July 1, 2008

Mr. John Sipple
State of Delaware
Department of Natural Resources and Environmental Control
156 South State Street
Dover, DE 19901

Re: City of Dover McKee Run Generating Station Best Available Retrofit Technology (BART) Analysis and Proposal Addendum

Dear Mr. Sipple:

As requested in your June 4, 2008 electronic mail correspondence, The City of Dover McKee Run Generating Station (McKee Run) is submitting an addendum to the Best Available Retrofit Technology (BART) Analysis and Proposal originally submitted in June 2007. The addendum is being submitted to address the suggestions and comments of the Federal Land Managers (FLM) that were received by the Delaware Department of Natural Resource and Environmental Conservation (DNREC) after FLM review of the draft Visibility State Implementation Plan (SIP).

As outlined in the June 4, 2008 electronic mail correspondence, McKee Run will address the following two items:

> ***Comment 1**: A wet electrostatic precipitator (ESP) is considered as a BART alternative, but cost analysis of the alternative is not performed. It is stated at the bottom of page 3-8 that the wet ESP alternative will not be analyzed since it offers a similar or lesser level of PM_{10} control than those already identified in the fuel switching options, but when all fuel switching alternatives are later deemed to be too expensive for BART, the wet ESP is never analyzed separately. The cost of a wet ESP should be analyzed as a BART alternative.*

> ***Comment 2**: Section 3.2.2 discusses that Boiler 3 will be required to reduce the sulfur content of the fuel oil to comply with Delaware's Multi-Point regulation for SO_2 and that this action is considered a control option for PM_{10}. Section 5, item 4 states that since Boiler 3 will be required under Delaware's Multi-Point regulation for SO_2 to meet the 0.5% sulfur in residual fuel requirement, "Therefore, the consideration of BART controls for Boiler 3 should be compared above and beyond the control level expected from compliance with the fuel sulfur specification of Delaware's Multi-Pollutant regulations. It should be noted that a BART determination is required to be performed using a 'pre-control' baseline, rather than a baseline assumption that includes a yet-to-be-installed improved sulfur content fuel employed for purposes of another regulatory program.*

Response to Comment 1: Attached to this letter are three amended tables; Table 3-2, Table 5-2, and Table B-5. These three tables have been amended to include the capital and annualized costs for the use of a wet ESP to control PM_{10} emissions. As demonstrated in the tables the installation of a wet ESP is not a cost effective BART control option for PM_{10}.

Response to Comment 2: Attached to this letter is an amended Section 5 of the June 2007 BART Analysis and Proposal. Section 5 has been revised to clarify item 4 in relation to Delaware's Multi-Pollutant regulation. Item 4. and Table 5-1 were included for discussion purposes only to highlight that future regulation would have an impact on visibility independently of the BART requirements. Delaware's Multi-Pollutant regulation will require McKee Run to reduce sulfur content in the fuel beginning in 2009 prior to the 2013 BART requirements. The BART analysis performed in the June 2007 submittal utilized the 'pre-control' baseline rates at McKee Run **without** taking into account the future requirements under Delaware's Multi-Pollutant regulation. Table 5-2 of the originally submitted June 2007 BART Analysis and Proposal summarizes the analysis performed per U.S. EPA's Appendix Y Guidance utilizing McKee Run's 'pre-control' baseline.

If you have any questions regarding this submittal, please do not hesitate to contact me at (302) 672-6304, or Ken Beard at (302) 672-6336.

Sincerely,

Vince Scire

cc: Ken Beard (McKee Run)
Cara Fox (All4 Inc.)

Attachments Comment 1) – Amended Table 3-2, Table 5-2, and New Table B-5

Amended Table 3-2 (July 2008)
Summary of Economic Impact Analysis for PM_{10} Controls at Boiler 3

Control Technology	*Projected Emission Rate (tons/yr)*	*Emissions Performance Level*	*Expected Emissions Reductions (tons/yr)*	*Costs of Compliance*
Switch from 1% S No. 6 Fuel Oil to Natural Gas	328.2	89%	292.8	Total Annualized Cost: $19,027,596 Average Cost Effectiveness: $64,986/ton Cost Effectiveness per dV: $243,943,538/dV Incremental Cost: Not calculated due to the high annual cost of the fuel switching option to No. 2 FO.
Switch from 1% S No. 6 Fuel Oil to 0.3% S No. 2 Fuel Oil	328.2	66%	216.1	Total Annualized Cost: $57,082,788 Average Cost Effectiveness: $264,137/ton Cost Effectiveness per dV: $1,001,452,421/dV Incremental Cost: $190,906/incremental ton (No. 6 FO to No. 2 FO vs. No. 6 FO to No. 4 FO)
Use Add-On Control of a Wet ESP	328.2	43%	141.1	Total Annualized Cost: $1,915,511 Average Cost Effectiveness: $13,573/ton Cost Effectiveness per dV: $47,887,775/dV Incremental Cost: Lowest annualized cost therefore no incremental cost analysis conducted.
Switch from 1% S No. 6 Fuel Oil to 0.3% S No. 4 Fuel Oil	328.2	35%	116.4	Total Annualized Cost: $38,055,192 Average Cost Effectiveness: $326,821/ton Cost Effectiveness per dV: $731,830,615/dV Incremental Cost: $2,918,484/incremental ton (No. 6 FO to No. 4 FO vs. No. 6 FO 1% to No. 6 FO 0.5%)
Switch from 1% S No. 6 Fuel Oil to 0.5% S No. 6 Fuel Oil	328.2	32%	106.7	Total Annualized Cost: $9,513,798 Average Cost Effectiveness: $89,197/ton Cost Effectiveness per dV: $221,251,116/dV

Amended Table 5-2 (July 2008)

Summary of BART Analysis

VIP	*Step 1 – Identify Control Technologies*	*Step 2 – Identify Technically Feasible Control Technologies*	*Step 3 – Evaluate Control Effectiveness for Technically Feasible Control Technologies*	*Step 4.1 – Calculate Cost Effectiveness for Control Technologies*	*Steps 4.2 and 4.3 – Determine Energy, Other Non-Air Quality Environmental Impacts, and Remaining Useful Life*	*Step 5 – Evaluate Visibility Impacts of Control Technologies*	*Identify BART Control*
Boiler 3 (Emission Unit 3)							
PM_{10}							
	Switch from 1% S No. 6 Fuel Oil to Natural Gas	Yes	89%	Total Annualized Cost: $19,027,596 Average Cost Effectiveness: $64,986/ton Cost Effectiveness per dV: $243,943,538/dV Incremental Cost: Not calculated due to the high annual cost of the fuel switching option to No. 2 FO.	N/A	Highest Average 98th Percentile Impact Improvement of only 0.08 dV in Brigantine.	Fuel switching is not a cost effective BART control option for PM_{10}. BART not justified as visibility improvement of only 0.08 dV occurs.
	Switch from 1% S No. 6 Fuel Oil to 0.3% S No. 2 Fuel Oil	Yes	66%	Total Annualized Cost: $57,082,788 Average Cost Effectiveness: $264,137/ton Cost Effectiveness per dV: $1,001,452,421/dV Incremental Cost: $190,906/incremental ton (No. 6 FO to No. 2 FO vs. No. 6 FO to No. 4 FO)	N/A	Highest Average 98th Percentile Impact Improvement of only 0.06 dV in Brigantine.	Fuel switching is not a cost effective BART control option for PM_{10}. BART not justified as visibility improvement of only 0.06 dV occurs.

Amended Table 5-2 (July 2008)

Summary of BART Analysis

VIP	*Step 1 – Identify Control Technologies*	*Step 2 – Identify Technically Feasible Control Technologies*	*Step 3 – Evaluate Control Effectiveness for Technically Feasible Control Technologies*	*Step 4.1 – Calculate Cost Effectiveness for Control Technologies*	*Steps 4.2 and 4.3 – Determine Energy, Other Non-Air Quality Environmental Impacts, and Remaining Useful Life*	*Step 5 – Evaluate Visibility Impacts of Control Technologies*	*Identify BART Control*
	Use Add-On Control of a Wet ESP	Yes	43%	Total Annualized Cost: $1,915,511 Average Cost Effectiveness: $13,573/ton Cost Effectiveness per dV: $47,887,775/dV Incremental Cost: Lowest annualized cost therefore no incremental cost analysis conducted.	1) Energy demand due to ESP and 2) Disposal and handling of collected slurry from wet ESP.	Highest Average 98th Percentile Impact Improvement of only 0.04 dV in Brigantine.	The use of add-on control of a wet ESP is not a cost effective BART control option for PM_{10}. BART not justified as visibility improvement of only 0.04 dV occurs.
	Switch from 1% S No. 6 Fuel Oil to 0.3% S No. 4 Fuel Oil	Yes	35%	Total Annualized Cost: $38,055,192 Average Cost Effectiveness: $326,821/ton Cost Effectiveness per dV: $731,830,615/dV Incremental Cost: $2,918,484/incremental ton (No. 6 FO to No. 4 FO vs. No. 6 FO 1% to No. 6 FO 0.5%)	N/A	Highest Average 98th Percentile Impact Improvement of only 0.05 dV in Brigantine.	Fuel switching is not a cost effective BART control option for PM_{10}. BART not justified as visibility improvement of only 0.05 dV occurs.

Amended Table 5-2 (July 2008)

Summary of BART Analysis

VIP	*Step 1 – Identify Control Technologies*	*Step 2 – Identify Technically Feasible Control Technologies*	*Step 3 – Evaluate Control Effectiveness for Technically Feasible Control Technologies*	*Step 4.1 – Calculate Cost Effectiveness for Control Technologies*	*Steps 4.2 and 4.3 – Determine Energy, Other Non-Air Quality Environmental Impacts, and Remaining Useful Life*	*Step 5 – Evaluate Visibility Impacts of Control Technologies*	*Identify BART Control*
	Switch from 1% S No. 6 Fuel Oil to 0.5% S No. 6 Fuel Oil	Yes	32%	Total Annualized Cost: $9,513,798 Average Cost Effectiveness: $89,197/ton Cost Effectiveness per dV: $221,251,116/dV	N/A	Highest Average 98th Percentile Impact Improvement of only 0.04 dV in Brigantine.	Fuel switching is not a cost effective BART control option for PM_{10}. BART not justified as visibility improvement of only 0.04 dV occurs. However, this improvement will occur as a result of Delaware's Multi-Pollutant regulation.
	Use Add-On Control of Dry ESP	Yes – However, not analyzed since fuel switching options alone resulted in greater control of PM_{10}.	N/A	N/A	High energy demand due to multiple field ESP.	N/A	Not analyzed since fuel switching options alone resulted in greater control of PM_{10}.
	Use Add-On Control of Baghouse	No	N/A	N/A	N/A	N/A	Not analyzed due to technical difficulty expressed by control technology vendors.

Comment 1) Table B-5
City of Dover - McKee Run Generating Station
CAPITAL AND ANNUALIZED COSTS FOR WESP
Boiler No. 3

CAPITAL COSTS

COST ITEM		COST ($)
Direct Costs		
Purchased Equipment Costs		
[a] ***Purchased Equipment Costs Subtotal***	A	***$3,100,000***
Freight	0.075 A	$232,500
Total Purchased Equipment Cost	B	***$3,332,500***
Direct Installation Costs		
[a] ***Direct Installation Cost***	C	***$1,000,000***
Total Direct Cost	D	***$4,332,500***
Indirect Costs		
[b] Engineering	0.10 D	$433,250
[b] Construction Management	0.03 D	$129,975
[b] Contingencies	0.25 (D+Eng)	$1,191,438
Total Indirect Cost		***$1,754,663***
Total Capital Investment (TCI)		***$6,087,163***

ANNUALIZED COSTS

COST ITEM	COST FACTOR	RATE	COST ($)
Direct Annual Costs			
Operating Labor			
[c] Operator, two employees	2 hours/shift	$44.00 per hour	$173,448
Supervisor	15% of operator labor		$26,017
Maintenance			
Maintenance Labor and Material	5% of sum of direct installation costs, engineering, contingencies, and owner's cost		$131,234
Utilities			
[a], [c] Fresh Water usage	69 MMgal/yr	$500.00 per MMgal[b]	$34,295
[a], [c] Wastewater disposal	69 MMgal/yr	$3.00 per Mgal[d]	$205,772
[a], [c] Electricity	420 KWh	$0.11 per kWh[e]	$354,141
Demand Charge	420 KW	$9.60 max kW per month [e]	$48,384
Total Direct Annual Costs			***$973,293***
Indirect Annual Costs			
Spare Parts	60% of Maintenance Labor & Materials		$78,741
Administrative charges	2% of TCI		$121,743
Property taxes	1% of TCI		$60,872
Insurance	1% of TCI		$60,872
Capital recovery	0.102 x TCI		$619,991
Life of the control:	20 years at	8.0% interest	
Total Indirect Annual Costs			***$942,218***
Total Annual Costs [d]			***$1,915,511***
Cost Effectiveness ($/ton) [f]			
PM_{10} Control Efficiency	43% PM_{10} removal		
Potential PM_{10} Emissions	328.2 tpy	Total Annual Costs/Controlled PM_{10} Emissions:	
Controlled PM_{10} Emissions	141.1 tons of PM_{10} removed annually		$13,573

[a] Estimated based on data obtained from Southern Environmental Inc. June 2008.
[b] Cost information estimated using the U.S. EPA Air Pollution Control Cost Manual (6th Edition) published in January 2002 by the OAQPS.
[c] Based on 8,760 hours of operation per year 90% uptime.
[d] Cost specific to McKee Run. McKee Run currently spends $3.00/gallon to dispose of wastewater from the facility.
[e] Cost specific to McKee Run. McKee Run has both a kWh use charge and a demand charge associated with electric usage. Specifically 10.695 cents per kWh and approximately $9.60 demand charge.
[f] Emissions from Table 3-2.

Attachment Comment 2) – Amended Section 5.

5. SUMMARY OF MCKEE RUN BART PROPOSAL

Based on the information developed in the Impacts Analysis and the other technical and cost analyses, McKee Run proposes that BART for PM_{10} from Boiler 3 is current combustion control methods. A summary of the factors that support this determination is contained in the following paragraphs.

1. None of the control technologies analyzed would result in any significant, or even perceptible, improvement in visibility in a Class I area. If the highest efficiency PM_{10} control technology was implemented (Switch to Natural Gas with 89% control) the maximum 98^{th} percentile visibility improvement that would result would be only 0.08 dV. The maximum visibility improvement that would result on the highest impact day would be only 0.10 dV. The human eye cannot perceive a change in visibility impairment unless it is at least 1 to 2 dV. McKee Run does not believe that controls are justified under BART if no perceptible visibility improvement will result from their implementation.
2. Based on U.S. EPA's Appendix Y guidance, which DNREC directed facilities to follow; Boiler 3 does not significantly cause nor contribute to visibility impairment in any Class I area. The pre-control visibility modeling analysis shows that the 98^{th} percentile visibility impact for Boiler 3 is 0.46 dV in the Brigantine Wildlife Refuge and 0.27 dV in the Shenandoah National Park. These impacts are less than the 0.5 dV level at which U.S. EPA suggests that a source should be considered to contribute to visibility impairment. A source that does not contribute to visibility impairment is not required to install BART controls under the Regional Haze rules.
3. The total annualized costs (which are actually the annual operating costs) to implement the fuel switching options are \$19.0 million for natural gas, \$57.0 million for No. 2 fuel oil, \$38 million for No. 4 fuel oil, and \$9.5 million for 0.5% S No. 6 fuel oil. The cost effectiveness of these technologies are \$64,986 (natural gas), \$264,137 (No. 2 fuel oil), \$326,821 (No. 4 fuel oil), and \$89,197 (0.5% S No. 6 fuel oil) per ton of PM_{10} removed, and \$2.4 million (natural gas), \$1.0

billion (No. 2 fuel oil), $7.3 million (No. 4 fuel oil), and $2.2 million (0.5% S No. 6 fuel oil) per deciview of visibility improvement. McKee Run does not believe that these costs of compliance are at all reasonable given that they would result in almost no visibility improvement in either of the Class I areas.

4. *In addition to the above points regarding the BART analysis another item to note is that in 2009 the facility will be required to comply with Delaware's Multi-Pollutant regulation at Boiler 3.* As a result of compliance with Delaware's Multi-Pollutant regulation Boiler 3 will have a PM_{10} reduction of 32% and thus, a visibility improvement associated with the 0.5% sulfur in residual fuel requirement. The facility will be required to comply with this requirement beginning January 1, 2009, prior to the requirement to install BART controls. *For comparison purposes provided below in* ~~Therefore, the consideration of BART controls for Boiler 3 should be compared above and beyond the control level expected from compliance with the fuel sulfur specifications of Delaware's Multi-Pollutant regulation. Provided below in~~ Table 5-1 is a summary of the emissions and economic impact for each of the control technologies considered in the BART analysis compared with the fuel switching option to 0.5% sulfur in No. 6 fuel oil *to meet Delaware's Multi-Pollutant regulation.*

Table 5-1 (July 2008)
Summary of Economic Impact for PM_{10} Controls at Boiler 3 Compared to 0.5% Sulfur Fuel

Control Technology	*Baseline Emission Rate (tons/yr)*	*Emissions Performance Level Above 0.5% Sulfur Fuel (32%)*	*Emissions Reductions Above 0.5% Sulfur Fuel (106.7) (tons/yr)*	*Incremental Costs of Compliance Compared to 0.5% Sulfur Fuel (Total Annualized Cost: $9,513,798)*
Switch from 1% S No. 6 Fuel Oil to Natural Gas	328.2	57%	186.1	Incremental Cost: $51,113/incremental ton (No. 6 FO 1% S to Natural Gas vs. No. 6 FO 1% S to No. 6 FO 0.5% S)
Switch from 1% S No. 6 Fuel Oil to 0.3% S No. 2 Fuel Oil	328.2	34%	109.4	Incremental Cost: $434,621/incremental ton (No. 6 FO 1% to No. 2 FO vs. No. 6 1% S to No. 6 FO 0.5% S)
Use Add-On Control of a Wet ESP	328.2	43%	34.40	Incremental Cost: Lowest annualized cost therefore no incremental cost analysis conducted.
Switch from 1% S No. 6 Fuel Oil to 0.3% S No. 4 Fuel Oil	328.2	3%	9.7	Incremental Cost: $2,918,484/incremental ton (No. 6 FO 1% to No. 4 FO vs. No. 6 FO 1% to No. 6 FO 0.5%)

** Please note that Table 5-1 is for comparison purposes only, to compare the effects of Delaware's Multi-Pollutant regulation on the BART analysis. The complete BART analysis and results are summarized in Table 5-2 per U.S. EPA Appendix Y Guidance.*

The results of the BART Analysis are provided in full detail, following the procedures outlined in the previous sections of this proposal. Table 5-2 outlines the following information for the Boiler 3 BART eligible source:

- Identify VIPs for the source;
- Identify control technologies available for each VIP;
- Identify technically feasible control technologies for each source/VIP scenario;
- Evaluate control effectiveness of each technically feasible control technology;

- Calculate cost effectiveness for each control technology;
- Determine energy, non-air quality environmental impacts, and remaining useful life of source;
- Evaluate visibility impacts of control technology; and
- Identify BART control.

McKee Run has included Table 5-3 that presents visibility impacts on the Brigantine Wilderness Refuge Class I area comparing the pre-control and post-control scenarios. McKee Run used the 98th Percentile deciview values for the pre-control and post-control scenarios for the Boiler 3 BART eligible source as outlined in 40 CFR Part 51, Appendix Y. The purpose of this table is to highlight the visibility impacts for the Boiler 3 BART-eligible source during the baseline or pre-control period and to compare these values with the visibility impacts for the proposed post-control scenario.