed a post-processor to do the calculations ("POST-1HR"). The following outlines the steps in our proposed procedure:

1. Run AERMOD with the PVMRM option for all the two combustion units at HERC using the 5 years of meteorological data to develop annual output binary files containing hourly concentrations at each receptor using the hourly POSTFILE option for each year that will be used in the steps below.
2. From the hourly AERMOD output, determine the maximum 1-hour concentration for each day of the 5-year modeling period for each receptor.
3. At each receptor, for each year modeled, determine the 98th-percentile (equivalent to 8th- highest) daily 1-hour maximum concentration from the distribution of 365 or 366 daily 1-hour maximum concentrations.
4. At each receptor, average the 98th-percentile highest daily 1-hour maximum concentrations for all 5-years modeled. This is consistent with guidance provided by USEPA regarding the modeling of the 1-hour NO_2 standard on the SCRAM website which states:"While the 1-hour NAAQS for NO_2 is defined in terms of the 3-year average for monitored design values to determine attainment of the NAAQS, this definition does not preempt the Appendix W requirement for use of 5 years of NWS data, and the 5-year average serves as an unbiased estimate of the 3-year average for purposes of modeling demonstrations of compliance with the NAAQS." (http://www.epa.gov/scram001/no2_hourly_NAAQS_aermod_02-25-10.pdf)
5. The highest of the average 8th-highest (98th-percentile) concentrations across all receptors represents the modeled 1-hour NO_2 design value based on the form of the standard.
6. The 1-hour average modeled concentrations will be summed with 1-hour average background concentrations on a concurrent hourly basis for the 5-year modeling period. This will be achieved using AECOM's post-processor (as a step between 1 and 2 above) which will also determine the 98th percentile of the total (modeled plus monitored) daily maximum 1-hour values for each model receptor. The highest 98th percentile value will then be compared to the NAAQS for the compliance demonstration. This refined approach incorporates the fact that the maximum hourly modeled project concentrations do not likely occur during the same time period as the highest hourly background concentrations.

The refined analysis pairing the modeled and monitored concentrations on an hourly basis utilized a conservative background data set (5-year data set, 2004-2008, of hourly NO_2 concentrations) provided by MPCA (email from M. Sheffer/MPCA to B. Stormwind/AECOM dated 5/19/10). AECOM understands that this data set was developed from hourly data measured at three monitors in the Minneapolis-St. Paul area; Inver Grove Heights, Rosemont and Anoka Airport. The monitor locations are shown in Figure 3-5. As shown in Figure 3-5, these monitors are located in or on the outskirts of the Twin Cities.

As an additional measure of conservatism, the hourly background concentrations in the MPCA database represent the highest concentration measured by all three monitors for each hour.

Based on the POST-1HR processing a 98th percentile value of 82.2 µg/m_3 was found for the modeled data with no background. With the paired NO_2 background, the 98th percentile result was 123.4 µg/m^3.

AECOM's POST-1HR program code is provided in Attachment C. The POST-1HR input and output files, Fortran code and executable files are included on the modeling archive CD. AECOM understands that MPCA will be verifying the POST-1HR program results with their own post-processor called "PAIRSUMS". PAIRSUMS is currently being reviewed by USEPA Region 5

4.3 Other Criteria Pollutant Model Analysis

For CO and SO_2 (all averaging periods) and annual NO_2, normalized results based on AERMOD output modeling 0.5 g/s for both of the two combustion units has been scaled per stack based on each respective pollutant's emission rate. For the particulate modeling, in addition to the combustion unit, ancillary sources (EU003-EU010, Table 2-2) and fugitive emissions form truck roadways were included. The combustion units were modeled with their actual emissions.

The modeled concentration results for all the criteria pollutants are presented in Table 4-1.

Table 4-1 Modeling Results

Pollutant	Averaging Period	NAAQS (µg/m^3)	SIL (µg/m^3)	Max Impacts (µg/m^3)	Background (µg/m3)	TOTAL Impacts (µg/m^3)	Percent of NAAQS	Impact based on 5-year Max. (unless otherwise noted):
CO	1[a]	40000	2,000	120.20	3565.00	**3685.20**	9.2%	H1H
	8[a]	10000	500	32.53	2760.00	**2792.53**	27.9%	H1H
NO_2	1[b]	188	-	82.20	-	**123.40**	65.6%	98%
	ANN[a]	100	1	5.79	17.00	**22.79**	22.8%	H1H
PM_{10}	24	150	5	18.31	47.00	**65.31**	43.5%	H1H[c]
	ANN	50	1	3.38	27.00	**30.38**	60.8%	H1H
$PM_{2.5}$	24	35	1.2	8.55	26.00	**34.55**	98.7%	5-yr H1H Avg.
	ANN	15	0.3	1.05	10.00	**11.05**	73.6%	H1H
SO_2	1[a]	196		49.29	110.00	**159.29**	81.3%	H1H
	3[a]	1300	25	22.35	86.00	**108.35**	8.3%	H1H
	24[a]	365	5	8.88	34.00	**42.88**	11.7%	H1H
	ANN[a]	80	1	0.56	5.00	**5.56**	7.0%	H1H

[a] Impact derived from normalized results scaled by pollutant specific emissions.

[b] 1-hr NO2 PVMRM runs using MPCA O3 and background NO2 with 10% in-stack thermal conversion

[c] In-lieu of H6H.

Appendix A

Emissions Estimation Spreadsheets

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY DIVISION
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

Permit Application Form EC-01
MSW Combustor UNIT
CALCULATION FORM (CRITERIA POLLUTANTS
5/15/2009

Duplicate this form as necessary, or attach sheets with equivalent information

1) AQ Facility I.D. No.:	05300400		
2) Facility Name:	Covanta Hennepin Energy Resource Company, L.P.		
3) Emissions Unit Identification Number	EU-001		
Emissions Unit Description:	MSW Combustor # 1		
4) Stack/Vent Designation Number:	SV-001		
5) Pollution Control Equipment Identification Number(s)	CE-001 (Activated Carbon Adsorption), CE-003 (Ammonia Injection), CE-005 (Lime Spray Dryer), CE-007 (Fabric Filter - High Temp)		
6) Process Type:	Continuous		
7) Operating Capacity			
MSW Heating Value	5200	**(Btu/lb)**	From Solid Waste Composition Study
Maximum Designed Heat Input:	262,600,000	**(Btu/hr)**	Calculated from heating value and mass throughput
Maximum Waste throughput	606.0	**(Tons/day)**	Facility Permit No. 05300400-003
Maximum Waste throughput	25.25	**(Tons/hr)**	Calculated
8) Projected Actual Capacity			
Operating Hours	8760.0	**(hr)**	Projected Actual
Waste throughput	25.25	**(Tons/hr)**	Projected Actual
Design Exhaust Flow Rate at 171,380 lb/hr steam flow	86722	**(DSCFM)**	
'F' Factor	206072	**(DSCF/Ton)**	Calculated
'F' Factor	5835.3	**(DSCM/Ton)**	Calculated
Average Three Year Oxygen Data (2007-2009)	10.7	**(O2 %V/V dry)**	
Unit Specific Information for Short Term PTE Calculations			
Exhaust Flow Rate at 195,000 lb/hr steam flow rate (NSPS Maximum)	98674	**(DSCFM)**	
Maximum Five Year 'F' Factor	219326	**(DSCF/Ton)**	Based upon Maximum Flow Rate from five year performance test data
Maximum Five Year 'F' Factor	6210.6	**(DSCM/Ton)**	Calculated
Average Three Year Oxygen Data (2007-2009)	10.7	**(O2 %V/V dry)**	

AUXILIARY BURNERS

Maximum Rated Burner Capacity:	0 **(Btu/hr)**	Primary and Secondary Burners @ 1.5 & 2.5 MMBtu/Hr. respectively

NATURAL GAS:

Heat Value:	1050 **(Btu/cf)**		
Maximum Fuel Consumption Rate	0 **(CF/hr)**		
Average two year Natural Gas Throughput:	0.00 **(CF/hr)**	0 **(CF/yr)**	From Facility Records

LPG:

Fuel Parameters:	0.02% **%-Sulfur**	**Per MPCA Form EC-02, Note 7.**	
Heat Value:	91500.00 **(BTU/gallon)**		
Average Two Year Propane Consumption Rate:	0.00 **(Gallons/hr)**	0 **(Gallons/yr)**	From Facility Records

BASIS FOR LIMITED & ACTUAL PM EMISSIONS

Limited Controlled PM Emissions Concentration	0.0200	**Gr/DSCF** Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	0.0147	**Gr/DSCF** Uncorrected (adjusted for O2 concentration)
Projected Actual PM Emissions Concentration	0.0047	**Gr/DSCF** Corrected to 7% Oxygen - average of five year performance tests
	0.0034	**Gr/DSCF** Uncorrected (adjusted for O2 concentration)
Facility Wide PM Emissions Limitation	90	**Tons/year** Combustor PTE Limitation for both Units (calculated by difference)
	45	**Tons/year** Combustor PTE limitation for this unit (calculated @ 1/2 above)
Limited Controlled PM Front Half Emissions Concentration (ton/yr	0.0120	**Gr/DSCF** Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	0.0088	**Gr/DSCF** Uncorrected (adjusted for O2 concentration)
Limited Controlled PM Front Half Emissions Concentration (lb/hr)	25.0	**mg/dscm** Corrected to 7% Oxygen per MR 7011.1227, NSPS Subpart Cb
Projected Actual PM Front Half Emissions Concentration	0.0021	**Gr/DSCF** Corrected to 7% Oxygen - average of five year performance tests
	0.0015	**Gr/DSCF** Uncorrected (adjusted for O2 concentration)
Limited Controlled PM Back Half Emissions Concentration	0.0080	**Gr/DSCF** Corrected to 7% Oxygen Back half is assumed to be 0.008 gr/dscf (0.02 gr/dscf - 0.012 gr/dscf)
	0.0059	**Gr/DSCF** Uncorrected (adjusted for O2 concentration)
Projected Actual PM Back Half Emissions Concentration	0.0026	**Gr/DSCF** Corrected to 7% Oxygen - Back half is assumed to be total minus front half
	0.0019	**Gr/DSCF** Uncorrected (adjusted for O2 concentration)

BASIS FOR LIMITED & ACTUAL SO_2 EMISSIONS

Limited Controlled SO2 Emissions Concentration	29.000	**ppm** Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	21.321	**ppm** Uncorrected (adjusted for O2 concentration)
Projected Actual Controlled SOx Emissions Concentration	5.200	**ppm** Corrected to 7% Oxygen - average of five year CEM Data
	3.823	**ppm** Uncorrected (adjusted for facility's average five year oxygen concentration)
Facility Wide SOx Emissions Limitation	99.9	**Tons/year** Facility wide PTE limitation
	49.95	**Tons/year** Combustor PTE limitation for this unit (calculated @ 1/2 above)

BASIS FOR LIMITED NOx & ACTUAL EMISSIONS

Limited Controlled NOx Emissions Concentration	205.000	**ppmv** Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-002
	150.718	**ppmv** Uncorrected (adjusted for P. Torkelson 02 concentration from 1995 permit)
Facility Wide NOx Emissions Limitation	225.0	**Tons/year** Combustor PTE limitation for this unit (calculated @ 1/2 550 Tons/year)

BASIS FOR LIMITED & ACTUAL VOC EMISSIONS

Limited Controlled VOC Emissions Concentration	3.000	**pounds/hour as C** per Air Permit No. 05300400-003
Projected Actual VOC Emissions Concentration	0.361	**pounds/hour as C** average of five year performance tests

BASIS FOR LIMITED & ACTUAL CO EMISSIONS

Limited Controlled CO Emissions Concentration	100.000	**ppm** Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	73.521	**ppm** Uncorrected (adjusted for O2 concentration)
Projected Actual Controlled CO Emissions Concentration	34.180	**ppm** Corrected to 7% Oxygen - average of five year CEM data
	25.130	**ppm** Uncorrected (adjusted for facility's average five year oxygen concentration)

BASIS FOR LIMITED & ACTUAL LEAD EMISSIONS		
Limited Controlled Lead Emissions Concentration (ton/yr	300.000	**micrograms/DSCM** Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	220.564	**micrograms/DSCM** Uncorrected (adjusted for O2 concentration)
Limited Controlled Lead Emissions Concentration (lb/hr)	400.000	**micrograms/DSCM** Corrected to 7% Oxygen per MR 7011.1227 & NSPS Cb Limit
	294.085	**micrograms/DSCM** Uncorrected (adjusted for O2 concentration)
Projected Actual Controlled Lead Emissions Concentration	9.773	**micrograms/DSCM** Corrected to 7% Oxygen - average of five year performance tests
	7.185	**micrograms/DSCM** Uncorrected (adjusted for facility's average five year oxygen concentration)
BASIS FOR LIMITED & ACTUAL DIOXIN/FURAN EMISSIONS		
Limited Controlled DF Emissions Concentration (ton/yr	3.14E-05	**ton/year based on** 30 ng/dscm Corrected to 7% Oxygen at design flow rate
Limited Controlled DF Emissions Concentration (lb/hr)	7.16E-06	**lb/hr** based on 30 ng/dscm corrected to 7% Oxygen at design flow rate
	8.15E-06	**lb/hr** Short term Total DF Emission Rate based on 30 ng/dscm Corrected to 7% Oxygen at maximum flow rate
Projected Actual Controlled DF Emissions Concentration	6.14E-06	**lb/hr** Annual average Total DF Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
BASIS FOR LIMITED & ACTUAL H_2SO_4 EMISSIONS		
Limited Controlled H_2SO_4 Emissions Concentration (ton/yr)	1.39E-03	**lb/hr** Annual average H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
Limited Controlled H_2SO_4 Emissions Concentration (lb/hr)	1.39E-03	**lb/hr** Annual average H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
	7.14E-03	**lb/hr** Short term H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
Projected Actual Controlled H_2SO_4 Emissions Concentration	1.39E-03	**lb/hr** Annual average H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
BASIS FOR LIMITED & ACTUAL Arsenic EMISSIONS		
Limited Controlled Arsenic Emissions Concentration (ton/yr	1.04E-03	**lb/hr** Annual average Arsenic Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Arsenic Emissions Concentration (lb/hr)	1.04E-03	**lb/hr** Annual average Arsenic Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	1.18E-03	**lb/hr** Short term Arsenic Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Arsenic Emissions Concentration	1.04E-03	**lb/hr** Annual average Arsenic Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
BASIS FOR LIMITED & ACTUAL Cadmium EMISSIONS		
Limited Controlled Cadmium Emissions Concentration (ton/yr	8.36E-03	**lb/hr** Annual average Cadmium Emission Rate Based on NSPS Cb Limit of 35 ug/DSCM and Design Steam Flow Rates
Limited Controlled Cadmium Emissions Concentration (lb/hr	8.36E-03	**lb/hr** Annual average Cadmium Emission Rate Based on NSPS Cb Limit of 35 ug/DSCM and Design Steam Flow Rates
	9.51E-03	**lb/hr** Short term Cadmium Emission Rate Based on NSPS Cb Limit of 35 ug/DSCM and Short Term Steam Flow Rates
Projected Actual Controlled Cadmium Emissions Concentration	1.61E-04	**lb/hr** Annual average Cadmium Emission Rate Based on 2009 emissions and ratio of design fuel use capacity to 2009 fuel use.
BASIS FOR LIMITED & ACTUAL Chromium EMISSIONS		
Limited Controlled Chromium Emissions Concentration (ton/yr	2.13E-03	**lb/hr** Annual average Chromium Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Chromium Emissions Concentration (lb/hr	2.13E-03	**lb/hr** Annual average Chromium Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	2.42E-03	**lb/hr** Short term Chromium Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Chromium Emissions Concentration	2.13E-03	**lb/hr** Annual average Chromium Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
BASIS FOR LIMITED & ACTUAL Mercury EMISSIONS		
Limited Controlled Mercury Emissions Concentration (ton/yr	3.58E-03	**lb/hr** Annual average Mercury Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Mercury Emissions Concentration (lb/hr)	3.58E-03	**lb/hr** Annual average Mercury Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	4.08E-03	**lb/hr** Short term Mercury Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Mercury Emissions Concentration	3.58E-03	**lb/hr** Annual average Mercury Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
BASIS FOR LIMITED & ACTUAL Nickel EMISSIONS		
Limited Controlled Nickel Emissions Concentration (ton/yr)	1.86E-03	**lb/hr** Annual average Nickel Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Nickel Emissions Concentration (lb/hr)	1.86E-03	**lb/hr** Annual average Nickel Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	2.12E-03	**lb/hr** Short term Nickel Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Nickel Emissions Concentration	1.86E-03	**lb/hr** Annual average Nickel Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
BASIS FOR LIMITED & ACTUAL Hydrochloric acid EMISSIONS		
Limited Controlled Hydrochloric acid Emissions Concentration (ton/yr	1.03E+01	**lb/hr** Annual average Hydrochloric acid Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Hydrochloric acid Emissions Concentration (lb/hr	1.03E+01	**lb/hr** Annual average Hydrochloric acid Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	1.17E+01	**lb/hr** Short term Hydrochloric acid Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Hydrochloric acid Emissions Concentration	7.38E+00	**lb/hr** Annual average Hydrochloric acid Emission Rate Based on 2009 emissions and ratio of design fuel use capacity to 2009 fuel use.

9) Calculations Summary

Pollutant Name	Design Controlled Emissions	Maximum Controlled Emissions	Projected Actual Controlled Emissions	Maximum Short Term Controlled Emissions
	lb/hr	(Tons/Yr)	(Tons/Yr)	lb/hr
Total PM	10.9	45.0	11.1	12.4
PM front half	6.6	NA	NA	7.5
PM back half	4.4	NA	NA	5.0
PM10	10.9	45.0	11.1	12.4
PM2.5	10.9	45.0	11.1	12.4
SOx	11.4	49.95	14.47	13.0
NOx	93.6	225.0	225.0	106.5
VOC	3.0	13.1	1.6	3.0
CO	27.8	121.8	41.6	31.6
Lead	0.096	0.418	0.010	0.109
Dioxin/Furan	7.16E-06	3.14E-05	2.69E-05	8.15E-06
H_2SO_4	1.39E-03	6.07E-03	6.07E-03	7.14E-03
Arsenic	1.04E-03	4.54E-03	4.54E-03	1.18E-03
Cadmium	8.36E-03	3.66E-02	1.61E-04	9.51E-03
Chromium	2.13E-03	9.31E-03	9.31E-03	2.42E-03
Mercury	3.58E-03	1.57E-02	1.57E-02	4.08E-03
Nickel	1.86E-03	8.15E-03	8.15E-03	2.12E-03
HCl	1.03E+01	4.52E+01	3.23E+01	1.17E+01

Comments:

Annual emission rate is based on exhaust flow rate at the design steam flow rate of 171,380 lb/hr per unit.
Short term emission rate is based on exhaust flow at NSPS regulatory steam flow limit of 195,000 lb/hr (10% above most recent compliant performance test)

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY DIVISION
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

Permit Application Form EC-01
MSW Combustor UNIT
CALCULATION FORM (CRITERIA POLLUTANTS
5/15/2009

Duplicate this form as necessary, or attach sheets with equivalent information

1) AQ Facility I.D. No.:	05300400		
2) Facility Name:	Covanta Hennepin Energy Resource Company, L.P.		
3) Emissions Unit Identification Number	EU-001		
Emissions Unit Description:	MSW Combustor # 2		
4) Stack/Vent Designation Number:	SV-002		
5) Pollution Control Equipment Identification Number(s)	CE-001 (Activated Carbon Adsorption), CE-003 (Ammonia Injection), CE-005 (Lime Spray Dryer), CE-007 (Fabric Filter - High Temp)		
6) Process Type:	Continuous		
7) Operating Capacity			
MSW Heating Value	5200	**(Btu/lb)**	From Solid Waste Composition Study
Maximum Designed Heat Input:	262,600,000	**(Btu/hr)**	Calculated from heating value and mass throughput
Maximum Waste throughput	606.0	**(Tons/day)**	Facility Permit No. 05300400-003
Maximum Waste throughput	25.25	**(Tons/hr)**	Calculated
8) Projected Actual Capacity			
Operating Hours	8760.0	**(hr)**	Projected Actual
Waste throughput	25.25	**(Tons/hr)**	Projected Actual
Design Exhaust Flow Rate at 171,380 lb/hr steam flow	86722	**(DSCFM)**	
'F' Factor	206072	**(DSCF/Ton)**	Calculated
'F' Factor	5835.3	**(DSCM/Ton)**	Calculated
Average Three Year Oxygen Data (2007-2009)	10.7	**(O2 %V/V dry)**	
Unit Specific Information for Short Term PTE Calculations			
Exhaust Flow Rate at 195,000 lb/hr steam flow rate (NSPS Maximum)	98674	**(DSCFM)**	
Maximum Five Year 'F' Factor	219326	**(DSCF/Ton)**	Based upon Maximum Flow Rate from five year performance test data
Maximum Five Year 'F' Factor	6210.6	**(DSCM/Ton)**	Calculated
Average Three Year Oxygen Data (2007-2009)	10.7	**(O2 %V/V dry)**	

AUXILIARY BURNERS

Maximum Rated Burner Capacity:	0	**(Btu/hr)**	Primary and Secondary Burners @ 1.5 & 2.5 MMBtu/Hr. respectively	
NATURAL GAS:				
Heat Value:	1050	**(Btu/cf)**		
Maximum Fuel Consumption Rate	0	**(CF/hr)**		
Average two year Natural Gas Throughput:	0.00	**(CF/hr)**	0 **(CF/yr)**	From Facility Records
LPG:				
Fuel Parameters:	0.02%	**%-Sulfur**	**Per MPCA Form EC-02, Note 7.**	
Heat Value:	91500.00	**(BTU/gallon)**		
Average Two Year Propane Consumption Rate:	0.00	**(Gallons/hr)**	0 **(Gallons/yr)**	From Facility Records

BASIS FOR LIMITED & ACTUAL PM EMISSIONS

Limited Controlled PM Emissions Concentration	0.0200	**Gr/DSCF**	Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	0.0147	**Gr/DSCF**	Uncorrected (adjusted for O2 concentration)
Projected Actual PM Emissions Concentration	0.0047	**Gr/DSCF**	Corrected to 7% Oxygen - average of five year performance tests
	0.0034	**Gr/DSCF**	Uncorrected (adjusted for O2 concentration)
Facility Wide PM Emissions Limitation	90	**Tons/year**	Combustor PTE Limitation for both Units (calculated by difference)
	45	**Tons/year**	Combustor PTE limitation for this unit (calculated @ 1/2 above)
Limited Controlled PM Front Half Emissions Concentration (ton/yr	0.0120	**Gr/DSCF**	Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	0.0088	**Gr/DSCF**	Uncorrected (adjusted for O2 concentration)
Limited Controlled PM Front Half Emissions Concentration (lb/hr)	25.0	**mg/dscm**	Corrected to 7% Oxygen per MR 7011.1227, NSPS Subpart Cb
Projected Actual PM Front Half Emissions Concentration	0.0021	**Gr/DSCF**	Corrected to 7% Oxygen - average of five year performance tests
	0.0015	**Gr/DSCF**	Uncorrected (adjusted for O2 concentration)
Limited Controlled PM Back Half Emissions Concentration	0.0080	**Gr/DSCF**	Corrected to 7% Oxygen Back half is assumed to be 0.008 gr/dscf (0.02 gr/dscf - 0.012 gr/dscf)
	0.0059	**Gr/DSCF**	Uncorrected (adjusted for O2 concentration)
Projected Actual PM Back Half Emissions Concentration	0.0026	**Gr/DSCF**	Corrected to 7% Oxygen - Back half is assumed to be total minus front half
	0.0019	**Gr/DSCF**	Uncorrected (adjusted for O2 concentration)

BASIS FOR LIMITED & ACTUAL SO_2 EMISSIONS

Limited Controlled SO2 Emissions Concentration	29.000	**ppm**	Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	21.321	**ppm**	Uncorrected (adjusted for O2 concentration)
Projected Actual Controlled SOx Emissions Concentration	5.200	**ppm**	Corrected to 7% Oxygen - average of five year CEM Data
	3.823	**ppm**	Uncorrected (adjusted for facility's average five year oxygen concentration)
Facility Wide SOx Emissions Limitation	99.9	**Tons/year**	Facility wide PTE limitation
	49.95	**Tons/year**	Combustor PTE limitation for this unit (calculated @ 1/2 above)

BASIS FOR LIMITED NOx & ACTUAL EMISSIONS

Limited Controlled NOx Emissions Concentration	205.000	**ppmv**	Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-002
	150.718	**ppmv**	Uncorrected (adjusted for P. Torkelson 02 concentration from 1995 permit)
Facility Wide NOx Emissions Limitation	225.0	**Tons/year**	Combustor PTE limitation for this unit (calculated @ 1/2 550 Tons/year)

BASIS FOR LIMITED & ACTUAL VOC EMISSIONS

Limited Controlled VOC Emissions Concentration	3.000	**pounds/hour as C**	per Air Permit No. 05300400-003
Projected Actual VOC Emissions Concentration	0.361	**pounds/hour as C**	average of five year performance tests

BASIS FOR LIMITED & ACTUAL CO EMISSIONS

Limited Controlled CO Emissions Concentration	100.000	**ppm**	Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	73.521	**ppm**	Uncorrected (adjusted for O2 concentration)
Projected Actual Controlled CO Emissions Concentration	34.180	**ppm**	Corrected to 7% Oxygen - average of five year CEM data
	25.130	**ppm**	Uncorrected (adjusted for facility's average five year oxygen concentration)

BASIS FOR LIMITED & ACTUAL LEAD EMISSIONS

Limited Controlled Lead Emissions Concentration (ton/yr	300.000	micrograms/DSCM	Corrected to 7% Oxygen per MR 7011.1227, Table 1 & Air Permit No. 05300400-003
	220.564	micrograms/DSCM	Uncorrected (adjusted for O2 concentration)
Limited Controlled Lead Emissions Concentration (lb/hr)	400.000	micrograms/DSCM	Corrected to 7% Oxygen per MR 7011.1227 & NSPS Cb Limit
	294.085	micrograms/DSCM	Uncorrected (adjusted for O2 concentration)
Projected Actual Controlled Lead Emissions Concentration	9.773	micrograms/DSCM	Corrected to 7% Oxygen - average of five year performance tests
	7.185	micrograms/DSCM	Uncorrected (adjusted for facility's average five year oxygen concentration)

BASIS FOR LIMITED & ACTUAL DIOXIN/FURAN EMISSIONS

Limited Controlled DF Emissions Concentration (ton/yr	3.14E-05	ton/year based on	30 ng/dscm Corrected to 7% Oxygen at design flow rate
Limited Controlled DF Emissions Concentration (lb/hr)	7.16E-06	lb/hr	based on 30 ng/dscm corrected to 7% Oxygen at design flow rate
	8.15E-06	lb/hr	Short term Total DF Emission Rate based on 30 ng/dscm Corrected to 7% Oxygen at maximum flow rate
Projected Actual Controlled DF Emissions Concentration	6.14E-06	lb/hr	Annual average Total DF Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen

BASIS FOR LIMITED & ACTUAL H_2SO_4 EMISSIONS

Limited Controlled H_2SO_4 Emissions Concentration (ton/yr)	1.39E-03	lb/hr	Annual average H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
Limited Controlled H_2SO_4 Emissions Concentration (lb/hr)	1.39E-03	lb/hr	Annual average H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
	7.14E-03	lb/hr	Short term H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen
Projected Actual Controlled H_2SO_4 Emissions Concentration	1.39E-03	lb/hr	Annual average H_2SO_4 Emission Rate from 2007, 2008 and 2009 Stack Test Data Corrected to 7% Oxygen

BASIS FOR LIMITED & ACTUAL Arsenic EMISSIONS

Limited Controlled Arsenic Emissions Concentration (ton/yr	1.04E-03	lb/hr	Annual average Arsenic Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Arsenic Emissions Concentration (lb/hr)	1.04E-03	lb/hr	Annual average Arsenic Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	1.18E-03	lb/hr	Short term Arsenic Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Arsenic Emissions Concentration	1.04E-03	lb/hr	Annual average Arsenic Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)

BASIS FOR LIMITED & ACTUAL Cadmium EMISSIONS

Limited Controlled Cadmium Emissions Concentration (ton/yr	8.36E-03	lb/hr	Annual average Cadmium Emission Rate Based on NSPS Cb Limit of 35 ug/DSCM and Design Steam Flow Rates
Limited Controlled Cadmium Emissions Concentration (lb/hr	8.36E-03	lb/hr	Annual average Cadmium Emission Rate Based on NSPS Cb Limit of 35 ug/DSCM and Design Steam Flow Rates
	9.51E-03	lb/hr	Short term Cadmium Emission Rate Based on NSPS Cb Limit of 35 ug/DSCM and Short Term Steam Flow Rates
Projected Actual Controlled Cadmium Emissions Concentration	1.61E-04	lb/hr	Annual average Cadmium Emission Rate Based on 2009 emissions and ratio of design fuel use capacity to 2009 fuel use.

BASIS FOR LIMITED & ACTUAL Chromium EMISSIONS

Limited Controlled Chromium Emissions Concentration (ton/yr	2.13E-03	lb/hr	Annual average Chromium Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Chromium Emissions Concentration (lb/hr	2.13E-03	lb/hr	Annual average Chromium Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	2.42E-03	lb/hr	Short term Chromium Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Chromium Emissions Concentration	2.13E-03	lb/hr	Annual average Chromium Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)

BASIS FOR LIMITED & ACTUAL Mercury EMISSIONS

Limited Controlled Mercury Emissions Concentration (ton/yr	3.58E-03	lb/hr	Annual average Mercury Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Mercury Emissions Concentration (lb/hr)	3.58E-03	lb/hr	Annual average Mercury Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	4.08E-03	lb/hr	Short term Mercury Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Mercury Emissions Concentration	3.58E-03	lb/hr	Annual average Mercury Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)

BASIS FOR LIMITED & ACTUAL Nickel EMISSIONS

Limited Controlled Nickel Emissions Concentration (ton/yr	1.86E-03	lb/hr	Annual average Nickel Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Nickel Emissions Concentration (lb/hr)	1.86E-03	lb/hr	Annual average Nickel Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	2.12E-03	lb/hr	Short term Nickel Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Nickel Emissions Concentration	1.86E-03	lb/hr	Annual average Nickel Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)

BASIS FOR LIMITED & ACTUAL Hydrochloric acid EMISSIONS

Limited Controlled Hydrochloric acid Emissions Concentration (ton/yr	1.03E+01	lb/hr	Annual average Hydrochloric acid Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
Limited Controlled Hydrochloric acid Emissions Concentration (lb/hr	1.03E+01	lb/hr	Annual average Hydrochloric acid Emission Rate Estimated from MPCA Data (From 2705300400_emis.xls)
	1.17E+01	lb/hr	Short term Hydrochloric acid Emission Rate is Annual Average Emission Rate Increased by Ratio of Annual and Short Term Flow Rates
Projected Actual Controlled Hydrochloric acid Emissions Concentration	7.38E+00	lb/hr	Annual average Hydrochloric acid Emission Rate Based on 2009 emissions and ratio of design fuel use capacity to 2009 fuel use.

9) Calculations Summary

Pollutant Name	Design Controlled Emissions	Maximum Controlled Emissions	Projected Actual Controlled Emissions	Maximum Short Term Controlled Emissions
	lb/hr	(Tons/Yr)	(Tons/Yr)	lb/hr
Total PM	10.9	45.0	11.1	12.4
PM front half	6.6	NA	NA	7.5
PM back half	4.4	NA	NA	5.0
PM10	10.9	45.0	11.1	12.4
PM2.5	10.9	45.0	11.1	12.4
SOx	11.4	49.95	14.47	13.0
NOx	93.6	225.0	225.0	106.5
VOC	3.0	13.1	1.6	3.0
CO	27.8	121.8	41.6	31.6
Lead	0.096	0.418	0.010	0.109
Dioxin/Furan	7.16E-06	3.14E-05	2.69E-05	8.15E-06
H_2SO_4	1.39E-03	6.07E-03	6.07E-03	7.14E-03
Arsenic	1.04E-03	4.54E-03	4.54E-03	1.18E-03
Cadmium	8.36E-03	3.66E-02	1.61E-04	9.51E-03
Chromium	2.13E-03	9.31E-03	9.31E-03	2.42E-03
Mercury	3.58E-03	1.57E-02	1.57E-02	4.08E-03
Nickel	1.86E-03	8.15E-03	8.15E-03	2.12E-03
HCl	1.03E+01	4.52E+01	3.23E+01	1.17E+01

Comments:

Annual emission rate is based on exhaust flow rate at the design steam flow rate of 171,380 lb/hr per unit.
Short term emission rate is based on exhaust flow at NSPS regulatory steam flow limit of 195,000 lb/hr (10% above most recent compliant performance test)

MINNESOTA POLLUTION CONTROL AGENCY
AIR QUALITY
520 LAFAYETTE ROAD
ST. PAUL, MN 55155-4194

Permit Application Form EC-01
GENERAL EMISSIONS
CALCULATION FORM
11/19/2010

- Duplicate this form as necessary, or attach sheets with equivalent information.

AQ Facility ID No.: 05300400
Facility Name: Covanta Hennepin Energy Resource Company, L.P.
Emissions Unit Identification Number: EU-003
Emissions Unit Description: Lime Silo - Pebble Lime
Stack/Vent Designation Number: SV-003
Control Equipment ID No(s): CE-009
Control Equipment Description: Fabric Filter - Low Temp
Process Type: Batch
Operating Capacity: 19447.2 (Tons/yr)
Source of Emission Factors: Fire Database SCC Code 30501615 (PM) & 30501610 (PM10)
Projected Actual Annual Throughput: 7,229 (Tons/yr) Maximum MSW throughput of 442,380 tons times the highest pebble lime throughput/MSW throughput since 1999 (year 2001)

Calculations Summary - Lime Silo - Pebble Lime

Pollutant	Emission Factors FIRE	Emissions Factor Units	Emissions Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Maximum Controlled Emissions lb/hr	Maximum Controlled Emissions (tons/yr)	Limited Controlled Emissions (tons/yr)	Projected Actual Controlled Emissions (tons/yr)
PM	2.2000000	(Lbs/ton)	4.88	21.4	8.0	99.00%	0.05	0.2	0.2	0.1
PM10	1.4000000	(Lbs/ton)	3.11	13.6	5.1	99.00%	0.03	0.1	0.1	0.1
PM2.5	1.4000000	(Lbs/ton)	3.11	13.6	5.1	99.00%	0.03	0.1	0.1	0.1
SOx	0.0000000					0.00%				
NOx	0.0000000					0.00%				
VOC	0.0000000					0.00%				
CO	0.0000000					0.00%				
Lead	0.0000000					0.00%				

Operating Limitations, if applicable:
Continuous operation of baghouse while filling silo. See Form CD-01.

MINNESOTA POLLUTION CONTROL AGENCY
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Permit Application Form EC-01
GENERAL EMISSIONS
CALCULATION FORM
11/19/2010

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AQ Facility ID No.:	05300400	
Facility Name:	Covanta Hennepin Energy Resource Company, L.P.	
Emissions Unit Identification Number:	EU-004	
Emissions Unit Description:	Fly Ash Silo	
Stack/Vent Designation Number:	SV-004	
Control Equipment ID No(s):	CE-010	
Control Equipment Description:	Fabric Filter - Low Temp	
Process Type:	Continuous	
Operating Capacity:		
Rated Incinerator Capacity:	1,212	(Tons/day)
	442,380	(Tons/yr)
Projected Actual Combined Ash Generation:	26.71%	(% MSW Throughput) Highest ash throughput/MSW throughput since 1999 (year 2001)
Projected Actual Combined Ash Capacity:	118,173	(Tons/yr)
Fly Ash Generation:	20.00%	(% Combined Ash) From Current Air Emission Inventory Estimation
Fly Ash Capacity:	23,635	(Tons/yr)
Source of Emission Factors:	Fire Database SCC Code 30501008	
Projected Actual Annual Throughput:	23,635	(Tons/yr)

Calculations Summary - Fly Ash Silo

Pollutant	Emission Factors FIRE	Emissions Factor Units	Emissions Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Maximum Controlled Emissions lb/hr	Maximum Controlled Emissions (tons/yr)	Limited Controlled Emissions (tons/yr)	Projected Actual Controlled Emissions (tons/yr)
PM	0.0200000	(Lbs/ton)	0.05	0.2	0.2	99%	0.0005	0.002	0.002	0.002
PM10	0.0060000	(Lbs/ton)	0.02	0.1	0.1	99%	0.0002	0.001	0.001	0.001
PM2.5	0.0060000	(Lbs/ton)	0.02	0.1	0.1	99%	0.0002	0.001	0.001	0.001
SOx	0.0000000					0%				
NOx	0.0000000					0%				
VOC	0.0000000					0%				
CO	0.0000000					0%				
Lead	0.0000000					0%				

Operating Limitations, if applicable:
Continuous operation of baghouse while filling silo. See Form CD-01.

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AQ Facility ID No.:	05300400
Facility Name:	Covanta Hennepin Energy Resource Company, L.P.
Emissions Unit Identification Number:	EU-005
Emissions Unit Description:	Lime Silo - Dolomitic Lime
Stack/Vent Designation Number:	SV-005
Control Equipment ID No(s):	CE-011
Control Equipment Description:	Fabric Filter - Low Temp
Process Type:	Batch
Operating Capacity:	59655.6 (Tons/yr)
Source of Emission Factors:	Fire Database SCC Code 30501615 (PM) & 30501610 (PM10)
Projected Actual Annual Throughput:	1,233 (Tons/yr) Maximum MSW throughput of 442,380 tons times the highest dolomiyiv lime throughput/MSW throughput since 1999 (year 2000)

Calculations Summary - Lime Silo - Dolomitic Lime

Pollutant	Emission Factors FIRE	Emissions Factor Units	Emissions Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Maximum Controlled Emissions lb/hr	Maximum Controlled Emissions (tons/yr)	Limited Controlled Emissions (tons/yr)	Projected Actual Controlled Emissions (tons/yr)
PM	2.2000000	(Lbs/ton)	14.98	65.6	1.4	99%	0.15	0.7	0.7	0.01
PM10	1.4000000	(Lbs/ton)	9.53	41.8	0.9	99%	0.10	0.4	0.4	0.01
PM2.5	1.4000000	(Lbs/ton)	9.53	41.8	0.9	99%	0.10	0.4	0.4	0.01
SOx	0.0000000					0%				
NOx	0.0000000					0%				
VOC	0.0000000					0%				
CO	0.0000000					0%				
Lead	0.0000000					0%				

Operating Limitations, if applicable:
Continuous operation of baghouse while filling silo. See Form CD-01.

MINNESOTA POLLUTION CONTROL AGENCY
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Permit Application Form EC-01
GENERAL EMISSIONS
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11/19/2010

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AQ Facility ID No.:	05300400
Facility Name:	Covanta Hennepin Energy Resource Company, L.P.
Emissions Unit Identification Number:	EU-006
Emissions Unit Description:	Activated Carbon Silo
Stack/Vent Designation Number:	SV-006
Control Equipment ID No(s):	CE-012
Control Equipment Description:	Fabric Filter - Low Temp
Process Type:	Batch
Operating Capacity:	350.4 (Tons/yr)
Source of Emission Factors:	Fire Database SCC Code 30501008
Projected Actual Annual Throughput:	350.4 (Tons/yr)

Calculations Summary - Activated Carbon Silo

Pollutant	Emission Factors FIRE	Emissions Factor Units	Emissions Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Maximum Controlled Emissions lb/hr	Maximum Controlled Emissions (tons/yr)	Limited Controlled Emissions (tons/yr)	Projected Actual Controlled Emissions (tons/yr)
PM	0.0200000	(Lbs/ton)	0.0008	0.004	0.004	99%	8.00E-06	3.5E-05	3.5E-05	3.5E-05
PM10	0.0060000	(Lbs/ton)	0.0002	0.001	0.001	99%	2.40E-06	1.1E-05	1.1E-05	1.1E-05
PM10	0.0060000	(Lbs/ton)	0.0002	0.001	0.001	99%	2.40E-06	1.1E-05	1.1E-05	1.1E-05
SOx	0.0000000					0%				
NOx	0.0000000					0%				
VOC	0.0000000					0%				
CO	0.0000000					0%				
Lead	0.0000000					0%				

Operating Limitations, if applicable:
Continuous operation of baghouse while filling silo. See Form CD-01.

MINNESOTA POLLUTION CONTROL AGENCY
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Permit Application Form EC-01
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11/19/2010

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AQ Facility ID No.:	05300400	
Facility Name:	Covanta Hennepin Energy Resource Company, L.P	
Emissions Unit Identification Number:	EU-007	
Emissions Unit Description:	Combined Ash Handling	
Stack/Vent Designation Number:	SV-007	
Control Equipment ID No(s):	CE-013	
Control Equipment Description:	Moisture Content of Material, 6% or more	
Process Type:	Continuous	
Operating Capacity:		
Rated Incinerator Capacity:	1,212	(Tons/day)
	442,380	(Tons/yr)
Combined Ash Generation:	26.71%	(% MSW Throughput) Highest ash throughput/MSW throughput since 1999 (year 2001)
Combined Ash Capacity:	118,173	(Tons/yr)
Bottom Ash Generation:	80.00%	(% Combined Ash) From Current Air Emission Inventory Estimation
Bottom Ash Capacity:	94,538	(Tons/yr)
Fly Ash Generation:	20.00%	(% Combined Ash) From Current Air Emission Inventory Estimation
Fly Ash Capacity:	23,635	(Tons/yr)
Source of Emission Factors:	Fire Database SCC Code 30501008	
Projected Actual Annual Throughput:	118,173	(Tons/yr)

Calculations Summary - Combined Ash Processing

Pollutant	Emission Factors FIRE	Emissions Factor Units	Emissions Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Maximum Controlled Emissions lb/hr	Maximum Controlled Emissions (tons/yr)	Limited Controlled Emissions (tons/yr)	Projected Actual Controlled Emissions (tons/yr)
PM	0.0200000	(Lbs/ton)	0.06	0.2	0.2	99.00%	5.61E-04	1.2E-02	1.2E-02	1.2E-02
PM10	0.0060000	(Lbs/ton)	0.02	0.1	0.1	99.00%	1.68E-04	3.5E-03	3.5E-03	3.5E-03
PM2.5	0.0060000	(Lbs/ton)	0.02	0.1	0.1	99.00%	1.68E-04	3.5E-03	3.5E-03	3.5E-03
SOx	0.0000000					0.00%				
NOx	0.0000000					0.00%				
VOC	0.0000000					0.00%				
CO	0.0000000					0.00%				
Lead	0.0000000					0.00%				

Operating Limitations, if applicable:
Maintain moisture content of material at 6% or more. See Form CD-01.

Note: The bottom ash passes through a water seal before being discharged onto the residue conveyor. This is inherant to the design and operation of the incinerator units. Therefore, the Maximum Uncontrolled Emissions and Actual Uncontrolled Emissions were calculated using a Pollution Control Efficiency of 99% for the bottom ash and a Pollution Control Efficiency of 0% for the fly ash. The Maximum Controlled Emissions, Limited Controlled emissions, and the Actual Controlled Emissions were calculated using a Pollution Control Efficiency of 99% for both the bottom ash and fly ash.

MINNESOTA POLLUTION CONTROL AGENCY
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ST. PAUL, MN 55155-4194

Permit Application Form EC-01
GENERAL EMISSIONS
CALCULATION FORM
11/19/2010

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AQ Facility ID No.:	05300400		
Facility Name:	Covanta Hennepin Energy Resource Company, L.P.		
Emissions Unit Identification Number:	EU-008		
Emissions Unit Description:	Cooling Tower		
Stack/Vent Designation Number:	SV-008, SV-009 & SV-010		
Control Equipment:	N/A		
Control Equipment Description:	N/A		
Process Type:	Continuous		
Cooling Tower Type:	Induced Draft Counterflow Tower		
Total Liquid Drift:	0.001%	% Circulating Water Flow; Brentwood Mfg. Specification	
Total Dissolved Solids (TDS):	1,500	(ppm)	From Cooling Water Analysis
PM to PM10 ratio:	70%	% Drift PM	California SCAQMD CEIDARS Table
PM to PM2.5 ratio	42%	% Drift PM	California SCAQMD CEIDARS Table
Circulating Water Flow:	27,900	(Gal/min)	Supplied by HERC
2 Year Average Actual Annual Throughput:	18,600	(Gal/min)	Operated as Induced Draft Counterflow Tower 8 Months/yr; Supplied by HERC

Calculations Summary - Cooling Tower

Pollutant	Emission Factors AP-42, 13.4	Emissions Factor Units	Emissions Rate (lbs/hr)	Maximum Uncontrolled Emissions (tons/yr)	Actual Uncontrolled Emissions (tons/yr)	Pollution Control Efficiency (%)	Maximum Controlled Emissions (tons/yr)	Limited Controlled Emissions (tons/yr)	Projected Actual Controlled Emissions (tons/yr)
PM	0.0001251	(Lbs/1000 gal)	0.21	0.9	0.6	0.00%	0.9	0.9	0.6
PM10	0.0000876	(Lbs/1000 gal)	0.15	0.6	0.4	0.00%	0.6	0.6	0.4
PM2.5	0.0000525	(Lbs/1000 gal)	0.09	0.4	0.3	0.00%	0.4	0.4	0.3
SOx	0.0000000					0.00%			
NOx	0.0000000					0.00%			
VOC	0.0000000					0.00%			
CO	0.0000000					0.00%			
Lead	0.0000000					0.00%			

Operating Limitations, if applicable:
None

Appendix B

GEP Analysis

Building Downwash

The analysis used to evaluate the potential for building downwash is referred to as a physical "Good Engineering Practice" ("GEP") stack height analysis. Stacks with heights below physical GEP are considered to be subject to building downwash.

A GEP stack height analysis was performed in accordance with US EPA's guidelines (US EPA, 1985). Per the guidelines, the physical GEP height ("H_{GEP}") is determined from the dimensions of all buildings which are within the region of influence using the following equation:

$$H_{GEP} = H + 1.5L$$

where:

H = height of the structure within 5L of the stack which maximizes H_{GEP}, and

L = lesser dimension (height or projected width) of the structure.

For a squat structure, i.e., height less than projected width, the formula reduces to:

$$H_{GEP} = 2.5H$$

In the absence of influencing structures, a "default" GEP stack height is credited up to 65 meters (213 feet).

AECOM obtained pertinent source information for the HERC stacks including stack parameters, permitted emission rates of criteria and hazardous air pollutants, and building dimensions for all existing and future structures within a distance of 5 x the lesser of structure height or width from the HERC stacks. Plan view and cross sections were provided for the new ballpark based on present design, including the footprint, height and dimensions of the field and stands. Figure A and Figure B provide far-field and near-field views of the stack locations and all of the buildings and structures that could result in aerodynamic downwash.

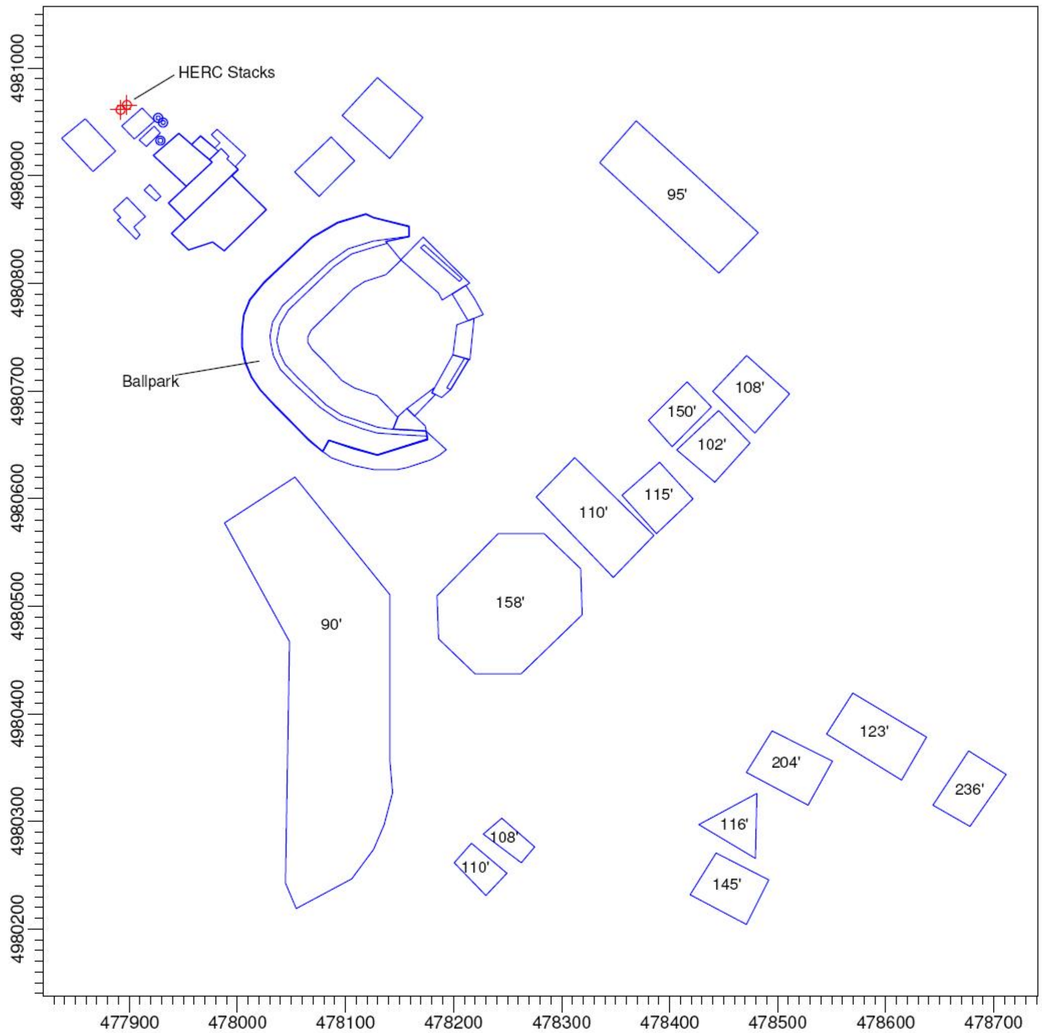
The direction-specific building dimensions were determined using the latest version of USEPA's Building Profile Input Program software (BPIP PRIME Dated 04274) using the design values of the stack and building heights.

Detailed BPIP PRIME input and output data are provided at the end of this appendix

Figure A Buildings Included in Downwash Analysis (far-field view) Showing Building Height (distances in meters)

PROJECT TITLE:

Buildings Included in BPIP Analysis
FAR VIEW



COMMENTS:

SOURCES:
2

RECEPTORS:
0

COMPANY NAME:

MODELER:

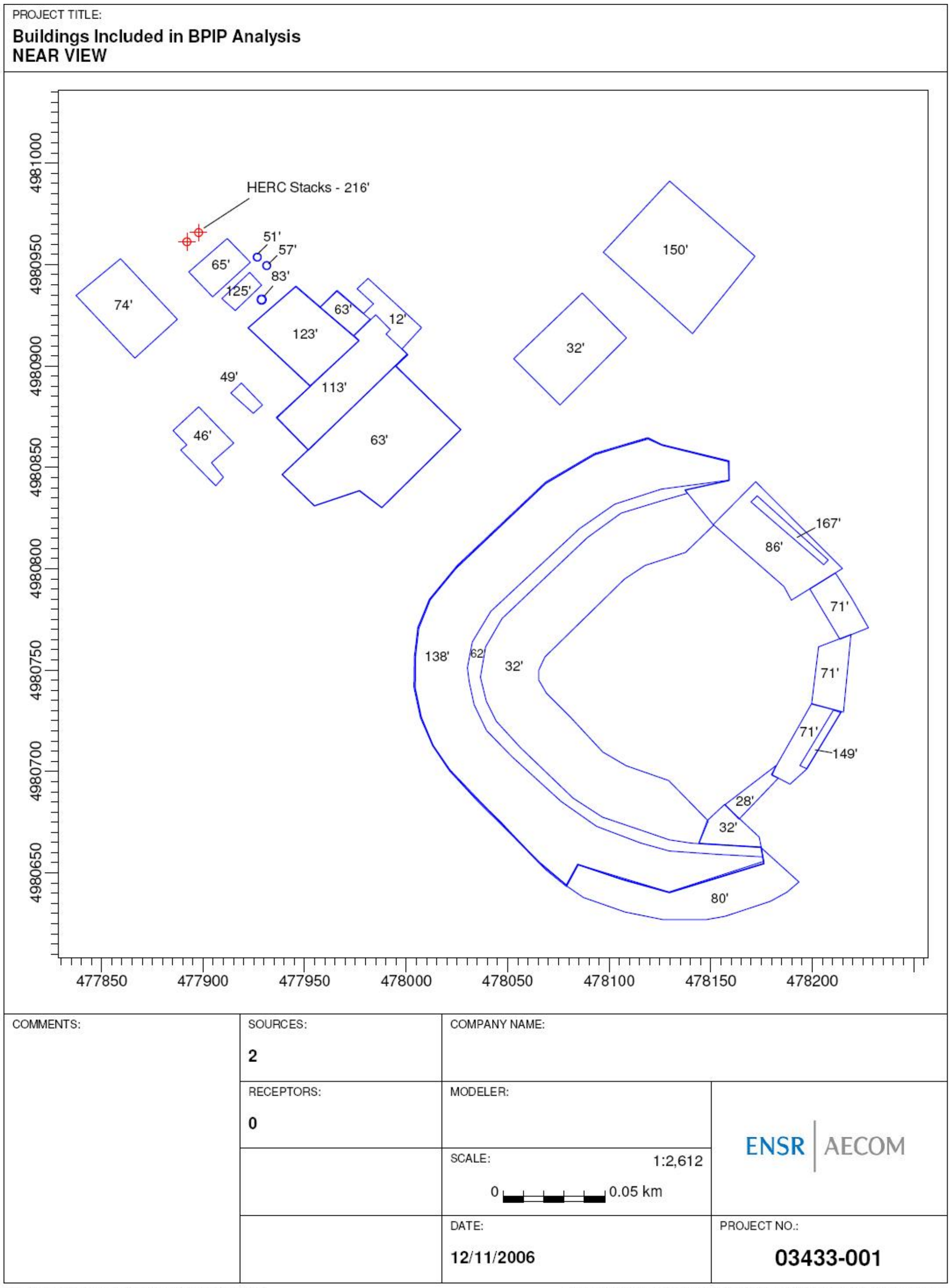
SCALE: 1:5,616
0 — 0.2 km

ENSR | AECOM

DATE:
12/11/2006

PROJECT NO.:
03433-001

Figure B Buildings Included in Downwash Analysis (near-field view) Showing Building Height (distances in meters)



BPIP PRIME Input Data

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'P'
'METERS'  1.00000000
'UTMY'  0.0000
34
'COOLTWR'  1         250.546  'Cooling Tower'
    4          22.555
           477859.393     4980952.812
           477887.433     4980922.923
           477866.480     4980903.818
           477837.462     4980934.651
'BGHSE'  1         250.546  'Baghouse'
    4          19.812
           477892.980     4980946.342
           477911.912     4980962.808
           477923.424     4980951.099
           477904.689     4980934.016
'SPRYDRY'  1         250.546  'Spray Dryers'
    4          38.100
           477909.191     4980933.088
           477915.896     4980927.222
           477928.886     4980939.793
           477923.019     4980946.078
'CARBON'  1         250.546  'Carbon Silo'
    32          17.374
           477931.400     4980951.260
           477931.043     4980951.224
           477930.700     4980951.120
           477930.384     4980950.951
           477930.107     4980950.724
           477929.879     4980950.447
           477929.710     4980950.131
           477929.606     4980949.788
           477929.571     4980949.431
           477929.606     4980949.074
           477929.710     4980948.731
           477929.879     4980948.415
           477930.107     4980948.138
           477930.384     4980947.910
           477930.700     4980947.741
           477931.043     4980947.637
           477931.400     4980947.602
           477931.757     4980947.637
           477932.100     4980947.741
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           477932.693     4980948.138
           477932.920     4980948.415
           477933.089     4980948.731
           477933.193     4980949.074
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           477933.089     4980950.131
           477932.920     4980950.447
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           477932.416     4980950.951
           477932.100     4980951.120
           477931.757     4980951.224
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           477926.434     4980955.415
           477926.091     4980955.311
           477925.774     4980955.142
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           477925.270     4980954.637
           477925.101     4980954.321
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          477927.147     4980951.827
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          477928.584     4980953.978
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          477927.616     4980934.570
          477927.269     4980934.286
          477926.985     4980933.939
          477926.774     4980933.544
          477926.644     4980933.115
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          477927.269     4980931.053
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          477928.011     4980930.557
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          477929.332     4980930.427
          477929.760     4980930.557
          477930.156     4980930.769
          477930.502     4980931.053
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          477931.128     4980932.223
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          477930.502     4980934.286
          477930.156     4980934.570
          477929.760     4980934.781
          477929.332     4980934.911
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           477954.866     4980830.844
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           477951.787     4980858.526
           477936.084     4980874.582
           477952.771     4980889.928
           477922.253     4980918.698
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           477985.036     4980925.127
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           477951.932     4980858.501
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           477976.845     4980912.500
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           477982.307     4980922.890
           477974.230     4980914.967
           477957.675     4980928.866
    4          37.490
           477945.692     4980938.947
           477922.177     4980918.765
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           477976.772     4980912.375
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           478000.657     4980905.593
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	478174.874	4980662.706
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	478108.404	4980702.759
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	478025.263	4980801.089
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	478013.199	4980712.803
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           478125.625     4980839.210
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           478158.694     4980852.687
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           478069.080     4980842.359
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           478006.258     4980770.569
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           478007.316     4980726.850
           478013.404     4980712.722
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           478129.701     4980660.682
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           478093.833     4980672.910
           478076.306     4980685.138
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           478033.508     4980732.827
           478031.063     4980744.239
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           478172.076     4980842.850
           478214.909     4980800.017
           478189.734     4980784.457
           478186.062     4980791.101
    4          50.902
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           478207.916     4980804.213
           478172.950     4980835.857
           478169.803     4980832.885
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         478215.433     4980729.211
         478199.699     4980733.233
'PARK_5'  2         251.765  'Section G'
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         478179.943     4980698.442
         478189.034     4980693.721
         478197.426     4980701.239
         478214.384     4980729.386
    4          45.415
         478214.052     4980729.008
         478210.459     4980730.260
         478193.958     4980702.801
         478197.365     4980701.307
'PARK_6'  1         251.765  'Section H'
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         478182.217     4980702.820
         478157.071     4980683.617
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         478180.160     4980698.019
'PARK_7'  1         251.765  'Section J'
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         478148.383     4980675.844
         478156.842     4980683.617
         478173.987     4980667.614
         478174.902     4980662.585
         478144.269     4980664.642
'PARK_8'  1         251.765  'Section K'
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         478078.840     4980643.722
         478087.261     4980637.778
         478107.817     4980630.596
         478126.639     4980626.881
         478143.480     4980626.881
         478147.690     4980626.881
         478157.101     4980628.615
         478179.390     4980636.045
         478187.563     4980640.502
         478193.507     4980645.456
         478174.933     4980662.297
         478176.171     4980655.610
         478129.363     4980640.502
         478084.537     4980654.124
'TRGT_CTR'  1         256.337  'Target Center'
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         478284.013     4980567.326
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         478319.119     4980492.098
         478262.698     4980436.931
         478220.069     4980436.931
         478186.217     4980469.530
         478184.963     4980509.651
'BLD_20'  1         257.556
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         478053.315     4980619.985
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         478054.569     4980218.771
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           478143.588     4980326.597
           478141.080     4980357.942
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'BLD_21'  1         252.984
    4          45.720
           478097.198     4980956.002
           478129.796     4980991.108
           478171.817     4980954.127
           478141.093     4980915.880
'BLD_22'  1         256.032
    4          28.956
           478335.418     4980912.119
           478369.271     4980950.986
           478482.112     4980846.922
           478445.752     4980809.308
'BLD_23'  1         259.080
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           478416.282     4980708.359
           478438.850     4980685.194
           478402.515     4980648.189
'BLD_24'  1         259.080
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           478406.885     4980645.061
           478445.512     4980681.769
           478474.590     4980651.330
           478441.991     4980614.970
'BLD_25'  1         259.080
    4          32.918
           478440.097     4980699.552
           478471.566     4980732.883
           478511.344     4980697.164
           478479.111     4980660.634
'BLD_26'  1         256.946
    4          35.052
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           478390.816     4980633.558
           478421.664     4980599.701
           478387.951     4980567.277
'BLD_27'  1         256.946
    4          33.528
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           478385.516     4980565.654
           478348.173     4980526.687
           478276.735     4980601.373
'BLD_28'  1         259.080
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           478200.832     4980261.433
           478216.662     4980279.698
           478249.540     4980251.691
           478230.057     4980230.990
'BLD_29'  1         259.080
    4          32.918
           478227.621     4980288.222
           478244.669     4980302.834
           478275.111     4980276.045
           478262.934     4980261.433
'BLD_30'  1         259.690
    4          44.196
           478419.349     4980231.611
           478443.225     4980270.577
           478491.861     4980245.603
           478471.184     4980204.177
'BLD_31'  1         259.690
    3          35.357
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           478427.249     4980296.797
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'BLD_32'  1         259.690
    4          62.179
           478471.160     4980345.454
           478494.945     4980383.904
           478550.986     4980355.923
           478528.418     4980315.038
'BLD_33'  1         259.690
    4          37.490
           478545.392     4980381.245
           478569.865     4980419.160
           478637.984     4980378.331
           478614.896     4980338.100
'BLD_34'  1         259.690
    4          71.933
           478643.890     4980314.987
           478676.863     4980365.379
           478711.701     4980343.604
           478678.107     4980295.079
2
'STCK1'         250.546          65.837      477892.090     4980961.160
'STCK2'         250.546          65.837      477897.770     4980965.700
```

Detailed BPIP PRIME Output Data

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J:\AQES\Projects\HennepinCounty\TwinsBallpark\Modeling\Lakes\Bllpk.i

                              BPIP (Dated: 04274)
 DATE : 11/10/2006
 TIME : 14:15:49
 J:\AQES\Projects\HennepinCounty\TwinsBallpark\Modeling\Lakes\Bllpk.i

 ============================
 BPIP PROCESSING INFORMATION:
 ============================

   The P  flag has been set for preparing downwash related data
          for a model run utilizing the PRIME algorithm.

   Inputs entered in METERS     will be converted to meters using
    a conversion factor of    1.0000.  Output will be in meters.

   The UTMP variable is set to UTMY.  The input is assumed to be in
     UTM coordinates.  BPIP will move the UTM origin to the first pair of
     UTM coordinates read.  The UTM coordinates of the new origin will
     be subtracted from all the other UTM coordinates entered to form
     this new local coordinate system.

   Plant north is set to   0.00 degrees with respect to True North.


 J:\AQES\Projects\HennepinCounty\TwinsBallpark\Modeling\Lakes\Bllpk.i



                PRELIMINARY* GEP STACK HEIGHT RESULTS TABLE
                         (Output Units: meters)

                            Stack-Building            Preliminary*
        Stack    Stack      Base Elevation    GEP**   GEP Stack
        Name     Height     Differences       EQN1    Height Value


       STCK1      65.84         -2.44       116.74       116.74
       STCK2      65.84         -2.44       116.74       116.74

   * Results are based on Determinants 1 & 2 on pages 1 & 2 of the GEP
     Technical Support Document.  Determinant 3 may be investigated for
     additional stack height credit.  Final values result after
     Determinant 3 has been taken into consideration.
  ** Results were derived from Equation 1 on page 6 of GEP Technical
     Support Document.  Values have been adjusted for any stack-building
     base elevation differences.

     Note:  Criteria for determining stack heights for modeling emission
     limitations for a source can be found in Table 3.1 of the
     GEP Technical Support Document.




                              BPIP (Dated: 04274)
 DATE : 11/10/2006
 TIME : 14:15:49


 J:\AQES\Projects\HennepinCounty\TwinsBallpark\Modeling\Lakes\Bllpk.i
```

BPIP output is in meters

```
    SO BUILDHGT STCK1      22.56   22.56   22.56   22.56   22.56   22.56
    SO BUILDHGT STCK1      22.56   22.56   37.49   37.49   37.49   37.49
    SO BUILDHGT STCK1      37.49   37.49   37.49   37.49   37.49   37.49
    SO BUILDHGT STCK1      22.56   22.56   22.56   22.56   22.56   22.56
    SO BUILDHGT STCK1      22.56   45.72   45.72   45.72   42.06   42.06
    SO BUILDHGT STCK1      42.06   42.06   42.06   37.49   37.49   37.49
    SO BUILDWID STCK1      51.25   50.97   49.14   45.82   42.27   45.97
    SO BUILDWID STCK1      48.46   49.48   55.88   46.77   43.38   38.66
    SO BUILDWID STCK1      32.78   37.71   44.09   49.12   62.96   67.58
    SO BUILDWID STCK1      51.25   50.97   49.14   45.82   42.27   45.97
    SO BUILDWID STCK1      48.46   76.05   75.23   72.12  223.49  220.68
    SO BUILDWID STCK1     211.17  202.66  195.81   49.12   62.96   67.58
    SO BUILDLEN STCK1      47.02   43.62   38.89   32.98   30.74   37.41
    SO BUILDLEN STCK1      42.95   47.18   67.58   54.88   53.49   50.48
    SO BUILDLEN STCK1      45.93   41.91   45.77   48.24   60.20   55.88
    SO BUILDLEN STCK1      47.02   43.62   38.89   32.98   30.74   37.41
    SO BUILDLEN STCK1      42.95   73.16   74.62   73.81  199.33  207.21
    SO BUILDLEN STCK1     209.60  212.64  216.25   48.24   60.20   55.88
    SO XBADJ    STCK1     -60.92  -62.64  -62.46  -60.39  -58.89  -60.56
    SO XBADJ    STCK1     -60.40  -58.40   17.10   36.99   42.77   47.25
    SO XBADJ    STCK1      50.30   51.47   46.04   39.21   20.22   15.08
    SO XBADJ    STCK1      13.90   19.03   23.58   27.41   28.15   23.15
    SO XBADJ    STCK1      17.45 -274.26 -279.73 -276.70 -371.80 -399.29
    SO XBADJ    STCK1    -414.65 -417.41 -407.49  -87.44  -80.42  -70.96
    SO YBADJ    STCK1      23.57   16.78    9.48    1.90   -6.33  -13.87
    SO YBADJ    STCK1     -20.89  -27.28  -43.02  -35.95  -24.23  -11.77
    SO YBADJ    STCK1       1.05   14.65   26.90   38.33   43.45   50.89
    SO YBADJ    STCK1     -23.57  -16.78   -9.48   -1.90    6.33   13.87
    SO YBADJ    STCK1      20.89   49.81    7.67  -34.71  122.49   70.98
    SO YBADJ    STCK1      17.31  -33.17  -78.75  -38.33  -43.45  -50.89


    SO BUILDHGT STCK2      37.49   22.56   22.56   22.56   22.56   22.56
    SO BUILDHGT STCK2      22.56   22.56   19.81   37.49   37.49   37.49
    SO BUILDHGT STCK2      37.49   37.49   37.49   37.49   37.49   37.49
    SO BUILDHGT STCK2      37.49   22.56   22.56   22.56   22.56   22.56
    SO BUILDHGT STCK2      22.56   45.72   45.72   45.72   42.06   42.06
    SO BUILDHGT STCK2      42.06   42.06   42.06   37.49   37.49   37.49
    SO BUILDWID STCK2      70.15   50.97   49.14   45.82   42.27   45.97
    SO BUILDWID STCK2      48.46   49.48   28.79   46.77   43.38   38.66
    SO BUILDWID STCK2      32.78   37.71   44.09   49.12   52.66   67.58
    SO BUILDWID STCK2      70.15   50.97   49.14   45.82   42.27   45.97
    SO BUILDWID STCK2      48.46   76.05   75.23   72.12  223.49  220.68
    SO BUILDWID STCK2     211.17  202.66  195.81   49.12   52.66   67.58
    SO BUILDLEN STCK2      49.86   43.62   38.89   32.98   30.74   37.41
    SO BUILDLEN STCK2      42.95   47.18   30.44   54.88   53.49   50.48
    SO BUILDLEN STCK2      45.93   41.91   45.77   48.24   49.24   55.88
    SO BUILDLEN STCK2      49.86   43.62   38.89   32.98   30.74   37.41
    SO BUILDLEN STCK2      42.95   73.16   74.62   73.81  199.33  207.21
    SO BUILDLEN STCK2     209.60  212.64  216.25   48.24   49.24   55.88
    SO XBADJ    STCK2     -64.80  -68.85  -69.24  -67.52  -66.16  -67.75
    SO XBADJ    STCK2     -67.29  -64.78   -4.79   32.19   38.99   44.60
    SO XBADJ    STCK2      48.87   51.30   47.13   41.53   34.67   19.62
    SO XBADJ    STCK2      14.94   25.24   30.35   34.54   35.42   30.34
    SO XBADJ    STCK2      24.34 -267.87 -274.05 -271.89 -368.01 -396.64
    SO XBADJ    STCK2    -413.22 -417.24 -408.59  -89.77  -83.91  -75.50
    SO YBADJ    STCK2     -51.99   20.57   12.13    3.33   -6.16  -14.96
    SO YBADJ    STCK2     -23.22  -30.77  -17.29  -41.41  -30.44  -18.54
    SO YBADJ    STCK2      -6.08    7.39   19.71   31.44   42.21   45.21
    SO YBADJ    STCK2      51.99  -20.57  -12.13   -3.33    6.16   14.96
    SO YBADJ    STCK2      23.22   53.29   12.21  -29.25  128.70   77.75
    SO YBADJ    STCK2      24.44  -25.90  -71.56  -31.44  -42.21  -45.21
```

Appendix C

AECOM's POST-1HR Fortran Code

```
C
******************************************************************************************
***************
C     AECOM Environment Proprietary Program, "POST-1HR", is provided to the Minnesota
Pollution Control Agency
C     to support their review of the 1-hour NO2 NAAQS dispersion
C     modeling analysis conducted by AECOM Environment in support of the air permitting
of the New Ulm Public
C     Utilities Commission Boiler 4 Project. The copies of the model Fortran code, model
executable, input files
C     and accompanying documentation is proprietary to AECOM Environment and therefore,
should not be disseminated
C     or modified.
C
******************************************************************************************
***************

C     This program takes a postfile generated with AERMOD containing daily 1 hour values
for every receptor
C     and combines those values with hourly background values. Then, the maximum daily
value for each day is saved.
C     For each receptor for each year,
C     the high-4th-high or high-8th-high dailt max is then determined, then the highest
impact of any receptor is reported.

C     This is the modified version of the program that will take 3 or 5 years of data and
give the average over that many years.
C
      Character*8  GRP1
      Character*20 Coords(15000)
      Character*40 InputFiles(5), MonitorFiles(5), OutputFile
      Character*40 ReceptorFile, High8thFile, High4thFile, junk
      Integer NumYears, NumDays(5), NumHours(5), Years(5),Receptors
      Integer i,j,k,x,KURDAT,KAVE,Day,Hour,Count,High,Scalar
      Integer High8th,High4th,BgrdSwitch,MaxHour
      Real Background(5,366,24), ModelConc(15000,366,24),DayMax
      Real TotalConc(15000,366,24), MaxDaily(15000,366),Sorter(24)
      Real High4thDay(15000,5), High8thDay(15000,5),DaySorter(366)
      Real Mod4thDay(15000,5),Mod8thDay(15000,5),AvgMod4th(15000)
      Real AvgHigh8th(15000),AvgHigh4th(15000),EmisFact,EighthMod
      Real EighthDay, FourthDay,Max8th,Max4th,BgrdConst,FourthMod
      Real ModelMaxDaily(15000,366),AvgMod8th(15000),Proj4th,Proj8th
      Real*8 PostConc(15000)

C     Read in the data from the input file, which must be named PM25DATA.INP

      Open(UNIT=1, FILE='POST-1hr.inp', STATUS='OLD')
      Read(1,1) NumYears
1     Format(/////,I2,/)
```

```
C     Read in the years to be evaluated
      Read(1,2) (years(i),i=1,NumYears)
2     Format(5(I5))
      if (NumYears .ne. 5) then
         NumYears = 3
      endif

C     Read in the number of receptors to be evaluated.
      Read(1,3) Receptors
3     Format(/,I5,/)

C     Read in the scaling value to be applies to the modeled impacts.
      Read(1,4) Scalar
4     Format(I5,/)
      EmisFact = Scalar / 100.00

C     Read in the names of the input post files to be processed.

      Do 100 i=1,NumYears
        Read(1,5) InputFiles(i)
5       Format(A40)
100   Continue

C     Find out if there are backgrounds files, a constant background, or no background.

      Read(1,'(//,I1,//)') BgrdSwitch
      Select Case (BgrdSwitch)
        Case(1)
C     Read in the names of the files with the hourly monitor data.
          Do 105 i=1,NumYears
           Read(1,5) MonitorFiles(i)
105       Continue

        Case(2)
C     Read in value to use as constant background.
           Read (1,'(F6.2)') BgrdConst
        Case(3)
C     Just skip a line, no background will be added.
           Read (1,5) junk
           BgrdConst = 0
      End Select

C     Read in the name of the file with the receptor data and the name of the output file
      Read(1,6) ReceptorFile
      Read(1,6) OutputFile
      Read(1,6) High8thFile
      Read(1,'(A40)') High4thFile
6     Format(/,A40)
```

```
C     Write some preliminary stuff to the screen and output file

      Open(UNIT=10, FILE=OutputFile, STATUS='UNKNOWN')

      Write(*,*) 'Number of years is: ', NumYears
      Write(10,*) 'Number of years is: ', NumYears

      Write(*,7) 'Years to be evaluated: ',(years(i),i=1,NumYears)
      Write(10,7) 'Years to be evaluated: ',(years(i),i=1,NumYears)
7     Format(/,A24,(5(I5)),/)

      Write(*,*) 'Impacts multiplied by: ',EmisFact
      Write(10,*) 'Impacts multiplied by: ',EmisFact
      Write(*,*) 'Number of Receptors: ',Receptors
      Write(10,*) 'Number of Receptors: ',Receptors

      Write(*,*)
      Write(*,*) 'Post files to be analyzed:'
      Write(10,*)
      Write(10,*) 'Post files to be analyzed:'

      Do 110 i=1,NumYears
        Write(*,*) InputFiles(i)
        Write(10,*) InputFiles(i)
110   Continue

      if (BgrdSwitch .eq. 1) then
        Write(*,*)
        Write(*,*) 'Monitor files to be analyzed:'
        Write(10,*)
        Write(10,*) 'Monitor files to be analyzed:'
        Do 120 i=1,NumYears
          Write(*,*) MonitorFiles(i)
          Write(10,*) MonitorFiles(i)
120     Continue
      else
        Write(*,*)
        Write(*,'(A31,F6.2)') ' Background Value to be added: '
     +,BgrdConst
        Write(10,*)
        Write(10,'(A31,F6.2)') ' Background Value to be added: '
     +,BgrdConst
      endif

      Write(*,*)
      Write(*,*) 'Receptors are contained in: ',ReceptorFile
      Write(*,*)
      Write(*,*) 'Results will be written to: ',OutputFile
```

```
       Write(*,*)
       Write(*,*) '98th percentile plot will be written to: '
      +,High8thFile
       Write(*,*)
       Write(*,*) '99th percentile plot will be written to: '
      +,High4thFile
       if (NumYears .eq. 3) then
         Write(*,*) '------------------------------------------------',
      +'----------------------'
       else
         Write(*,*) '------------------------------------------------',
      +'-----------------------------'
       end if

       Write(10,*)
       Write(10,*) 'Receptors are contained in: ',ReceptorFile
       Write(10,*)
       Write(10,*) 'Results will be written to: ',OutputFile
       Write(10,*)
       Write(10,*) '98th percentile plot will be written to: '
      +,High8thFile
       Write(10,*)
       Write(10,*) '99th percentile plot will be written to: '
      +,High4thFile
       if (NumYears .eq. 3) then
         Write(10,*) '------------------------------------------------',
      +'----------------------'
       else
         Write(10,*) '------------------------------------------------',
      +'-----------------------------'
       end if

C       ---------------------------------- End of reading input file ---------------------
--

C      Determine which years are leap years and set the NumDays arrays

       Do 200 i=1,NumYears
         x = MOD(years(i)-1960,4)
         if (x .eq. 0) then
           NumDays(i) = 366
           NumHours(i) = 8784
         else
           NumDays(i) = 365
           NumHours(i) = 8760
         endif
200    Continue
       Close(1)
```

```
C     If there are background files, Read in the hourly background values for every hour
of each year.

      if (BgrdSwitch .eq. 1) then
       Do 300 i=1,NumYears
         Open(UNIT=2, FILE=MonitorFiles(i), STATUS='OLD')
         Read(2,'(//)')
         Do 400 j=1,NumDays(i)
           Do 500 k=1,24
             Read (2,8)Background(i,j,k)
8            Format(14X,F10.5)
500        Continue
400      Continue
         Close(2)
300    Continue

      else
       Do 310 i=1,NumYears
         Do 410 j=1,NumDays(i)
           Do 510 k=1,24
             Background(i,j,k) = BgrdConst
510        Continue
410      Continue
310    Continue
      endif


C     Read in the list of receptors being used in this analysis

      Open(UNIT=3, FILE=ReceptorFile, STATUS='OLD')

      Do 600 i=1,Receptors
        Read (3,10) Coords(i)
10      Format(A20)
600   Continue
      Close(3)

C     Read in the hourly concentrations from every receptor for each year, and add the
appropriate
C     daily background to fill in the total concentration (TotalConc) array as well.
Process one
C     year at a time.

      Do 700 i=1,NumYears
        OPEN(UNIT=4, FILE=InputFiles(i),FORM='UNFORMATTED',
     +ACCESS='SEQUENTIAL',STATUS='OLD')
        Day=1
        Hour=1
        Do 800 j=1,NumHours(i)
```

```
          Read (4) KURDAT,KAVE,GRP1,(PostConc(k),k=1,Receptors)
          Do 850 x=1,Receptors
            ModelConc(x,Day,Hour)=PostConc(x)
            ModelConc(x,Day,Hour)=ModelConc(x,Day,Hour)*EmisFact
            TotalConc(x,Day,Hour)=ModelConc(x,Day,Hour)
     ++Background(i,Day,Hour)
850       Continue
            if (Hour .eq. 24) then
              Hour = 1
              Day = Day+1
            else
              Hour = Hour+1
            Endif
800     Continue
        Close(4)

        Write(*,*)'Done summation of model results and',
     +' backgrounds for',years(i)

C     Figure out the daily max for each receptor for every day in the year being
processed

        Do 1100 j=1,NumDays(i)
          Do 1200 k=1, Receptors
            Do 1300 Hour=1,24
C           Fill up Sorter for daily max processing
            Sorter(Hour) = TotalConc(k,j,Hour)
1300        Continue
            DayMax = 0
            Do 1400 Hour=1,24
              if (Sorter(Hour) .gt. DayMax) then
                  DayMax = Sorter(Hour)
                  MaxHour = Hour
              endif
1400        Continue
            MaxDaily(k,j) = DayMax
            ModelMaxDaily(k,j) = ModelConc(k,j,MaxHour)
1200      Continue
1100    Continue

        Write(*,*)'Done Finding the daily max for each receptor for'
     +,years(i)

C     Determine the high-4th-high and high-8th-high concentration for each of the
receptors being analyzed for the year.

        Do 1500 k=1, Receptors
          Do 1520 j=1,NumDays(i)
C         Fill up Sorter for High-4th-high and High-8th-high processing
```

```
          DaySorter(j) = MaxDaily(k,j)
1520    Continue
          Do 1530 Count=1,8
            EighthDay = 0
            Do 1540 x=1,Numdays(i)
              if (DaySorter(x) .gt. EighthDay) then
                EighthDay = DaySorter(x)
                High = x
              endif
1540        Continue
            if (Count .eq. 4) then
              FourthDay = EighthDay
              FourthMod = ModelMaxDaily(k,High)
            endif
            if (Count .eq. 8) then
              EighthMod = ModelMaxDaily(k,High)
            endif
            DaySorter(High) = 0
1530      Continue
          High4thDay(k,i) = FourthDay
          Mod4thDay(k,i) = FourthMod
          High8thDay(k,i) = EighthDay
          Mod8thDay(k,i) = EighthMod
1500    Continue

        Write(*,*)'Calculated the 98th and 99th percentiles for '
     +,years(i)

700   Continue

C     Now determine the average high 4th and 8th highs out of all 3 or 5 years and
publish the result.

      Do 1600 k=1,Receptors
        AvgHigh4th(k) = 0
        AvgHigh8th(k) = 0
        AvgMod4th(k) = 0
        AvgMod8th(k) = 0
        Do 1610 i=1,NumYears
          AvgHigh4th(k) = AvgHigh4th(k) + High4thDay(k,i)
          AvgHigh8th(k) = AvgHigh8th(k) + High8thDay(k,i)
          AvgMod4th(k) = AvgMod4th(k) + Mod4thDay(k,i)
          AvgMod8th(k) = AvgMod8th(k) + Mod8thDay(k,i)
1610    Continue
        AvgHigh4th(k) = AvgHigh4th(k) / NumYears
        AvgHigh8th(k) = AvgHigh8th(k) / NumYears
        AvgMod4th(k) = AvgMod4th(k) / NumYears
        AvgMod8th(k) = AvgMod8th(k) / NumYears
1600  Continue
```

```
C     Finally find the highest-4th high and highest-8th high out of all of the receptors
and report it.
      Max4th = 0
      Max8th = 0

      Do 1700 k=1,Receptors
        if (AvgHigh4th(k) .gt. Max4th) then
          Max4th = AvgHigh4th(k)
          Proj4th = AvgMod4th(k)
          High4th = k
        endif
        if (AvgHigh8th(k) .gt. Max8th) then
          Max8th = AvgHigh8th(k)
          Proj8th = AvgMod8th(k)
          High8th = k
        endif
1700  Continue

C     Write out the final results to the screen, output file, and plot files

C     Output for case where 3 years are being averaged.
      if (NumYears .eq. 3) then
       Open(UNIT=11, FILE=High8thFile, STATUS='UNKNOWN')
       Open(UNIT=12, FILE=High4thFile, STATUS='UNKNOWN')

       Write(*,*)
       Write(*,*) '----------------------------------------------',
     +'----------------------'
       Write(*,*)'3-Year Average 99th Percentile Results by Receptor'
       Write(*,12) '   Receptor     Year: ',(Years(i),i=1,NumYears),
     +    '  Average'
       Write(*,*) '----------------------------------------------',
     +'----------------------'
       Write(10,*)
       Write(10,*) '----------------------------------------------',
     +'----------------------'
       Write(10,*)'3-Year Average 99th Percentile Results by Receptor'
       Write(10,12) '       Receptor     Year:   ',
     +(Years(i),i=1,NumYears),'  Average'
       Write(10,*) '----------------------------------------------',
     +'----------------------'
       Write(12,*) '    X         Y        CONC'
       Do 1800 k=1,Receptors
        Write(*,13) Coords(k),(High4thDay(k,i),i=1,NumYears),
     +AvgHigh4th(k)
        Write(10,13) Coords(k),(High4thDay(k,i),i=1,NumYears),
     +AvgHigh4th(k)
        Write(12,14) Coords(k),AvgHigh4th(k)
```

```
1800   Continue

       Write(*,'(A36,A35,//)')' -----------------------------------'
     +,'-----------------------------------'
       Write(10,'(A36,A35,//)')' -----------------------------------'
     +,'-----------------------------------'

       Write(*,*)
       Write(*,*) '------------------------------------------------',
     +'----------------------'
       Write(*,*)'3-Year Average 98th Percentile Results by Receptor'
       Write(*,12) '   Receptor     Year: ',(Years(i),i=1,NumYears),
     +    '  Average'
       Write(*,*) '------------------------------------------------',
     +'----------------------'
       Write(10,*)
       Write(10,*) '------------------------------------------------',
     +'----------------------'
       Write(10,*)'3-Year Average 98th Percentile Results by Receptor'
       Write(10,12) '       Receptor     Year:   ',
     +(Years(i),i=1,NumYears),'  Average'
       Write(10,*) '------------------------------------------------',
     +'----------------------'
       Write(11,*) '    X         Y        CONC'

       Do 1900 k=1,Receptors
        Write(*,13) Coords(k),(High8thDay(k,i),i=1,NumYears),
     +AvgHigh8th(k)
        Write(10,13) Coords(k),(High8thDay(k,i),i=1,NumYears),
     +AvgHigh8th(k)
        Write(11,14) Coords(k),AvgHigh8th(k)
1900   Continue

       Write(*,'(A36,A35,/)')' --------------------------------------'
     +,'-----------------------------------'
       Write(10,'(A36,A35,/)')' ------------------------------------'
     +,'-----------------------------------'

       Write(*,15) 'Highest 3-year Average 99th percentile daily ',
     +'max is',Max4th
       Write(*,16)'at receptor: ',Coords(High4th),'.'
       Write(*,17)'The Project Contribution to the 3-year Average ',
     +'99th percentile'
       Write(*,18)'Daily Max is: ',Proj4th,'.'
       Write(*,'(/,A36,A35,/)')' --------------------------------------'
     +,'-----------------------------------'
       Write(10,19)'Highest 3-year Average 99th percentile Daily Max is'
     +, Max4th, ' at receptor: ',Coords(High4th)
       Write(10,20) 'The Project Contribution to the 3-year Average ',
```

```
     +'99th percentile Daily Max is: ',Proj4th

       Write(*,15) 'Highest 3-year Average 98th percentile daily ',
     +'max is',Max8th
       Write(*,16)'at receptor: ',Coords(High8th),'.'
       Write(*,17)'The Project Contribution to the 3-year Average ',
     +'98th percentile'
       Write(*,18)'Daily Max is: ',Proj8th,'.'
       Write(*,'(/,A36,A35,/)')' --------------------------------------'
     +,'-----------------------------------'
       Write(10,19)'Highest 3-year Average 98th percentile Daily Max is'
     +, Max8th, ' at receptor: ',Coords(High8th)
       Write(10,20) 'The Project Contribution to the 3-year Average ',
     +'98th percentile Daily Max is: ',Proj8th

12     Format(/,A28,3(I4,'       '),A10)
13     Format(' ',A20,'     ',3((F7.2),'    '),'     ',F7.2)
14     Format(' ',A20,',',F7.2)
15     Format(A46,A6,F7.2)
16     Format(A14,A20,A1,/)
17     Format(A48,A15)
18     Format(A15,F7.2,A1)
19     Format(/,A51,F7.2,A14,A20)
20     Format(A47,A30,F7.2)
      Endif

C     Output for case where 5 years are being averaged.
      if (NumYears .eq. 5) then
       Open(UNIT=11, FILE=High8thFile, STATUS='UNKNOWN')
       Open(UNIT=12, FILE=High4thFile, STATUS='UNKNOWN')

       Write(*,*)
       Write(*,*) '------------------------------------------------',
     +'---------------------------'
       Write(*,*)'5-Year Average 99th Percentile Results by Receptor'
       Write(*,21) '   Receptor    Year:  ',(Years(i),i=1,NumYears),
     +    'Average'
       Write(*,*) '------------------------------------------------',
     +'---------------------------'
       Write(10,*)
       Write(10,*) '------------------------------------------------',
     +'---------------------------'
       Write(10,*)'5-Year Average 99th Percentile Results by Receptor'
       Write(10,21) '   Receptor    Year:  ',
     +(Years(i),i=1,NumYears),'Average'
       Write(10,*) '------------------------------------------------',
     +'---------------------------'
       Write(12,*) '    X         Y        CONC'
       Do 2000 k=1,Receptors
```

```
         Write(*,22) Coords(k),(High4thDay(k,i),i=1,NumYears),
     +AvgHigh4th(k)
         Write(10,22) Coords(k),(High4thDay(k,i),i=1,NumYears),
     +AvgHigh4th(k)
         Write(12,23) Coords(k),AvgHigh4th(k)
2000    Continue

        Write(*,'(A36,A42,//)')' ------------------------------------'
     +,'------------------------------------------'
        Write(10,'(A36,A42,//)')' ------------------------------------'
     +,'------------------------------------------'

        Write(*,*)
        Write(*,*) '------------------------------------------------',
     +'-----------------------------'
        Write(*,*)'5-Year Average 98th Percentile Results by Receptor'
        Write(*,21) '   Receptor    Year:  ',(Years(i),i=1,NumYears),
     +    'Average'
        Write(*,*) '------------------------------------------------',
     +'-----------------------------'
        Write(10,*)
        Write(10,*) '------------------------------------------------',
     +'-----------------------------'
        Write(10,*)'5-Year Average 98th Percentile Results by Receptor'
        Write(10,21) '   Receptor    Year:  ',
     +(Years(i),i=1,NumYears),'Average'
        Write(10,*) '------------------------------------------------',
     +'-----------------------------'
        Write(11,*) '    X         Y        CONC'

        Do 2100 k=1,Receptors
         Write(*,22) Coords(k),(High8thDay(k,i),i=1,NumYears),
     +AvgHigh8th(k)
         Write(10,22) Coords(k),(High8thDay(k,i),i=1,NumYears),
     +AvgHigh8th(k)
         Write(11,23) Coords(k),AvgHigh8th(k)
2100    Continue

        Write(*,'(A36,A42,/)')' ---------------------------------------'
     +,'------------------------------------------'
        Write(10,'(A36,A42,/)')' -------------------------------------'
     +,'------------------------------------------'

        Write(*,24) 'Highest 5-year Average 99th percentile daily ',
     +'max is',Max4th
        Write(*,25)'at receptor: ',Coords(High4th),'.'
        Write(*,26)'The Project Contribution to the 5-year Average ',
     +'99th percentile'
        Write(*,27)'Daily Max is: ',Proj4th,'.'
```

```
        Write(*,'(/,A36,A42,/)')' --------------------------------------'
     +,'------------------------------------------'
        Write(10,28)'Highest 5-year Average 99th percentile Daily Max is'
     +, Max4th, ' at receptor: ',Coords(High4th)
        Write(10,29) 'The Project Contribution to the 5-year Average ',
     +'99th percentile Daily Max is: ',Proj4th

        Write(*,24) 'Highest 5-year Average 98th percentile daily ',
     +'max is',Max8th
        Write(*,25)'at receptor: ',Coords(High8th),'.'
        Write(*,26)'The Project Contribution to the 5-year Average ',
     +'98th percentile'
        Write(*,27)'Daily Max is: ',Proj8th,'.'
        Write(*,'(/,A36,A42,/)')' --------------------------------------'
     +,'------------------------------------------'
        Write(10,28)'Highest 5-year Average 98th percentile Daily Max is'
     +, Max8th, ' at receptor: ',Coords(High8th)
        Write(10,29) 'The Project Contribution to the 5-year Average ',
     +'98th percentile Daily Max is: ',Proj8th

21      Format(/,A26,5(I4,'     '),A7)
22      Format(' ',A20,'   ',5((F7.2),'  '),'  ',F7.2)
23      Format(' ',A20,',',F7.2)
24      Format(A46,A6,F7.2)
25      Format(A14,A20,A1,/)
26      Format(A48,A15)
27      Format(A15,F7.2,A1)
28      Format(/,A51,F7.2,A14,A20)
29      Format(A47,A30,F7.2)
       Endif

       Close(10)
       Close(11)
       Close(12)
       END
```

Appendix D

Stack Measurements of NO and NO_2 at Covanta Lee

Data Summary Report

Lee County Solid Waste Resource Recovery Facility

Company:	Covanta Lee, Inc. 10500 Buchingham Road Fort Myers, FL 33905
Data Group:	U3_1 HOUR DATA
Report Name:	No Title
Start of Report:	05/13/2008 00:00
End of Report:	05/13/2008 23:59

Validation: All Available Data

Group#-Channel#	G9-C29	G9-C30
Long Descrip.	U3 1 HR F	U3 1 HR F
Short Descrip.	NO-FTIR	NO2-FTIR
Units	ppm	ppm
Range	0-500	0-500
05/13/2008 00:00	61.4	7.0
05/13/2008 01:00	70.5	5.9
05/13/2008 02:00	75.7	4.3
05/13/2008 03:00	76.5	5.2
05/13/2008 04:00	85.7	4.9
05/13/2008 05:00	79.0	6.3
05/13/2008 06:00	81.6 <	5.5 <
05/13/2008 07:00	73.0 <	5.3 <
05/13/2008 08:00	71.7	5.6
05/13/2008 09:00	60.7	5.2
05/13/2008 10:00	71.0	4.5
05/13/2008 11:00	70.7	5.7
05/13/2008 12:00	82.5	5.4
05/13/2008 13:00	71.9	6.6
05/13/2008 14:00	70.8	6.8
05/13/2008 15:00	84.8	4.1
05/13/2008 16:00	76.6	3.4
05/13/2008 17:00	76.9	3.0
05/13/2008 18:00	72.2	2.5
05/13/2008 19:00	75.5	3.7
05/13/2008 20:00	75.9	4.9
05/13/2008 21:00	84.1	4.4
05/13/2008 22:00	79.8	4.2
05/13/2008 23:00	82.3	4.7
Period Average =	75.5	5.0
Period Max Value =	85.7	7.0
Period Min Value =	60.7	2.5
Period Totals =	1.81E+3	1.19E+2
Period % Recovery =	100.0	100.0

Data Summary Report

Company:	Covanta Lee, Inc. 10500 Buchingham Road Fort Myers, FL 33905
Data Group:	U3_1 HOUR DATA
Report Name:	No Title
Start of Report:	02/13/2008 00:00
End of Report:	02/13/2008 23:59

Validation: All Available Data

Group#-Channel#	G9 C29	G9 C30
Long Descrip.	U3 1 HR F	U3 1 HR F
Short Descrip.	NO-FTIR	NO2-FTIR
Units	ppm	ppm
Range	0-500	0-500
02/13/2008 00:00	97.8	4.5
02/13/2008 01:00	86.7	4.2
02/13/2008 02:00	96.5	3.3
02/13/2008 03:00	83.7	5.7
02/13/2008 04:00	88.4	4.8
02/13/2008 05:00	84.4	3.6
02/13/2008 06:00	97.4	4.4
02/13/2008 07:00	76.2	3.4
02/13/2008 08:00	100.0	4.6
02/13/2008 09:00	71.2	3.9
02/13/2008 10:00	88.1	4.8
02/13/2008 11:00	98.6	3.9
02/13/2008 12:00	90.9	5.5
02/13/2008 13:00	85.6	6.5
02/13/2008 14:00	97.9	5.5
02/13/2008 15:00	88.6	4.8
02/13/2008 16:00	101.9	5.5
02/13/2008 17:00	87.1	6.2
02/13/2008 18:00	92.6	4.9
02/13/2008 19:00	92.2	5.0
02/13/2008 20:00	91.6	4.6
02/13/2008 21:00	78.7	4.7
02/13/2008 22:00	92.1	4.9
02/13/2008 23:00	95.2	6.1
Period Average =	90.1	4.8
Period Max Value -	101.9	6.5
Period Min Value -	71.2	3.3
Period Totals =	2.16E+3	1.15E+2
Period % Recovery =	100.0	100.0

Date/Time Printed: 06/19/2008 10:10

Data Summary Report

Company:	Covanta Lee, Inc. 10500 Buchingham Road Fort Myers, FL 33905
Data Group:	U3_1 HOUR DATA
Report Name:	No Title
Start of Report:	10/23/2007 00:00
End of Report:	10/23/2007 23:59

Validation: All Available Data

Group#-Channel#	G9-C29	G9-C30
Long Descrip.	U3 1 HR F	U3 1 HR F
Short Descrip.	NO-FTIR	NO2-FTIR
Units	ppm	ppm
Range	0-500	0-500
10/23/2007 00:00	95.1	7.4
10/23/2007 01:00	94.3	7.0
10/23/2007 02:00	94.3	7.0
10/23/2007 03:00	95.3	8.1
10/23/2007 04:00	98.8	7.5
10/23/2007 05:00	104.5	7.1
10/23/2007 06:00	91.6	6.6
10/23/2007 07:00	89.4<	7.0<
10/23/2007 08:00	81.0	9.9
10/23/2007 09:00	94.7	8.4
10/23/2007 10:00	81.1	8.3
10/23/2007 11:00	87.2	7.9
10/23/2007 12:00	95.6	8.3
10/23/2007 13:00	76.9	10.0
10/23/2007 14:00	79.4	6.5
10/23/2007 15:00	90.1	5.3
10/23/2007 16:00	84.8	5.8
10/23/2007 17:00	87.6	5.8
10/23/2007 18:00	84.9	5.2
10/23/2007 19:00	83.7	6.4
10/23/2007 20:00	90.5	6.0
10/23/2007 21:00	83.3	8.3
10/23/2007 22:00	86.5	8.3
10/23/2007 23:00	79.9	6.6
Period Average =	88.8	7.3
Period Max Value =	104.5	10.0
Period Min Value =	76.9	5.2
Period Totals =	2.13E+3	1.74E+2
Period % Recovery =	100.0	100.0

Data Summary Report

Company:	Covanta Lee, Inc. 10500 Buchingham Road Fort Myers, FL 33905
Data Group:	U3_1 HOUR DATA
Report Name:	No Title
Start of Report:	11/13/2007 00:00
End of Report:	11/13/2007 23:59

Validation: All Available Data

Group#-Channel#	G9-C29	G9-C30
Long Descrip.	U3 1 HR F	U3 1 HR F
Short Descrip.	NO-FTIR	NO2-FTIR
Units	ppm	ppm
Range	0-500	0-500
11/13/2007 00:00	58.7	4.1
11/13/2007 01:00	60.9	4.5
11/13/2007 02:00	61.5	5.3
11/13/2007 03:00	64.8	5.8
11/13/2007 04:00	53.0	8.3
11/13/2007 05:00	59.9	5.3
11/13/2007 06:00	60.5	3.7
11/13/2007 07:00	63.6 <	4.3 <
11/13/2007 08:00	62.2	3.8
11/13/2007 09:00	66.0	3.6
11/13/2007 10:00	59.0	4.1
11/13/2007 11:00	60.4	4.0
11/13/2007 12:00	60.0	3.3
11/13/2007 13:00	55.0	3.6
11/13/2007 14:00	59.5	6.9
11/13/2007 15:00	61.3	3.4
11/13/2007 16:00	64.5	3.6
11/13/2007 17:00	68.2	3.0
11/13/2007 18:00	67.4	3.3
11/13/2007 19:00	71.5	3.3
11/13/2007 20:00	67.8	4.5
11/13/2007 21:00	52.5	1.7
11/13/2007 22:00	68.3	4.1
11/13/2007 23:00	63.9	3.3
Period Average =	62.1	4.2
Period Max Value =	71.5	8.3
Period Min Value =	52.5	1.7
Period Totals =	1.49E+3	1.00E+2
Period % Recovery =	100.0	100.0