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SHAWN M. LATOURETTE
Commissioner

October 18, 2021

Patricia Earls.
New Jersey Regional Manager
Covanta Essex Company
183 Raymond Boulevard
Newark, New Jersey 07105-4798

RE: Air Quality Modeling Report of Iodine Emissions Assessment Administrative Constent Order
EA ID#200001-07736 Covanta Essex Company, Program Interest #07736

Dear Ms. Earls:

Attached please find the Department's Air Quality Modeling Report of Iodine Emissions Assessment.

Should you have any questions concerning this letter, please contact Mr. Scott Michenfelder of My Staffof my staff at (973)656-4444.

Sincerely,

Jeffrey Meyer, Manager
Bureau of Air Compliance &
Enforcement-Northern

CC: Richelle Wormley-Air Enforcement
Francis Steitz-Director AQES
Kenneth Ratzman- Assissant Director Air Quality
Sharon Davis – Manager, Bureau of Evaluation and Planning

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FRANCIS C. STEITZ
Director

MEMORANDUM

TO: Richelle Wormley, Director
Division of Air Enforcement

THROUGH: Francis C. Steitz, Director
Division of Air Quality

FROM: Ken Ratzman, Assistant Director
Division of Air Quality

SUBJECT: Air Quality Modeling Report for Iodine Emissions Assessment
Administrative Consent Order (ACO) EA ID# 200001-07736
Covanta Essex Company, Newark, Essex County; Program Interest # 07736

DATE: October 7, 2021

Covanta Essex Company (Covanta Essex) operates the Essex County Resource Recovery Facility (the Essex Facility) under an approved Title V operating permit. The Essex Facility is an energy-from-waste facility consisting of three identical Municipal Waste Combustion (MWC) units. Each unit has its own flue, and all three flues vent into a single 279 feet tall stack. For 11 days from January 2019 to February 2020, purple plume opacity events occurred at the exhaust stack. An ACO was then issued requiring Covanta Essex to conduct air quality modeling and risk assessment for the emissions of iodine, as well as sulfur dioxide (SO_2), hydriodic acid (HI), and sulfuric acid (H_2SO_4) during the plume opacity events.

Modeling of each plume opacity event was conduct with the latest version of the AERMOD model. The maximum pollutant concentrations associated with all opacity events across the entire modeling receptor grid were identified and compared to the corresponding health benchmarks. The emissions assessment shows that the iodine plume events resulted in negligible impacts to the neighboring community. The percent of the predicted maximum concentration for each pollutant relative to the established health benchmarks is provided below.

- Iodine: maximum impact is approximately 15 to 63% of benchmarks;
- SO_2: maximum impact is 3.6% of benchmark;
- HI: maximum impact is 0.27% of benchmark;

- H_2SO_4: maximum impact is almost 9% of the benchmark.

Attached is the summary of the air quality modeling and risk assessment.

c: K. Ratzman, DAQ
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DRAFT

Bureau of Evaluation and Planning's Iodine Emission Air Quality Impact Assessment for COVANTA Essex Company (PI 07736)
September 2021

Facility Description

Covanta Essex Company (Covanta Essex) operates the Essex County Resource Recovery Facility under an approved Title V operating permit. The Covanta Essex Facility is an energy-from-waste facility consisting of three identical Municipal Waste Combustion (MWC) units. Each unit has its own flue, and all three flues vent into a single 279 feet tall stack. Each MWC unit includes the following steam generation equipment: an economizer, main steam drum, waterwalls (water-filled tubes that line the combustion chamber), a bank evaporator, a superheater, a spray attemperator, safety valves and blowdown tanks. The main building at the facility houses the tipping hall, the refuse storage bunker, the boiler, two turbine-generators rated at 36 megawatts (MW) each, residue processing, residue bunker, ferrous and non-ferrous metal storage areas, and administrative offices. The facility is located at 183 Raymond Boulevard, just off of U.S. Route 1/9 and the New Jersey Turnpike, in Newark, NJ.

For 11 days from January 2019 to February 2020, purple plume opacity events occurred at the exhaust stack. An Administrative Consent Order (ACO) was then issued requiring Covanta Essex to conduct air quality modeling and risk assessment for its emissions of iodine, as well as sulfur dioxide (SO_2), hydriodic acid (HI), and sulfuric acid (H_2SO_4) during the plume opacity events.

At the time of the iodine plume assessment required by the ACO, the Department did not have an established health benchmark for iodine. Upon review of the available data, the NYSDEC Short-Term Guideline Concentration (SGC) for iodine of 100 $\mu g/m^3$ was approved by the Bureau of Evaluation and Planning for Covanta Essex to use as the iodine short-term health benchmark. Because of uncertainty with how the NYSDEC SGC was derived, the Department's Division of Science and Research also recommended a short-term 1-hour inhalation concentration of 25 $\mu g/m^3$ (memorandum dated February 19, 2021).

A similar review was conducted for hydriodic acid (HI), and a concentration value of 5,200 ug/m^3 was approved as the HI short-term health benchmark.

Stack Modeling Parameters and Pollutant Emission Rates

Green Toxicology LLC analyzed continuous emissions monitoring system (CEMS) opacity data for the purple plume opacity events that occurred over 11 separate days. Hourly iodine emission rates during the opacity events were conservatively estimated based on the opacity readings.

The Covanta Essex stack contains 3 flues (each with a diameter of 7.54 feet), one for each MWC unit. Table 1 lists the other stack parameters and pollutant emission rates used in the air dispersion modeling during the purple plume events. An equivalent diameter of 10.7 feet was

modeled for events when two MWC units were firing (1/14/2019 & 2/5/2020), and an equivalent diameter of 13.1 feet was modeled when all three MWC units were firing (9 of the 11 dates).

Table 1. Stack Modeling Parameters and Emission Rates

Event Date	Event Start Time[1]	Meteorological Hours Modeled[2] (Hr 1, Hr 2)	Iodine Emission Rate (g/sec)	SO_2 Emission Rate (g/sec)	HI Emission Rate (g/sec)	H_2SO_4 Emission Rate (g/sec)	Stack Temp (K)	Exit Velocity (m/sec)
01_14_2019[3]	16:10[3]	17, 18, 19	15.4	12.2	24.6	18.4	430.4	27.3
1_28_2019	17:25	18, 19	15.2	8.2	16.5	12.2	425.6	27.5
5_2_2019	15:53	16, 17	4.8	15.3	30.9	23.1	422.1	24.3
6_3_2019	18:56	19, 20	18.6	21.5	43.2	32.2	417.0	21.0
6_16_2019	4:03	05, 06	4.4	11.4	23.0	17.2	422.2	24.6
6_19_2019	12:24	13, 14	54.1	14.4	30.2	21.9	424.2	25.4
6_24_2019	5:08	06, 07	15.0	15.4	31.1	23.2	421.5	25.1
8_7_2019	9:40	10, 11	5.5	12.2	24.5	18.3	419.1	25.8
9_20_2019	18:04	19, 20	5.8	11.6	23.3	17.4	424.0	26.5
10_10_2019	14:46	15, 16	12.4	11.9	24.0	17.9	423.6	25.3
2_5_2020	18:52	19, 20	3.7	4.2	8.5	6.4	424.3	25.0
	Stack Height:	85.039 m						

Notes:
(1) 24-hour time.
(2) Meteorological hours run from 01-24 such that 0:00 = meteorological hour 01 and 23:00 = meteorological hour 24.
(3) Three hours were modeled for this day to fully capture in the model the span of events that began and 17:12 and 16:10 for Units 2 and 3, respectively.

Modeling Methodology

Modeling was conducted using AERMOD model, version 21112. Regulatory default options were used. Land use in the vicinity of the facility was determined to be urban. A Cartesian receptor grid consisting of 4,222 receptors was used. The BPIP-PRIME program was used to assess the building downwash effect. Covanta Essex processed meteorological data suitable for AERMOD modeling for 2019 and 2020, using surface meteorological data from the National Weather Service site at the Newark International Airport and concurrent upper air data from Brookhaven, New York.

Results of Modeling and Risk Assessment

AERMOD modeling was conducted for each event day/meteorological period with the corresponding stack parameters and emission rates as listed in Table 1. The maximum 1-hour average pollutant concentrations associated with each event modeled across the entire receptor grid are summarized in Table 2. The maximum pollutant concentrations over all events are summarized in Table 3 for comparison with the health benchmarks. Results indicate that the maximum impact of each pollutant modeled is below the health benchmark(s).

Table 2. Maximum Modeled Impact for Each Event Day

Date	Modeled Maximum 1-Hour Unit Emission Rate (1 g/s) Concentration ($\mu g/m^3$)	Maximum 1-Hour Concentration ($\mu g/m^3$)			
		Iodine	SO_2	HI	H_2SO_4
01_14_19	0.272	4.20	3.32	6.70	5.01
01_28_19	0.135	2.06	1.11	2.23	1.65
05_02_19	0.340	1.63	5.21	10.51	7.86
06_03_19	0.092	1.71	1.98	3.97	2.96
06_16_19	0.135	0.59	1.53	3.10	2.31
06_19_19	0.290	**15.66**	4.17	8.74	6.34
06_24_19	0.442	6.63	6.81	13.76	10.26
08_07_19	0.498	2.74	6.08	12.20	9.11
09_20_19	0.178	1.03	2.07	4.15	3.10
10_10_19	0.585	7.25	**6.96**	**14.04**	**10.47**
02_05_20	0.322	1.19	1.35	2.73	2.06

Table 3. Maximum Modeled Impact for All Event Days

Pollutant	Maximum 1-Hour Concentration ($\mu g/m^3$)	Inhalation Risk Benchmark ($\mu g/m^3$)	% of Benchmark	Benchmark Reference
Iodine	15.66	100	15.7%	NYSDEC[a]
		25	62.6%	NJDEP/DSR[b]
SO_2	6.96	196	3.6%	NAAQS
HI	14.04	5,200	0.27%	PAC-1[c]
H_2SO_4	10.47	120	8.72%	NJDEP

a) New York State Dept. of Environmental Conservation Short-Term Guideline Concentration
b) New Jersey Dept. of Environmental Protection Short-term Inhalation Concentration, Division of Science and Research memorandum, dated February 19, 2021.
c) U.S. Department of Energy Protective Action Criteria