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2 Technology Park Drive, Westford, Massachusetts 01886-3140
 T 978.589.3000 F 978.589.3100 www.ensr.aecom.com

Memorandum

Date: March 26, 2007
 To: Rick Roper (Duke Energy Carolinas)
 From: Jeffrey Connors (ENSR)
 Subject: Addendum to Class I Modeling:
 Cliffside Unit 6 Project – PSD Permit
 Application (NO_x Netting Analysis and
 Updated Class I Modeling)

Distribution:	<u>Duke Energy</u> Kris Knudsen Harry Lancaster	<u>ENSR</u> William Campbell	<u>NC DAQ</u> Don van der Vaart Chuck Buckler Tom Anderson Ed Martin
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ENSR has performed additional netting and subsequent Class I modeling analyses in support of Duke Energy Carolina’s “Unit 6&7 Project” located at the Cliffside Steam Station (Cliffside) in Rutherford County, NC. These additional analyses examine the impact of PSD applicability for criteria pollutants and the related Class I area impacts by permitting just one (Unit 6) of the new 800 MW boilers at the Cliffside Steam Station.

Netting Analysis

Duke Energy Carolinas has revised its netting analysis to incorporate the permitting of just the new Unit 6 (800 MW) boiler. The focus of this netting analysis will be NO_x. The project still nets out of SO₂ as previously demonstrated even with construction of both of the originally proposed units. Therefore the netting analysis presented within this memo focuses upon NO_x. Table 1 shows a list of historical NO_x emissions data for Unit 1-4 and Unit 5 that will be used in the netting analysis.

The data in Table 1 has been incorporated into Table 2 which presents the netting analysis for NO_x. As shown in Table 1 the emission offsets from a combination of retiring Units 1-4 and taking an annual NO_x emission limit of 2,471 tons/year for Unit 5 is enough to offset the new emissions from Unit 6 below the PSD significance threshold of 40 TPY. For purposes of this netting analysis, ancillary sources (existing and new) are not included in the baseline calculation and are included at the maximum potential for future emissions. This is conservative because it does not provide any credit for existing ancillary sources in the baseline emissions. However, the overall impact on the reduction required from Unit 5 is minimal.

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Class I Modeling Update

Additional Class I area modeling has also been conducted to reflect that the project has now netted out of PSD review for SO₂ and NO_x. Like for previous modeling iterations that did not include SO₂ because the project netted out of PSD review for SO₂, these additional analysis do not account for NO_x since the project now nets out of PSD review for NO_x. The modeling was conducted for just project emissions of primary PM₁₀ from the new Unit 6 boiler.

There are five PSD Class I areas within 300-km of Cliffside (see Figure 1). As summarized in Section 10 of the December 2005 PSD Application, CALPUFF was run with two different grid resolutions for specific areas: (1) a 1-km resolution for more distant Class I areas – Cohutta, Great Smoky Mountains, and Joyce Kilmer-Slickrock; (2) a 500-m resolution for the nearest Class I areas – Linville Gorge and Shining Rock.

Since the project is not a significant source of SO₂ or NO_x, only a PSD increment analysis for PM₁₀ and a regional haze analysis (that only considers emissions of PM₁₀) were performed. The sulfur and nitrogen deposition analyses were excluded from this analysis because the source is no longer a significant source of either SO₂ or NO_x.

Tables 3 and 4 present an updated set of modeling results for PM₁₀ increment and regional haze based on primary PM₁₀ emissions from the Unit 6 boiler alone. Like in previous analyses, the proposed project does not exceed the significance thresholds for PM₁₀ or regional haze. Therefore the proposed project does not have an adverse impact on air quality.

Table 1: Historical NO_x Emissions Data for Units 1-5

Year	Unit 1-4 NO _x (TPY)	Unit 5 NO _x (TPY)	Unit 1-4 (MMBtu/yr)	Unit 5 (MMBtu/yr)
2000	1,471	7,365	7,439,937	33,175,658
2001	1,128	7,380	5,842,787	33,623,389
2002	664	2,930	3,479,216	24,218,041
2003	1,801	4,017	8,857,771	35,402,456
2004	1,016	2,941	5,333,731	30,166,012
PSD: Avg. 2003-2004	1,408	3,479	7,095,751	32,784,234

Note: Calendar year 2002 may be not representative of typical operations due to the bad drought and associated operational problems that year.

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Table 2: Netting Analysis for NO_x

Proposed NO_x Rate for Unit 6 = 0.07 lb NO_x/MMBtu

Emission Source Description	NO _x with Unit 6 Only (ton/yr)
Main Boilers	2,406.8
All Ancillary Combustion Sources on Site	48.6
Creditable Decreases (Units 1 -4)	-1,408.4
Creditable Decrease (Unit 5)	-1,008.0
Total Project Emissions:	39.0

Key Parameters

Unit 6 Boiler

Heat Input Rate = 7,850 MMBtu/hr
 Operating Hours = 8,760 hr/yr

Unit 1 - 4 Boilers

Past Actual NO_x Emissions = **1,408.4** Ton/yr

Unit 5 Boiler

Past Actual NO_x Emissions = 3,479.0 Ton/yr
 Future Allowable NO_x Emissions = 2,471.0 Ton/yr
 Net Decrease (Creditable) = **1,008.0** Ton/yr

Auxiliary Combustion Sources

Emission Source Description		NO _x Ton/Yr
Aux Boiler (876 Hr)	Unit 6 Auxiliary Boiler	8.32
EMR_GEN1 (100 Hr)	Unit 6 Emergency Generator	0.53
FWP_5 (100 hr)	Unit 5 Fire Water Pump	0.36
FWP_6 (100 Hr)	Unit 6 Fire Water Pump	0.63
EQWP_6 (100 Hr)	Unit 5 Quench Pump	0.23
EQWP_5 (100 Hr)	Unit 6 Quench Pump	0.23
ES_6 (PTE)	Unit 5 Auxiliary Boiler	37.58
ES_12 (100 Hr)	Emergency Generator (1000 kw)	<u>0.71</u>
	Total	48.59

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Emission Basis for Unit 5 Existing Sources

Unit 5 Auxiliary Boiler

Heat Input Rate = 71.5 MMBtu/hr
 Operating Hours = 8,760 hr/yr
 NOx Emission Rate = 0.12 lb/MMBtu

Unit 5 Emergency Generator

Capacity = 1,340 bHp
 Operating Hours = 100 hr/yr
 NOx Emission Factor = 14.18 lb/hr

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Table 3 Maximum Concentrations at the PSD Class I Areas

Pollutant	Class I Area	Averaging Period	CALPUFF Modeled Concentration ($\mu\text{g}/\text{m}^3$)			Class I Significant Impact Level ($\mu\text{g}/\text{m}^3$)
			2001	2002	2003	
PM ₁₀	Cohutta	24-hour	0.0392	0.0739	0.0535	0.32
		Annual	0.0011	0.0026	0.0015	0.16
	Great Smoky Mountain	24-hour	0.1329	0.0652	0.1371	0.32
		Annual	0.0023	0.0026	0.0019	0.16
	Joyce Kilmer Slickrock	24-hour	0.0700	0.0494	0.0995	0.32
		Annual	0.0017	0.0022	0.0017	0.16
	Linville Gorge	24-hour	0.1215	0.1196	0.1208	0.32
		Annual	0.0068	0.0061	0.0054	0.16
	Shinning Rock	24-hour	0.1434	0.0902	0.0617	0.32
		Annual	0.0031	0.0040	0.0023	0.16

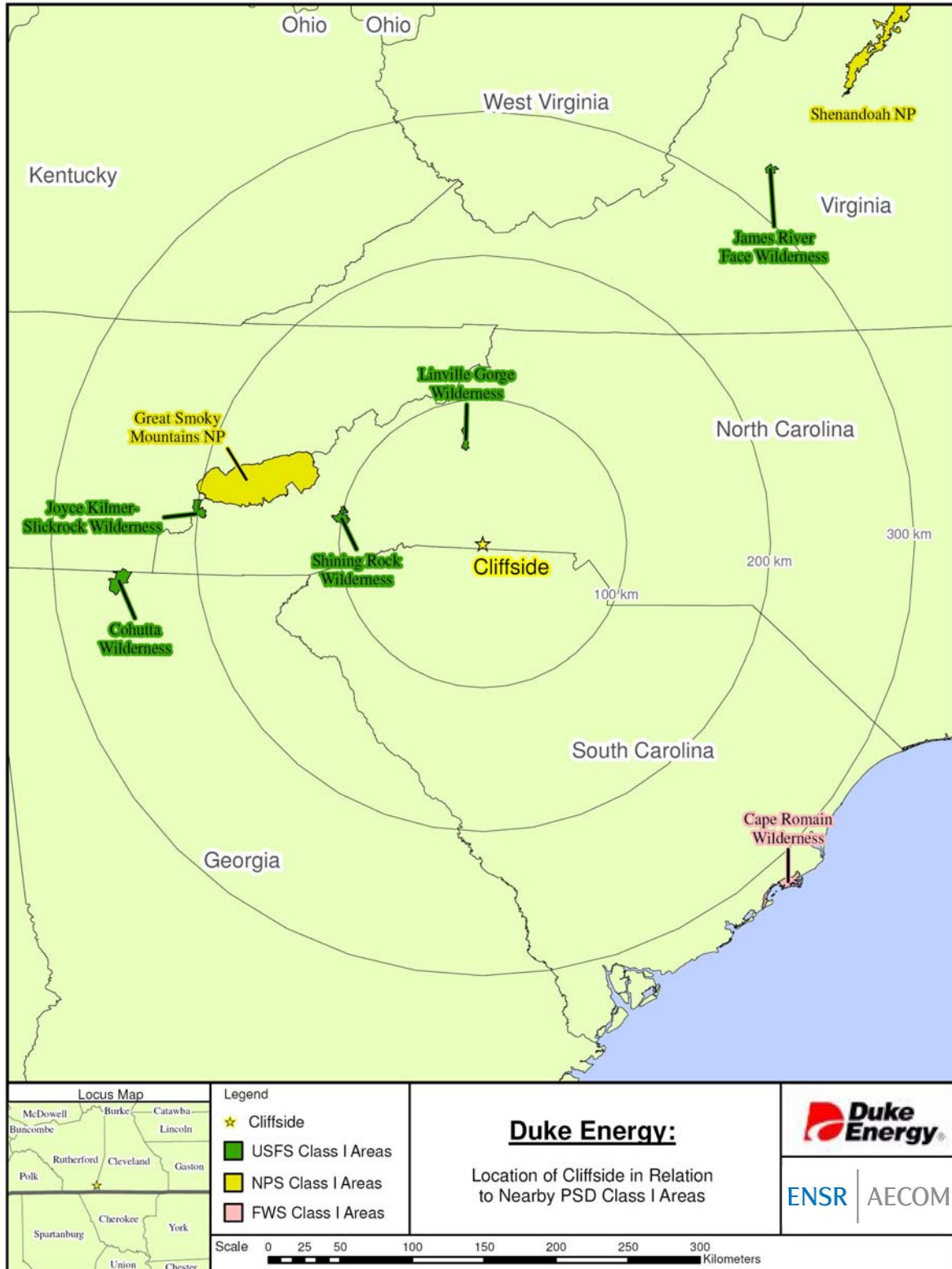
Table 4 Visibility Impacts at the PSD Class I Areas

Class I Area	2001			2002			2003		
	Days > than		MAX % Change in B _{ext}	Days > than		MAX % Change in B _{ext}	Days > than		MAX % Change in B _{ext}
	5% Δ B _{ext}	10% Δ B _{ext}		5% Δ B _{ext}	10% Δ B _{ext}		5% Δ B _{ext}	10% Δ B _{ext}	
Cohutta	0	0	0.17	0	0	0.20	0	0	0.15
Great Smoky Mountains	0	0	0.43	0	0	0.22	0	0	0.40
Joyce Kilmer-Slickrock	0	0	0.26	0	0	0.15	0	0	0.29
Linville Gorge	0	0	0.41	0	0	0.56	0	0	0.67
Shining Rock	0	0	0.53	0	0	0.30	0	0	0.21

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Figure 1 Location of Nearby Class I Areas in Relation to the Cliffside Steam Station



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