

DOCKETED

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Issue Responses to Email Questions dated March 10, 2016

Issues:

- Construction timing: Revised PTA for PEP text describes 23 month and the revised spreadsheets still includes 27.
- The PTA text Data responses states the construction emission were updated. The revised spreadsheet include revised calculations for the offsite linears however the tables included in the PTA and DR still include the old numbers.
- The amended PEP fugitive dust calculations for fugitive dust (not including the solar component) results are lower. It is not immediately clear from the spreadsheet or text what factor results in the decrease for this category.
- The District PDOC and the revised PTA use different VOC emission rates for the auxiliary boiler
- The revised PTA startup and shutdown emissions for PM10/2.5 (lbs/event) for the turbine state 8.32 and excel spreadsheet states 7.56.
- The NH3 maximum daily emission in lbs. Table 4.1-10 doesn't match spreadsheet.
- SO2 follow up.
- Auxiliary boiler monitoring requirements update.

Responses

2. The tables presented in the response updated the onsite emissions, but overlooked an update to the linear emissions values in Table 4-3 of the response. Updated Tables 4-1 through 4-3 are presented herein. These tables reflect updates to the linear emissions values as well as correcting several values that were misread from the (AECOM) calculation files.

Table 4-1 Estimated Daily Construction Emissions (lbs)						
Onsite and Offsite Emissions						
Project Component	NO_x	CO	VOC	SO_x	PM10	PM2.5
Onsite	49.7	34.3	8.2	0.1	46.4	12.2
Offsite	58.7	161.6	16.6	0.1	19.0	5.3

Note: PM10 and PM2.5 values in this table represent the total of exhaust and fugitive emissions.

Table 4-2 Estimated Annual Onsite Construction Emissions (TPY)

Project Component	NO_x	CO	VOC	SO_x	PM10	PM2.5
Onsite Exhaust	5.7	4.3	1.0	0.01	0.3	0.3
Onsite Fugitives	-	-	-	-	4.9	1.2

Table 4-3 Daily Emissions Estimates for Offsite Linears (lbs)						
Project Component	NO_x	CO	VOC	SO_x	PM10	PM2.5
Reclaim water line	41.7	143.3	18.2	0.1	36.9	9.1
Natural gas pipeline	41.7	143.3	18.2	0.1	36.9	9.1
Sanitary wastewater line	10.6	45.3	5.4	0.012	8.6	2.1
Potable water line	10.6	45.3	5.4	0.012	8.6	2.1
T-line Segment 1	97.8	128.4	19.3	0.2	75.0	19.3
T-line Segment 2	107.5	167.9	20.8	0.2	288.3	67.6

3. The onsite fugitive dust emissions previously calculated were 6.6 TPY. The revised calculations without the solar array are 4.9 TPY. The applicant did not adjust or amend any fugitive dust emissions factors or calculation procedure in the calculation files as developed by AECOM. The decrease in fugitive dust is due solely to the removal of the solar field.
4. Table 4.1-8 in the PTA contains a typo. The maximum lb/hr for VOC should be 0.66 lb/hr and should replace the 0.55 lb/hr in the table. The daily emissions and annual VOC emissions are based on the 0.66 lb/hr value, so no other corrections are needed. This table has been revised and now matches the spreadsheets and PDOC.

**Table 4.1-8
Combustion Turbine/HRSG and Auxiliary Boiler Emissions
(Startup and Steady State Operation Per Turbine/HRSG)**

Combustion Turbine/HRSG					
Pollutant	Emission Factor and Units	Max Hour Emissions at Cold Startup (lb/hr)	Max Hour Emissions Steady State w/o DB (lb/hr)	Max Hour Emissions Steady State w/DB (lbs)	Max Daily Emissions (lbs)^a
NO _x	2.0 ppmvd	57.47	17.1	18.5	564.54
CO	2.0 ppmvd	419.44	10.4	11.3	1084.14
VOC	2.0 ppmvd	-	-	6.36	235.25
VOC	1 ppmvd	31.41	3.0	-	-
SO _x ^b	0.75 gr S/100scf 0.2 gr S/100scf	3.41	5.25	5.63	135.12
PM10/2.5	<=0.0047 (CT) <=0.011 (DB) lbs/MMBtu	11.75	9.8	11.8	283.2
NH ₃	5.0 ppmvd	13.79	15.8	17.2	412.8
CO ₂ e	116.89 lb/mmbtu	2,112,350 (Max TPY-Scenario 1)			
Auxiliary Boiler Emissions					
Pollutant	Emissions Factor and Units	Max Hour Emissions (lb/hr)	Max Daily Emissions (lb/hr)	Max Annual Emissions (tpy)^c	
NO _x	9.0 ppm	1.21	29.04	2.95	
CO	50 ppm	4.07	97.68	9.94	
VOC	15 ppm	0.66	15.84	1.61	
SO _x	0.0006 lb/MMBtu	0.07	1.58	0.16	
PM10/2.5	0.007 lb/MMBtu	0.77	18.48	1.88	
CO ₂ e	116.89 lb/MMBtu	-	-	31,430.9	

^a Worst-case 23-hour day based on Case 2 (23°F day) with one (1) warm start, one (1) hot start, two (2) shutdowns plus remaining 22.08 hours at full load with duct burner on. For PM and SO₂, maximum daily assumes 24-hours of operation with the duct burner on. See Appendix 4.1A.

^b Short term and annual fuel sulfur limit are based on 0.75 and 0.2 gr/100scf, respectively.

^c Auxiliary boiler annual emissions is based on Operational Scenario 2 with 4,884 hours per year and 24-hours per worst-case day. See Appendix 4.1A. Auxiliary boiler startup emissions are equal to a steady state hour.
Turbine/HRSG ppm reference = 15% O₂ dry
Auxiliary boiler ppm reference = 3% O₂ dry

**Table 4.1-8
Combustion Turbine/HRSG and Auxiliary Boiler Emissions
(Startup and Steady State Operation Per Turbine/HRSG)**

Combustion Turbine/HRSG

Pollutant	Emission Factor and Units	Max Hour Emissions at Cold Startup (lb/hr)	Max Hour Emissions Steady State w/o DB (lb/hr)	Max Hour Emissions Steady State w/DB (lbs)	Max Daily Emissions (lbs)^a
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CT = Combustion Turbine
DB = Duct Burner

**Table 4.1-7
Startup and Shutdown Emissions Per Turbine**

Parameter/Mode	Cold Startup to 100% Turbine Load	Warm Startup to 100% Turbine Load	Hot Start to 100% Turbine Load	Shutdown from 100% Turbine Load
NO _x , lbs/event	51.48	46.8	43.2	33.0
CO, lbs/event	415.80	378	304.8	75.9
VOC, lbs/event	30.36	27.6	27.6	19.8
PM10/2.5, lbs/event	8.32	7.56	6.48	4.07
SO _x , lbs/event	3.41	3.06	2.63	2.35
Event Time, minutes (hours)	39 (0.65)	35 (0.583)	30 (0.5)	25 (0.417)
Maximum Number of Events/Year (Operational Scenario)	5 (Operational Scenario 1, 2 and 3)	360 (Operational Scenario 2 and 3)	360 (Operational Scenario 2)	725 (Operational Scenario 2)

* A 20% and 10% margin has been added to the startup and shutdown emissions, respectively. During the remaining minutes during the start hour, Case 1 (23°F) full load, non duct burner emissions are used. Cold start event data is based on 100% turbine load at the end of the start cycle. Duct burner operation would not be available during the first hour of any start.

- The correct value is 8.32 lb/event and is reflected in the revised spreadsheet which included in this response. The maximum resultant change in the annual emissions for Operational Scenario 1 is an increase of 0.004 tpy for a new total of 80.68. This does not affect the daily emission calculations which were based on 24-hours of full load operation with duct burner on or 11.8 lb/hr.

6. Table 4.1-10 was not updated in the data previous data response. A revised version is provided here.

Table 4.1-10			
Summary of Maximum Facility Emissions for the Project			
(Highest Operating Scenario Values)			
Pollutant	lbs/hour	lbs/day	tons/year
NO _x	116.15	1140.73	138.99
CO	842.95	2179.05	351.09
VOCs	63.79	472.30	51.64
SO _x	11.34	271.61	11.39*
TSP/PM10/2.5	24.57	568.21	81.01
NH ₃	31.70	823.88	125.32
CO ₂ e	-	-	2,117,775.06

Normal Operation Assumptions:
 * Annual SO₂ based on 0.2 gr/scf sulfur content in the fuel. Short-term based on 0.75 gr/scf.
 For the highest annual emissions of NO_x, SO_x, PM10/2.5 and CO₂e, up to 7,960 hours of operation at base load, up to 35 warm starts, five (5) cold start, and up to 40 shutdowns per year for a total of 8,000 hours per year with up to 24 hours per day of operation. For this scenario, the auxiliary boiler is expected to operate up to 836 hours per year. (Operational Scenario 1)

For the highest annual emissions of CO and VOC, up to 3,625 hours at base load with up to 360 hot starts, 360 warm starts, five (5) cold starts, and up to 725 shutdowns for a total of 4,320 hours per year with up to 24-hour per day of operation. For this scenario, the auxiliary boiler is expected to operate up to 4,884 hours per year. (Operational Scenario 2)

The third Operational Scenario is based on 4,470hours per year of base load operation, up to 180 hot starts, 360 warm starts, 5 cold starts, and up to 545 shutdowns per year for a total of 5,000 hours per year with up to 24-hours per day of operation. For this scenario, the auxiliary boiler is expected to operate up to 4,136 hours per year. (Operational Scenario 3)

All three emissions scenarios include 1,500 hours per year for the duct burners in the HRSG with up to 24 hours per day of operation, and 50 hours per year for fire pump and 26 hours per year for the emergency generator testing.

Total facility estimated maximum emissions (including turbine SU/SD emissions).

Hourly emissions include the auxiliary boiler for all pollutants. The emergency generator is only included for SO_x and PM10/2.5 hourly as the maximum hour for NO_x, CO and VOCs is based on startup (no emergency engine testing). Daily emissions assume two (2) startups and two (2) shutdowns with the remaining hours at full load with duct burners, except for SO_x and PM10/2.5 which is based on 24-hours of full load with duct burners. The auxiliary boiler is assumed to operate two hours for the worst-case day.

7. The short-term SO₂ emissions on the turbine/HRSG were revised to reflect 0.75 gr S/100 scf with the long term (annual) remaining at 0.2 gr S/100 scf. The revised emissions are presented in Tables 4.1-8 and 4.1-10, above. The resultant modeling results for SO₂ adjusted to reflect the higher short-term limit of 0.75 gr S/100 scf and is summarized below.

**Table 4.1-27
Air Quality Impact Results for
Refined Modeling Analysis of Project – Ambient Air Quality Standards**

Pollutant	Avg. Period	Maximum Concentration (µg/m³)	Background (µg/m³)	Total (µg/m³)	Ambient Air Quality Standards CAAQS/NAAQs (µg/m³)	
Normal Operating Conditions						
NO ₂ ^a	1-hour Max	204.7	98	303	339	-
	1-hr 5-yr Avg of 98 th %	13.49	81	94	-	188
	Annual Max	0.981	15.1	16.1	57	100
CO	1-hour Max	123.8	2,176	2,300	23,000	40,000
	8-hour Max	29.48 ^b	1,603	1,632	10,000	10,000
SO ₂	1-hour Max	5.67	16	21.7	655	-
	1-hr 5-yr Avg of 99 th %	5.03	10	15	-	196
	3-hour H2H	4.28	16	20.3	-	1,300
	24-hour Max	3.00	8	11	105	-
PM10	24-hour Max	7.22 ^c (6.34)	185	192	50	-
	24-hour H2H	6.93 ^c (6.07)	80	97	-	150
	Annual Max	0.750	28.3	29.1	20	-
PM2.5	24-hr 5-yr Avg of 98 th %	4.73 ^c (4.15)	18	23	-	35
	Annual Max	0.750	7.2	8.0	12	-
	5-yr Avg of Annual Conc's	0.723	6.1	6.8	-	12.0
Start-up/Shutdown Periods						
NO ₂ ^a	1-hour Max	58.29	98	156	339	-
	1-hr 5-yr Avg of 98 th %	49.10	81	130	-	188
CO	1-hour Max	574.5	2,176	2,751	23,000	40,000
	8-hour Max	88.57	1,603	1,692	10,000	10,000
^a NO ₂ 1-hour and annual impacts evaluated using the Ambient Ratio Method with 0.80 (80%) and 0.75 (75%) ratios, respectively. ^b CO 8-hour facility impacts greater for auxiliary boiler operating continuously without any concurrent turbine operations. ^c PM10/PM2.5 24-hour worst-case impacts are for 43% load Case 27, which would be unlikely to occur for two turbines for a full 24-hours (i.e., two turbines at less than 50% load). The worst-case for 24-hour operations at 75% and 100% loads for PM10/PM2.5 is the same as the other pollutants – Case 2 (these impacts shown in parentheses).						