
From: McWade, Tammy [mailto:Tammy.McWade@dep.state.fl.us]
Sent: Wednesday, June 29, 2011 1:21 PM
To: Velasco, Robert A.
Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC

I need some actual numbers to show the exemption applies. Let me check with Al and see if the comment will be acceptable? Usually not, but it won't hurt to ask. I will get back with you asap.

Thanks Rob!

Tammy McWade

Engineering Specialist II
Florida Department of Environmental Protection (DEP)
Division of Air Resource Management (DARM)
Permitting & Compliance Section
Chemicals & Combustion Key Industry Group
Phone: (850) 717-9086

From: Velasco, Robert A. [mailto:RAVelasco@tecoenergy.com]
Sent: Wednesday, June 29, 2011 12:23 PM
To: McWade, Tammy
Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC

Tammy:

Does the yellow highlighted section below suffice?

Best Regards,

(Rob) Robert Velasco, P.E., BCEE, QEP
EHS Air Programs
Tampa Electric Company
P.O. Box 111
Tampa, FL 33601
Phone: (813) 228-4232
Cell: (813) 417-9524
Fax: (813) 228-1308
www.tampaelectric.com/environmental/

From: McWade, Tammy [mailto:Tammy.McWade@dep.state.fl.us]
Sent: Wednesday, June 29, 2011 11:54 AM
To: Velasco, Robert A.
Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC

Robert,

I still need the projected PM and PM₁₀ emissions from the cooling tower. Please acknowledge or clarify the following requested exemptions under State Rule and/or federal regulations:

Post Carbon Capture & Release Demonstration Project

- Meets the definition of "Clean Coal Technology Demonstration Project" pursuant to 62-210.200(79)

- Major modification-Any physical change or change in method shall not include: The installation & operation of a temporary clean coal technology demonstration project provided it complies with the State SIP & other requirements necessary to attain and maintain the national ambient air quality standards during the project and after it is terminated pursuant to Rule 62-210.200(186)(c)8.

Post Carbon Capture Project (Carbon absorber/desorber towers 2.5 MW slip stream) and Cooling tower

- Generic & Temporary Exemptions pursuant to Rule 62-210.300(3)(b):
 - a) Generic Emissions Unit or Activity Exemption. Except as otherwise provided at subsection 62-210.300(3), F.A.C., above, an emissions unit or pollutant-emitting activity that is not entitled to a categorical or conditional exemption pursuant to paragraph 62-210.300(3)(a), F.A.C., shall be exempt from any requirement to obtain an air construction permit or non-Title V air operation permit, or to use an air general permit pursuant to Rule 62-210.310, F.A.C., if it meets all of the following criteria.
 - b) It would not be subject to any unit-specific limitation or requirement.
 - c) Its emissions, in combination with the emissions of other units and activities at the facility, would not cause the facility to emit or have the potential to emit any pollutant in such amount as to create a Title V source.
 - d) It would neither emit nor have the potential to emit 500 pounds per year or more of lead and lead compounds expressed as lead, 1,000 pounds per year or more of any hazardous air pollutant, 2,500 pounds per year or more of total hazardous air pollutants, or 5.0 tons per year or more of any other regulated air pollutant as defined at Rule 62-210.200, F.A.C.**
 - e) In the case of a proposed new emissions unit at an existing facility, the emissions of such unit, in combination with the emissions of any other proposed new or modified units and activities at the facility, would not result in a modification subject to the preconstruction review requirements of subparagraph 62-204.800(11)(d)2., Rule 62-212.400 or 62-212.500, F.A.C.
 - f) In the case of a proposed new pollutant-emitting activity, such activity would not constitute a modification of any existing non-exempt emissions unit at a non-Title V source or any existing non-insignificant emissions unit at a Title V source.

**I need you to address these two specific units and state what the projected actual emissions are and how it was obtained.

Boiler (No. 2 fuel oil) if used:

- Fossil fuel steam generators, hot water generators, and other external combustion heating units with heat input capacity less than 100 million Btu per hour, provided all the following conditions are met with respect to each such unit.

The proposed boiler will have a rated heat input capacity of 14 MMBtu/hour and will use low sulfur No.2 fuel. The maximum amount of fuel used will be less than one million gallons of fuel oil with a sulfur content not exceeding 0.05 %, which meets the requirements pursuant to Rule 62-210.300(3)34, F.A.C.
- Exemption of IB MACT pursuant to NSPS 40 CFR 63.7491(g).
- NSPS 40 CFR 60, Subpart Dc - Except as provided in paragraphs (d), (e), (f), and (g) of this section, the affected facility to which this subpart applies is each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 million British thermal units per hour (MMBtu/hr)) or less, but greater than or equal to 2.9 MW (10 MMBtu/hr). Are not subject to the sulfur dioxide (SO₂) or particulate matter (PM) emission limits, performance testing requirements, or monitoring requirements under this subpart (§§60.42c, 60.43c, 60.44c, 60.45c, 60.46c, or 60.47c) during periods of combustion research, as defined in §60.41c, which meets the definition of "Combustion research".

If you can address this information and your previous email on letter head so I can show you do meet these exemptions.

If you have any questions please give me a call or email.

Thank you!

Tammy McWade

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From: Velasco, Robert A. [mailto:RAVelasco@tecoenergy.com]
Sent: Tuesday, June 28, 2011 11:07 PM
To: McWade, Tammy
Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC

Tammy:

In response to your request, please find the following clarifications to the carbon capture permit application No. 2959-1:

PM and PM₁₀ Emissions

The PM emission rate for the cooling tower was calculated as the product of the TDS concentration, drift rate and water recirculation rate using AP 42, Chapter 13.4 Wet Cooling Towers (latest Ed).

A correction factor (PM₁₀/PM ratio) was applied to the PM emission rate to determine the PM₁₀ emission rate. The correction factor was calculated using the TDS concentration, a realistic drift particle size distribution and a conservative 0.0006% drift rate.

Boiler Fuel Oil

The proposed boiler will utilize No. 2 fuel oil with a sulfur content < 0.05% to meet the exemption requirements in Rule 62-210.300(3)34. An electric boiler may be installed instead of the No. 2 fuel boiler eliminating this exemption requirement.

System Exemption (page 4 of application)

The cooling tower is exempt from permitting pursuant to Rule 62-210.300(3)(b), F.A.C. since the PM₁₀ emission rate is substantially below the 5 tons per year criteria. Similarly, the post carbon system is also exempt from permitting, since there are no net increase in emissions. The project is exempt as a major modification pursuant to Rule 62-210.200(186)(c)8.

Construction Equipment

Construction equipment will be used to construct the temporary carbon capture system. The Contractor will use appropriate engineering controls during construction to meet the Condition FW5 (Section II) of the permit.

Please contact me if you need additional information.

Best Regards,

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Subject: TECO Big Bend Station Project No. 0570039-047-AC

Robert,

As per our conversation, please clarify the emissions for PM and PM₁₀ as it pertains to the cooling tower, such as, projected emissions from the project and how it was obtained. If there is going to be temporary construction equipment used when constructing the temporary carbon capture pilot plant. Please clarify what is the maximum sulfur content of the proposed No. 2 fuel oil specified for the boiler. On page 4 of the report, you stated that the cooling tower and the post carbon capture project is exempt from air construction permit application pursuant to Rule 62-210.300(3)(b), please clarify based on the criteria of this Rule.

If you have any questions please give me a call or email.

Thank you for your help!

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The Department of Environmental Protection values your feedback as a customer. DEP Secretary Herschel T. Vinyard Jr. is committed to continuously assessing and improving the level and quality of services provided to you. Please take a few minutes to comment on the quality of service you received. Simply click on [this link to the DEP Customer Survey](#). Thank you in advance for completing the survey.

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McWade, Tammy

From: Velasco, Robert A. [RAVelasco@tecoenergy.com]
Sent: Friday, July 01, 2011 8:09 AM
To: McWade, Tammy
Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC

Tammy

The plant anticipates using "reclaimed water" for makeup to the cooling tower.

Best Regards,

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Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC

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As previously discussed today, please find additional clarifications to the carbon capture permit application. Contact me if you need additional information.

Fuel Oil Boiler

The proposed boiler meets the categorical exemption criteria in accordance with Rule 62-210.300(3)34. Therefore, emission calculations are not required.

PM and PM₁₀ Emissions

The calculations were revised to show the PM emissions at the specific design conditions (see attached). The PM rate was calculated as the product of the TDS concentration, drift rate (0.0015%) and water recirculation rate (2160 gpm). The PM₁₀ rate was calculated using the PM emission rate and correction factor by Reisman and Frisbie (2001). The correction factor was computed using the design TDS concentration, a realistic drift particle size distribution and a conservative 0.0006% drift rate. Based on these calculations, the cooling tower is exempt from air permitting pursuant to Rule 62-210.300(3)(b), F.A.C. since the PM emission rate is substantially below the 5 tons per year criteria.

<u>PM emission rate</u>	<u>PM₁₀ emission rate</u>
0.18 lb/hr	0.0091 lb/hr
0.78 tons/yr	0.040 tons/yr

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Robert,

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NOTICE: This email is intended only for the individual(s) to whom it is addressed and may contain confidential information. If you have received this email by mistake, please notify the sender immediately, delete this email from your system and do not copy or disclose it to anyone else. Although we take precautions to protect against viruses, we advise you to take your own precautions to protect against viruses as we accept no liability for any which remain.

McWade, Tammy

From: Velasco, Robert A. [RAVelasco@tecoenergy.com]
Sent: Friday, July 01, 2011 4:06 PM
To: McWade, Tammy
Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC
Attachments: TDS vs PM10.xlsx

Tammy:

Please find the PM10 vs. TDS data and graph. Have a great weekend.

Best Regards,

(Rob) Robert Velasco, P.E., BCEE, QEP
EHS Air Programs
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From: McWade, Tammy [mailto:Tammy.McWade@dep.state.fl.us]
Sent: Friday, July 01, 2011 3:30 PM
To: Velasco, Robert A.
Subject: RE: TECO Big Bend Station Project No. 0570039-047-AC

Rob, can you send me the PM10 Emissions Rate vs. TDS graph in excel or the numbers used to plug in so I can re-graph it. I am having a hard time copying this one and making it clear. It is just for the technical for reference.

Thank you!

Tammy McWade

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Fuel Oil Boiler

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PM and PM₁₀ Emissions

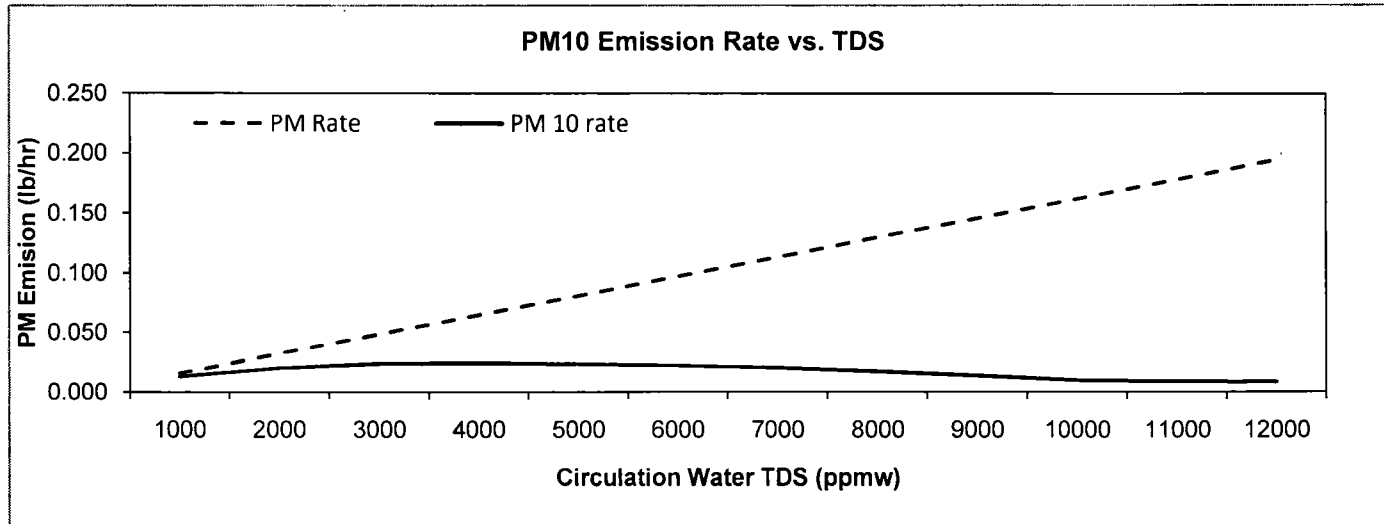
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<u>PM emission rate</u>	<u>PM₁₀ emission rate</u>
0.18 lb/hr	0.0091 lb/hr
0.78 tons/yr	0.040 tons/yr

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TDS	PM Rate (lb/hr)	PM 10 rate (lb/hr)	PM 10 Rate (ton/year)
1000	0.01621296	0.013301228	0.058259377
2000	0.03242592	0.020590786	0.090187643
3000	0.04863888	0.02431758	0.106511002
4000	0.06485184	0.024857583	0.108876212
5000	0.0810648	0.024296125	0.106417027
6000	0.09727776	0.022946415	0.100505297
7000	0.11349072	0.020657919	0.090481686
8000	0.12970368	0.017602435	0.077098666
9000	0.14591664	0.014086861	0.06170045
10000	0.1621296	0.0101784	0.044581393
11000	0.17834256	0.009115919	0.039927726
12000	0.19455552	0.008680694	0.038021438



Revised



Emission Inventory Work Sheet

PM EMISSIONS - WET COOLING TOWERS

Big Bend Power Station
Tampa Electric Company
Facility ID No. 0570039

INPUT DATA AND EMISSION CALCULATIONS

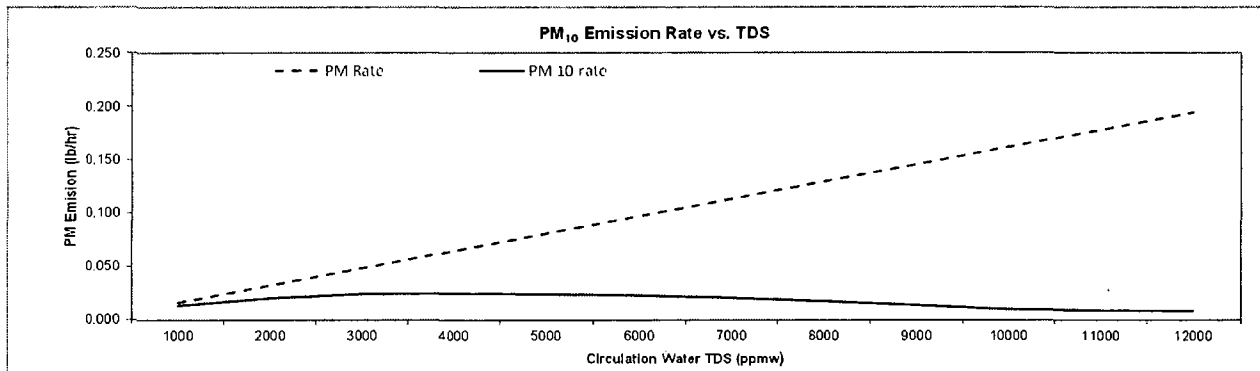
Emission Source Description: Wet cooling tower for carbon capture and release project
Emission Control Methods: Drift eliminators
Emission Points: Cooling drift

INPUT DATA AND EMISSION CALCULATIONS

Water droplet density 1 g/cm³
Solid particle density 2.2 g/cm³
TDS 11000 ppmw
Drift rate 0.0015 %
Water circulation rate 2160 gpm
PM emission rate 0.18 lb/hr
0.781 ton/yr
PM₁₀ emission rate 0.0091 lb/hr
0.040 ton/yr

Solids Particle Size Distribution

EPRI Droplet Diameter (μm)	Droplet Volume (μm ³) [2]	Droplet Mass (μg) [3]	Particle Mass Solids (μg) [4]	Solid Particle Volume (μm ³)	Solid Particle Diameter (μm) [7]	EPRI % Mass Smaller
10	524	5.24E-04	5.76E-06	2.62	1.710	0.000
20	4189	4.19E-03	4.61E-05	20.94	3.420	0.196
30	14137	1.41E-02	1.56E-04	70.69	5.130	0.226
40	33510	3.35E-02	3.69E-04	167.55	6.840	0.514
50	65450	6.54E-02	7.20E-04	327.25	8.550	1.816
60	113097	1.13E-01	1.24E-03	565.49	10.260	5.702
70	179594	1.80E-01	1.98E-03	897.97	11.970	21.348
90	381704	3.82E-01	4.20E-03	1908.52	15.390	49.812
110	696910	6.97E-01	7.67E-03	3484.55	18.810	70.509
130	1150347	1.15E+00	1.27E-02	5751.73	22.230	82.023
150	1767146	1.77E+00	1.94E-02	8835.73	25.650	88.012
180	3053628	3.05E+00	3.36E-02	15268.14	30.780	91.032
210	4849048	4.85E+00	5.33E-02	24245.24	35.909	92.468
240	7238229	7.24E+00	7.96E-02	36191.15	41.039	94.091
270	10305995	1.03E+01	1.13E-01	51529.97	46.169	94.689
300	14137167	1.41E+01	1.56E-01	70685.83	51.299	96.288
350	22449298	2.24E+01	2.47E-01	112246.49	59.849	97.011
400	33510322	3.35E+01	3.69E-01	167551.61	68.399	98.340
450	47712938	4.77E+01	5.25E-01	238564.69	76.949	99.071
500	65449847	6.54E+01	7.20E-01	327249.23	85.499	99.071
600	113097336	1.13E+02	1.24E+00	565486.68	102.599	100.000



EMISSION EQUATIONS

- [2] Volume of drift droplet $V = 4/3 \pi (D_w/2)^3$
- [3] Mass of solids in drift droplet $TDS \times \rho_w \times V$
- [4] Mass of solids $\rho_{TDS} \times V$
- [7] Diameter of drift droplet $D_d((TDS)(\rho_w/\rho_{TDS}))^{1/3}$

SOURCES OF INPUT DATA

- Circulation Rate Siemens Inc.
- Drift Rate Siemens Inc.
- PM Calculation EPA AP 42 Chapter 13.4 Wet Cooling Towers (latest Ed.)
- PM₁₀ Calculation Reisman, J. and Frisbie, G., Calculating Realistic PM₁₀ Emissions from Cooling Towers, Technical Proceedings Air Waste Management

NOTES AND OBSERVATIONS

PM₁₀/PM ratio based on a conservative 0.0005% drift rate