AIR QUALITY PROGRAM
301 39TH STREET
PITTSBURGH, PA 15201

Modeling Review of Invenergy LLC (Invenergy) Final Natural Gas Combined-Cycle Power Plant Installation Permit

TO:

Sandra Etzel, Chief, Planning and Data Analysis Section
JoAnn Truchan, Chief, Permitting Section
Bernadette Lipari, Permitting Section

FROM:

Shaun Vozar, Planning and Data Analysis Section

DATE:

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Introduction

On March 21, 2019, the Allegheny County Health Department (ACHD) Air Quality Program received an installation permit application for a new combined-cycle power plant in Elizabeth Township, Allegheny County, Pennsylvania. Modeled results for the proposed installation were received on the same day. This Application included a complete review of air quality regulations that apply to the emission units associated with proposed installation. These regulations include regulations implemented and enforced by the United States Environmental Protection Agency (EPA) as well as regulations that ACHD implements and enforces.

A modeling protocol for the potential air quality impacts created by the proposed installation was submitted by ALL4INC on behalf of Invenergy on January 21, 2019 and approved by ACHD in February 2019. ALL4INC performed the modeling on behalf of Invenergy. All modeling files used in this demonstration were submitted to ACHD for review on March 21, 2019.

Model Selection

AERMOD was selected to predict ambient air concentration from the proposed source. AERMET, the meteorological preprocessor component for AERMOD was not ran, as ACHD provided the meteorological data for years 2010-2014. Liberty onsite data was used for the surface level meteorology, and upper air data, including cloud cover data, was taken from Pittsburgh International Airport. AERMAP was used as the terrain preprocessor. Terrain elevations were assigned to discreet receptors. The AERMAP terrain preprocessor and U.S. Geological Survey (USGS) 1/3 arc-second National Elevation Dataset (NED) files were used to determine representative terrain elevations for the receptors.

Methodology

A detailed air quality modeling report was submitted as part of the proposed Installation Permit application. The air quality modeling report will review the procedures that were followed in the air quality modeling analysis. Modeling was performed by ALL4INC using the AERMOD dispersion model.

ACHD has reviewed the emission inventory on a pollutant-by-pollutant basis associated with the submitted Installation Permit and reviewed the ALL4INC's modeling using AERMOD to verify the inputs and outputs.

Receptor Grid

The following receptor grid settings were used for the impact analysis:

- 50 meters out to 2 km
- 100 meters out to 5 km
- 500 meters out to 10 km
- 10-meter fence line receptors that represents the location of fencing on the property

Source Parameters

The tables below provide the physical parameters of the sources included in the application permit modeling.

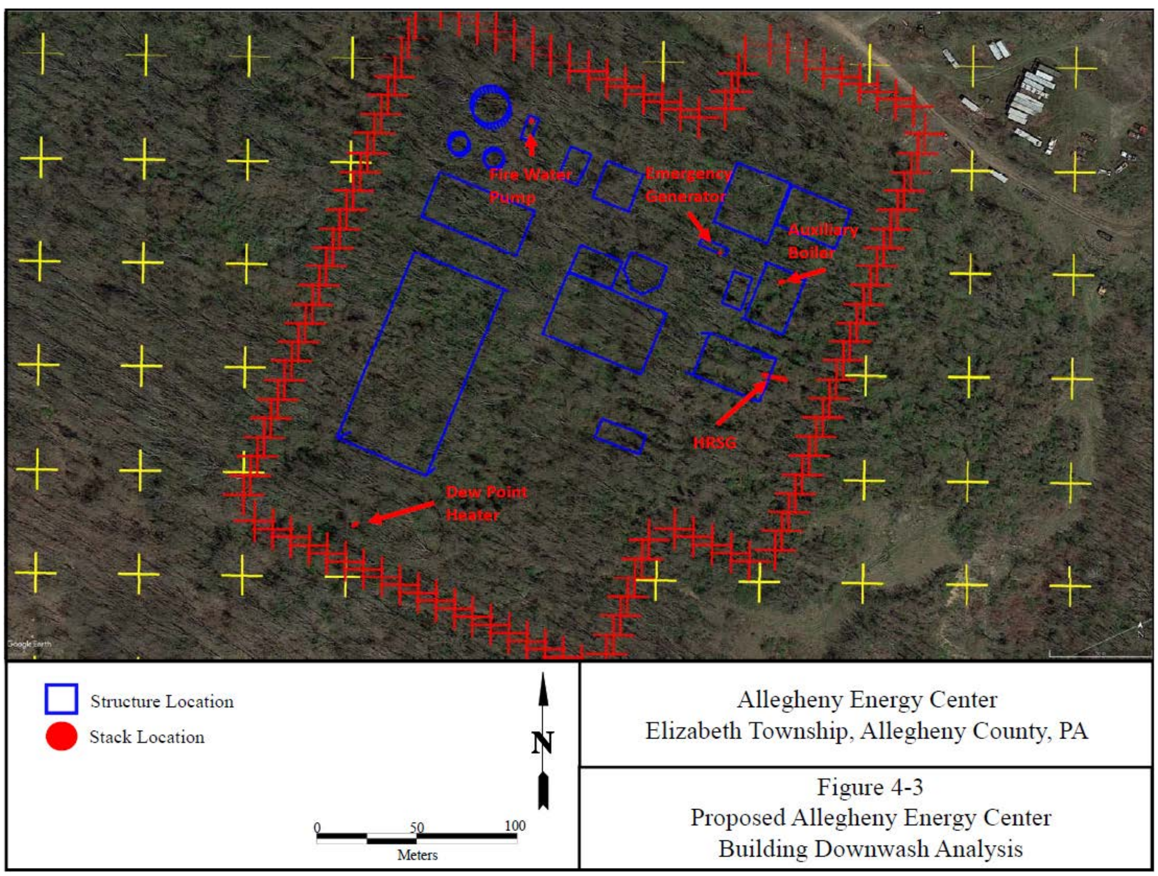
Summary of Physical Stack Characteristics
Invenergy LLC - Allegheny Energy Center

Source	UTM Easting	UTM Northing	Base Elevation	Stack Height	Stack Temperature	Stack Velocity	Stack Diameter
	(m)	(m)	(m)	(m)	(K)	(m/s)	(m)
Auxiliary Boiler	602,449.2	4,453,431.3	309.40	10.67	405.37	9.28	1.2
Dew Point Heater	602,247.0	4,453,313.1	309.40	7.62	622.04	6.35	0.5
Emergency Generator	602,419.7	4,453,445.1	309.40	4.57	753.15	46.29	0.5
Fire Water Pump	602,324.0	4,453,497.4	309.40	3.81	789.26	36.22	0.2
HRSG[(a)]	602,441.6	4,453,386.8	309.40	54.86	Various[(b)]	Various[(b)]	6.7

[(a)] The combustion turbine and the duct burners vent to a common HRSG stack.
[(b)] To be determined based on Worst Case Load Analysis.

Facility Location

Below is an aerial map showing the key modeled locations of proposed sources.



Source Emission Rates

Source emission rates differ for each modeling run. Refer to Invenergy AEC Emissions Inventory for ACHD (03-20-19) for emission rates per each pollutant and source.

Background sources for PSD NOx modeling not incorporated into the background monitor provided below:

Invenergy LLC - Allegheny Energy Center
Local Source List & Stack Parameters

Site Name/Stack	AERMOD ID	NO_x (tpy)	UTM X Coordinate (m)	UTM Y Coordinate (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	Distance to AEC (km)
BASIC CARBIDE CORP/BUENA VISTA	CARB1	0.11	602,380.01	4,457,460.32	282.00	4.27	293.15	0.001	0.30	4.07
CLAIRTON SLAG INC/WEST ELIZABETH PAVING MATL PLT	SLAG1	8.10	593,695.99	4,458,273.31	230.00	8.84	295.22	23.84	0.40	10.02
KELLY RUN SANI/MSW LDFL	KELLY1	15.63	594,649.01	4,456,398.28	355.00	10.67	1,160.93	0.80	2.03	8.35
GENON POWER MIDWEST LP/ELRAMA POWER PLT	ELRAMA	561.12	592,059.01	4,456,413.28	229.00	119.48	324.80	15.07	7.92	10.81
Eastman Chemical Resins, Inc. - BOILERS 1-2	ECRB12	0.94	593,092.57	4,457,578.88	225.00	14.33	616.48	8.70	0.70	10.25
Eastman Chemical Resins, Inc. - BOILERS 3-4	ECRB34	1.60	593,092.57	4,457,578.88	225.00	18.29	616.48	17.40	0.70	10.25
Eastman Chemical Resins, Inc. - NO. 5 TRANE BOILER	ECRB5	12.72	593,100.94	4,457,590.09	225.00	22.25	560.93	15.90	0.91	10.24
Eastman Chemical Resins, Inc. - HOT OIL HEATER, NG	ECRHOH	1.83	593,092.57	4,457,578.88	225.00	6.10	616.48	7.45	0.34	10.25
Eastman Chemical Resins, Inc. - LTC Unit #1	ECRLTC1	1.02	593,092.57	4,457,578.88	225.00	6.10	810.78	16.76	0.30	10.25
Eastman Chemical Resins, Inc. - LTC Unit #2	ECRLTC2	1.11	593,092.57	4,457,578.88	225.00	6.10	616.33	23.77	0.30	10.25
Eastman Chemical Resins, Inc. - Thermal Oxidizer	ECRTO	11.42	593,092.57	4,457,578.88	225.00	15.24	293.15	0.12	0.24	10.25
Eastman Chemical Resins, Inc. - Misc. NG	ECRMNG	0.93	593,092.57	4,457,578.88	225.00	3.05	293.15	0.01	0.03	10.25
Eastman Chemical Resins, Inc. - Hydro Unit Heater, NG	ECRHNG	1.79	593,092.57	4,457,578.88	225.00	6.10	293.15	34.74	0.06	10.25
Eastman Chemical Resins, Inc. - Vehicle Exhaust	ECRVE	3.62	593,092.57	4,457,578.88	225.00	6.10	293.15	0.01	0.03	10.25
Peoples Natural Gas Co/WALL Comp. Station	PNGCS	42.50	595,188.70	4,453,823.64	318.00	6.10	293.15	0.01	0.24	7.27
US STEEL IRVIN Boiler #1	IRBLR1	19.9725	593,149.00	4,465,476.00	287.00	19.50	635.38	10.23	1.10	15.25
US STEEL IRVIN Boiler #2	IRBLR2	23.4439	593,171.00	4,465,165.00	287.00	21.94	537.05	8.00	1.28	14.99
US STEEL IRVIN Boilers #3-4	IRBLR3	12.6494	593,419.00	4,465,596.00	287.00	22.86	644.26	9.70	1.42	15.18
US STEEL IRVIN 80" Mill Reheat Furnace 1	IR80IN1	130.2518	593,177.00	4,465,871.00	287.00	20.00	710.38	29.43	1.98	15.55
US STEEL IRVIN 80" Mill Reheat Furnace 2	IR80IN2	129.5317	593,178.00	4,465,884.00	287.00	20.00	710.38	29.43	1.98	15.56
US STEEL IRVIN 80" Mill Reheat Furnace 3	IR80IN3	121.4517	593,179.00	4,465,896.00	287.00	20.00	710.38	29.43	1.98	15.57
US STEEL IRVIN 80" Mill Reheat Furnace 4	IR80IN4	132.4266	593,180.00	4,465,909.00	287.00	20.00	710.38	29.43	1.98	15.58
US STEEL IRVIN 80" Mill Reheat Furnace 5	IR80IN5	120.0247	593,181.00	4,465,923.00	287.00	20.00	710.38	29.43	1.98	15.59
US STEEL IRVIN 80" Mill Reheat Waste Stack 6	IR80INW	13.2347	593,243.00	4,465,922.00	287.00	28.34	710.38	29.43	1.82	15.55
US STEEL IRVIN #1 Galv Line Preheat	IRGALV1	4.091	593,352.00	4,465,406.00	287.00	25.30	944.26	9.48	1.42	15.07
US STEEL IRVIN #2 Galv Line Preheat	IRGALV2	4.8934	593,350.00	4,465,386.00	287.00	26.82	944.26	2.66	1.37	15.05
US STEEL IRVIN HPH Annealing Furnaces (seg a)	IRHPH_a	3.3062714	593,328.56	4,465,585.48	287.00	21.33	527.60	10.00	0.76	15.23
US STEEL IRVIN HPH Annealing Furnaces (seg b)	IRHPH_b	3.3062714	593,325.15	4,465,553.51	287.00	21.33	527.60	10.00	0.76	15.20
US STEEL IRVIN HPH Annealing Furnaces (seg c)	IRHPH_c	3.3062714	593,321.76	4,465,521.64	287.00	21.33	527.60	10.00	0.76	15.18
US STEEL IRVIN HPH Annealing Furnaces (seg d)	IRHPH_d	3.3062714	593,318.44	4,465,489.75	287.00	21.33	527.60	10.00	0.76	15.16
US STEEL IRVIN HPH Annealing Furnaces (seg e)	IRHPH_e	3.3062714	593,315.27	4,465,457.80	287.00	21.33	527.60	10.00	0.76	15.13
US STEEL IRVIN HPH Annealing Furnaces (seg f)	IRHPH_f	3.3062714	593,311.57	4,465,425.87	287.00	21.33	527.60	10.00	0.76	15.11
US STEEL IRVIN HPH Annealing Furnaces (seg g)	IRHPH_g	3.3062714	593,308.19	4,465,393.98	287.00	21.33	527.60	10.00	0.76	15.09
US STEEL IRVIN Open Coil Annealing	IROCA	13.7173	593,335.00	4,465,243.00	287.00	21.33	310.94	10.52	2.96	14.95
US STEEL IRVIN Continuous Annealing	IRCONTA	6.0931	593,341.00	4,464,903.00	287.00	36.57	513.72	10.52	1.07	14.68
US STEEL IRVIN Peach Tree Flare A&B	IRPTF	4.4282	592,868.00	4,464,808.00	333.00	18.28	1,273.00	20.00	0.63	14.90
US STEEL IRVIN COG Flares 1-3	IRCOGF	2.7033	593,237.00	4,464,601.00	287.00	8.99	1,273.00	20.00	0.63	14.51
US STEEL CLAIRTON Quench Tower 1	CLQNCH1	0.69	595,964.00	4,461,731.00	231.00	30.48	358.49	3.54	6.80	10.56
US STEEL CLAIRTON Quench Tower 5	CLQNCH5	0.93	595,472.00	4,462,078.00	231.00	30.48	358.49	3.54	7.10	11.14
US STEEL CLAIRTON Quench Tower 7	CLQNCH7	1.05	595,430.00	4,462,047.00	231.00	37.18	362.77	2.99	8.81	11.14
US STEEL CLAIRTON Quench Tower B	CLQNCHB	0.87	595,460.00	4,462,374.00	231.00	41.15	368.55	4.30	9.51	11.38
US STEEL CLAIRTON Quench Tower C	CLQNCHC	0.00	595,622.00	4,462,186.00	231.00	50.00	378.00	3.66	12.67	11.13
US STEEL CLAIRTON Quench Tower 5A	CLQNCH5A	0.00	595,223.00	4,462,366.00	231.00	50.00	378.00	3.66	12.67	11.52
US STEEL CLAIRTON Quench Tower 7A	CLQNCH7A	0.00	595,188.00	4,462,316.00	231.00	50.00	378.00	3.66	12.67	11.50
US STEEL CLAIRTON PEC Baghouse 1-3 (seg a)	CLPEC1a	5.65	595,865.75	4,461,872.18	231.00	24.99	324.83	8.84	1.22	10.74
US STEEL CLAIRTON PEC Baghouse 1-3 (seg b)	CLPEC1b	5.65	595,861.10	4,461,877.19	231.00	24.99	324.83	8.84	1.22	10.74
US STEEL CLAIRTON PEC Baghouse 1-3 (seg c)	CLPEC1c	5.65	595,856.39	4,461,882.39	231.00	24.99	324.83	8.84	1.22	10.75
US STEEL CLAIRTON PEC Baghouse 13-15 (seg a)	CLPEC13a	7.34	595,324.70	4,462,210.47	231.00	24.99	324.83	16.95	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 13-15 (seg b)	CLPEC13b	7.34	595,320.28	4,462,215.54	231.00	24.99	324.83	16.95	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 13-15 (seg c)	CLPEC13c	7.34	595,315.94	4,462,220.42	231.00	24.99	324.83	16.95	0.91	11.35
US STEEL CLAIRTON PEC Baghouse 19-20 (seg a)	CLPEC19a	8.28	595,319.97	4,462,206.37	231.00	24.99	304.83	15.60	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 19-20 (seg b)	CLPEC19b	8.28	595,315.54	4,462,211.35	231.00	24.99	304.83	15.60	0.91	11.34
US STEEL CLAIRTON PEC Baghouse 19-20 (seg c)	CLPEC19c	8.28	595,311.02	4,462,216.53	231.00	24.99	304.83	15.60	0.91	11.35
US STEEL CLAIRTON PEC Baghouse B (seg a)	CLPECBa	3.68	595,439.48	4,462,426.08	231.00	15.54	324.83	13.78	1.22	11.43
US STEEL CLAIRTON PEC Baghouse B (seg b)	CLPECBb	3.68	595,430.87	4,462,433.71	231.00	15.54	324.83	13.78	1.22	11.45
US STEEL CLAIRTON PEC Baghouse B (seg c)	CLPECBc	3.68	595,420.91	4,462,441.34	231.00	15.54	324.83	13.78	1.22	11.46
US STEEL CLAIRTON PEC Baghouse C	CLPECC	0.00	595,678.00	4,462,007.00	231.00	30.00	328.20	15.10	2.49	10.96

Invenergy LLC - Allegheny Energy Center
Local Source List & Stack Parameters

Site Name/Stack	AERMOD ID	NO_X (tpy)	UTM X Coordinate (m)	UTM Y Coordinate (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	Distance to AEC (km)
US STEEL CLAIRTON Battery 1 Underfiring	CLCOMB1	192.13	595,871.00	4,461,845.00	231.00	68.58	526.49	7.59	2.44	10.71
US STEEL CLAIRTON Battery 2 Underfiring	CLCOMB2	181.10	595,866.00	4,461,852.00	231.00	68.58	534.27	7.71	2.44	10.72
US STEEL CLAIRTON Battery 3 Underfiring	CLCOMB3	198.62	595,742.00	4,461,989.00	231.00	68.58	539.27	7.38	2.44	10.90
US STEEL CLAIRTON Battery 13 Underfiring	CLCOMB13	129.75	595,389.00	4,462,164.00	231.00	68.58	535.38	4.48	3.05	11.26
US STEEL CLAIRTON Battery 14 Underfiring	CLCOMB14	121.81	595,380.00	4,462,174.00	231.00	68.58	536.49	4.30	3.05	11.27
US STEEL CLAIRTON Battery 15 Underfiring	CLCOMB15	152.02	595,253.00	4,462,318.00	231.00	68.58	541.49	4.48	3.05	11.46
US STEEL CLAIRTON Battery 19 Underfiring	CLCOMB19	339.26	595,273.00	4,462,117.00	231.00	76.20	519.27	3.72	4.72	11.30
US STEEL CLAIRTON Battery 20 Underfiring	CLCOMB20	546.23	595,258.00	4,462,134.00	231.00	76.20	542.05	4.27	4.72	11.32
US STEEL CLAIRTON B Battery Underfiring	CLCOMBB	371.80	595,477.00	4,462,406.00	231.00	96.01	515.38	5.06	4.95	11.40
US STEEL CLAIRTON C Battery Underfiring	CLCOMBC	0.00	595,768.00	4,462,126.00	231.00	98.14	503.20	5.81	3.66	11.00
US STEEL CLAIRTON Boiler 1	CLBLR1	455.29	595,004.00	4,462,714.00	231.00	57.91	457.60	29.56	2.67	11.93
US STEEL CLAIRTON Boiler 2	CLBLR2	170.92	594,989.00	4,462,717.00	231.00	57.91	437.05	21.94	2.13	11.94
US STEEL CLAIRTON Boiler R1	CLBLRR1	6.09	594,892.00	4,462,604.00	231.00	50.29	524.27	7.47	2.59	11.91
US STEEL CLAIRTON Boiler R2	CLBLRR2	4.21	594,892.00	4,462,604.00	231.00	50.29	524.27	7.47	2.59	11.91
US STEEL CLAIRTON Boiler T1	CLBLRT1	14.32	594,845.00	4,462,563.00	231.00	26.52	544.27	9.05	1.46	11.91
US STEEL CLAIRTON Boiler T2	CLBLRT2	10.85	594,837.00	4,462,569.00	231.00	26.52	543.16	9.05	1.46	11.92
US STEEL CLAIRTON SCOT Incinerator	CLSCOT	0.90	595,575.00	4,462,036.00	231.00	45.72	638.16	17.43	1.17	11.04
US STEEL CLAIRTON Misc. Flaring	CLFLARE	19.81	595,580.00	4,462,050.00	231.00	8.26	1,273.00	20.00	0.63	11.05
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S1	0.03141	595,736.56	4,461,971.88	231.00	10.50	1,366.49	6.10	0.46	10.89
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S2	0.03141	595,753.45	4,461,952.91	231.00	10.50	1,366.49	6.10	0.46	10.87
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S3	0.03141	595,770.35	4,461,933.93	231.00	10.50	1,366.49	6.10	0.46	10.84
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S4	0.03141	595,787.25	4,461,914.95	231.00	10.50	1,366.49	6.10	0.46	10.82
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S5	0.03141	595,804.15	4,461,895.97	231.00	10.50	1,366.49	6.10	0.46	10.79
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S6	0.03141	595,821.05	4,461,876.99	231.00	10.50	1,366.49	6.10	0.46	10.77
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S7	0.03141	595,837.95	4,461,858.01	231.00	10.50	1,366.49	6.10	0.46	10.74
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S8	0.03141	595,854.85	4,461,839.03	231.00	10.50	1,366.49	6.10	0.46	10.72
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S9	0.03141	595,871.75	4,461,820.05	231.00	10.50	1,366.49	6.10	0.46	10.69
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S10	0.03141	595,888.65	4,461,801.07	231.00	10.50	1,366.49	6.10	0.46	10.66
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S11	0.03141	595,905.55	4,461,782.09	231.00	10.50	1,366.49	6.10	0.46	10.64
US STEEL CLAIRTON Batteries 1-3 Soaking	CLB1S12	0.03141	595,922.44	4,461,763.12	231.00	10.50	1,366.49	6.10	0.46	10.61
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S1	0.0458	595,275.68	4,462,318.79	231.00	10.80	1,366.49	6.10	0.46	11.45
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S2	0.0458	595,293.14	4,462,299.33	231.00	10.80	1,366.49	6.10	0.46	11.43
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S3	0.0458	595,310.61	4,462,279.87	231.00	10.80	1,366.49	6.10	0.46	11.40
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S4	0.0458	595,328.07	4,462,260.42	231.00	10.80	1,366.49	6.10	0.46	11.37
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S5	0.0458	595,345.54	4,462,240.96	231.00	10.80	1,366.49	6.10	0.46	11.35
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S6	0.0458	595,363.00	4,462,221.50	231.00	10.80	1,366.49	6.10	0.46	11.32
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S7	0.0458	595,380.46	4,462,202.04	231.00	10.80	1,366.49	6.10	0.46	11.29
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S8	0.0458	595,397.93	4,462,182.58	231.00	10.80	1,366.49	6.10	0.46	11.27
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S9	0.0458	595,415.39	4,462,163.13	231.00	10.80	1,366.49	6.10	0.46	11.24
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S10	0.0458	595,432.86	4,462,143.67	231.00	10.80	1,366.49	6.10	0.46	11.22
US STEEL CLAIRTON Batteries 13-15 Soaking	CLB13S11	0.0458	595,450.32	4,462,124.21	231.00	10.80	1,366.49	6.10	0.46	11.19
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S1	0.0569	595,232.65	4,462,250.77	231.00	12.50	1,366.49	6.10	0.46	11.43
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S2	0.0569	595,250.06	4,462,231.15	231.00	12.50	1,366.49	6.10	0.46	11.40
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S3	0.0569	595,267.47	4,462,211.54	231.00	12.50	1,366.49	6.10	0.46	11.37
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S4	0.0569	595,284.88	4,462,191.92	231.00	12.50	1,366.49	6.10	0.46	11.35
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S5	0.0569	595,302.29	4,462,172.31	231.00	12.50	1,366.49	6.10	0.46	11.32
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S6	0.0569	595,319.71	4,462,152.69	231.00	12.50	1,366.49	6.10	0.46	11.29
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S7	0.0569	595,337.12	4,462,133.08	231.00	12.50	1,366.49	6.10	0.46	11.27
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S8	0.0569	595,354.53	4,462,113.46	231.00	12.50	1,366.49	6.10	0.46	11.24
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S9	0.0569	595,371.94	4,462,093.85	231.00	12.50	1,366.49	6.10	0.46	11.22
US STEEL CLAIRTON Batteries 19-20 Soaking	CLB19S10	0.0569	595,389.35	4,462,074.23	231.00	12.50	1,366.49	6.10	0.46	11.19
US STEEL CLAIRTON B Battery Soaking	CLBBS1	0.0947	595,519.57	4,462,333.89	231.00	17.10	1,366.49	6.10	0.46	11.31
US STEEL CLAIRTON B Battery Soaking	CLBBS2	0.0947	595,536.28	4,462,315.20	231.00	17.10	1,366.49	6.10	0.46	11.29
US STEEL CLAIRTON B Battery Soaking	CLBBS3	0.0947	595,553.00	4,462,296.50	231.00	17.10	1,366.49	6.10	0.46	11.26
US STEEL CLAIRTON B Battery Soaking	CLBBS4	0.0947	595,569.72	4,462,277.80	231.00	17.10	1,366.49	6.10	0.46	11.24
US STEEL CLAIRTON B Battery Soaking	CLBBS5	0.0947	595,586.43	4,462,259.11	231.00	17.10	1,366.49	6.10	0.46	11.21
US STEEL CLAIRTON C Battery Soaking	CLBCS1	0.00	595,661.57	4,462,174.90	231.00	17.10	1,366.49	6.10	0.46	11.10

Invenergy LLC - Allegheny Energy Center
Local Source List & Stack Parameters

Site Name/Stack	AERMOD ID	NO_X (tpy)	UTM X Coordinate (m)	UTM Y Coordinate (m)	Elevation (m)	Stack Height (m)	Stack Temperature (K)	Stack Velocity (m/s)	Stack Diameter (m)	Distance to AEC (km)
US STEEL CLAIRTON C Battery Soaking	CLBCS2	0.00	595,676.94	4,462,157.74	231.00	17.10	1,366.49	6.10	0.46	11.08
US STEEL CLAIRTON C Battery Soaking	CLBCS3	0.00	595,692.31	4,462,140.58	231.00	17.10	1,366.49	6.10	0.46	11.05
US STEEL CLAIRTON C Battery Soaking	CLBCS4	0.00	595,707.69	4,462,123.42	231.00	17.10	1,366.49	6.10	0.46	11.03
US STEEL CLAIRTON C Battery Soaking	CLBCS5	0.00	595,723.06	4,462,106.26	231.00	17.10	1,366.49	6.10	0.46	11.01
US STEEL CLAIRTON C Battery Soaking	CLBCS6	0.00	595,738.43	4,462,089.10	231.00	17.10	1,366.49	6.10	0.46	10.98
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P1	0.03141	595,747.54	4,461,978.87	231.00	8.50	1,033.16	3.05	1.59	10.89
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P2	0.03141	595,764.17	4,461,960.08	231.00	8.50	1,033.16	3.05	1.59	10.87
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P3	0.03141	595,780.80	4,461,941.28	231.00	8.50	1,033.16	3.05	1.59	10.84
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P4	0.03141	595,797.43	4,461,922.49	231.00	8.50	1,033.16	3.05	1.59	10.82
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P5	0.03141	595,814.06	4,461,903.69	231.00	8.50	1,033.16	3.05	1.59	10.79
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P6	0.03141	595,830.69	4,461,884.90	231.00	8.50	1,033.16	3.05	1.59	10.77
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P7	0.03141	595,847.31	4,461,866.10	231.00	8.50	1,033.16	3.05	1.59	10.74
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P8	0.03141	595,863.94	4,461,847.31	231.00	8.50	1,033.16	3.05	1.59	10.72
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P9	0.03141	595,880.57	4,461,828.51	231.00	8.50	1,033.16	3.05	1.59	10.69
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P10	0.03141	595,897.20	4,461,809.72	231.00	8.50	1,033.16	3.05	1.59	10.67
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P11	0.03141	595,913.83	4,461,790.92	231.00	8.50	1,033.16	3.05	1.59	10.64
US STEEL CLAIRTON Batteries 1-3 PEC Fugitives (pushing + car)	CLB1P12	0.03141	595,930.46	4,461,772.13	231.00	8.50	1,033.16	3.05	1.59	10.62
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P1	0.0458	595,266.65	4,462,308.76	231.00	8.80	1,033.16	3.05	1.59	11.45
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P2	0.0458	595,283.82	4,462,289.41	231.00	8.80	1,033.16	3.05	1.59	11.42
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P3	0.0458	595,300.99	4,462,270.06	231.00	8.80	1,033.16	3.05	1.59	11.40
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P4	0.0458	595,318.16	4,462,250.71	231.00	8.80	1,033.16	3.05	1.59	11.37
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P5	0.0458	595,335.33	4,462,231.35	231.00	8.80	1,033.16	3.05	1.59	11.35
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P6	0.0458	595,352.50	4,462,212.00	231.00	8.80	1,033.16	3.05	1.59	11.32
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P7	0.0458	595,369.67	4,462,192.65	231.00	8.80	1,033.16	3.05	1.59	11.29
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P8	0.0458	595,386.84	4,462,173.29	231.00	8.80	1,033.16	3.05	1.59	11.27
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P9	0.0458	595,404.01	4,462,153.94	231.00	8.80	1,033.16	3.05	1.59	11.24
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P10	0.0458	595,421.18	4,462,134.59	231.00	8.80	1,033.16	3.05	1.59	11.22
US STEEL CLAIRTON Batteries 13-15 PEC Fugitives (pushing + car)	CLB13P11	0.0458	595,438.35	4,462,115.24	231.00	8.80	1,033.16	3.05	1.59	11.19
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P1	0.0569	595,243.66	4,462,257.78	231.00	10.50	1,033.16	3.05	1.59	11.42
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P2	0.0569	595,260.96	4,462,238.38	231.00	10.50	1,033.16	3.05	1.59	11.40
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P3	0.0569	595,278.26	4,462,218.99	231.00	10.50	1,033.16	3.05	1.59	11.37
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P4	0.0569	595,295.55	4,462,199.59	231.00	10.50	1,033.16	3.05	1.59	11.35
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P5	0.0569	595,312.85	4,462,180.20	231.00	10.50	1,033.16	3.05	1.59	11.32
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P6	0.0569	595,330.15	4,462,160.80	231.00	10.50	1,033.16	3.05	1.59	11.29
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P7	0.0569	595,347.45	4,462,141.41	231.00	10.50	1,033.16	3.05	1.59	11.27
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P8	0.0569	595,364.74	4,462,122.01	231.00	10.50	1,033.16	3.05	1.59	11.24
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P9	0.0569	595,382.04	4,462,102.62	231.00	10.50	1,033.16	3.05	1.59	11.22
US STEEL CLAIRTON Batteries 19-20 PEC Fugitives (pushing + car)	CLB19P10	0.0569	595,399.34	4,462,083.22	231.00	10.50	1,033.16	3.05	1.59	11.19
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP1	0.0947	595,506.60	4,462,322.92	231.00	15.10	1,033.16	3.05	1.95	11.31
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP2	0.0947	595,523.30	4,462,304.46	231.00	15.10	1,033.16	3.05	1.95	11.29
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP3	0.0947	595,540.00	4,462,286.00	231.00	15.10	1,033.16	3.05	1.95	11.26
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP4	0.0947	595,556.70	4,462,267.54	231.00	15.10	1,033.16	3.05	1.95	11.24
US STEEL CLAIRTON B Battery PEC Fugitives (pushing)	CLBBP5	0.0947	595,573.40	4,462,249.08	231.00	15.10	1,033.16	3.05	1.95	11.21
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP1	0.00	595,650.59	4,462,163.92	231.00	15.10	1,033.16	3.05	1.95	11.10
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP2	0.00	595,665.55	4,462,147.35	231.00	15.10	1,033.16	3.05	1.95	11.08
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP3	0.00	595,680.52	4,462,130.78	231.00	15.10	1,033.16	3.05	1.95	11.05
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP4	0.00	595,695.48	4,462,114.22	231.00	15.10	1,033.16	3.05	1.95	11.03
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP5	0.00	595,710.45	4,462,097.65	231.00	15.10	1,033.16	3.05	1.95	11.01
US STEEL CLAIRTON C Battery PEC Fugitives (pushing + car)	CLBCP6	0.00	595,725.41	4,462,081.08	231.00	15.10	1,033.16	3.05	1.95	10.99
NRG Cheswick Main Boiler (FGD stack)	CHESWICK	3,294.21	602,375.00	4,488,256.00	231.00	168.40	326.38	12.47	8.15	34.87

ACHD made the following refinements to All4INC's modeling analysis for NOx:

- Removed fugitive emissions from USS Clairton from the model, since they bleed into the background and can be accounted for in the background concentration.
- Removed Elrama from the model, based on ACHD's PM-2.5 SIP for the 24-hour NAAQS:
  - "ACHD presumes that these emissions, if traded under the ERC program, would not be used at the same location and have therefore not been included in this analysis."
- Refined the stack parameters for Peoples Natural Gas Company – Wall Compressor Station
  Hs = 10.668 m, Ts = 700 K, Vs = 4.60 m/s, Ds = 0.229 m
- Updated Peoples Natural Gas Company – Wall Compressor Station's Emissions from 2011 NEI value of 42.50 tpy to the 2014 NEI value of 5.614 tpy.

Air Toxics Modeling Results

ACHD verified the modeled results of the air toxics modeling as submitted by ALL4INC. To evaluate the potential inhalation health risk from the project due to air toxics emissions, the published carcinogenic and non-carcinogenic risk factors for air toxics were used. Unit risk factors (URFs) are dose-response values used to evaluate potential carcinogens. An inhalation URF is an upper bound excess lifetime carcinogenic risk estimated to result from continuous inhalation exposure to an air toxic at a concentration of 1 $\mu g/m^3$ for a lifetime. Non-carcinogenic effects are evaluated by reference concentrations (RfCs) for inhalation exposure. The RfC is an estimate of a continuous inhalation exposure concentration to people (including sensitive subgroups) that is likely to be without risk of deleterious effects during a lifetime. URF and RfC values were compiled consistent with ACHD's Policy on Air Toxics.

All URF and RfC values were consistent with ACHD's values except the following:

- Formaldehyde – ALL4INC used an RfC of 9.83 $\mu g/m^3$ based on data from the Agency for Toxics Substances and Disease Registry (ATSDR), which differs from ACHD's RfC value of 9.0 $\mu g/m^3$ based on data from the California Environmental Protection Agency (Cal EPA). The difference in the Maximum Individual Carcinogenic Risk (MICR) for formaldehyde and aggregated MICR was negligible.
- Vanadium – ALL4INC used an RfC of 0.1 $\mu g/m^3$ based on data from the ATSDR, ACHD had no value, so the use of the ATSDR RfC was appropriate.

The aggregated MICR was calculated to be 1.91E-7 by ALL4INC and 1.77E-7 by ACHD. Both values are below the threshold of 1.0E-5. Note the ACHD's aggregated MICR value is slightly lower than ALL4INC's aggregated MICR value due to fact that ALL4INC used the highest receptor on an annual basis, while ACHD used the highest receptor for the entire 5-year period.

The maximum individual Hazard Quotient (HQ) was for Acrolein. ALL4INC calculated a value of 6.23E-3 and ACHD calculated a value of 5.76E-3. Both values are below the threshold of 1. All other air toxics had values below the threshold of 1 as well. The Hazard Index (HI), calculated by ALL4INC was 8.84E-3 and calculated by ACHD was 8.22E-3. Both values are below the threshold of 2. Note the ACHD's HI was lower than ALL4INC's HI because of the different RfC used for Formaldehyde and for differences in modeling as explained above for the aggregated MICR.

ACHD's results can be found on the excel spreadsheet titled Air Toxics Results Invenergy.

ALL4INC's results can be found in section 6-15 Risk Results on the excel spreadsheet titled Invenergy AEC Emissions Inventory for ACHD (03-20-19).

Prevention of Significant Deterioration (PSD) Modeling Results

The proposed project will trigger major New Source Review (NSR). The PSD rules will apply for all regulated NSR pollutants except for those pollutants or precursor pollutants for which the area is not in attainment with respect to the National Ambient Air Quality Standards (NAAQS). The Nonattainment New Source Review (NNSR) rules will apply for those areas classified as nonattainment with respect to the NAAQS.

The proposed project will be located in Elizabeth Township, which is included in the Northeast Ozone Transport Region (OTR). This project qualifies as a major source because of potential emissions exceeding the major NSR 100 ton per year (tpy) threshold for NOx. As a major stationary source that has the potential emissions exceeding the PSD significant emission rate (SER) for carbon monoxide (CO), nitrogen dioxide (NO_2), and particulate matter less than 10 microns (PM_{10}), thus an air quality modeling analysis was performed.

Ambient background 1-hour NO_2 concentrations must be considered for all non-modeled NO_2 sources. The ambient background concentration will be added to the cumulative modeled concentration resulting from the proposed project and local sources. Invenergy followed guidance from EPA's March 1, 2011 memorandum which outlines a Tier 2 approach. The Charleroi, PA monitor was used as the background monitor; the seasonal diurnal 3rd highest average was used as the background concentration. Modeling results from ALL4INC were consistent with the ACHD modeling review. The modeling concentration plus background concentration for the 8th highest NO_2 value was below the NAAQS threshold of 188 µg/m^3 (100 ppb). The maximum 8th highest impact from the proposed project-only sources is 18.6 µg/m^3 for the worst-case operating scenario, and 16.1 µg/m^3 for the design scenario. The background value from the Charleroi monitor is 43.6 µg/m^3.

All4 modeled and ACHD verified NOx emissions for the proposed facility. The maximum receptor for the Annual NOx was modeled to be 0.48 µg/m^3 well below the Annual NOx SIL of 1 µg/m^3. The PSD requirement for NOx has been fulfilled.

The Modeled Emission Rates for Precursors (MERPs) were used as a Tier 1 evaluation for ozone. Note that the EPA replaced the draft MERPs values for most areas within the continental United States. The MERPs analysis from ALL4 used draft values. The projected VOC emissions from the proposed project are 93.40 tpy and the projected NOx emissions are 145.71 tpy. Draft MERPs values for the Eastern US are 814 tpy for VOC and 109 tpy for NOx. The precursor emissions were evaluated for ozone:

$$\frac{EMIS_{NOx}}{MERP_{NOx}} + \frac{EMIS_{VOC}}{MERP_{VOC}} < 1 (Equation\ 6-1)$$

$$\frac{145.71\ \text{tpy}}{109\ \text{tpy}} + \frac{93.40\ \text{tpy}}{814\ \text{tpy}} = 1.45 \quad > 1$$

Since, the sum of the ratios are above one, a cumulative analysis for ozone must be done. The cumulative impacts from the project were evaluated:

$$Background\_ozone + \left(\frac{EMIS_{NOx}}{MERP_{NOx}} + \frac{EMIS_{VOC}}{MERP_{VOC}}\right) \times SIL\_ozone \leq NAAQS\_ozone\ (Equation\ 6-2)$$

$$68.3\ ppb + \left(\frac{145.71\text{ tpy}}{109\text{ tpy}} + \frac{93.40\text{ tpy}}{814\text{ tpy}}\right) \times 1\ ppb\ = 69.8\ ppb \leq 70\ ppb$$

Where the background ozone is the average of the three-year design value from a representative background ozone monitor. The closest monitor to the project is the Charleroi monitor (42-125-0005), which measured a design value of 68.3 ppb for 2015-2017. The cumulative air quality impacts of ozone precursor emissions from the proposed project are not expected to increase the critical air quality threshold for ozone, as the secondary impacts on 8-hour ozone plus background concentrations are below the 8-hour ozone NAAQS of 70 ppb.

Note the Northeast MERPs for NOx is 209 and for VOC 2,068 for 8-hour Ozone based on Table 4-1 of Guidance on the Development of Modeled Emissions Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program. Using the revised MERP numbers, equation 1 now is calculated below:

145.71 tpy / 209 tpy + 93.40 tpy / 2,068 tpy = 0.74 < 1

Since, the ratios above is below 1, a cumulative analysis for ozone would not need to be done based on the updated MERPs values for NOx and VOC for 8-hour ozone. Either way the PSD requirement for ozone has been fulfilled.

To evaluate the 24-hour $PM_{2.5}$ SIL for secondary formation, the equation from the December 2016 draft MERP guidance was used. For 24-hour $PM_{2.5}$, the NOx MERP was 2,467 tpy and the SO_2 MERP was 675 tpy. Note that the EPA replaced the draft MERPs values for most areas within the continental United States. The assessment of NOx and SO_2 precursor emissions and primary emissions was evaluated for 24-hour $PM_{2.5}$:

$$\frac{EMIS\_PM2.5}{SER\_PM2.5} + \frac{EMIS_{NOx}}{MERP_{NOx}} + \frac{EMIS_{SO2}}{MERP_{SO2}} < 1\ (Equation\ 6-3)$$

$$\frac{90.66\text{ tpy}}{10\text{ tpy}} + \frac{145.71\text{ tpy}}{2{,}467\text{ tpy}} + \frac{24.43\text{ tpy}}{675\text{ tpy}} = 9.2 > 1$$

The 24-hour $PM_{2.5}$ evaluation is greater than 1, SIL modeling with AERMOD was required for primary $PM_{2.5}$ to further evaluate the SIL for 24-hour $PM_{2.5}$. ACHD reviewed ALL4's modeling the confirmed that the primary impact from the proposed project to be 0.99 $\mu g/m^3$. The refined assessment of NOx and SO_2 precursor emissions and modeled primary emissions was evaluated for 24-hour $PM_{2.5}$:

$$\frac{HMC_{PM_{2.5}}}{SIL_{PM_{2.5}}} + \frac{EMIS_{SO_2}}{MERP_{SO_2}} + \frac{EMIS_{NOx}}{MERP_{NOx}} < 1\ (Equation\ 6-4)$$

$$\left(\frac{0.99\ \mu g/m^3}{1.2\ \mu g/m^3} + \frac{145.71\ tpy}{2{,}467\ tpy} + \frac{24.43\ tpy}{675\ tpy}\right) \times 100 = 92.36 < 100$$

Note the Northeast MERPS for NOx is 2,218 tpy and for SO_2 is 623 tpy for 24-hour $PM_{2.5}$ based on Table 4-1 of Guidance on the Development of Modeled Emissions Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program. Using the revised MERP numbers equation 1 now is calculated below:

$$0.99\ \mu g/m^3 / 1.2\ \mu g/m^3 + 145.71\ tpy / 2{,}218\ tpy + 24.43\ tpy / 623\ tpy = 0.9299 < 1$$

Since the ratios above are below 1, no further analysis for 24-hour $PM_{2.5}$ would be needed based on the updated MERPs values for NOx and SO_2 for 24-hour $PM_{2.5}$ and the modeled results from the proposed facility per 24-hour $PM_{2.5}$ SIL. Either way the PSD requirement for 24-hour $PM_{2.5}$ has been fulfilled.

All4 modeled and ACHD verified CO emissions for the proposed facility. The maximum receptor for the 1-hour CO was modeled to be 639.56 $\mu g/m^3$ well below the 1-hour CO SIL of 2000 $\mu g/m^3$. The maximum receptor for the 8-hour CO was 363.09 $\mu g/m^3$ well below the 8-hour CO SIL of 500 $\mu g/m^3$. The PSD requirement for CO has been fulfilled.

All4 modeled and ACHD verified PM_{10} emissions for the proposed facility. The maximum receptor for the 24-hour PM_{10} was modeled to be 1.60 $\mu g/m^3$ well below the 24-hour PM_{10} SIL of 5 $\mu g/m^3$. The maximum receptor for the Annual PM_{10} was 0.15 $\mu g/m^3$ well below the Annual PM_{10} SIL of 1 $\mu g/m^3$. The PSD requirement for PM_{10} has been fulfilled.

Nonattainment New Source Review (NNSR)

The proposed project will trigger major New Source Review (NSR). The Nonattainment New Source Review (NNSR) rules will apply for those areas classified as nonattainment with respect to the NAAQS. Allegheny County is managed as a moderate nonattainment area for ozone due to its inclusion in the Northeast Ozone Transport Region (OTR) and the entire county is classified as nonattainment for 2012 annual $PM_{2.5}$ NAAQS. In addition, portions of Allegheny County, including Elizabeth Township, are designated as nonattainment for the 2010 1-hour SO_2 NAAQS.

With respect to ozone precursors, the proposed project is a major source for NOx and VOC. Therefore, NOx and VOC will trigger major source NNSR requirements; NOx emissions will also trigger NNSR requirements as a precursor to $PM_{2.5}$. Project emissions for SO_2, direct $PM_{2.5}$ and NH_3 do not exceed the major NNSR threshold, so they do not trigger NNSR.

The applicant has addressed the NNSR requirements related to siting of the project, compliance at other Allegheny Energy Center sites within the Commonwealth of Pennsylvania and need to secure emission reduction credits (ERCs). For pollutants that fall under multiple NNSR ERC requirements, the most stringent offset ratio specified in 25 Pa. Code § 127.210 applies.

A summary of ERCs needed for the proposed project with an estimated cost, shown in the Table below:

Summary of ERCs

Invenergy, LLC - Allegheny Energy Center

Pollutant	Total Project-Wide Emissions [(a)] (tpy)	Offset Ratio [(b)]	ERC Offsets (tons)	ERC Cost [(c)] ($/ton)	Total ERC Cost
NO_X	146	1.15	168	$9,000	$1,508,063.53
VOC (stack emissions)	93		107	$7,000	$751,666.13
VOC (fugitive emissions)	2.95E-02	1.3	3.83E-02		$268
		Total	**275**		**$2,259,998**

[(a)] The project total emissions for NO_X and VOC are obtained from Table 3-14 of the Permit Application.

[(b)] The offset ratios prescribed by 25 Pa. Code §127.210(a) for moderate O_3 nonattainment areas (i.e., 1.15:1 for NO_X and VOC stack emissions and 1.3:1 for VOC fugitive emissions).

[(c)] Approximate ERC cost based on recent transactions ALL4 has been involved with.

The NNSR requirements have been fulfilled.

Class I Significant Impact Analysis

A Class II SIL analysis was performed to demonstrate the proposed project related emissions resulted in predicted concentration below the Class I PM_{10}, $PM_{2.5}$, and NO_2 SILs. The worst-case operating condition and the design load were modeled for each pollutant and respective averaging period. Based on the five years of meteorological data, the predicted concentrations were less than the Class I SILS for PM_{10}, $PM_{2.5}$, and NO_2 for each respective averaging period for both the worst-case load and the design load. The results of the analysis are provided below:

Results of the Class I Significant Impact Level Modeling Analysis
Invenergy LLC - Allegheny Energy Center

Pollutant	Averaging Period	Form	Scenario	Class I SIL ($\mu g/m^3$)	Modeled Concentration ($\mu g/m^3$)	Modeled Concentration Less Than Class I SIL (Y/N)
NO_2	Annual	Maximum	Worst Case	0.1	1.00E-02	Yes
			Design		1.06E-02	Yes
PM_{10}	24-Hour		Worst Case	0.32	9.21E-02	Yes
			Design		1.03E-01	Yes
	Annual		Worst Case	0.2	6.32E-03	Yes
			Design		7.13E-03	Yes
$PM_{2.5}$	24-Hour		Worst Case	0.27	5.98E-02	Yes
			Design		6.63E-02	Yes
	Annual		Worst Case	0.05	6.31E-03	Yes
			Design		7.12E-03	Yes

Because proposed project emissions resulted in modeled concentrations less than the Class I SILs, no Class I PSD increment modeling analysis is required.

Class II Significant Impact Analysis

A Class II SIL analysis was performed to determine if the proposed project's emissions resulted in predicted concentration above the Class II CO, PM_{10}, $PM_{2.5}$, and NO_2 SILs. In order justify the use of SILs to preclude the need for NAAQS and PSD increment analyses "headroom" test was conducted by ALL4INC. Ambient data used for the "headroom" test below:

Ambient Monitor Summary
Invenergy, LLC - Allegheny Energy Center

Monitor				Averaging Period	Form	2015	2016	2017	Average	Maximum	NAAQS	Difference	Class II SILs
State	County	City	ID			µg/m³							
PA	Allegheny	Pittsburgh	42-003-0008	1-Hour	High Second-High	1,489.3	1,603.8	2,062.1	N/A	**2,062.1**	**40,000**	**37,938**	**2,000**
				8-Hour	High Second-High	1,260.2	1,374.7	1,260.2	N/A	**1,374.7**	**10,000**	**8,625**	**500**
PA	Washington	Charleroi	42-125-0005	Annual	Maximum	51.0	44.0	43.0	N/A	**51.0**	**100**	**49.0**	**1.0**
PA	Allegheny	Clairton	42-003-3007	24-Hour	98th Percentile	26.0	20.0	19.0	**21.7**	N/A	**35**	**13.3**	**1.2**
				Annual	Average	10.4	9.3	9.8	**9.8**	N/A	**12**	**2.2**	**0.2**
PA	Allegheny	Clairton	42-003-3007	24-Hour	High Second-High	34.0	27.0	28.0	N/A	**34.0**	**150**	**116.0**	**5.0**

As shown in the Table above the use of SILs is appropriate for justifying that no NO_2 (annual), CO (1-hr), CO (8-hr), $PM_{2.5}$ (24-hr), $PM_{2.5}$ (annual), nor PM_{10} (24-hr) multi-source air quality modeling analyses will be required for these pollutants and averaging periods.

The worst-case operating load and design load were modeled for each pollutant and respective averaging period. The results from the Class II SIL analysis are provided below:

Results of the Class II Significant Impact Level Modeling Analysis
Invenergy LLC - Allegheny Energy Center

Pollutant	Averaging Period	Form	Scenario	Class II SIL (µg/m³)	Modeled Concentration (µg/m³)	Modeled Concentration Less Than Class II SIL (Y/N)
CO	1-Hour	Maximum	Worst Case	2,000	639.56	Yes
			Design		639.56	Yes
	8-hour		Worst Case	500	363.09	Yes
			Design		363.09	Yes
NO_2	1-Hour		Worst Case	7.5	28.95	No
			Design		23.41	No
	Annual		Worst Case	1	0.42	Yes
			Design		0.43	Yes
PM_{10}	24-Hour		Worst Case	5	1.60	Yes
			Design		1.60	Yes
	Annual		Worst Case	1	0.09	Yes
			Design		0.08	Yes
$PM_{2.5}$	24-Hour		Worst Case	1.2	0.99	Yes
			Design		0.99	Yes
	Annual		Worst Case	0.2	0.08	Yes
			Design		0.07	Yes

Since project related emissions resulted in modeled concentrations greater than the 1-hour NO_2 Class II SIL, a 1-hour NO_2 NAAQS modeling demonstration was conducted. See: **Prevention of Significant Deterioration (PSD) Modeling Results**

Conclusions

The submitted modeling for the proposed combined-cycle power plant in Elizabeth Township, Allegheny County was found to be complete and technically accurate. Supplemental modeling performed by ACHD showed nearly identical results to the submitted modeling. Refined modeling was performed by ACHD to determine that NOx would not exceed the 1-hour NAAQS.

The ACHD Planning and Data Analysis section approves of the modeling submitted for the proposed combined-cycle power plant installation. Copies of the modeling input and output files are available from ACHD by request.