ATTACHMENT B
DAQ Revised SO_2 Modeling

DIVISION OF AIR QUALITY
September 11, 2015

MEMORANDUM

TO: Sheila Holman, Director, Division of Air Quality
Sushma Masemore, AQ Planning Section Chief

FROM: Tom Anderson, Supervisor, Air Quality Analysis Branch (AQAB)

THROUGH: William Willets, Chief, Permitting Section

SUBJECT: Review of Dispersion Modeling Analysis for Capital Power USA (CPI Southport)
Facility ID - 1000067
Southport, NC Brunswick County

A dispersion modeling analysis has been completed in support of the impending area designations for the CPI Southport facility in Brunswick County for the 2010 1-hour sulfur dioxide (SO_2) standard. The CPI Southport facility was identified by EPA as being subject to the second round of designation actions due its 2012 SO_2 emission level and emission rate exceeding the thresholds established in a March 2, 2015 consent decree in the U.S. District Court for the Northern District of California. Our modeling analysis consists of two exercises: (1) review of dispersion modeling submitted by CPI Southport, and (2) revised dispersion modeling conducted by AQAB to incorporate additional nearby sources at Archer Daniels Midland (ADM) and Duke Energy Brunswick Nuclear plant. The modeling shows that the 1-hour SO_2 standard of 75 ppb (196.3 $\mu g/m^3$) will be met in the vicinity of the CPI Southport facility. The following discusses the results.

1. Review of CPI Southport Dispersion Modeling Submittal

As required by the EPA and using guidance from the SO_2 NAAQS Designations Modeling Technical Assistance Document (TAD), source-specific air dispersion modeling of CPI Southport facility and ADM was conducted by Trinity Consultants. The AQAB has completed the review of this modeling submittal and concludes that it was performed in accordance with the TAD. Modeling results are below the 1-hour SO_2 NAAQS and as such, the area around the CPI Southport facility has been shown to be in attainment of the 1-hour NAAQS.

2. Revised Dispersion Modeling

The DAQ revised the modeling to include additional nearby sources: ADM and Duke Energy Brunswick Nuclear plant which may have the potential to influence ambient SO_2 concentrations in the vicinity of CPI Southport facility. SO_2 emissions from both facilities occur on an intermittent basis during periods of gas/power curtailment or when testing the emergency generators; however, it was conservatively assumed that they occur every hour of each year over the 3-year modeled period (2012-2014).

Actual hourly SO_2 emissions from CPI Southport were included in the model for the 3-year period from 2012-2014. Table 1 provides the source parameters and emission rates used in the modeling. Please note the SO_2 rates listed in the table for the CPI Southport EGUs (model IDs UNIT1 and UNIT2) are the

permit-allowable rates and were only used if an hourly value for the EGUs was missing.

For ADM, emission rates used in the CPI Southport submittal were replaced with worst-case conditions (i.e. highest actual 1-hour rate) as provided by the DAQ Wilmington Regional Office (WIRO). These emission rates represent maximum hourly rates based on 2014 emissions inventory data. AQAB staff remodeled the facility using the revised rates.

For the Brunswick Nuclear Plant, SO_2 emissions occur on an intermittent basis during the testing and operation of emergency generators and mitigation pumps at the plant. The Brunswick Nuclear Plant's emissions were added to determine if they would contribute to the modeled impacts in the vicinity of CPI Southport. Even though the SO_2 emissions at the Brunswick Plant occur on an intermittent basis, it was conservatively assumed that they occur every hour of each year over the 3-year modeled period. The facility-wide total hourly emissions, based on 2012-2014 inventories, were also conservatively assumed to be emitted from the source with the worst-case dispersion characteristics, which was determined through an M-factor analysis.

Table 1. CPI Southport, ADM, and Brunswick Nuclear Plant Source Parameters and SO_2 Emission Rates Used in AQAB Dispersion Modeling

Facility	Model ID	Easting (X)	Northing (Y)	Base Elevation	Stack Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)	SO_2 (lb/hr)
CPI	UNIT 1	221576.9	3760059.24	7.62	60.35	449.82	22.49	2.64	983.42
	UNIT 2	221579.23	3760098.97	7.62	60.35	449.82	22.49	2.64	983.42
ADM	EU23	223450	3759465	7.62	18.90	380.00	23.50	2.44	1.91
	EU21	223473.76	3759461.97	7.62	18.29	773.15	19.39	2.83	51.1
	EU22	223451.39	3759471.18	7.62	18.29	790.93	20.71	2.83	51.1
	WHB21	223457.27	3759441.53	7.62	18.29	386.48	24.34	2.53	0
	WHB22	223449.28	3759446.04	7.62	20.73	384.82	20.37	2.53	0
	EU48	223449.2	3759500.56	7.62	3.05	810.93	35.66	0.24	0.0011
	EP54	223363.41	3759430.74	7.62	21.34	383.15	8.62	0.91	0.0029
DUKE	BRUNSWICK	221977	3761559	6.10	2.74	763.15	37.07	0.10	4.6081

AERMOD (version 151818), using the latest three years (2012-2014) of available meteorological data from the Wilmington, NC National Weather Service surface observation station combined with upper air sounding data from Newport, NC, was used to evaluate impacts in the area surrounding the CPI Southport facility. The meteorological data was processed using AERMET (version 15181) following the standard EPA-recommended protocol. BPIP-PRIME was used to calculate building parameters required by AERMOD for downwash effects. Receptors were placed around the facility's fenceline with a spacing of 25 meters and extended outward to a distance of 30 kilometers using a nested grid.

Modeling of CPI Southport, ADM, and Brunswick Nuclear Plant indicates that the maximum 1-hour impact (i.e. design concentration) occurs just over 500 meters to the west of the CPI Southport facility at a level of 183.3 $\mu g/m^3$. Adding a representative background concentration, obtained from the New Hanover County SO_2 monitor, of 7.9 $\mu g/m^3$ to the modeled impact results in a total modeled concentration of 191.2 $\mu g/m^3$, which is less than the 1-hour SO_2 NAAQS of 196.3 $\mu g/m^3$. This information is shown in Table 2.

Table 2. 1-hour SO_2 Impact surrounding CPI Southport

Pollutant	Averaging Period	Maximum Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	% of NAAQS
SO_2	1-hour	183.3*	7.9	191.2	196.3	97 %

* Design concentration – i.e. 3 year average of the High-4th-High Daily Max. 1-hour concentration.

Based on the AQAB's dispersion modeling of all contributing SO_2 sources, the 1-hour SO_2 standard of 75 ppb (196.3 $\mu g/m^3$) will be met in the vicinity of the CPI Southport facility.

cc: Brad Newland, WIRO
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