

# Memorandum

To Brian Bahor, Joe Walsh Page 1  
 CC Project File  
 Subject Covanta Alexandria - Preliminary Modeling Summary  
 From Jim Slack   
 Date July 21, 2015

This memorandum summarizes the results of the preliminary dispersion modeling analysis that AECOM conducted to evaluate the effect of a potential new apartment building complex on air quality impacts associated with actual and potential emissions from the Covanta Alexandria facility.

**Overview**

Modeling was conducted for facility NO<sub>x</sub>, SO<sub>2</sub>, CO, PM<sub>10</sub>, and PM<sub>2.5</sub> actual and potential emissions (see Table 1 below) using USEPA’s current version of AERMOD and with five years of meteorological data from the nearby Regan airport. The USEPA-approved Tier 2 default approach was used to determine ambient NO<sub>2</sub> concentrations (80% conversion of NO<sub>x</sub> emissions to ambient NO<sub>2</sub> concentrations for the 1-hour averaging period and 75% conversion for the annual averaging period). Representative background concentrations obtained from USEPA’s AirData database were added to the model results for comparison to the National Ambient Air Quality Standards (NAAQS).

**Table 1 – Emission Rates used in the Modeling Analysis**

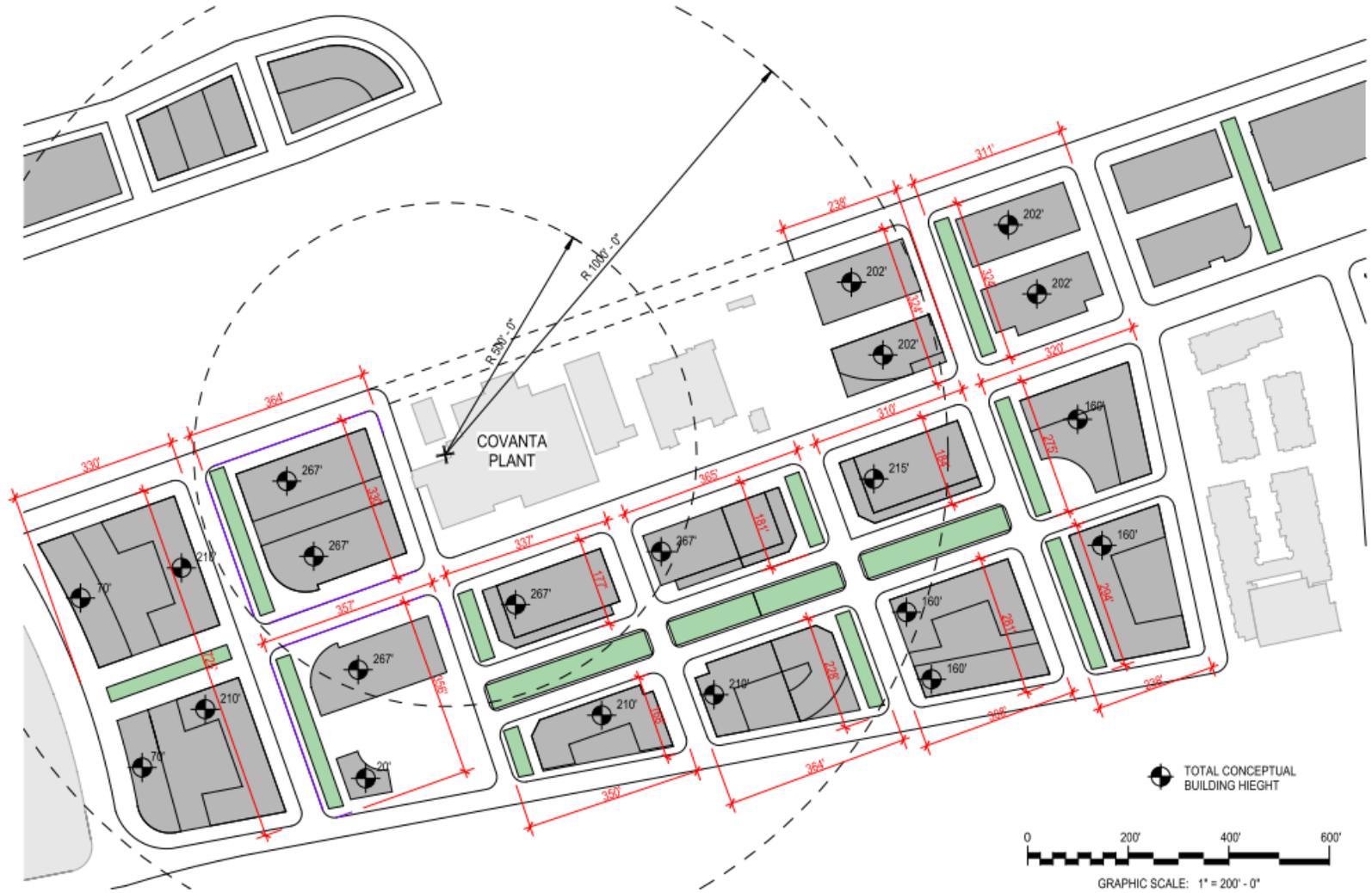
Pollutant	Emission Rate for Single Unit at Full Load (lb/hr)		Basis for Potential Emission Rate
	Actual <sup>(1)</sup>	Potential	
NO <sub>x</sub>	43.4	67.1	Based on permit limit of 0.55 lb/mmBtu and design heat input of 122 mmBtu/hr per unit
SO <sub>2</sub>	0.52	16.6	Permit limit
CO	6.63	68.5	Permit limit
PM <sub>10</sub> <sup>(1)</sup>	0.191	8.54	Based on permit limit of 0.07 lb/mmBtu and design heat input of 122 mmBtu/hr per unit
PM <sub>2.5</sub> <sup>(2)</sup>	1.11	1.11	There is no permit limit for PM <sub>2.5</sub> ; it was assumed that potential emissions were equal to actual emissions

(1) From 2014 stack test

Figure 1 – Apartment Complex Layout

EISENHOWER WEST SMALL AREA PLAN  
05/05/15

COVANTA DATA



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Modeling was conducted for the following scenarios:

- Base case – no apartment building complex (ground level receptors only)
- Future case 1 – effect of apartment building complex on dispersion (downwash), starting with a maximum height of 267 feet (see Figure 1); additional modeling was conducted at increasingly lower building heights until compliance with the NAAQS was demonstrated (ground level receptors)
- Future case 2 – same as future case 1 except that elevated (or flagpole) receptors were modeled; receptors were located on the faces of the apartment complex buildings at different elevations from ground level to the top of the building. This case was evaluated because NAAQS compliance must be demonstrated at all ambient air locations, including balconies and rooftops of buildings that are accessible to the public.

## Results

Model concentrations associated with Covanta Alexandria sources were added to representative background concentrations and the totals were compared to the NAAQS. The results of the modeling analysis are summarized in the following tables.

### Preliminary Modeling Results – Actual Emissions, Ground Level Receptors

Pollutant	Averaging Period	Modeling Scenario	Concentration ( $\mu\text{g}/\text{m}^3$ )			NAAQS
			Modeled: Covanta Alexandria	Background	Total	
NO <sub>2</sub>	1-hr	Base Case	36.7	110.1	146.8	188
		w/ 267-ft bldgs.	331.5	110.1	<b>441.6</b>	
		w/ 100-ft bldgs.	36.7	110.1	146.8	
	Annual	Base Case	1.2	25.6	26.8	100
w/ 267-ft bldgs.		21.6	25.6	47.2		
SO <sub>2</sub>	1-hr	Base Case	0.7	34.0	34.7	196
		w/ 267-ft bldgs.	6.0	34.0	40.0	
	3-hr	Base Case	0.4	31.4	31.8	1,300
		w/ 267-ft bldgs.	4.5	31.4	35.9	
CO	1-hr	Base Case	12.1	5,610.5	5,622.6	40,000
		w/ 267-ft bldgs.	109.8	5,610.5	5,720.3	
	8-hr	Base Case	4.1	4,465.6	4,469.7	10,000
		w/ 267-ft bldgs.	39.9	4,469.6	4,509.5	
PM <sub>2.5</sub>	24-hr	Base Case	0.2	22.1	22.3	35
		w/ 267-ft bldgs.	2.0	22.1	22.4	
	Annual	Base Case	0.03	8.8	8.8	12
		w/ 267-ft bldgs.	0.7	8.8	9.5	
PM <sub>10</sub>	24-hr	Base Case	0.07	35.0	35.1	150
		w/ 267-ft bldgs.	0.6	35.0	35.6	

### Preliminary Modeling Results – Maximum Potential Emissions, Ground Level Receptors

Pollutant	Averaging Period	Modeling Scenario	Concentration ( $\mu\text{g}/\text{m}^3$ )			
			Modeled: Covanta Alexandria	Background	Total	NAAQS
NO <sub>2</sub>	1-hr	Base Case	56.7	110.1	166.8	188
		w/ 267-ft bldgs.	512.5	110.1	<b>622.6</b>	
		w/ 100-ft bldgs.	56.7	110.1	166.8	
	Annual	Base Case	1.9	25.6	27.5	100
		w/ 267-ft bldgs.	33.3	25.6	59.9	
SO <sub>2</sub>	1-hr	Base Case	21.6	34.0	55.6	196
		w/ 267-ft bldgs.	191.8	34.0	<b>225.8</b>	
		w/ 100-ft bldgs.	21.6	34.0	55.6	
	3-hr	Base Case	12.2	31.4	43.6	1,300
		w/ 267-ft bldgs.	143.5	31.4	174.9	
CO	1-hr	Base Case	125.4	5,610.5	5,735.9	40,000
		w/ 267-ft bldgs.	1,134.1	5,610.5	6,744.6	
	8-hr	Base Case	42.6	4,465.5	4,508.1	10,000
		w/ 267-ft bldgs.	412.6	4,465.5	4,878.1	
PM <sub>2.5</sub>	24-hr	Base Case	1.6	22.1	23.7	35
		w/ 267-ft bldgs.	2.0	22.1	24.1	
	Annual	Base Case	0.03	8.8	9.0	12
		w/ 267-ft bldgs.	0.7	8.8	9.5	
PM <sub>10</sub>	24-hr	Base Case	3.1	35.0	38.1	150
		w/ 267-ft bldgs.	25.4	35.0	60.4	

### Preliminary Modeling Results – Actual Emissions, Elevated (Flagpole) Receptors

Pollutant	Averaging Period	Modeling Scenario	Concentration ( $\mu\text{g}/\text{m}^3$ )			
			Modeled: Covanta Alexandria	Background	Total	NAAQS
NO <sub>2</sub>	1-hr	w/ 267-ft bldgs.	3,438.5	110.1	<b>3,548.6</b>	188
		w/ 100-ft bldgs..	42.5	110.1	152.6	
	Annual	w/ 267-ft bldgs.	94.9	25.6	<b>120.5</b>	100
		w/ 100-ft bldgs.	1.1	25.6	26.7	
SO <sub>2</sub>	1-hr	w/ 267-ft bldgs.	57.3	34.0	91.3	196
	3-hr	w/ 267-ft bldgs.	43.8	31.4	75.2	1,300
CO	1-hr	w/ 267-ft bldgs.	887.2	5,610.5	6,497.7	40,000
	8-hr	w/ 267-ft bldgs.	340.2	4,469.6	4,805.7	10,000
PM <sub>2.5</sub>	24-hr	w/ 267-ft bldgs.	17.8	22.1	<b>39.9</b>	35
		w/ 100-ft bldgs.	0.2	22.1	22.3	
	Annual	w/ 267-ft bldgs.	0.3	8.8	9.1	12
PM <sub>10</sub>	24-hr	w/ 267-ft bldgs.	4.8	35.0	39.8	150

### Preliminary Modeling Results – Potential Emissions, Elevated (Flagpole) Receptors

Pollutant	Averaging Period	Modeling Scenario	Concentration ( $\mu\text{g}/\text{m}^3$ )			
			Modeled: Covanta Alexandria	Background	Total	NAAQS
NO <sub>2</sub>	1-hr	w/ 267-ft bldgs.	5,316.2	110.1	<b>5,426.3</b>	188
		w/ 100-ft bldgs.	65.7	110.1	175.8	
	Annual	w/ 267-ft bldgs.	146.7	25.6	<b>172.3</b>	100
		w/ 100-ft bldgs.	1.7	25.6	27.3	
SO <sub>2</sub>	1-hr	w/ 267-ft bldgs.	1,830.7	34.0	<b>1,864.7</b>	196
		w/ 100-ft bldgs.	23.3	34.0	57.3	
	3-hr	w/ 267-ft bldgs.	1,399.0	31.4	<b>1,430.4</b>	1,300
		w/ 100-ft bldgs.	21.3	31.4	52.7	
CO	1-hr	w/ 267-ft bldgs.	9,166.4	5,610.5	14,776.9	40,000
	8-hr	w/ 267-ft bldgs.	3,515.3	4,469.6	7,980.9	10,000
PM <sub>2.5</sub>	24-hr	w/ 267-ft bldgs.	17.8	22.1	<b>39.9</b>	35
		w/ 100-ft bldgs.	0.2	22.1	22.3	
	Annual	w/ 267-ft bldgs.	2.3	8.8	11.1	12
PM <sub>10</sub>	24-hr	w/ 267-ft bldgs.	216.1	35.0	<b>251.1</b>	150
		w/ 100-ft bldgs.	4.4	35.0	39.4	

## Discussion

- Base Case - Compliance with the NAAQS is demonstrated based on the use of actual and potential emissions.
- Scenario 1 – Ground level receptors - Compliance with the NAAQS is demonstrated for both actual and potential emissions for all pollutants and averaging periods with the following exceptions:
  - 1-hour NO<sub>2</sub> (actual and potential emission rates)
  - 1-hour SO<sub>2</sub> (potential emission rates)
- Scenario 2 – Elevated (flagpole) receptors - Compliance with the NAAQS is demonstrated for both actual and potential emissions for all pollutants and averaging periods with the following exceptions:
  - 1-hour and annual NO<sub>2</sub> (actual and potential emission rates)
  - 1-hour and 3-hour SO<sub>2</sub> (potential emission rates)
  - 24-hour PM<sub>2.5</sub> (actual and potential emission rates)
  - 24-hour PM<sub>10</sub> (potential emission rates)

All cases where modeled total concentrations were above the NAAQS were brought into compliance by reducing the maximum height of the apartment complex buildings to 100 feet.