ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

Subject: Review Memo for BART Application — May 4, 2009
Allegheny Ludlum Corporation
Brackenridge Facility
100 River Road
Brackenridge, PA 15014

To: Jim Thompson
Air Quality Program Manager
Allegheny County Health Department

From: Tom Lattner, Air Pollution Control Engineer
Erin O'Brian, Air Pollution Control Engineer

Through: Jayme Graham
Supervisor Planning Section
Air Quality Program
Allegheny County Health Department

Sandra Etzel
Chief Engineer
Air Quality Program
Allegheny County Health Department

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class 1 area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the PA Department of Environmental Protection has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States and local air agencies are required to make a determination of BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

ACHD requested that Allegheny County sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. <u>Process Description:</u>

Allegheny Ludlum is an iron and steel mill plant. The ACHD had originally identified a list of 39 units as BART eligible. The company reviewed that list and found several of those units were not installed in the BART-eligible timeframe and several other units that were installed in the BART-eligible timeframe but that had not been included on the ACHD's original list. The net result was actually an increase in BART eligible emissions.
The following are the Source ID numbers of the affected units.

Table 1

ID	Emission Source	Install-ation Date	PM_{10} Potential To Emit (TPY)	PM_{10} Actual (TPY) 1994	SO_2 Potential To Emit (TPY)	SO_2 Actual (TPY) 1994	NOx Potential To Emit (TPY)	NOx Actual (TPY) 1994	VOC Potential To Emit (TPY)	VOC Actual (TPY) 1994
S0007A	BOFs #71 and #72 Charging	1967	0.2	0.13						
S0007B	BOFs #71 and #72 Tapping	1967	0.4	0.28						
S0007C	BOFs #71 and #72 Melting	1967	17.3	11.70	0.36	0.24	7.15	4.90	5.36	3.7
	BOF Fugitives	1967	50.0	33.9	0.004		0.07		0.05	
S008	Koppers BOF Ladle Preheater	1973	0.15	0.02	0.01	0	1.9	0.21	0.11	0.01
S019	Argon-Oxygen Decarburization (AOD) Vessel – Canopy Baghouse	1977	31.30	18.60	48.2	28.6	56.9	33.8	26.3	15.6
S019	Argon-Oxygen Decarburization (AOD) Vessel – Roof Monitor	1977	3.80	2.20	0.06	0	0.07	0	0.03	0.01
S037	BP Slab Grinder No. 15	1968	32.40	9.80	0*	unknown	0*	unknown	0*	unknown
S038	BP Slab Grinder No. 16	1968	32.40	9.80	0*	unknown	0*	unknown	0*	unknown
S039	BP Slab Grinder No. 18	1968	32.40	9.80	0*	unknown	0*	unknown	0*	unknown

S040	BP Slab Grinder No. 19	1968	32.40	9.80	0*	unknown	0*	unknown	0*	unknown
S041	BP Slab Grinder No. 20	1968	32.40	9.80	0*	unknown	0*	unknown	0*	unknown
S042	BP Slab Grinder No. 21	1968	32.40	9.80	0*	unknown	0*	unknown	0*	unknown
S043	BP Slab Grinder No. 22	1968	32.40	9.80	0*	unknown	0*	unknown	0*	unknown
S044	BP Slab Grinder No. 23	1974	1.5	0.55	0*	unknown	0*	unknown	0*	unknown
S045	BP Slab Grinder No. 24	1974	1.5	0.55	0*	unknown	0*	unknown	0*	unknown
S046	Plate Burner/Torch Cutter No.1 (cutting)	1973	6.30	1.30	0	0		unknown		
	Plate Burner/Torch Cutter No.1 (NG)		0.1		0.01		1.3*	0.15	0.07	0.01
S047	Plate Burner/Torch Cutter No.2 (cutting)	1973	6.30	1.30	0	0		unknown		
	Plate Burner/Torch Cutter No.2 (NG)		0.1		0.01		1.3*	0.15	0.07	0.01
S056	Belt Grinders #1 and #2	1967	0.3	0.05	0	unknown		unknown		
S057	Loftus Soaking Pit. No. 9	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S058	Loftus Soaking Pit. No. 10	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S059	Loftus Soaking Pit. No. 11	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S060	Loftus Soaking Pit. No. 12	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S061	Loftus Soaking Pit. No. 13	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S062	Loftus Soaking Pit. No. 14	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S063	Loftus Soaking Pit. No. 15	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S064	Loftus Soaking Pit. No. 16	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1

S065	Loftus Soaking Pit. No. 17	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S066	Loftus Soaking Pit. No. 18	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S067	Loftus Soaking Pit. No. 19	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S068	Loftus Soaking Pit. No. 20	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S069	Loftus Soaking Pit. No. 21	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S070	Loftus Soaking Pit. No. 22	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S071	Loftus Soaking Pit. No. 23	1970	0.84	0.14	0.07	0.01	11.1	1.8	0.61	0.1
S080	Loftus Soaking Pit. No. 43	1965	0.52	0.10	0.04	0	6.8	1.3	0.37	0.07
S081	Loftus Soaking Pit. No. 44	1965	0.52	0.10	0.04	0	6.8	1.3	0.37	0.07
S082	Loftus Soaking Pit. No. 45	1965	0.52	0.10	0.04	0	6.8	1.3	0.37	0.07
S083	Loftus Soaking Pit. No. 46	1965	0.52	0.10	0.04	0	6.8	1.3	0.37	0.07
S088	Hot Band Normalizing Furnace	1973	2.30	0.59	0.18	0.05	30.2	7.8	1.7	0.43
	TOTAL (tpy)		**363.0**	**142.27**	**50**	**29.04**	**294.1**	**79.21**	**44.3**	**21.55**
			PTE	Actual	PTE	Actual	PTE	Actual	PTE	Actual

*Values taken from October 22, 2004 ACHD letter EJ O'Brian to SL Etzel.
Other values in the October letter were compared against those from the 9-11-2000 operating permit application and found to be nearly the same.

3. NESCAUM CALPUFF modeling:

Allegheny Ludlum has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date-eligible units of two visibility impairing pollutants (PM10 and NOx) are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, Subpart P Protection of Visibility.

Based upon the NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 0.0148 deciviews (dv). This impact is on the Shenandoah National Park.

On an individual emission unit basis, PM10 from the Basic Oxygen Furnaces #71 and 72 produces the maximum impact (0.0085 dv) on a Class 1 area - again Shenandoah National Park.

The visibility impact of the units with respect to the Class I area affected is described in Table II.

TABLE II. Maximum Daily Impact (dv)

Nat_bgr	Change in visibility (delta-deciview)					Stack Name
	Maxclsi	Total	SO4	NO3	PM10	
	24_01	24_01	24_01	24_01	24_01	
Best	Shen 2	0.0035	0.0	0.0	0.0035	BP Slab Grinder
Best	Shen 2	0.0009	0.0	0.0009	0.0	Plate Burner Torch Cutter No. 1
Best	Dolly Sods	0.0007	0.0	0.0007	0.0	Loftus Soak Pit 14
Best	Dolly Sods	0.0007	0.0	0.0007	0.0	Loftus Soak Pit 18
Best	Dolly Sods	0.0007	0.0	0.0007	0.0	Loftus Soak Pit 23
Best	Shen 2	0.0004	0.0	0.0	0.0004	Plate Burner Torch Cutter 2
Best	Shen 2	0.0005	0.0	0.0005	0.0	Loftus Soaking Pit 12
Best	Shen 2	0.0009	0.0	0.0005	0.0005	Generic Stack
	Shen 2	0.0085	0.0	0.0005* (Dolly Sods)	0.0085*	Basic Oxygen Furnaces #71 and 72

*Values for BOF #71 and 72 were not part of the NESCAUM modeling, but were ratioed from deciview changes for BP Slab Grinder (PM10) and Loftus Soaking Pit 14 (NOx). The BOF was identified as BART eligible (on the date criteria) after the modeling was performed.

4. BART Analysis:

Allegheny Ludlum did not submit a BART engineering analysis. Instead, in a September 6, 2006 letter to ACHD, the company proposed certain permit limitations to reduce BART eligible emissions of NOx and PM10 to below the 250 tpy criterion by taking throughput limitations related to some of its slab grinders and Loftus soaking pits. The company subsequently withdrew this proposal one year later (September 14, 2007 letter to ACHD).”

The ACHD performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States and local agencies can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). ACHD must follow the guidelines in making BART determinations on a source-by-source basis for 750-megawatt (MW) or greater power plants, but is not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, ACHD retains the discretion to deviate from the guidelines as appropriate.

The ACHD's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, ACHD used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, ACHD took into account the remaining useful life of the source and any existing control technology present at the source. For each source, ACHD determined a "best system of continuous emission reduction" based upon its evaluation of these factors. Below is the five-factor analysis, in detail, for the emissions units at this facility, which had the greatest impact.

<u>BART Five-Factor Analysis:</u>

STEP – 1: Identify All Available Retrofit Control Technologies

	BP Slab Grinders	Plate Burner Torch Cutters 1 & 2	Loftus Soak Pits 12 - 23	BOFs
Existing controls:	None	Baghouse D011	None	Wet venturi scrubber
Retrofit controls:	Baghouse	None	Ultra low NOx burners	None

Baghouses are the available retrofit control option with the practical potential for application to the slab grinders for the control of PM10.

Ultra low NOx burners are the available retrofit control option with the practical potential for application to the natural gas burners for the control of NOx.

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

A baghouse is a technically feasible option already in use for two slab grinders at this facility.

Ultra low NOx burners achieve a 65% reduction in NOx emissions compared to conventional natural gas burners.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Baghouses can be up to 99% effective in particulate filtration.

An ultra low NOx burner provides a 65% improvement over the conventional natural gas burner.

STEP – 4: Evaluate Impacts and Document the Results

Cost Of Compliance:
(1) According to the EPA-CICA Fact Sheet, a typical baghouse could have annualized cost of $5 to $45 per scfm (Fabric Filter, Mechanical Shaker Cleaned Type). Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars. This facility has two slab grinders that already exhaust to a their own baghouse. Based on the installation of a new baghouse for the seven BP Slab Grinders numbered 15,16, and 18 through 22, sized conservatively for similar operating parameters, and not correcting for inflation, the annualized cost is $120,000. The modeled emissions for the Slab Grinders was 9.5 tons per year, resulting in a cost of $12,632 per ton PM10 removed, and an cost of $34,286,000 per deciview change.

(2) Ultra Low NOx Burner (for Loftus Soaking Pits): $12,800/ton, the Annualized Cost is $182,000. These calculations are based upon information obtained from EPA's AP42 Manual. The potential emissions reduction for this control was estimated to be 14 tons.

The existing useful life of this facility was not a factor since the facility is not expected to close within the expected life span of the control equipment. There are no direct energy impacts or non-air quality impacts associated with this control.

STEP – 5: Evaluate Visibility Impacts

Using the CALPUFF NWS platform computer modeling the total visibility impact of this facility, including all BART eligible units, on the Shenandoah Class 1 area was found to be 0.0148 dv.
The costs of possible new controls in terms of dollars per deciview for this facility were calculated to be:

1. $34,286,000 /dv for the baghouse for the BP slab grinders; and
2. $70,000,000/dv for the ultra low NOx Burners for the Loftus Soaking Pits.

The other two sources – the Plate Burner Torch Cutters 1 & 2 and the BOFs have existing controls. The majority of the visibility impairing emissions was associated with the emissions from the BOFs and slab grinders. The greatest visibility impact of either individually was 0.0085 dv attributed to the PM10 emissions from those BOFs.

Based on a review of current PM10 emissions reduction approaches in the RACT/BACT/LAER Clearinghouse (RBLC) there does not appear to be adequate alternatives available for the two BOF emissions sources, beyond the currently installed wet venturi scrubbers. Thus, no cost effectiveness calculations were performed for PM10 from these units.

With their existing baghouse, and low total visibility impact of 0.0009 dv due to NOx from Plate Burner Torch Cutter Number 1, and 0.0005 dv due to PM10 from Plate Burner Torch Cutter Number 2, no cost effectiveness calculation was deemed necessary for these two units.

5. Conclusion:

Based on the five-factor analysis, the impact of this facility does not warrant additional control. ACHD recommends the following determination of BART for the Allegheny Ludlum facility: compliance with the existing operating / installation permits for this facility.

cc: Nancy Herb, PA DEP, Harrisburg
Jane Mahinske, PA DEP, Harrisburg

OPERATING PERMITS FOR BART ELIGIBLE SOURCES --Allegheny Ludlum

BART Eligible Units- Existing operating permits.
Installation Permit referenced where noted. Values with an asterisk signify Emission Limits = PTE.

ID	Emission Source	Permit #
S0007A	BOFs #71 and #72 Charging	0025603-000-82900
S0007B	BOFs #71 and #72 Tapping	Same
S0007C	BOFs #71 and #72 Melting	Same
	BOF Fugitives	Same
S008	Koppers BOF Ladle Preheater	Unknown
S019	Argon-Oxygen Decarburization (AOD) Vessel – Canopy Baghouse	0025603-000-92800
S019	Argon-Oxygen Decarburization (AOD) Vessel – Roof Monitor	Same

ID	Emission Source	Permit #
S037	BP Slab Grinder No. 15	0025603-000-65304
S038	BP Slab Grinder No. 16	Same
S039	BP Slab Grinder No. 18	Same
S040	BP Slab Grinder No. 19	Same
S041	BP Slab Grinder No. 20	Same
S042	BP Slab Grinder No. 21	Same
S043	BP Slab Grinder No. 22	Unknown
S044	BP Slab Grinder No. 23	Installation Permit #0059-I004
S045	BP Slab Grinder No. 24	Same

ID	Emission Source	Permit #
S046	Plate Burner/Torch Cutter No.1 (cutting)	0025603-000-1160
	Plate Burner/Torch Cutter No.1 (NG)	Same
S047	Plate Burner/Torch Cutter No.2 (cutting)	Same
	Plate Burner/Torch Cutter No.2 (NG)	Same
S056	Belt Grinders #1 and #2	Installation Permit #0059-I003

ID	Emission Source	Permit #
S057	Loftus Soaking Pit. No. 9	0025603-000-22803
S058	Loftus Soaking Pit. No. 10	Same
S059	Loftus Soaking Pit. No. 11	Same
S060	Loftus Soaking Pit. No. 12	Same
S061	Loftus Soaking Pit. No. 13	Same
S062	Loftus Soaking Pit. No. 14	Same
S063	Loftus Soaking Pit. No. 15	Same
S064	Loftus Soaking Pit. No. 16	Same
S065	Loftus Soaking Pit. No. 17	Unknown
S066	Loftus Soaking Pit. No. 18	Unknown
S067	Loftus Soaking Pit. No. 19	Unknown
S068	Loftus Soaking Pit. No. 20	Unknown
S069	Loftus Soaking Pit. No. 21	Unknown
S070	Loftus Soaking Pit. No. 22	Unknown
S071	Loftus Soaking Pit. No. 23	Unknown

ID	Emission Source	Permit #
S080	Loftus Soaking Pit. No. 43	0025603-000-22804
S081	Loftus Soaking Pit. No. 44	0025603-000-22804
S082	Loftus Soaking Pit. No. 45	0025603-000-22804
S083	Loftus Soaking Pit. No. 46	0025603-000-22804
S088	Hot Band Normalizing Furnace	0025603-000-71500

ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

Subject: Review Memo for BART Application — May 4, 2009
Reliant Energy Company
Orion Power - Cheswick Plant
121 Champion Way
Canonsburg, PA 15317

To: Jim Thompson
Air Quality Program Manager
Allegheny County Health Department

From: Tom Lattner, Air Pollution Control Engineer
Erin O'Brian, Air Pollution Control Engineer

Through: Jayme Graham
Supervisor Planning Section
Air Quality Program
Allegheny County Health Department

Sandra Etzel
Chief Engineer
Air Quality Program
Allegheny County Health Department

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the PA Department of Environmental Protection has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States and local agencies are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Allegheny County Health Department (ACHD) requested that Allegheny County facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The PA DEP and ACHD have determined that an engineering analysis of VOC control options is not needed. EPA has determined that BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Allegheny County EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Orion Power Cheswick is a fossil fuel fired steam electric generating plant of more than 250 million BTU's per hour heat input. The plant is composed of one main boiler (Boiler #1) exhausting to one stack, which fires coal or synfuel as an alternate fuel. Natural gas is combusted as an auxiliary fuel for startup, shutdown, and at the operator's description. Pollution control equipment for the main boiler includes low NOx burners, electrostatic precipitation with flue gas conditioning, and selective catalytic reduction.

Boiler #1 was originally constructed between 1962 and 1977, and the total emissions of three of the eligible pollutants (SO2, NOx and PM_{10}) are over 250 tons, making it subject to the Best Available Retrofit Technology (BART) requirements that are a part of the Regional Haze rules specified in 40 CFR Part 51, Subpart P Protection of Visibility.

The following information relates to Boiler #1, the lone BART affected unit:

Point	Emission Source	Install Date	SO_2 Potential To Emit (TPY)	SO_2 Actual (TPY) 1999	NOx Potential To Emit (TPY)	NOx Actual (TPY) 1999	PM_{10} Potential To Emit (TPY)	PM_{10} Actual (TPY) 1999	VOC Potential To Emit (TPY)	VOC Actual (TPY) 1999
S-001	Coal/ Gas Boiler 1	1970	67452.0	41602.0	10840.0	5029.0	361.0	228.0	15.8	13.7

Reliant Energy (Tax I.D. 52-2201498) Orion Power Midwest, L.P.- Cheswick Power Station (Facility I.D. 00157)
BART Category 1 - Fossil Fuel Fired Steam Electric Plant
Emissions data taken from Form K of October 2000 Operation Permit Application

The facility reported the 2002 Boiler #1 emissions (tpy) as follows:

SO2	NOx	PM10	VOC
42,017.9	5,761.2	205.7	10.7

3. NESCAUM CALPUFF Modeling:

Based upon the NESCAUM modeling (results shown in table below) the maximum impact of this source on a Class 1 area due to PM_{10} was 0.0336 deciviews (dv). This impact is on the Otter Creek Wilderness Area. The impacts from SO2 and NOx are not considered in this memo, since the source will be participating in CAIR.

			Change in visibility (delta-deciview)		
Nat_bgr	Maxclsi	Total	SO4	NO3	PM_{10}
Best	otcr	3.4898	3.1606	0.8134	0.0336
Average	otcr	2.5034	2.2569	0.5611	0.0229
Worst	otcr	1.7710	1.5910	0.3856	0.0156

4. BART Analysis

Orion Power Cheswick did not submit a BART engineering analysis. Instead the company performed their own BART modeling in January 2007, and provided the ACHD with a report containing their results, which will not be discussed in this memo.

The ACHD performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States and local agencies can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). ACHD must follow the guidelines in making BART determinations on a source-by-source basis for 750-megawatt (MW) or greater power plants.

The ACHD's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition, for the source subject to BART identified in this review memo, ACHD used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, ACHD took into account the remaining useful life of the source and any existing control technology present at the source. For this source, ACHD determined a "best system of continuous emission reduction" based upon its evaluation of these factors. Below is the five-factor analysis, in detail, for the emissions unit at this facility that had the greatest impact.

BART Five-Factor Analysis:
STEP – 1: Identify All Available Retrofit Control Technologies

	Boiler #1
Existing controls:	Low NOx burners, electrostatic precipitator (ESP) with flue gas conditioning, selective catalytic reduction (SCR)
Retrofit controls:	Baghouse

A baghouse is the available retrofit control option with the practical potential for application to Boiler #1 for the control of PM10.

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

A baghouse is a technically feasible option already in use for two slab grinders at this facility.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Baghouses can be up to 99% effective in particulate filtration.

STEP – 4: Evaluate Impacts and Document the Results

Cost Of Compliance:
(1) According to the EPA-CICA Fact Sheet, a typical baghouse could have annualized cost of $5 to $45 per scfm (Fabric Filter, Mechanical Shaker Cleaned Type). Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars. Based on the installation of a new baghouse for Boiler #1, sized for similar operating parameters listed in the operating permit and the operating permit application, and not correcting for inflation, the annualized cost is $7,351,900. The modeled emissions for Boiler #1 were 228.9 tons per year, resulting in a cost of $32,118 per ton PM10 removed, and a cost of $218,806,000 per deciview change

STEP – 5: Evaluate Visibility Impacts

Using the CALPUFF NWS platform computer modeling the visibility impact of this facility due to PM10 on the Otter Creek Wilderness Area was found to be 0.0336 dv.
The costs of possible new controls in terms of dollars per deciview for this facility were calculated to be at least $218,806,000 /dv for the baghouse for Boiler #1. This analysis indicates that it would not be cost effective to require this control option to achieve this modeled delta deciview impact

5. Conclusion:

Based on the five-factor analysis, the impact of this facility does not warrant additional control. ACHD recommends the following determination of BART for the Orion Power Cheswick facility: The control equipment described in this analysis is required by Operating Permit

1065009-003-00100 and Installation Permits IP93-I-0009-C, IP0054-I002, and IP0054-I004. The conditions of these permits along with the implementation of EGU CAIR requirements satisfy BART requirements for this facility.

cc: Nancy Herb, PA DEP, Harrisburg
Jane Mahinske, PA DEP, Harrisburg

OPERATING PERMITS FOR BART ELIGIBLE SOURCES - - Orion Power Cheswick Plant

ID	Emission Source	Permit #
S-001	Main Boiler Number 1	1065009-003-00100 IP93-I-0009-C (Low NOx Burners) IP-0054-I-002 (SCR)
		RACT Plan 217, 3-8-1996
		IP #0054-I004 (FGD) Table V-A-1

ALLEGHENY COUNTY HEALTH DEPARTMENT
AIR QUALITY PROGRAM

Subject: Review Memo for BART Application May 5, 2009
United State Steel Corporation
Clairton Works
400 State Street
Clairton, PA 15025

To: Jim Thompson
Air Quality Program Manager
Allegheny County Health Department

From: Tom Lattner, Air Pollution Control Engineer
Erin O'Brian, Air Pollution Control Engineer

Through: Jayme Graham
Supervisor Planning Section
Air Quality Program
Allegheny County Health Department

Sandra Etzel
Chief Engineer
Air Quality Program
Allegheny County Health Department

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class 1 area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the PA Department of Environmental Protection has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States and local agencies are required to make a determination of BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Allegheny County Health Department (ACHD), in a letter dated May 31, 2006, requested that Allegheny County sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

US Steel Clairton Works is a coke oven battery plant. It has eight units that meet the date criteria for BART.

The following are the Source ID numbers of the BART affected units at this facility.

US Steel Corporation (Tax I.D. 25-0996816)
Clairton Works (Facility I.D. 00032)
BART Category 14 - Coke Oven Batteries
Emissions data taken from Form K of March 2001 Operating Permit Application and April 2002 update, and from the ACHD Emission Inventory.

Table I
Units Known to Have Been Installed Within 1962-77 Time Frame

Emission Unit	**Units discharging to this stack**	**Emission Source Description**	**Install Date**	**PM_{10} PTE (TPY)**	**PM_{10} Actual (TPY) 2002**	**NOx PTE (TPY)**	**NOx Actual (TPY) 2002**	**SO2 PTE (TPY)**	**SO_2 Actual (TPY) 2002**	**VOC PTE (TPY)**	**VOC Actual (TPY)** 2002
N/A	P019	Desulfurization Plant	1968	1.49	No data	27.33	1.66	55.87	151.44	346.53	125.27
S032	B002	Boiler #2 - COG	1965	29.57	12.36	1285.00	263.03	1508.45	115.32	5.06	3.41
S032	B002	Boiler #2 - NG	1965	16.85	0.28	1285.00	26.82	1508.45	0.08	11.59	0.77
S036	B005	R1 Boiler - COG	1974	14.05	0.49	525.00	8.82	796.40	6.45	2.44	0.13
S036	B005	R1 Boiler - NG	1974	20.06	0.00	525.00	0.00	796.40	0.00	5.52	0.00
S036	B006	R2 Boiler - COG	1975	14.04	0.30	525.00	5.51	796.40	4.54	2.44	0.08
S036	B006	R2 Boiler - NG	1975	20.06	0.00	525.00	0.00	796.40	0.00	5.52	0.00
S038	B007	T1 Boiler - COG	1976	9.61	0.30	358.00	5.36	572.59	3.58	1.65	0.08
S038	B007	T1 Boiler - NG	1976	13.67	0.00	358.00	0.00	572.59	0.00	3.76	0.00
S039	B008	T2 Boiler - COG	1975	9.59	0.31	358.00	5.36	572.59	4.26	1.65	0.08
S039	B008	T2 Boiler - NG	1975	13.67	0.00	358.00	0.00	572.59	0.00	3.76	0.00
	P020	Keystone Cooling Tower	1962-77	0.78	0.31	0.00	0.00	0.00	0.00	0.00	0.00
	P041	Boom Conveyer	1962-77	6.23	0.16	0.00	0.00	0.00	0.00	0.00	0.00
			TOTAL	169.67	14.35	6129.33	316.56	8548.73	285.67	389.92	129.82

3. NESCAUM CALPUFF modeling:

US Steel Corporation's Clairton Works has emission units at its facility that were originally constructed between 1962 and 1977. The total potential emissions from the date-eligible units of three visibility impairing pollutants (SO2, NOx and VOC) are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, Subpart P Protection of Visibility.

Based upon the NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area, in this case the Otter Creek Wilderness Area, was 0.0897 deciviews (dv).

The visibility impact of the units with respect to the Class I area affected is described in Table II, which displays the adjusted* NESCAUM modeling results.

Table II

Nat_bgr	Change in visibility (delta-deciview)					Stack Name
	Maxclsi	Total	SO4	NO3	PM10	
	24_01	24_01	24_01	24_01	24_01	
Best	Otter Creek	0.0142	0.0140	0.0003	0.0001	Desulfurization_Plant
Best	Otter Creek	0.0732*	0.0107*	0.0605*	0.0020*	Boiler_#2
Best	Otter Creek	0.0023	0.0006	0.0017	0.0000	R1_Boiler
Best	Dolly Sods	0.0066	0.0013	0.0041	0.0012	Generic Stack

* Boiler #2 results are "adjusted" because an error in the emission rate was found in the NESCAUM modeling results for Boiler #2 after the modeling was completed. In order to make a proper analysis, modeling results were corrected by multiplying modeled results by the corrected emission rates, i.e., using ratios.

On an individual emission unit basis, the maximum impact of these units on a Class 1 area, again Otter Creek Wilderness Area, is from nitrates from Boiler #2.

4. <u>BART Analysis:</u>

US Steel Corporation did not submit a BART engineering analysis. Rather, contrary to the requirements of the MANE-VU regional planning organization, the company submitted visibility impairment modeling, to exempt itself from the engineering analysis. The company submitted this modeling in a December 20, 2006 letter to the ACHD. The results of the report are not discussed here.

The ACHD performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a 'BART Determination' process that States and local agencies can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). The ACHD must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) or greater power plants, but is not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, the ACHD retains the discretion to deviate from the guidelines as appropriate.

The ACHD's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition, for each source subject to BART identified in this review memo, ACHD used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, the ACHD took into account the remaining useful life of the source and any existing control technology present at the source. For each source, ACHD determined a “best system of continuous emission reduction” based upon its evaluation of these factors. Below is the five-factor analysis, in detail, for the emissions units at this facility, which had the greatest impact.

BART 5 Factor Analysis:
STEP – 1: Identify All Available Retrofit Control Technologies

	Desulfurization Plant	Boiler #2	R1 Boiler
Existing controls	Afterburner	N/A	N/A
Retrofit controls	None	Ultra Low NOx Burners	Ultra Low NOx Burners

The facility’s Desulfurization Plant design incorporates redundant equipment to ensure its can continue to remove sulfur compounds from the coke oven gas in the event of component failures. No alternate control options to the Afterburner are identified in the RACT/BACT/LAER Clearinghouse.

Ultra low NOx burners is the available retrofit control option with the practical potential for application to Boiler #2 and the R1 Boiler for the control of NOx. These boilers may use coke oven gas or natural gas.

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

No control options to the Afterburner are identified in the RACT/BACT/LAER Clearinghouse.

Ultra low NOx burners currently achieve a 65% reduction in NOx emissions compared to conventional natural gas burners. These boilers may use coke oven gas or natural gas.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Ultra Low NOx Burners provide a 65% improvement over the conventional natural gas burners. These boilers may use coke oven gas or natural gas.

STEP – 4: Evaluate Impacts and Document the Results

Cost Of Compliance: Ultra Low NOx Burner $12,800/ton.

The Annualized Cost for Boiler #2 is $2,406,400, and for the R1 Boiler it is $73,300. These calculations are based upon information obtained from EPA's AP42 Manual. The potential NOx emissions reductions for these controls were estimated to be 188 and 5.73 tons, respectively.

The existing useful life of this facility was not a factor since the facility is not expected to close within the expected life span of the control equipment. There are no direct energy impacts or non-air quality impacts associated with this control.

STEP – 5: Evaluate Visibility Impacts

Using the CALPUFF NWS platform computer modeling the total visibility impact of this facility, including all BART eligible units, on the Otter Creek Class 1 area was found to be 0.0897 dv.
The costs of possible new controls in terms of dollars per deciview for this facility were calculated to be:

(1) $39,775,000/dv for the ultra low NOx Burners for Boiler #2; and
(2) $43,144,000/dv for the ultra low NOx Burners for the R1 Boiler.

The majority of the visibility impairing emissions was associated with the emissions from Boiler #2. The greatest visibility impact individually was 0.0605 dv attributed to the NOx emissions from Boiler #2.

The other emission source, the Desulfurization Plant, has existing controls. Based on a review of current emissions reduction approaches in the RACT/BACT/LAER Clearinghouse (RBLC) there does not appear to be adequate alternatives available for the Desulfurization Plant, beyond the currently installed afterburner. Thus, no cost effectiveness calculations were performed for SOx from this unit.

5. <u>Conclusion:</u>

Based on the five-factor analysis, the impact of this facility does not warrant additional control. ACHD recommends the following determination of BART for the US Steel Clairton Works facility: Compliance with the existing operating permits for this facility.

<u>OPERATING PERMITS FOR BART ELIGIBLE SOURCES – U.S. Steel Clairton Works</u>

ID	Emission Source	Permit #
S032 B002	Boiler No. 2	7035003-010-00800
S036-B005 & B006	Boiler Nos. R1 and R2	7035003-010-01300
S036- B007 & B008	Boiler Nos. T1 and T2	7035003-010-00600
P019	Desulfurization Plant	7035003-010-25600
P020	Keystone Cooling Tower	No OP#
P041	Boom Conveyer	No OP#

cc: Nancy Herb, PA DEP, Harrisburg
Jane Mahinske, PA DEP Harrisburg

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
February 6, 2008

Subject: Review Memo for BART Application
Carmeuse Lime Inc.
Millard Lime Plant
Route 422 W
Annville, PA 17003

Operating Permit #: 38-05003

To:

William Weaver	Joyce Epps
Environmental Program Manager	Bureau Director
Southcentral Regional Office	Bureau of Air Quality

From: Martin L. Hochhauser, P.E., Air Quality Engineering Specialist

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to Carmeuse/Millard indicated that an engineering analysis of VOC control options was not needed, because the relationship of VOC and particulate could not be quantified. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than US EPA's de minimis levels of 40 tons per year for NOx and SO_2 or 15 tons per year of PM10, because of the small effect on visibility.

2. Process Description:

Carmeuse/Millard is a lime production plant. It has one affected lime kiln, Kiln Number 5. Kiln Number 5 and associated material handling units are affected units.

The primary purpose of this facility is to convert limestone into lime. It is produced in both quick and hydrated forms. The limestone kiln has no preheater and is a long unit. The kiln has one downstream control device, a fabric filter processing the kiln flue gas.

The following are the source ID numbers of the affected units.

TABLE 1 - 2002 Actual Emissions

UNIT	**NOx (tpy)**	**PM10 (tpy)**	**SO2 (tpy)**
107 - Number 5 Kiln	293.16	18.24	60.82
114 - Number 5 Kiln Storage Bin	0.00	2.01	0.00
116 – Chemical Hydrate Loadout	0.00	0.11	0.00
118 – Bulk Hydrate Loadout	0.00	0.11	0.00
119 – Pneu. Conv. of Quick Lime	0.00	0.58	0.00
120 – Hydration of Quick Lime	0.00	0.02	0.00
121 – Packing & Shipping	0.00	0.01	0.00

123 – Truck Loadout – East Silo	0.00	0.20	0.00
Total:	293.16	21.28	60.82

3. NESCAUM CALPUFF Modeling:

Carmeuse/Millard Lime Plant has eight (8) emission units at this facility originally constructed between the specified dates in 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling the maximum combined impact of this source on a Class I area was 0.059 deciview (dv). This impact is on the Dolly Sods Wilderness Area.

The visibility impact of the units with respect to the Class I area affected is described in Table 2.

Table 2 – Maximum Daily Impact (dv)

Source ID	Class I Area	Total	SO4	NO3	PM10
107	Dolly Sods	0.059	0.004	0.055	0.000
114	Dolly Sods	0.000	0.000	0.000	0.000
116	Dolly Sods	0.000	0.000	0.000	0.000
118	Dolly Sods	0.000	0.000	0.000	0.000
119	Dolly Sods	0.000	0.000	0.000	0.000
120	Dolly Sods	0.000	0.000	0.000	0.000
121	Dolly Sods	0.000	0.000	0.000	0.000
123	Dolly Sods	0.000	0.000	0.000	0.000
	Total:	**0.059**	**0.004**	**0.055**	**0.001**

Upon reviewing the 2002 actual emissions of this facility it was determined that the NOx emissions from the Carmeuse\Millard Kiln Number 5 (Source ID #107) make up the preponderance of the affected visibility impairing emissions.

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction'' based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3 lists all available control technologies on the Carmeuse\Millard Number 5 Lime Kiln for control of SO2 and NOx. Visibility improvement is based on the MANE-VU analysis for the peak 24-hour period during 2002. Control system costs were based on a size-corrected average of other submittals.

Table 3 - Available Retrofit Control Technologies for BART Evaluation
Emission Unit – Carmeuse\Millard – Lime Kiln, Unit 5

Pollutant	Uncontrolled emission rate TPY (2002EI)	Control Technology	% Control	MANE-VU Maximum 24-hour Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	61	Dry Injection	40%	0.004	7,045	44,443,313
SO2	61	Semi-Dry	82%	0.008	16,048	101,246,572
SO2	61	Wet Scrubber	89%	0.009	24,431	154,132,597
NOx	293	Indirect Firing	18%	0.009	33,479	211,214,331
NOx	293	Low NOx Burner	20%	0.009	1,318	8,315,467
NOx	293	SNCR	35%	0.016	1,014	6,398,357

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by a fabric filter (FF). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter (SDA/FF) system, operating full time, on the exhaust of a lime or cement kiln. The SDA/FF or Semi-Dry Control Technology was removed from consideration due to technical infeasibility.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. On long kilns, this temperature may move along the axis of the kiln with time, causing injection to take place outside of the temperature range. SNCR has not been used full time on long wet or long dry kiln systems.

Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted. The USEPA RACT/BACT/LAER Clearinghouse lists no long cement kiln, either wet or dry, with NOx controlled by a SNCR system. It has been reported that SNCR has been proposed for NOx control as BART on a long cement kiln in the US. While there several technical issues associated with the installation of SNCR for long kilns, economic and impact analyses were performed for this control option. A NOx reduction of 35% was used for SNCR on long kilns based on the July 2006 ERG report to the Texas Commission on Environmental Quality. They used this reduction since SNCR control on long kilns is considered Innovative and available data is limited.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 40% to 89%. Removal efficiencies of the technically feasible NOx control technologies range from 18% to 35%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Dry Injection system for Kiln 5 is $7,045 per ton of actual SO2 removed. The estimated cost of a Semi-Dry system for the kiln is $16,048 per ton of actual SO2 removed. The estimated cost of a Wet Scrubber system for Kiln 2 is $24,431 per ton of actual SO2 removed. These control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Dolly Sods Wilderness Area).

The estimated cost of Indirect Firing is $33,479 per ton of NOx removed and is considered too expensive to be considered as control for BART at the level of improvement produced and determined to be Economically Infeasible. The estimated cost of Low NOx Burning is $1,318 per ton of NOx removed. The estimated cost of SNCR is $1,014 per ton of NOx removed.

In addition, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Step 5 – Evaluate Visibility Impacts.

The technical guidance for BART analysis specified a 98th percentile maximum for the three year period of 2001 through 2003 be used for visibility impact. The peak 24-hour visibility impact for 2002 was used in this analysis rather than a 98th percentile maximum for the three year period of 2001 through 2003. This was due to a lack of company estimated visibility analysis. Estimated visibility impact is expected to be significantly higher due to this difference.

The maximum visibility improvement due to the most effective SO2 control in a Class I area (Dolly Sods Wilderness Area) was 0.009 dv. The minimum cost of improvement was $44,443,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of SO2 as a result of the BART analysis. The current operating permit limitation for SO2 emissions from the kiln is 500 ppm by volume.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area was 0.016 dv. The minimum cost of improvement was $8,315,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of NOx as a result of the BART analysis. The current operating permit limitation for NOx emissions from the kiln is 6.0 pounds per ton of lime produced.

5. Conclusion:

The estimated visibility improvement is too low and the cost of additional air emission control too high to warrant additional emission control to meet the BART requirements. Thus, this reviewer concludes that no additional emission control equipment for BART is warranted at this location. Therefore, the existing permit limits will meet the requirements for BART.

cc: Southcentral Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
June 16, 2008

Subject: Review Memo for BART Application
CEMEX Inc.
2001 Portland Park
Wampum, PA 16157-3913

Operating Permit #: 37-00013

To: John Guth
Environmental Program Manager
Northwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality

From: Daniel C. Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of

improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to CEMEX/Wampum Plant indicated that an engineering analysis of VOC control options was not needed, because the relationship between VOC and particulate could not be quantified. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than US EPA's de minimis levels of 40 tons per year for NOx and SO_2 or 15 tons per year of PM10, because of the small effect on visibility.

2. Process Description:

CEMEX/Wampum Plant is a portland cement production plant. Kiln Number 3 at the facility and associated equipment are affected units. Kiln Number 3 is a long, dry kiln. Fuel is fed to Kiln Number 3 by a direct firing system.

The primary purpose of this facility is to convert limestone and other component materials into portland cement. This kiln has one downstream control device, an electrostatic precipitator processing the kiln flue gas.

The following are the source ID numbers of the affected units.

TABLE 1 - 2002 Actual Emissions

UNIT	NOx (tpy)	PM10 (tpy)	SO2 (tpy)
228 – Kiln Number 3	351.00	14.10	799.80
158 – #3 Shale Belt to #3 Raw Mill Feed Belt	0.00	0.01	0.00
159 – #3 Raw Mill Feed Belt	0.00	0.59	0.00
168 – 3101 Belt to Clinker Pile Transfer	0.00	2.60	0.00
169 – Removal from Clinker Pile	0.00	0.00	0.00
171 – #3 Kiln Dust Refeed	0.00	0.00	0.00
179 – Clinker Dome Feeder Transfer	0.00	0.00	0.00
199 – 3101 Belt & 3102 Belt	0.00	2.60	0.00

200 – Gravel Bed Filter Dust Silo	0.00	2.60	0.00
202 – 3104 Belt & 3105 Belt	0.00	2.60	0.00
204 – Clinker Dome and Tunnel	0.00	21.90	0.00
207 – #5 Homogenizing Silo	0.00	7.00	0.00
217 – New Truck Loading	0.00	1.80	0.00
225 – #3 Clinker Cooler	0.00	4.50	0.00
231 – #3 Kiln Auxiliary Motor	0.00	0.00	0.00
Total:	351.00	60.30	799.80

3. NESCAUM CALPUFF Modeling:

The CEMEX Wampum Plant has fifteen (15) sources at this facility originally constructed between the specified dates in 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling the combined impact on a Class I area was 0.161 deciview (dv). This impact is on the Dolly Sods Wilderness Area.

The visibility impact of the units with respect to the Class I area affected is described in Table 2.

Table 2 – Maximum Daily Impact (dv)

Source ID	**Class I Area**	**Total**	**SO4**	**NO3**	**PM10**
228	Dolly Sods	0.159	0.081	0.077	0.001
158					
159					
168					
169					
171					
179					
199					
200					

202					
204	Dolly Sods	0.001	0.000	0.000	0.001
207					
217					
225					
231					
	Total:	**0.161**	**0.081**	**0.077**	**0.003**

Upon reviewing actual emissions of this facility it was determined that the emissions from the Cement Kiln Number 3 (Source ID #228) make up the preponderance of the affected visibility impairing emissions.

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3 lists all available control technologies on the CEMEX\Wampum Unit 3 Cement Kiln for control of SO2 and NOx. CEMEX proposed evaluation of Selective Mining without estimation of costs. Visibility improvement is based on the MANE-VU analysis for the peak 24-hour period during 2002. Control system costs were based on a size-corrected average of other submittals.

Table 3 - Available Retrofit Control Technologies for BART Evaluation
Emission Unit – CEMEX\Wampum Kiln Number 3

Pollutant	Uncontrolled emission rate TPY (2002EI)	Control Technology	% Control	MANE-VU Maximum 24-hour Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	800	Dry Injection	40%	0.032	7,045	70,759,062
SO2	800	Semi-Dry	82%	0.066	16,048	159,538,000
SO2	800	Wet Scrubber	89%	0.072	24,431	240,786,792
SO2	800	Selective Mining	70%	0.057		
NOx	351	SNCR	35%	0.027	1,014	4,678,401
NOx	351	Water Injection	7%	0.005	1,849	9,095,000
NOx	351	Low NOx Calciner w/ indirect firing	40%	0.031	10,517	47,632,258
NOx	351	Low NOx Burner w/ indirect firing	20%	0.015	10,873	50,886,667
NOx	351	Mid Kiln TDF	5%	0.0038	11,062	51,236,842
NOx	351	Indirect Firing	18%	0.014	33,479	245,282,864

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by an electrostatic precipitator (ESP). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter (SDA/FF) system, operating full time, on the exhaust of a cement kiln. The SDA/FF or Semi-Dry Control Technology was removed from consideration due to technical infeasibility.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. On long kilns, this temperature may move along the axis of the kiln with time, causing injection to take place outside of the temperature range. SNCR has not been used full time on long wet or long dry kiln systems.

Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted. The USEPA RACT/BACT/LAER Clearinghouse lists no long cement kiln, either wet or dry, with NOx controlled by a SNCR system. It has been reported that SNCR has been proposed for NOx control as BART on a long cement kiln in the US. While there several technical issues associated with the installation of SNCR for long kilns, economic and impact analyses were performed for this control option. A NOx reduction of 35% was used for SNCR on long kilns based on the July 2006 ERG report to the Texas Commission on Environmental Quality. They used this reduction since SNCR control on long kilns is considered innovative and there is limited available data.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 40% to 89%. Removal efficiencies of the technically feasible NOx control technologies range from 5% to 40%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Dry Injection system for Kiln 3 is $7,045 per ton of actual SO2 removed. The estimated cost of a Semi-Dry system for the kiln is $16,048 per ton of actual SO2 removed. The estimated cost of a Wet Scrubber system for Kiln 3 is $24,431 per ton of actual SO2 removed. These SO2 control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Dolly Sods Wilderness Area). Selective mining of limestone was also proposed by CEMEX, with cost only estimated as “significant”.

The estimated cost of indirect firing is $33,479 per ton of NOx removed. The estimated cost of mid kiln TDF is $11,062 per ton of NOx removed. The estimated cost of low NOx burner with indirect firing is $10,873 per ton of NOx removed. The estimated cost of low NOx calciner with indirect firing is $10,517 per ton of NOx removed. These NOx control systems are considered too expensive to be considered as control for BART at the level of improvement produced and was determined to be economically infeasible. The estimated cost of water injection is $1,849 per ton of NOx removed. The estimated cost of SNCR is $1,014 per ton of NOx removed.

Also, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Selective mining of limestone would lower the concentration of iron pyrite in limestone entering the kiln. Pyrites are the primary source of sulfur in SO2 emitted from the cement kiln. To mine purer limestone, the top portion of the limestone seam would have to be mined and discarded. The bottom portion of the seam would have to be left in place. Strata with impurities within the seam may also have to be mined and discarded. Portions of the seam determined by core drilling to have a high concentration of pyrite would not be mined. This would increase both the amount of limestone quarried and overburden removed. Less limestone would be available for the kin from a defined land area.

Step 5 – Evaluate Visibility Impacts.

The technical guidance for BART analysis specified a 98th percentile maximum for the three year period of 2001 through 2003 be used for visibility impact. The peak 24-hour visibility impact for 2002 was used in this analysis rather than a 98th percentile maximum for the three year period of 2001 through 2003. This was due to a lack of company estimated visibility analysis. Estimated visibility impact is expected to be significantly higher due to this difference.

The maximum visibility improvement due to the most effective SO2 control in a Class I area was 0.072 dv. The minimum cost of improvement was $70,759,062 annually per deciview, for lesser improvement. Therefore, I do not recommend any additional control of SO2 as a result of the BART analysis. The current operating permit limitation for SO2 emissions from the kiln is 500 ppm by volume.

The maximum visibility improvement due to the most effective NOx control, SNCR, in the most affected Class I area (Brigantine Wilderness Area) was 0.027 dv. The minimum cost of improvement was $4,678,401 annually per deciview. Given the uncertainties associated with the effectiveness of SNCR with kilns, and its cost effectiveness, I do not recommend the use of SNCR for control of NOx as a result of the BART analysis. The next most cost effective NOx control was water injection at $9,095,000 annually per deciview. This cost effectiveness combined with its overall expected visibility improvement of, 0.005 dv, renders it an inappropriate BART control option. The current operating permit NOx emission limitation from Kiln Number 3 is 6.0 pounds per ton of clinker produced during the period from May 1 through September 30, and 6.2 pounds per ton of clinker produced during the period from October 1 through April 30.

5. Conclusion:

The estimated visibility improvement is too low and the cost of additional air emission control too high to warrant additional emission control to meet the BART requirements. The determination for the BART affected sources at this facility is consistent with the determination for other similar cement manufacturing facilities. Thus, this reviewer concludes that no additional emission control equipment for BART is warranted at this location. Therefore, the existing permit limits will meet the requirements for BART.

cc: Northwest Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
June 13, 2008

Subject: Review Memo for BART Application
Essroc Cement Corporation
P.O. Box 779
Bessemer, PA 16112

Operating Permit #: 37-00003

To:	John Guth Environmental Program Manager Northwest Regional Office	Joyce Epps Bureau Director Bureau of Air Quality

From: Daniel C. Husted, P.E., Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to Essroc Cement/Bessemer Plant indicated that an engineering analysis of VOC control options was not needed, because the relationship of VOC and NOx could not be quantified. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than US EPA's de minimis levels of 40 tons per year for NOx and SO_2 or 15 tons per year of PM10, because of the small effect on visibility.

2. Process Description:

Essroc Cement/Bessemer Plant is a portland cement production plant. Clinker Kiln Number 5 kiln is a long, wet, cement kiln. This kiln and associated equipment are affected units. Fuel is fed to the kiln by a direct firing system.

The primary purpose of this facility is to convert limestone and other component materials into portland cement. Clinker Kiln Number 5 has one downstream control device, an electrostatic precipitator, processing the kiln flue gas.

The following are source ID numbers of the affected units.

TABLE 1 - 2002 Actual Emissions

UNIT	**NOx (tpy)**	**PM10 (tpy)**	**SO2 (tpy)**
502 – Clinker Kiln Number 5	1,604.50	118.03	516.60
212 – Stone Storage Building	0.00	4.92	0.00
225 – Crane Transfer System	0.00	1.32	0.00
504 – #5 Clinker Cooler	0.00	38.13	0.00
511 – #5 Clinker Storage Tank	0.00	2.04	0.00
512 – #5 Clinker Loadout	0.00	2.04	0.00
604 – #14 Clinker and Gypsum Bins	0.00	9.14	0.00

605 – #16 Clinker and Gypsum Bins	0.00	8.90	0.00
Total:	1,604.50	184.52	516.60

3. NESCAUM CALPUFF Modeling:

Essroc Cement/Bessemer Plant has eight (8) emission units at this facility originally constructed between the specified dates in 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling the maximum combined impact on a Class I area was 0.301 deciview (dv). This impact is on the Shenandoah National Park.

The visibility impact of the units with respect to the Class I area affected is described in Table 2.

Table 2 – Maximum Daily Impact (dv)

Source ID	**Class I Area**	**Total**	**SO4**	**NO3**	**PM10**
502	Shenandoah	0.296	0.073	0.218	0.007
212		0.000	0.000	0.000	0.000
225		0.000	0.000	0.000	0.000
504	Shenandoah	0.003	0.000	0.000	0.000
511		0.000	0.000	0.000	0.000
512		0.000	0.000	0.000	0.000
604		0.000	0.000	0.000	0.000
605		0.000	0.000	0.000	0.000
	Total:	**0.301**	**0.073**	**0.218**	**0.012**

Upon reviewing actual emissions of this facility it was determined that the emissions from the Clinker Kiln Number 5 (Source ID #502) make up the preponderance of the affected visibility impairing emissions.

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction'' based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3 lists all available control technologies on the Essroc\Bessemer Clinker Kiln Number 5 for control of SO2 and NOx. Essroc Cement Company conducted ambient modeling and visibility analysis for the period 2001 through 2003 at Class 1 areas affected by this facility. Visibility improvement is based on the company analysis. Emission control system costs, other than the Wet Scrubber, were based on size-corrected averages of other company submittals.

Table 3 - Available Retrofit Control Technologies for BART Evaluation
Emission Unit – Essroc\Bessemer Clinker Kiln Number 5

Pollutant	Uncontrolled emission rate TPY (2002EI)	Control Technology	% Control	Maximum Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	517	Dry Injection	40%	0.029	7,045	50,432,103
SO2	517	Semi-Dry	82%	0.060	16,048	113,352,167
SO2	517	Wet Scrubber	80%	0.058	32,370	230,649,690
NOx	1,605	Indirect Firing	18%	0.039	33,479	253,224,410
NOx	1,605	Low NOx Burner	20%	0.044	1,318	9,612,931
NOx	1,605	SNCR	35%	0.076	1,014	7,494,026

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by an electrostatic precipitator (ESP). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter (SDA/FF) system, operating full time, on the exhaust of a cement kiln. The SDA/FF or Semi-Dry Control Technology was removed from consideration due to technical infeasibility.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. On long kilns, this temperature may move along the axis of the kiln with time, causing injection to take place outside of the temperature range. SNCR has not been used full time on long wet or long dry kiln systems.

Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted. The USEPA RACT/BACT/LAER Clearinghouse lists no long cement kiln, either wet or dry, with NOx controlled by a SNCR system. It has been reported that SNCR has been proposed for NOx control as BART on a long cement kiln in the US. While there several technical issues associated with the installation of SNCR for long kilns, economic and impact analyses were performed for this control option. A NOx reduction of 35% was used for SNCR on long kilns based on the July 2006 ERG report to the Texas Commission on Environmental Quality. They used this reduction since SNCR control on long kilns is considered Innovative and available data is limited.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 40% to 82%. Removal efficiencies of the technically feasible NOx control technologies range from 18% to 35%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Wet Scrubber system for Kiln 5 is $32,370 per ton of actual SO2 removed. The estimated cost of a Semi-Dry system for the kiln is $16,048 per ton of actual SO2 removed. The estimated cost of a Dry Injection system for Kiln 5 is $7,045 per ton of actual SO2 removed. These SO2 control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Shenandoah National Park).

The estimated cost of Indirect Firing is $33,479 per ton of NOx removed and is considered too expensive to be considered as control for BART at the level of improvement produced and was determined to be economically infeasible. The estimated cost of Low NOx Burning is $1,318 per ton of NOx removed. The estimated cost of SNCR is $1,014 per ton of NOx removed.

In addition, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Step 5 – Evaluate Visibility Impacts.

The maximum visibility improvement due to the most effective SO2 control in a Class I area was 0.060 dv. The minimum cost of improvement was $50,432,103 annually per deciview. Therefore, I do not recommend any additional control of SO2 as a result of the BART analysis. The current operating permit limitation for SO2 emissions from the kiln is 500 ppm by volume.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area (Shenandoah National Park) was 0.076 dv. The minimum cost of improvement was $7,494,026 annually per deciview. Therefore, I do not recommend any additional control of NOx as a result of the BART analysis. The current operating permit limitation for NOx emissions from Clinker Kiln Number 5 is 476 pounds per hour.

5. Conclusion:

The estimated visibility improvement is too low and the cost of additional air emission control too high to warrant additional emission control to meet the BART requirements. Thus, this reviewer concludes that no additional emission control equipment for BART is warranted at this location. Therefore, the existing permit limits will meet the requirements for BART.

cc: Northwest Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
February 5, 2008

Subject: Review Memo for BART Application
Keystone Cement Company
Route 329, Drawer A
Bath, PA 18014

Operating Permit #: 48-00003

To: Mark Wejkszner
Environmental Program Manager
Northeast Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality

From: Martin L. Hochhauser, P.E., Air Quality Engineering Specialist

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of

improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to Keystone Portland Cement/East Allen Plant indicated that an engineering analysis of VOC control options was not needed, because the relationship of VOC and particulate could not be quantified. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than US EPA's de minimis levels of 40 tons per year for NOx and SO_2 or 15 tons per year of PM10, because of the small effect on visibility.

2. Process Description:

The Keystone Portland Cement/East Allen Plant is a portland cement production plant. Kiln Number 2 at the facility is a long, wet, cement kiln. Kiln Number 2 and associated equipment are affected units. Fuel is fed to this kiln by a direct firing system.

The primary purpose of this facility is to convert limestone and other component materials into portland cement. This kiln has one downstream control device, a fabric filter, processing the kiln flue gas.

The following are the source ID numbers of the affected units.

TABLE 1 - 2002 Actual Emissions

UNIT	**NOx (tpy)**	**PM10 (tpy)**	**SO2 (tpy)**
102 – Cement Kiln Number 2	1,315.60	122.60	2,027.30
127 – Stone Plant	0.00	9.70	0.00
Total:	1,315.60	132.30	2,027.30

3. NESCAUM CALPUFF Modeling:

Keystone Portland Cement/East Allen Plant has two (2) emission units at this facility originally constructed between the specified dates in 1962 and 1977 that may continue operating after January 1, 2013. The total emissions from the date-eligible units of a single visibility impairing pollutant are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling the maximum combined impact on a Class I area was 0.378 deciview (dv). This impact is on the Brigantine Wilderness Area.

The visibility impact of the units with respect to the Class I area affected is described in Table 2.

Table 2 – Maximum Daily Impact (dv)

Source ID	Class I Area	Total	SO4	NO3	PM10
102	Brigantine	0.378	0.226	0.181	0.009
127	Brigantine	0.001	0.001	0.000	0.001
	Total:	**0.378**	**0.226**	**0.181**	**0.009**

Upon reviewing actual emissions of this facility it was determined that the emissions from the Cement Kiln Number 2 (Source ID #102) make up the preponderance of the affected visibility impairing emissions.

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3 lists all available control technologies on the Keystone Unit 2 Cement Kiln for control of SO2 and NOx. Keystone Cement Company conducted ambient modeling and visibility analysis for the period 2001 through 2003 at Class 1 areas affected by this facility. Visibility improvement is based on the company analysis. SNCR costs were based on a size-corrected average of other submittals.

Table 3 - Available Retrofit Control Technologies for BART Evaluation
Emission Unit - Keystone - Unit 2

Pollutant	Uncontrolled Emission Rate TPY (2002EI)	Control Technology	Emission Control %	98th Percentile Maximum Visibility Improvement dv	Control Cost	
					$ per Ton Controlled	Annual $ per dv Improvement
SO2	2,027	Dry Injection	50%	0.044	8,894	205,490,868
SO2	2,027	Semi-Dry	90%	0.079	5,404	124,847,548
SO2	2,027	Wet Scrubber	90%	0.079	2,224	51,380,361
NOx	1,316	Indirect Firing	20%	0.011	2,796	64,590,816
NOx	1,316	Low NOx Burner	20%	0.011	874	20,196,626
NOx	1,316	Staged Air Combustion	20%	0.011	1,066	24,635,624
NOx	1,316	SNCR	35%	0.020	1,014	23,431,248

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by a fabric filter (FF). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter (SDA/FF) system, operating full time, on the exhaust of a cement kiln. The SDA/FF or Semi-Dry Control Technology was removed from consideration due to technical infeasibility.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. On long kilns, this temperature may move along the axis of the kiln with time, causing injection to take place outside of the temperature range. SNCR has not been used full time on long wet or long dry kiln systems.

Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted. The USEPA RACT/BACT/LAER Clearinghouse lists no long cement kiln, either wet or dry, with NOx controlled by a SNCR system. It has been reported that SNCR has been proposed for NOx control as BART on a long cement kiln in the US. While there several technical issues associated with the installation of SNCR for long kilns, economic and impact analyses were performed for this control option. A NOx reduction of 35% was used for SNCR on long kilns based on the July 2006 ERG report to the Texas Commission on Environmental Quality. They used this reduction since SNCR control on long kilns is considered Innovative and available data is limited.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 50% to 90%. Removal efficiencies of the technically feasible NOx control technologies range from 20% to 35%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Dry Injection system for Kiln 2 is $8,894 per ton of actual SO2 removed. The estimated cost of a Semi-Dry system for Kiln 2 is $5,404 per ton of actual SO2 removed. The estimated cost of a Wet Scrubber system for Kiln 2 is $2,224 per ton of actual SO2 removed. These control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Brigantine Wilderness Area).

The estimated cost of Indirect Firing is $2,796 per ton of NOx removed and is considered too expensive to be considered as control for BART at the level of improvement produced and determined Economically Infeasible. The estimated cost of Low NOx Burning is $874 per ton of NOx removed. The estimated cost of Staged Air Combustion is $1,066 per ton of NOx removed. The estimated cost of SNCR is $1,014 per ton of NOx removed.

In addition, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Step 5 – Evaluate Visibility Impacts.

The maximum visibility improvement due to the most effective SO2 control in a Class I area was 0.079 dv. The minimum cost of improvement was $51,380,000 annually per deciview.

Therefore I do not recommend any additional control of SO2 as a result of the BART analysis. The current operating permit limitation for SO2 emissions from the kiln is 500 ppm by volume.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area (Brigantine Wilderness Area) was 0.020 dv. The minimum cost of improvement was $20,197,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of NOx as a result of the BART analysis. The current operating permit NOx emission limitation from the kiln is 529.0 pounds per hour.

5. Conclusion:

The estimated visibility improvement is too low and the cost of additional air emission control too high to warrant additional emission control to meet the BART requirements. Thus, this reviewer concludes that no additional emission control equipment for BART is warranted at this location. Therefore, the existing permit limits will meet the requirements for BART.

cc: Northeast Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
February 5, 2008

Subject: Review Memo for BART Application
Lafarge Corp/Whitehall Plant
5160 Main St.
Whitehall, PA 18052-1827

Operating Permit #: 39-00011

To:	Mark Wejkszner Environmental Program Manager Northeast Regional Office	Joyce Epps Bureau Director Bureau of Air Quality

From: Martin L. Hochhauser, P.E., Air Quality Engineering Specialist

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of

improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to Lafarge Corp./Whitehall Plant indicated that an engineering analysis of VOC control options was not needed, because the relationship of VOC and particulate could not be quantified. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than US EPA's de minimis levels of 40 tons per year for NOx and SO_2 or 15 tons per year of PM10, because of the small effect on visibility.

2. Process Description:

Lafarge Corp./Whitehall Plant is a portland cement production plant. Kilns K-2 and K-3 at the facility and associated equipment are affected units. These kilns are dry kilns with preheaters. Each kiln has fuel fed to it by a direct firing system.

The primary purpose of this facility is to convert limestone and other component materials into portland cement. Each of these kilns, K-2 and K-3, has a downstream control device, a fabric filter processing the kiln flue gas.

The following are the source ID numbers of the affected units.

TABLE 1 - 2002 Actual Emissions

UNIT	NOx (tpy)	PM10 (tpy)	SO2 (tpy)
101 – Kiln K-2	692.10	1.60	813.20
114 – Kiln K-3	410.70	0.9	496.60
103 – K-2 Cooler	0.00	2.60	0.00
112 – H3/H4 Silo	0.00	1.90	0.00
113 – K-2 Dust Return System	0.00	0.70	0.00
115 – K-3 Cooler	0.00	1.90	0.00
118 – C-1 Clinker Silo	0.00	0.40	0.00
119 – C-2 Clinker Silo	0.00	0.40	0.00

120 – C-5 Clinker Silo	0.00	0.40	0.00
121 – C-6 Clinker Silo	0.00	0.40	0.00
122 – #2 Finish Mill OSEPA	0.00	3.00	0.00
123 – Clinkers Silos Collector	0.00	3.00	0.00
124 – K-3 Clinker Tower	0.00	1.70	0.00
125 – K-3 Clinker Transfer Tower	0.00	1.70	0.00
127 – #1 Finish Grinding Mill	0.00	2.80	0.00
128 – #2 Finish Grinding Mill	0.00	5.40	0.00
129 – #2 Finish Mill Auxiliaries	0.00	3.70	0.00
135 – H5/H6 Silo	0.00	4.00	0.00
137 – #1 Finish Mill Auxiliaries	0.00	3.10	0.00
140 – Bulk Silos Lane #1	0.00	0.03	0.00
141 – Bulk Silos Lane #2	0.00	0.03	0.00
143 – Coal Mill #2	0.00	3.40	0.00
144 – Coal Mill #3	0.00	3.70	0.00
Total:	1,102.80	46.76	1,309.80

3. NESCAUM CALPUFF Modeling:

LaFarge Corp./Whitehall has twenty-three (23) emission units at this facility originally constructed between the specified dates in 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling the combined impact of these units on a Class I area was 0.231 deciview (dv). This impact is on the Brigantine Wilderness Area.

The visibility impact of the units with respect to the Class I area affected is described in Table 2.

Table 2 – Maximum Daily Impact (dv)

Source ID	**Class I Area**	**Total**	**SO4**	**NO3**	**PM10**
101	Brigantine	0.140	0.074	0.099	0.000
114	Brigantine	0.091	0.048	0.066	0.000
103		0.00	0.00	0.00	0.00
112		0.00	0.00	0.00	0.00
113		0.00	0.00	0.00	0.00
115		0.00	0.00	0.00	0.00
118		0.00	0.00	0.00	0.00
119		0.00	0.00	0.00	0.00
120		0.00	0.00	0.00	0.00
121		0.00	0.00	0.00	0.00
122		0.00	0.00	0.00	0.00
123		0.00	0.00	0.00	0.00
124		0.00	0.00	0.00	0.00
125		0.00	0.00	0.00	0.00
127		0.00	0.00	0.00	0.00
128		0.00	0.00	0.00	0.00
129		0.00	0.00	0.00	0.00
135		0.00	0.00	0.00	0.00
137		0.00	0.00	0.00	0.00
140		0.00	0.00	0.00	0.00
141		0.00	0.00	0.00	0.00
143		0.00	0.00	0.00	0.00
144		0.00	0.00	0.00	0.00
	Total:	**0.231**	**0.121**	**0.159**	**0.003**

Upon reviewing actual emissions of this facility it was determined that the emissions from the Kilns K-2 (Source ID #101) and K-3 (Source ID #114) make up the preponderance of the affected visibility impairing emissions.

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate, for the Lafarge Corp./Whitehall Facility.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction'' based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

The BART determination process will be performed on Kilns K-2 and K-3 separately.

A. BART Analysis of Kiln K-2:

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3a lists all available control technologies on the Lafarge Corp/Whitehall Plant Kiln K-2 for control of SO2 and NOx. Lafarge Corp. conducted ambient modeling and visibility analysis for the period 2001 through 2003 at Class 1 areas affected by this facility. Visibility improvement is based on the company analysis.

Table 3a - Available Retrofit Control Technologies for BART Evaluation
Emission Unit – Lafarge\Whitehall – Kiln K-2

Pollutant	Uncontrolled emission rate TPY (2002EI)	Control Technology	% Control	98th Percentile Maximum Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	813	Dry Injection	25%	0.013	3,636	54,784,228
SO2	813	Semi-Dry	50%	0.027	31,722	478,020,997
SO2	813	Wet Scrubber	81%	0.044	6,412	96,628,145
NOx	692	Low NOx Burner	20%	0.009	1,318	24,591,254
NOx	692	SNCR	25%	0.011	1,804	27,177,065

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by a fabric filter (FF). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter system, operating full time, on the exhaust of a cement kiln. The SDA/FF Control Technology was removed from consideration due to technical infeasibility, for this reason.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted.

However this technology has been used to control NOx emissions from other cement kilns with preheaters in the United States. While there are technical issues associated with the installation of SNCR for cement kilns, economic and impact analyses were performed for this control option.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 25% to 81%. Removal efficiencies of the technically feasible NOx control technologies range from 20% to 25%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Dry Injection system for Kiln K-2 is $3,636 per ton of actual SO2 removed. The estimated cost of a Semi-Dry control system for Kiln K-2 is $31,722 per ton of actual SO2 removed. The estimated cost of a Wet Scrubber system for Kiln K-2 is $6,412 per ton of actual SO2 removed. These control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Brigantine Wilderness Area).

The estimated cost of LNB is $1,318 per ton of NOx removed. The estimated cost of SNCR is $1,804 per ton of NOx removed.

Also, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Step 5 – Evaluate Visibility Impacts.

The maximum visibility improvement due to the most effective SO2 control in a Class I area (Brigantine Wilderness Area) was 0.044 dv. The minimum cost of improvement was $54,784,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of SO2 on Kiln K-2 as a result of the BART analysis. The current operating permit SO2 emission limitation from Kiln K-2 is 362.0 pounds per hour.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area (Brigantine Wilderness Area) was 0.011 dv. The minimum cost of improvement was $24,177,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of NOx on Kiln K-2 as a result of the BART analysis. The current operating permit NOx emission limitation from Kiln K-2 is 260.5 pounds per hour, when burning Tire Derived Fuel (TDF) and 297.7 pounds per hour when not burning TDF.

B. BART Analysis of Kiln K-3:

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3b lists all available control technologies on the Lafarge Corp.\Whitehall Kiln K-3 for control of SO2 and NOx. Lafarge Corp. conducted ambient modeling and visibility analysis for the period 2001 through 2003 at Class 1 areas affected by this facility. Visibility improvement is based on the company analysis.

Table 3b - Available Retrofit Control Technologies for BART Evaluation
Emission Unit – Lafarge\Whitehall – Kiln K-3

Pollutant	Uncontrolled emission rate TPY (2002EI)	Control Technology	% Control	98th Percentile Maximum Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	497	Dry Injection	25%	0.011	5,076	57,621,139
SO2	497	Semi-Dry	50%	0.022	37,538	426,151,544
SO2	497	Wet Scrubber	81%	0.035	7,948	90,234,180
NOx	411	Low NOx Burner	20%	0.007	2,750	31,219,928
NOx	411	SNCR	25%	0.009	2,144	24,336,753

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by a fabric filter (FF). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter system, operating full time, on the exhaust of a cement kiln. The SDA/FF Control Technology was removed from consideration due to technical infeasibility, for this reason.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted.

However this technology has been used to control NOx emissions from other cement kilns with preheaters in the United States. While there are technical issues associated with the installation of SNCR for cement kilns, economic and impact analyses were performed for this control option.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 25% to 81%. Removal efficiencies of the technically feasible NOx control technologies range from 20% to 25%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Dry Injection system for Kiln K-3 is $5,076 per ton of actual SO2 removed. The estimated cost of a Semi-Dry control system for Kiln K-3 is $37,538 per ton of actual SO2 removed. The estimated cost of a Wet Scrubber system for Kiln K-3 is $7,948 per ton of actual SO2 removed. These control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Brigantine Wilderness Area).

The estimated cost of LNB is $2,750 per ton of NOx removed. The estimated cost of SNCR is $2,144 per ton of NOx removed.

Also, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Step 5 – Evaluate Visibility Impacts.

The maximum visibility improvement due to the most effective SO2 control in a Class I area (Brigantine Wilderness Area) was 0.035 dv. The minimum cost of improvement was $57,621,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of SO2 on Kiln K-3 as a result of the BART analysis. The current operating permit SO2 emission limitation from Kiln K-3 is 362.0 pounds per hour.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area (Brigantine Wilderness Area) was 0.009 dv. The minimum cost of this improvement was $24,337,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of NOx on Kiln K-3 as a result of the BART analysis. The current operating permit NOx emission limitation from Kiln K-3 is 166.0 pounds per hour, when burning TDF and 202.3 pounds per hour when not burning TDF.

5. Conclusion:

The estimated visibility improvement is too low and the cost of additional air emission control too high to warrant additional emission control on these units to meet the BART requirements. Thus, this reviewer concludes that no additional emission control equipment for BART is warranted at this location. Therefore, the existing permit limits will meet the requirements for BART.

cc: Northeast Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
June 18, 2008

Subject: Review Memo for BART Application
Lehigh Cement/Evansville Cement Plant
537 Evansville Rd.
Fleetwood, PA 19522

Operating Permit #: 06-05002

To:	William Weaver Environmental Program Manager Southcentral Regional Office	Joyce Epps Director Bureau of Air Quality

From: Daniel C. Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of

improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to Lehigh Cement/Evansville Cement Plant indicated that an engineering analysis of VOC control options was not needed, because the relationship of VOC and particulate could not be quantified. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than US EPA's de minimis levels of 40 tons per year for NOx and SO_2 or 15 tons per year of PM10, because of the small effect on visibility.

2. Process Description:

Lehigh Cement/Evansville Cement Plant is a portland cement production plant. Kilns Number 1 and 2 at the facility and associated equipment are affected units. These kilns are dry cement kilns with preheaters. Each kiln has fuel fed to it by a direct firing system.

The primary purpose of this facility is to convert limestone and other component materials into portland cement. The plant has two cement kilns, Kilns Number 1 and 2 with associated material handling units. Each kiln has a downstream control device, a fabric filter processing the kiln flue gas.

The following are the source ID numbers of the affected units.

TABLE 1 - 2002 Actual Emissions

UNIT	NOx (tpy)	PM10 (tpy)	SO2 (tpy)
121 – Kiln Number 1	1,275.20	53.10	181.30
122– Kiln Number 2	1,333.80	53.30	215.90
125 – Clinker Cooler Number 1	0.00	30.30	0.00
126 – Clinker Cooler Number 2	0.00	15.00	0.00
112 – Raw Mill Grinder & Heater	0.00	27.40	0.00
159 – Finish Mill Number 1	0.00	10.30	0.00
160 – Finish Mill Number 2	0.00	12.30	0.00

162 – Finish Mill Number 3	0.00	40.10	0.00
103 – Limestone Crushing	0.00	3.20	0.00
105 – Rock Silo West & Heater	0.00	1.40	0.00
106 – Rock Silo East & Heater	0.00	1.40	0.00
107 – Raw Mill 1 & 2 Belt Circuit	0.00	2.00	0.00
108 – Raw Mill 3 Belt Circuit	0.00	2.10	0.00
113 – Kiln Feed Blending Number 1	0.00	6.70	0.00
114 – Kiln Feed Blending Number 2	0.00	6.70	0.00
115 – Kiln Feed Silo 1 & 3	0.00	1.25	0.00
116 – Kiln Feed Silo 2 & 4	0.00	1.25	0.00
117 – Kiln Feed Pump	0.00	4.90	0.00
127 – Clinker Handling	0.00	5.70	0.00
128 – Clinker Handling	0.00	3.40	0.00
129 – Clinker Handling	0.00	3.00	0.00
130 – Clinker Handling	0.00	6.00	0.00
144 – Bulk Loading Number 1	0.00	2.40	0.00
145 – Bulk Loading Number 2	0.00	2.40	0.00
163 – Cement Storage	0.00	0.00	0.00
164 – Cement Storage	0.00	5.30	0.00
165 – Cement Storage	0.00	6.20	0.00
166 – Cement Storage	0.00	6.20	0.00
167 – Clinker Handling	0.00	1.80	0.00

168 – Clinker Handling	0.00	4.00	0.00
170 – Bulk Loading	0.00	7.80	0.00
172 – Clinker Silos	0.00	3.50	0.00
179 – Plant Roadways	0.00	44.70	0.00
440 – Wash House Boiler	0.00	0.02	0.00
Total:	2,609.00	375.12	397.20

3. NESCAUM CALPUFF Modeling:

Lehigh Cement/Evansville has thirty-four (34) emission units at this facility originally constructed between the specified dates in 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling the combined impact of these units on a Class I area was 0.617 deciview (dv). This impact is on the Brigantine Wilderness Area.

The visibility impact of the units with respect to the Class I area affected is described in Table 2.

Table 2 – Maximum Daily Impact (dv)

Source ID	Class I Area	Total	SO4	NO3	PM10
121	Brigantine	0.292	0.014	0.280	0.002
122	Brigantine	0.317	0.015	0.306	0.000
125	Brigantine	0.00	0.00	0.00	0.00
126	Brigantine	0.001	0.000	0.000	0.001
112	Brigantine	0.001	0.000	0.000	0.001
159	Brigantine	0.00	0.00	0.00	0.00
160	Brigantine	0.00	0.00	0.00	0.00
162	Brigantine	0.001	0.000	0.000	0.001
103	Brigantine	0.00	0.00	0.00	0.00
105	Brigantine	0.00	0.00	0.00	0.00
106	Brigantine	0.00	0.00	0.00	0.00
107	Brigantine	0.00	0.00	0.00	0.00
108	Brigantine	0.00	0.00	0.00	0.00

113	Brigantine	0.00	0.00	0.00	0.00
114	Brigantine	0.00	0.00	0.00	0.00
115	Brigantine	0.00	0.00	0.00	0.00
116	Brigantine	0.00	0.00	0.00	0.00
117	Brigantine	0.00	0.00	0.00	0.00
127	Brigantine	0.00	0.00	0.00	0.00
128	Brigantine	0.00	0.00	0.00	0.00
129	Brigantine	0.00	0.00	0.00	0.00
130	Brigantine	0.00	0.00	0.00	0.00
144	Brigantine	0.00	0.00	0.00	0.00
145	Brigantine	0.00	0.00	0.00	0.00
163	Brigantine	0.00	0.00	0.00	0.00
164	Brigantine	0.00	0.00	0.00	0.00
165	Brigantine	0.00	0.00	0.00	0.00
166	Brigantine	0.00	0.00	0.00	0.00
167	Brigantine	0.00	0.00	0.00	0.00
168	Brigantine	0.00	0.00	0.00	0.00
170	Brigantine	0.00	0.00	0.00	0.00
172	Brigantine	0.001	0.000	0.000	0.001
179	Shenandoah	0.004	0.000	0.000	0.004
440	Brigantine	0.00	0.00	0.00	0.00
	Total:	**0.617**	**0.029**	**0.586**	**0.010**

Upon reviewing actual emissions of this facility in Table 2, it was determined that the NOx emissions from Kilns 1 (Source ID #121) and 2 (Source ID #122) make up the preponderance of the affected visibility impairing emissions.

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate, for the Lehigh Cement/Evansville Plant.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction'' based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

The BART determination process will be performed on Kilns 1 and 2 separately.

A. BART Analysis of Kiln 1:

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3a lists all available control technologies on the Lehigh Cement/Evansville Cement Plant Kiln 1 for control of SO2 and NOx. Lehigh Cement conducted ambient modeling and visibility analysis for the period 2001 through 2003 at Class 1 areas affected by this facility. Visibility improvement is based on the company analysis.

Table 3a - Available Retrofit Control Technologies for BART Evaluation
Emission Unit – Lehigh\Evansville – Kiln 1

Pollutant	Uncontrolled emission rate TPY (2002EI)	Control Technology	% Control	98th Percentile Maximum Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	181	Semi-Dry	90%	0.004	1,856	171,079,211
SO2	181	Wet Scrubber	95%	0.005	13,592	1,253,151,622
NOx	1,275	Indirect Firing	15%	0.005	34,640	1,332,162,809
NOx	1,275	Low NOx Burner	20%	0.007	1,166	50,880,783
NOx	1,275	SNCR	60%	0.020	627	14,267,800*

- Costs calculated for common system for kilns 1 and 2

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by a fabric filter (FF). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter (SDA/FF) system, operating full time, on the exhaust of a cement kiln. The SDA/FF SO2 control technology was removed from consideration due to technical infeasibility, for this reason.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted.

However, this technology has been used to control NOx emissions from other cement kilns with preheaters in the United States. While there are technical issues associated with the installation of SNCR for cement kilns, economic and impact analyses were performed for this control option.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 90% to 95%. Removal efficiencies of the technically feasible NOx control technologies range from 15% to 60%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Wet Scrubber system for Kiln 1 is $ 13,592 per ton of actual SO2 removed. This control system is too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Brigantine Wilderness Area). The estimated cost of a Semi-Dry system for Kiln 1 is $ 1,856 per ton of actual SO2 removed.

The estimated cost of Indirect Firing is $ 34,640 per ton of NOx removed and is considered too expensive to be considered as control for BART at the level of improvement produced and determined Economically Infeasible. The estimated cost of Low NOx Burners is $ 1,166 per ton of NOx removed. The estimated cost of SNCR is $ 627 per ton of NOx removed.

Also, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Step 5 – Evaluate Visibility Impacts.

The maximum visibility improvement due to the most effective SO2 control in a Class I area (Brigantine Wilderness Area) was 0.005 dv. The minimum cost of improvement was $ 171,079,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of SO2 on Kiln 1 as a result of the BART analysis. The current operating permit limitation for SO2 emissions from Kiln 1 is 59.4 pounds per hour.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area (Brigantine Wilderness Area) was 0.020 dv. The minimum cost this improvement was $ 47,910,000 annually per deciview. Therefore I do not recommend any additional control of NOx on Kiln 1 as a result of the BART analysis. The current NOx emission permit limitation is 367.7 pounds per hour from Kiln Number 1.

B. BART Analysis of Kiln 2:

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3b lists all available control technologies on the Lehigh Cement/Evansville Cement Plant Kiln 2 for control of SO2 and NOx. Lehigh Cement conducted ambient modeling and visibility analysis for the period 2001 through 2003 at Class 1 areas affected by this facility. Visibility improvement is based on the company analysis.

Table 3b - Available Retrofit Control Technologies for BART Evaluation Emission Unit – Lehigh\Evansville – Kiln 2

Pollutant	Uncontrolled emission rate TPY (2002EI)	Control Technology	% Control	98th Percentile Maximum Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	216	Semi-Dry	90%	0.005	2,937	150,988,971
SO2	216	Wet Scrubber	95%	0.005	21,703	1,115,868,499
NOx	1,334	Indirect Firing	15%	0.005	40,772	1,352,435,404
NOx	1,334	Low NOx Burner	20%	0.007	1,540	51,275,899
NOx	1,334	SNCR	60%	0.040	627	14,267,800*

- Costs calculated for common system for kilns 1 and 2

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by a fabric filter (FF). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter (SDA/FF) system, operating full time, on the exhaust of a cement kiln. The SDA/FF SO2 control technology was removed from consideration due to technical infeasibility, for this reason.

For Selective Non-Catalytic Reduction (SNCR), ammonia or urea would be injected into the rotating kiln at a location where the gas is within the temperature range of 1600 to 2000 Deg. F. Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted.

However, this technology has been used to control NOx emissions from other cement kilns with preheaters in the United States. While there are technical issues associated with the installation of SNCR for cement kilns, economic and impact analyses were performed for this control option.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 90% to 95%. Removal efficiencies of the technically feasible NOx control technologies range from 15% to 60%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Wet Scrubber system for Kiln 2 is $ 21,703 per ton of actual SO2 removed. The estimated cost of a Semi-Dry system for Kiln 2 is $ 2,937 per ton of actual SO2 removed. These control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Brigantine Wilderness Area).

The estimated cost of Indirect Firing is $ 40,772 per ton of NOx removed and is considered too expensive to be considered as control for BART at the level of improvement produced and determined Economically Infeasible. The estimated cost of LNB is $ 1,540 per ton of NOx removed. The estimated cost of SNCR is $ 627 per ton of NOx removed.

Also, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

Step 5 – Evaluate Visibility Impacts.

The maximum visibility improvement due to the most effective SO2 control in a Class I area (Brigantine Wilderness Area) was 0.005 dv. The minimum cost of improvement was $ 150,989,000 annually per deciview, for lesser improvement. Therefore I do not recommend any additional control of SO2 on Kiln 2 as a result of the BART analysis. The current operating permit limitation for SO2 emissions from Kiln 2 is 59.4 pounds per hour.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area (Brigantine Wilderness Area) was 0.020 dv. The minimum cost of this improvement was $ 48,640,000 annually per deciview. Therefore I do not recommend any additional control of NOx on Kiln 2 as a result of the BART analysis. The current NOx emission operating permit limitation is 367.7 pounds per hour from Kiln Number 2.

5. Conclusion:

The estimated visibility improvement is too low and the cost of additional air emission control too high to warrant additional emission control on these units to meet the BART requirements. Thus, this reviewer concludes that no additional emission control equipment for BART is warranted at this location. Therefore, the existing permit limits will meet the requirements for BART.

cc: Southcentral Regional Office
Central Office

ALL4 INC. • 2393 Kimberton Road • P.O. Box 299 • Kimberton, PA 19442 • p.610.933.5246 • f.610.933.5127 • www.all4inc.com

January 10, 2008

Mr. Krishnan Ramamurthy
Pennsylvania Department of
Environmental Protection
Rachel Carson Building
P.O. Box 8468
Harrisburg, PA 17105-8468

Re: Lehigh Cement Company – Evansville and York Pennsylvania Facilities Supplemental Best Available Retrofit Technology (BART) Information

Dear Mr. Ramamurthy,

On behalf of the Lehigh Cement Company (Lehigh), All4, Inc. (ALL4) is submitting supplemental information related to Lehigh's Best Available Retrofit Technology (BART) proposals that were prepared for the Lehigh Evansville and York, Pennsylvania facilities and submitted to the Pennsylvania Department of Environmental Protection (PA DEP) in January, 2007. The supplemental information was initially discussed during our conference call of November 6, 2007 with you and Martin Hochhauser and during several supplemental telephone conversations and e-mail communications between Lehigh, ALL4, and PA DEP.

There are several issues concerning the visibility modeling that was conducted in support of the BART proposals that should be considered in conjunction with the control technology cost evaluations. These issues include the low visibility impacts, the conservatism of the visibility analysis, and the necessity of out-of-state emission reductions to demonstrate future acceptable progress at the Shenandoah Class I area. This letter includes a brief discussion of the background leading up to this letter, a supplemental visibility modeling discussion, a supplemental NO_X control cost/feasibility discussion, a response to a Federal Land Manager comment, and a conclusion.

Background

In separate April 2006 letters to each Lehigh facility in Pennsylvania, the PA DEP identified two potential options for addressing the BART requirements of the Federal Regional Haze Program. These options were:

1. Establish a permit limit to restrict the combined emissions from BART eligible sources to below 250 tons per year for each visibility impairing pollutant; or
2. Conduct and submit a BART proposal based on an engineering analysis of control options for each BART eligible unit at the facility for each visibility impairing pollutant.

Since neither the Evansville nor York facilities could accept emission limits that would be necessary under Option 1 to avoid the BART applicability, Lehigh prepared BART proposals for each facility to satisfy Option 2. In the April 2006 letters, PA DEP specified that the BART proposals should be prepared in accordance with United States Environmental Protection Agency (U.S. EPA) guidance published in Appendix Y of 40 CFR Part 51 (Guidelines for BART Determinations under the Regional Haze Rule). In accordance with Appendix Y, Lehigh completed BART analyses for the BART eligible emission units at Evansville and York facilities taking the following statutory requirements from Section 169A(g) of the CAA into account for each control option:

1. The cost of compliance;
2. The energy and non-air quality impacts of compliance;
3. Any existing air pollution control technology in use at the source;
4. The remaining useful life of the source; and
5. The degree of visibility improvement which may reasonably be anticipated from the use of BART.

The final BART proposals, prepared in accordance with the Part 51 Appendix Y guidance, were submitted to PA DEP in January 2007. The results of the BART analyses indicated that the baseline visibility impacts due to the Evansville BART eligible sources were no greater than 0.16 deciview (dV) for either the Brigantine or Shenandoah Class I areas on a 98th percentile basis. The visibility impacts due to BART eligible sources at the York facility were less than 0.05 dV at either the Brigantine or Shenandoah Class I areas using the 98th percentile. These visibility impacts are well below the level at which a human can distinguish a "just noticeable change", which is defined as a 1 to 2 dV change per "Development and Application of a Standard Visual Index" (Pitchford and Malm 1994). The visibility improvement due to the use of BART controls at either the Evansville or York facilities did not result in significant improvement in visibility at the Shenandoah or Brigantine Class I areas. Using the 98th percentile, the greatest change in visibility due to BART NO_X or SO_2 controls at Evansville was 0.08 dV while the 98th percentile change due to BART NO_X or SO_2 controls at York was 0.02 dV. The most stringent technically feasible NO_X control option for either kiln at Evansville was the use of selective non-catalytic reduction (SNCR). The most stringent technically feasible NO_X control for the York cement kiln was determined to be staged air combustion. While the use of certain retrofit controls may be considered cost effective based upon BART cost criteria developed by PA DEP, the installation of those controls will not result in a noticeable improvement in visibility.

Lehigh understands that PA DEP had agreed to use the BART protocol developed by the Mid-Atlantic/Northeast Visibility Union (MANE-VU) regional planning organization (RPO). The MANE-VU protocol does not include provisions for the use of the Appendix Y suggested 0.5 deciview visibility impairment contribution threshold. As a result, facility exemption modeling in the MANE-VU region was not an available option for the Lehigh facilities. Rather, all BART affected facilities in the MANE-VU region were required to prepare and submit complete BART analyses. A facility exemption modeling option was a part of the BART protocol developed by the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) RPO which includes Virginia. However, Lehigh also understands that PA DEP must consider all five of the statutory

ALL4 INC. • 2393 Kimberton Road • P.O. Box 299 • Kimberton, PA 19442 • p.610.933.5246 • f.610.933.5127 • www.all4inc.com

factors identified above when making a BART determination and not focus solely on the cost effectiveness of a given control technology to determine BART. Given the imperceptible visibility improvements predicted for the most stringent technically feasible NO_X controls at the Lehigh Evansville and York cement kilns and the excessive capital and on-going operational costs associated with implementing those controls, Lehigh reasserts that the use of the existing air pollution controls at the Evansville and York facilities represents BART for each facility.

Supplemental Visibility Modeling Discussion

During the BART proposal development process, PA DEP advised Lehigh and other BART eligible sources throughout the state that PA DEP would be providing visibility impairment modeling results to each facility. An analysis of the visibility improvement associated with each control option is a required component of a BART proposal. Lehigh understands that the MANE-VU modeling was conducted by a contractor working for the Northeast States for Coordinated Air Use Management (NESCAUM). PA DEP provided the NESCAUM modeling results to Lehigh on November 17, 2006 along with information intended to assist the BART eligible sources in completing the requisite BART proposals. In the transmittal letter that accompanied the NESCAUM modeling results, PA DEP acknowledged that the NESCAUM visibility modeling had not been conducted in accordance with the Part 51 Appendix Y visibility modeling guidelines. As a result, Lehigh conducted independent visibility impairment modeling as part of each facility's BART proposal in accordance with modeling protocols submitted to PA DEP in November of 2006. The visibility impacts due to emissions from the BART eligible sources at the Lehigh facilities are extremely low at the Shenandoah Class I area. The difference between the pre-control and post control visibility impacts are below the level at which human perception can detect a difference in visibility improvement.

Since the original visibility modeling was conducted, the National Park Service (NPS) in conjunction with the IMPROVE Steering Committee identified deficiencies in the original IMPROVE equation and recommended changes (i.e., the new IMPROVE equation). The IMPROVE equation is the algorithm that uses pollutant concentration levels to determine the amount of light that is scattered or absorbed (i.e., beta extinction – b_{ext}). The new IMPROVE equation correlates more closely with actual measurements than the old IMPROVE equation. The recommended changes to the old IMPROVE equation reflect large and small size fractions for ammonium sulfate and nitrate compounds, new hydroscopic growth terms, and new f(RH) terms for large and small size fractions. The new IMPROVE equation also reflects site specific Rayleigh scattering and includes an approach to factor in the presence of sea salt and ambient levels of nitrogen dioxide (NO_2). The impact of the new IMPROVE equation has been to increase the background levels of light extinction and thus decrease the deciview change from BART eligible sources.

ALL4 INC. • 2393 Kimberton Road • P.O. Box 299 • Kimberton, PA 19442 • p.610.933.5246 • f.610.933.5127 • www.all4inc.com

Supplemental NO_X Technical Feasibility/Control Cost Discussion

Lehigh Evansville

The BART analysis that was prepared for the Lehigh Evansville facility included an evaluation of the retrofit costs for a common selective non-catalytic reduction (SNCR) system for both of the dry, preheater kilns to abate NO_X emissions. SNCR was found to be technically feasible with a cost effectiveness of $627 per ton of NO_X reduced (combined), a total capital cost of $1,500,000, and annual operating costs of $970,712/year. At the request of PA DEP, Lehigh reviewed the costs associated with retrofitting the two Evansville long dry cement kilns with SNCR. Lehigh has determined that the SNCR capital and operating costs that were provided with the January 2007 BART proposal for the facility remain valid.

Lehigh York

The BART analysis that was prepared for the Lehigh York facility included an evaluation of the retrofit costs for staged combustion via a mid-kiln air injection fan for the white cement kiln to abate NO_X emissions. Staged combustion using a mid-kiln air injection fan provided by Cadence Environmental Energy, Inc. (Cadence) was found to be technically feasible with a capital cost of $295,293, annual operating costs of $132,476, and a cost effectiveness value of $1,046 per ton of NO_X reduced. At the request of PA DEP, Lehigh reviewed both the technical feasibility and the costs associated with retrofitting the York kiln with a mid-kiln air injection system. Lehigh has confirmed that mid-kiln air injection via a Cadence fan system is technically feasible. The capital and operating costs have been revised slightly based on a recent cost proposal provided by Cadence dated December 7, 2007 for the retrofit of the Lehigh York white cement kiln with a mid-kiln air injection system. The revised annual operating cost was calculated to be $1,118 per ton of NO_X reduced.

The BART analysis that was prepared for the Lehigh York facility included an evaluation of the technical feasibility of retrofitting a SNCR system on the white cement kiln at York. At the time of the BART proposal, Lehigh had determined that SNCR was not technically feasible for use on a wet, white cement kiln due to concerns with product quality (color) and very limited use of SNCR systems on wet cement kilns in the world. At the request of PA DEP, Lehigh re-evaluated the technical feasibility of using SNCR on a wet, white cement kiln. Lehigh has determined that the use of an ammonia or urea based reagent in an SNCR system will not likely impact the quality (color) of the white cement produced by the York wet kiln.

At Lehigh's request, All4 Inc. (ALL4) contacted FuelTech, a well-known provider of SNCR systems. Upon evaluation of the logistics associated with injecting their reagent at the appropriate temperature "window" within the wet cement kiln, FuelTech declined to provide a cost estimate. Upon further evaluation of the limited application of SNCR domestically on wet cement kilns, ALL4 discovered that the SNCR system installed on the Ash Grove Cement Company kiln in Midlothian, Texas was not a "typical" SNCR system, but a proprietary combination of mid-kiln air injection via a Cadence fan and ammonia/urea injection directly into the mid-kiln air injection "tubes." By injecting

ALL4 INC. • 2393 Kimberton Road • P.O. Box 299 • Kimberton, PA 19442 • p.610.933.5246 • f.610.933.5127 • www.all4inc.com

reagent directly into the Cadence mixing fan manifold or air injection tubes, the installation of a reagent pipeline along the length of the kiln is avoided.

Lehigh has determined that the use of a combined mid-kiln air/reagent injection system is technically feasible at the Lehigh York wet, white cement kiln. A Cadence representative visited the Lehigh York facility in late November 2007, but never provided a cost quotation for retrofitting a SNCR system at the Lehigh York kiln. Therefore, Lehigh evaluated the cost effectiveness of SNCR at the York facility based on a cost quotation provided to Lehigh by Cadence dated October 26, 2007 for a comparable Lehigh white cement kiln in Waco, Texas. Based on the analysis presented in Attachment A, the cost effectiveness for SNCR was determined to be $3,314/ton at 40% efficiency, with a total capital cost of $1,154,880, and annual operating costs of $559,588/year. Based on this analysis and using PA DEP's BART control cost criteria, SNCR is not a cost-effective retrofit option at the Lehigh York facility. A copy of the cost analysis spreadsheet is provided in Attachment A.

Federal Land Manager Comments

In an e-mail dated September 7, 2007, Don Sheppard of the National Park Service quoted an excerpt from the preamble to the Appendix Y BART Guidelines:

> *It is incorrect to dismiss a control strategy on the basis that the resulting improvement is not perceptible or significant. EPA states in the preamble to its BART Guidelines that, "Even though the visibility improvement from an individual source may not be perceptible, it should still be considered in setting BART because the contribution to haze may be significant relative to other source contributions in the Class I areas. Thus, we disagree that the degree of impairment should be contingent upon perceptibility. Failing to consider less-than-perceptible contributions to visibility impairment would ignore the CAA's intent to have BART requirements apply to sources that contribute to, as well as cause, such impairment."*

Mr. Sheppard's comment addresses the scenario where many small sources with minor visibility impacts combine to have a noticeable impact on visibility. It has not been demonstrated to either the York or Evansville facilities that they are part of a group of insignificant sources adversely impacting visibility. Further, it is Lehigh's understanding that for the Shenandoah Class I area, the State of Virginia regional haze state implementation plan (SIP) is not requiring any sources outside of Virginia to commit to controls for improving visibility at Shenandoah. Thus it appears that the Evansville and York facilities are not part of a group of singularly insignificant sources that collectively are adversely contributing to visibility impairment.

Conclusion

Lehigh reasserts the findings of the BART proposals prepared for the Lehigh Evansville and York facilities that the use of the existing air pollution controls at each facility represents BART. This conclusion is based on the following:

ALL4 INC. • 2393 Kimberton Road • P.O. Box 299 • Kimberton, PA 19442 • p.610.933.5246 • f.610.933.5127 • www.all4inc.com

- In accordance with the guidance presented in Appendix Y, baseline visibility impairing pollutant (VIP) emissions from the Evansville or York facilities do not cause or contribute to visibility impairment at Shenandoah National Park.
- The difference between the pre-control and post control visibility impacts due to emissions from the BART eligible sources at the Lehigh facilities are below the level at which human perception can detect a difference in visibility improvement.
- The use of the new IMPROVE equation would further reduce the visibility impacts associated with baseline facility emissions and would reduce the visibility improvements associated with the use of retrofit control technology.
- Regardless of the cost-effectiveness of a given retrofit technology, the PA DEP must sufficiently consider the visibility impacts of the BART analyses in conjunction with the retrofit control costs to meet the statutory BART requirements.

By not sufficiently considering the visibility impacts analysis (a statutory requirement) provided with each BART analysis, the BART evaluation process becomes a retrofit control technology cost analysis by default, focusing solely on the cost effectiveness of a given retrofit technology rather than the five statutory requirements identified above. We believe that this approach is both inconsistent with the intent of the BART regulations and with the guidance provided by U.S. EPA in Appendix Y. Furthermore, based upon the modeling conducted by Lehigh, any additional costs incurred by Lehigh to retrofit NO_X controls on the York and/or Evansville cement kilns will have no perceptible impact on visibility in the Class I areas.

Please contact Tim Matz at (610) 366-4752 or me at (610) 933-5246 if you have any questions or require additional information.

Sincerely,

All4, Inc.

Roy Rakiewicz
Senior Consultant

cc: Timothy L. Matz, Director of Environmental Affairs - Lehigh Cement Company
Martin Hochhauser – PA DEP

ALL4 INC. • 2393 Kimberton Road • P.O. Box 299 • Kimberton, PA 19442 • p.610.933.5246 • f.610.933.5127 • www.all4inc.com

ATTACHMENT A

CAPITAL AND ANNUALIZED COSTS FOR INSTALLATION OF A CADENCE FAN/SNCR SYSTEM FOR NO_X CONTROL

LEHIGH CEMENT YORK FACILITY

WHITE CEMENT KILN

CAPITAL COSTS[a]

COST ITEM		COST ($)
Direct Costs		
Purchased Equipment Costs		
Purchased Equipment Costs Subtotal		***$198,000***
Ammonia Storage Tank (estimate)		***$250,000***
Freight	0.05 A	$22,400
Total Purchased Equipment Cost	B	***$470,400***
Direct Installation Costs		
Direct Installation Cost		***$399,840***
Total Direct Costs	1.85 B	***$870,240***
Cadence License Agreement Fee		***$120,000***
Indirect Costs		
Engineering	0.10 B	$47,040
Construction Management	0.10 B	$47,040
Contractor fees	0.10 B	$47,040
Start-up	0.01 B	$4,704
Performance test	0.01 B	$4,704
Contingencies	0.03 B	$14,112
Total Indirect Costs		***$164,640***
Total Capital Investment (TCI)		***$1,154,880***

ANNUALIZED COSTS

COST ITEM	COST FACTOR		RATE		COST ($)
Direct Annual Costs					
Operating Labor					
Operator, two employees[b]	0.5	hours/shift	$36.74	per hour[c]	$40,230
Supervisor	15%	of operator labor			$6,035
Maintenance					
Maintenance Labor and Material	5%	of sum of direct installation costs, engineering, contingencies			$23,050
Utilities					
Electricity	47	kW	$0.05	per kWh[d]	$21,821
Reagent Consumption					
Aqueous ammonia	0.85	lb NH_3/lb NO	$0.065	per lb[e]	$239,630
Surcharges	$47.40	per delivery	92	deliveries	$4,369
Total Direct Annual Costs					***$335,134***
Indirect Annual Costs					
Spare Parts	60%	of Maintenance Labor & Materials			$13,830
Administrative charges	2%	of TCI			$23,098
Property taxes	1%	of TCI			$11,549
Insurance	1%	of TCI			$11,549
Capital recovery	0.142	x TCI			$164,429
Life of the control:		10 years at	7.0%	interest	
Total Indirect Annual Costs					***$224,454***
Total Annual Costs					***$559,588***
Cost Effectiveness ($/ton)					
NO_X Control Efficiency	40% [f]				
Potential NO_X Emissions	422.2	tpy	Total Annual Costs/Controlled NO_X Emissions:		
Controlled NO_X Emissions	168.9	tons of NO_X removed annually	***$3,314***	/ton	

[a] Capital costs are estimated based on a quotation provided by Cadence Environmental Energy, Inc. (Cadence) for the Lehigh White Cement kiln in Waco Texas dated October 26, 2007 which specified $198,000 for a SNCR system and a $120,000 licensing fee. Installation costs were estimated using U.S.EPA control cost algorithms. The quotation for the Waco kiln is representative of the costs that would be experienced at the York facility since the Waco and York kilns are similarly sized and are both white cement kilns. The capital cost includes an estimated cost provided by Cadence for the purchase and installation of an aqueous ammonia storage tank at York.

[b] Based on 8,760 hours of operation per year.

[c] Facility specific cost.

[d] Utility costs for electricity represent the electrical consumption of an air mixing cadence fan and other ancillary equipment.

[e] A site specific quote for 19.5% aqueous ammonia delivered to York was not received as of 1/10/08. The aqueous ammonia cost used in the cost analysis represents the delivered cost of 19.5% aqueous ammonia delivered to Lehigh Waco. The ammonia injection rate is based on 1.5:1 NH3 to NO molar ratio.

[f] The NO_X control efficiency resulting from the installation of an air mixing cadence fan and SNCR is conservatively assumed to be 40 percent.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
January 15, 2008

Subject: Review Memo for BART Application
Lehigh Cement/York Operations
200 Hokes Mill Rd.
York, PA 17404-5540

Operating Permit #: 67-05024

To: William Weaver
Environmental Program Manager
Southcentral Regional Office

Joyce Epps
Director
Bureau of Air Quality

From: Martin L. Hochhauser, P.E., Air Quality Engineering Specialist

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of

improvement in visibility which may reasonably be anticipated to result from use of the technology.

The Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to Lehigh Cement/York Plant indicated that an engineering analysis of VOC control options was not needed, because the relationship of VOC and particulate could not be quantified. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than US EPA's de minimis levels of 40 tons per year for NOx and SO_2 or 15 tons per year of PM10, because of the small effect on visibility.

2. Process Description:

Lehigh Cement/York is a portland cement production plant. It produces "White" cement. The plant has one cement kiln, known as the White Cement Kiln. The White Cement Kiln and associated material handling units are affected units. This kiln has one downstream control device, an electrostatic precipitator processing the kiln flue gas.

The primary purpose of this facility is to convert limestone and other component materials into "white" cement. Unlike kilns used for other Portland Cement production, the White Cement Kiln and its operations are designed to prevent formation of color changing iron oxides.

The following are the source ID numbers of the affected units:

TABLE 1 - 2002 Actual Emissions

UNIT	**NOx (tpy)**	**PM10 (tpy)**	**SO2 (tpy)**
200 – White Cement Kiln (2003 EI data)	391.30	21.70	56.90
031 – York Shipley Boiler	0.41	0.05	0.08
121A – Limestone Silo Pneumatic	0.00	0.01	0.00
122 – Raw Clay Stockpiling	0.00	1.27	0.00
123 – Clay Silo Loading	0.00	0.00	0.00
124 – Gypsum Silo Loading	0.00	0.01	0.00

135 – Clay Wash Mill	0.00	1.29	0.00
140 – Raw Mill Feed System	0.00	1.47	0.00
150 – Raw Mill (All Wet)	0.00	0.00	0.00
205 – CKD Return Bin 34 Ton	0.00	0.40	0.00
210 – Cement Cooler/Steam Exhaust	0.00	1.45	0.00
220 – Clinker Discharge System	0.00	1.36	0.00
230A – 8th Floor Bldg. Transfer	0.00	1.45	0.00
231 – Yard Filling Operations	0.00	0.11	0.00
300 – Finish Mill Grinding System	0.00	5.31	0.00
380 – Three Truck Loadout	0.00	0.66	0.00
400 – Packhouse (Backup)	0.00	0.00	0.00
450 – 1956 Silos Receiving	0.00	1.53	0.00
Total:	391.71	38.07	56.98

3. NESCAUM CALPUFF Modeling:

Lehigh Cement/York has eighteen (18) emission units at this facility originally constructed between the specified dates in 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant are over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling the maximum combined impact of these units on a Class I area was 0.128 deciview (dv). This impact is on the Shenandoah National Park.

The visibility impact of the units with respect to the Class I area affected is described in Table 2.

Table 2 – Maximum Daily Impact (dv)

Source ID	Class I Area	Total	SO4	NO3	PM10
200 (2003 EI)	Shenandoah	0.128	0.011	0.117	0.001
031	Shenandoah	0.000	0.000	0.000	0.000
121A	Shenandoah	0.000	0.000	0.000	0.000
122	Shenandoah	0.000	0.000	0.000	0.000
123	Shenandoah	0.000	0.000	0.000	0.000
124	Shenandoah	0.000	0.000	0.000	0.000
121	Shenandoah	0.000	0.000	0.000	0.000
135	Shenandoah	0.000	0.000	0.000	0.000
140	Shenandoah	0.000	0.000	0.000	0.000
150	Shenandoah	0.000	0.000	0.000	0.000
205	Shenandoah	0.000	0.000	0.000	0.000
210	Shenandoah	0.000	0.000	0.000	0.000
220	Shenandoah	0.000	0.000	0.000	0.000
230A	Shenandoah	0.000	0.000	0.000	0.000
231	Shenandoah	0.000	0.000	0.000	0.000
300	Shenandoah	0.000	0.000	0.000	0.000
380	Shenandoah	0.000	0.000	0.000	0.000
400	Shenandoah	0.000	0.000	0.000	0.000
450	Shenandoah	0.000	0.000	0.000	0.000
	Total:	**0.128**	**0.011**	**0.117**	**0.001**

(Source 2002 SO4 impact adjusted for 2003 SO2 emissions since the EI 2002 SO2 estimate is considered inaccurate.)

Upon reviewing actual emissions of this facility in Table 2, it was determined that the NOx emissions from the White Cement Kiln (Source ID #200) make up the preponderance of the affected visibility impairing emissions.

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate, for the Lehigh Cement/York Plant.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction'' based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Table 3 lists all available control technologies on the Lehigh\York White Cement Kiln for control of SO2 and NOx. Lehigh Cement conducted ambient modeling and visibility analysis for the period 2001 through 2003 at Class 1 areas affected by this facility. Visibility improvement is based on the company analysis.

Table 3 - Available Retrofit Control Technologies for BART Evaluation
Emission Unit – Lehigh\York – White Cement Kiln

Pollutant	Uncontrolled emission rate TPY (2003EI)	Control Technology	% Control	98th Percentile Maximum Impact Visibility Improvement dv	Control Cost	
					$ per Ton Removed	Annual $ per dv Improvement
SO2	57	Semi-Dry	90%	0.005	54,178	562,845,137
SO2	57	Wet Scrubber	95%	0.006	104,577	917,180,124
NOx	399	Indirect Firing	15%	0.006	97,769	991,394,772
NOx	399	Cadence Fan	30%	0.012	1,118	10,605,754
NOx	399	Cadence Fan+SNCR	40%	0.017	2,623	26,596,064

PM10 will serve as a surrogate for PM2.5. The particulate emissions from this kiln are controlled by an electrostatic precipitator (ESP). The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on this kiln is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Step 2 – Eliminate Technically Infeasible Options.

There is presently no Spray Dryer Absorber/Fabric Filter (SDA/FF) system, operating full time, on the exhaust of a cement kiln. The SDA/FF SO2 control technology was removed from consideration due to technical infeasibility, for this reason.

For Selective Non-Catalytic Reduction (SNCR) with a Cadence fan, ammonia or urea would be injected into the rotating kiln at a specific location. The location would be fixed, since a Cadence, non-rotating, injection system would be used. SNCR operates properly when flue gas at the injection location is within the temperature range of 1600 to 2000 Deg. F. On long kilns, this temperature range may move along the axis of the kiln with time, causing injection to take place outside of the temperature range. SNCR has not been used full time on long wet or long dry kiln systems.

Reagent injection outside of this range does not cause a reaction with NOx and makes ammonia available to react with HCl and sulfur oxides downstream of the particulate control device. This reacted material is emitted as fine particulate. Unreacted ammonia may also be emitted. The USEPA RACT/BACT/LAER Clearinghouse lists no long cement kiln, either wet or dry, with NOx controlled by a SNCR system. It has been reported that SNCR has been proposed for NOx control as BART on a long cement kiln in the US. While there several technical issues associated with the installation of SNCR for long kilns, economic and impact analyses were performed for this control option. A NOx reduction of 35% was used for SNCR on long kilns based on the July 2006 ERG report to the Texas Commission on Environmental Quality. They used this reduction since SNCR control on long kilns is considered Innovative and available data is limited.

The Cadence air injection system has been operated on other cement kilns owned by Lehigh Cement. However, they have experienced lower NOx reductions than the predicted 30% at these units.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Removal efficiencies of the technically feasible SO2 control technologies range from 90% to 95%. Removal efficiencies of the technically feasible NOx control technologies range from 15% to 40%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated cost of a Semi-Dry system for the White Cement Kiln is $ 54,178 per ton of actual SO2 removed. The estimated cost of a Wet Scrubber system for the White Cement Kiln is $ 104,577 per ton of actual SO2 removed. These control systems are considered too expensive to be considered as control for BART at the level of improvement determined for the most affected Class I area (Shenandoah National Park).

In addition, a Wet Scrubber has significant energy requirements and produces a sludge that must be treated and disposed of.

The estimated cost of Indirect Firing is $ 97,769 per ton of NOx removed and is considered too expensive to be considered as control for BART. The estimated cost of a Cadence fan combined with a SNCR system is $ 2,623 per ton of NOx removed and also determined to be Economically Infeasible. The estimated cost of a Cadence fan system is $ 1,118 per ton of NOx removed.

Step 5 – Evaluate Visibility Impacts.

The maximum visibility improvement due to the most effective SO2 control in a Class I area (Shenandoah National Park) was 0.006 dv. The minimum cost of improvement was $ 562,845,000 annually per deciview, for lesser improvement. Therefore, I do not recommend any additional control of SO2 as a result of the BART analysis. The current operating permit limitation for SO2 emissions from the kiln is 500 ppm by volume.

The maximum visibility improvement due to the most effective NOx control in the most affected Class I area (Shenandoah National Park) was 0.017 dv. The minimum cost of improvement was $ 10,606,000 annually per deciview, for lesser improvement. Therefore, I do not recommend any additional control of NOx as a result of the BART analysis. The current operating permit limitation for NOx emissions from the kiln is 8.2 pounds per ton of cement clinker produced.

5. Conclusion:

The estimated visibility improvement is too low and the cost of additional air emission control too high to warrant additional emission control to meet the BART requirements. Thus, this reviewer concludes that no additional emission control equipment for BART is warranted at this location. Therefore, the existing permit limits will meet the requirements for BART.

cc: Southcentral Regional Office
Central Office

DLA PIPER

DLA Piper US LLP
111 South Calvert Street, Suite 1950
Baltimore, Maryland 21202-6193
www.dlapiper.com

Deborah E. Jennings
deborah.jennings@dlapiper.com
T 410.580.4180
F 410.580.3665

August 14, 2007

VIA ELECTRONIC MAIL

Mr. Martin Hochhauser
Bureau of Air Quality
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17105-8468

Re: Lehigh Cement York Facility BART Issue

Dear Mr. Hochhauser:

In follow up to our prior communications, we would like to provide you with the following and attached information.

The York plant is only subject to the state-required limit of 500 ppm for SO_2. Table B-3, attached, provides the costs of a wet scrubber for the York facility. This cost is based on actual costs from Lehigh's Mason City, Iowa plant, which installed a scrubber in November 2005. Table B-4, attached provides capital and operating costs for a semi-dry SO_2 scrubbing system, including replacement of the ESP with a baghouse. This is based on actual costs as purchased and delivered to Lehigh's Evansville, Pennsylvania plant. This reflects the costs for a fabric filter based on an actual vendor quote received for the York facility's sister white plant in Waco, Texas, which is the same size as the York plant, approximately 140,000 stpy.

Please let me know if you have any questions.

Very truly yours,

DLA Piper US LLP

Deborah E. Jennings

Deborah E. Jennings

DEJ/pkp
Attachments

TABLE B-3
CAPITAL AND ANNUALIZED COSTS FOR WET SCRUBBING OF SO_2
LEHIGH CEMENT YORK FACILITY
WHITE CEMENT KILN

CAPITAL COSTS[a]

COST ITEM		COST ($)
Direct Costs		
Purchased Equipment Costs		
Purchased Equipment Costs Subtotal		***$9,576,271***
Freight	0.05 A	$423,729
B ***Total Purchased Equipment Cost***	0.45 TCI	***$10,000,000***
Direct Installation Costs		
Direct Installation Cost	0.85 B	***$8,500,000***
Total Direct Costs		***$18,500,000***
Indirect Costs		
Engineering	0.10 B	$1,000,000
Construction Management	0.10 B	$1,000,000
Contractor fees	0.10 B	$1,000,000
Start-up	0.01 B	$100,000
Performance test	0.01 B	$100,000
Contingencies	0.03 B	$300,000
Total Indirect Costs		***$3,500,000***
Total Capital Investment (TCI)[e]		***$22,000,000***

ANNUALIZED COSTS

COST ITEM	COST FACTOR	RATE	COST ($)
Direct Annual Costs			
Operating Labor			
Operator, two employees[b]	0.5 hours/shift	$36.70 per hour[c]	$40,187
Supervisor	15% of operator labor		$6,028
Maintenance			
Maintenance Labor and Material	5% of sum of direct installation costs, engineering, contingencies		$490,000
Utilities			
Chemicals	2.3 lb lime per lb SO_2	$132.00 per ton Lime[c]	$15,315
Fresh Water usage	69 MMgal/yr	$2,300.00 per MMgal[c]	$158,700
Electricity	2,335 kW	$0.05 per kWh[d]	$975,684
Total Direct Annual Costs			***$1,685,914***
Indirect Annual Costs			
Spare Parts	60% of Maintenance Labor & Materials		$294,000
Administrative charges	2% of TCI		$440,000
Property taxes	1% of TCI		$220,000
Insurance	1% of TCI		$220,000
Capital recovery	0.110 x TCI		$2,415,482
Life of the control:	15 years at	7.0% interest	
Total Indirect Annual Costs			***$3,589,482***
Total Annual Costs			***$5,275,396***
Cost Effectiveness ($/ton)			
SO_2 Control Efficiency	95%[f]		
Potential SO_2 Emissions	53.1 tpy	Total Annual Costs/Controlled SO_2 Emissions:	
Controlled SO_2 Emissions	50.4 tons of SO_2 removed annually		$104,577

[a] Capital components were estimated based on a $22,000,000 total capital investment (TCI) to install a wet scrubber on White Cement Kiln at the Lehigh Cement Company York Facility provided by control technology engineers from the Heidelberg Cement Group.

[b] Based on 8,760 hours of operation per year.

[c] Facility specific hydrated lime cost delivered per short ton.

[d] Utility cost for electricity represents the electrical consumption of a wet scrubber system including the following, and other ancillary equipment:
- 1500 hp push fan
- two (2) 350 hp slurry circulating pumps

[e] Total capital investment (TCI) figure of $22,000,000 was provided by Lehigh Cement Company Corporate Offices and represents the result of an in-depth analysis into the cost of installing a wet scrubber on White Cement Kiln at the Lehigh Cement Company York Facility.

[f] Control efficiency of SO_2 emissions from installing a wet SO_2 scrubber is assumed to be at least 95 percent.

TABLE B-4
CAPITAL AND ANNUALIZED COSTS FOR SEMI-DRY SO_2 SCRUBBING SYSTEM
INCLUDING REPLACEMENT OF THE ESP WITH A BAGHOUSE
LEHIGH CEMENT YORK FACILITY
WHITE CEMENT KILN

CAPITAL COSTS[a]

COST ITEM		Scrubber		Baghouse		COST ($)
Direct Costs						
Purchased Equipment Costs						
Purchased Equipment Costs Subtotal		*$1,035,273*		*$2,122,309*		*$3,157,581*
Freight	0.05 A	$45,809	0.05 A	$93,907	0.05 A	$139,716
B *Total Purchased Equipment Cost*	B	*$1,081,081*	B	*$2,216,216*	B	*$3,297,297*
Direct Installation Costs						
Direct Installation Cost	0.85 B	*$918,919*	0.85 B	*$1,883,784*	0.85 B	*$2,802,703*
Total Direct Costs	1.85 B	*$2,000,000*		*$4,100,000*		*$6,100,000*
Indirect Costs						
Engineering	0.10 B	$108,108	0.10 B	$221,622	0.10 B	$329,730
Construction Management	0.10 B	$108,108	0.10 B	$221,622	0.10 B	$329,730
Contractor fees	0.10 B	$108,108	0.10 B	$221,622	0.10 B	$329,730
Start-up	0.01 B	$10,811	0.01 B	$22,162	0.01 B	$32,973
Performance test	0.01 B	$10,811	0.01 B	$22,162	0.01 B	$32,973
Contingencies	0.03 B	$32,432	0.03 B	$66,486	0.03 B	$98,919
Total Indirect Costs		*$378,378*		*$775,676*		*$1,154,054*
Total Capital Investment (TCI)[e]		*$2,378,378*		*$4,875,676*		*$7,254,054*

ANNUALIZED COSTS

COST ITEM	COST FACTOR	RATE	COST ($)
Direct Annual Costs			
Operating Labor			
Operator, two employees[b]	0.5 hours/shift	$36.47 per hour[c]	$39,935
Supervisor	15% of operator labor		$5,990
Maintenance			
Maintenance Labor and Material	5% of sum of direct installation costs, engineering, contingencies		$108,595
Utilities			
Chemicals	2.3 lb lime per lb SO_2	$132.00 per ton Lime[c]	$14,509
Electricity	3,761 kW	$0.05 per kWh[d]	$1,746,157
Total Direct Annual Costs			*$1,915,186*
Indirect Annual Costs			
Spare Parts	60% of Maintenance Labor & Materials		$65,157
Administrative charges	2% of TCI		$145,081
Property taxes	1% of TCI		$72,541
Insurance	1% of TCI		$72,541
Capital recovery	0.110 x TCI		$796,456
Life of the control:	15 years at	7.0% interest	
Total Indirect Annual Costs			*$1,151,775*
Total Annual Costs			*$3,066,961*
[illegible]	[illegible]	[illegible]	[illegible]

[a] Capital components were estimated based on a $2,000,000 Total Direct Cost (DC) to install a semi-dry scrubber on the White Cement Kiln at the Lehigh Cement Company York provided by TurboSonic, and a $4,100,000 Total Direct Cost (DC) to install a new baghouse on the White Cement Kiln at the Lehigh Cement Company York provided by Lehigh Cement Corporate Offices.
[b] Based on 8,760 hours of operation per year.
[c] Facility specific hydrated lime cost delivered per short ton.
[d] Utility cost for electricity represents the electrical consumption of a semi-dry scrubber and other ancillary equipment.
[e] Total Direct Cost (DC) figure of $2,000,000 was provided by TurboSonic, Total Direct Cost (DC) figure of $4,100,000 was provided by Lehigh Cement Corporate Offices for a similarly sized kiln, both represent the result of in-depth analyses into the cost of installing a semi-dry scrubber and new baghouse on White Cement Kiln at the Lehigh Cement Company York Facility.
[f] Control efficiency of SO_2 emissions from installing a semi-dry SQ scrubber and associated baghouse is assumed to be at least 90 percent.

ATTACHMENT B

REVISED CAPITAL AND ANNUALIZED COSTS FOR INSTALLATION OF AN AIR MIXING CADENCE FAN FOR NO_X CONTROL

LEHIGH CEMENT YORK FACILITY

WHITE CEMENT KILN

CAPITAL COSTS[a]

COST ITEM		COST ($)
Direct Costs		
Purchased Equipment Costs		
Purchased Equipment Costs Subtotal		***$102,600***
Freight	0.05 A	$5,130
Total Purchased Equipment Cost	B	***$107,730***
Direct Installation Costs		
Direct Installation Cost		***$91,571***
Total Direct Costs	1.85 B	***$199,301***
Cadence License Agreement Fee		***$120,000***
Indirect Costs		
Engineering	0.10 B	$10,773
Construction Management	0.10 B	$10,773
Contractor fees	0.10 B	$10,773
Start-up	0.01 B	$1,077
Performance test	0.01 B	$1,077
Contingencies	0.03 B	$3,232
Total Indirect Costs		***$37,706***
Total Capital Investment (TCI)		***$357,006***

ANNUALIZED COSTS

COST ITEM	COST FACTOR		RATE		COST ($)
Direct Annual Costs					
Operating Labor					
Operator, two employees[b]	0.5	hours/shift	$36.74	per hour[c]	$40,230
Supervisor	15%	of operator labor			$6,035
Maintenance					
Maintenance Labor and Material	5%	of sum of direct installation costs, engineering, contingencies			$5,279
Utilities					
Electricity	47	kW	0.053	per kWh[c]	$21,821
Total Direct Annual Costs					***$73,365***
Indirect Annual Costs					
Spare Parts	60%	of Maintenance Labor & Materials			$3,167
Administrative charges	2%	of TCI			$7,140
Property taxes	1%	of TCI			$3,570
Insurance	1%	of TCI			$3,570
Capital recovery	0.142	x TCI			$50,830
Life of the control:	10	years at	7.0%	interest	
Total Indirect Annual Costs					***$68,277***
Total Annual Costs					***$141,642***
Cost Effectiveness ($/ton)					
NO_X Control Efficiency	30% [e]				
Potential NO_X Emissions	422.2	tpy		Total Annual Costs/Controlled NO_X Emissions:	
Controlled NO_X Emissions	126.7	tons of NO_X removed annually			***$1,118***

[a] Capital costs are estimated based on a quotation provided by Cadence Environmental Energy for the Lehigh York White Cement kiln dated December 7, 2007 which specified $102,600 for a mid kiln air injection fan system and a $120,000 licensing fee. Installation costs were estimated using U.S.EPA control cost algorithms.

[b] Based on 8,760 hours of operation per year.

[c] Facility specific cost.

[d] Utility costs for electricity represent the electrical consumption of an air mixing cadence fan and other ancillary equipment.

[e] Control efficiency of NO_X emissions from installing an air mixing cadence fan is assumed to be at least 30 percent.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
Allegheny Energy Supply Company, LLC
Hatfield's Ferry Power Station
2907 E Roy Furman Hwy
Masontown, PA 15461- 2591

TV Operating Permit #: 30-00099

To:

Mark Wayner
Environmental Program Manager
Bureau of Air Quality Control
Southwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined

that an engineering analysis of VOC control options is not needed. EPA has determined that BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Hatfield's Ferry Power Station consists of 3 BART affected boilers, each rated at 570 MW. The facility has recently received a Plan Approval for the installation of FGD. Part of the FGD Plan Approval's conditions is a filterable particulate emissions rate of 0.075 lb/MMBtu. This filterable particulate emission rate was used by the facility to do their own CALPUFF modelling.

3. BART Analysis

The facility provided cost analysis data for a variety of filterable particulate matter control technologies. The retrofit technologies reviewed included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC). Of the technologies reviewed, COHPAC provided the highest filterable particulate matter removal rate with the lowest $/ton cost. This cost was calculated to be $5,723.00/ton or $7,111,805.00 $/year per boiler. This includes an energy impact of 20,772 MWh/year per unit to run the booster fans required to operate the COHPAC device. The estimated useful life for this cost analysis was 20 years.

The facility's CALPUFF modeling indicates that the 98th percentile delta-deciview improvement using this technology would be 0.177 dv at Otter Creek, 0.139 dv at Dolly Sods, 0.135 dv at Shenandoah and 0.053 at James River.

The lowest levelized annual dollars per deciview visibility improvement would be $121,000,000/dv at the Dolly Sods Wilderness Area. This analysis indicates that it would not be cost effective to install this BART technology or any of the lesser ones at this facility.

A three to five percent reduction from ESP enhancement would yield a 0.006 to 0.010 delta dv improvement respectively. Using the facility's three unit 3 to 5 percent annualized cost range of $236,492 to $1,440,000 per year yields a dollar per deciview improvement cost range of $39,000,000 to $144,000,000/delta dv.

4. Permit Conditions

The permit conditions listed in Plan Approval 30-00009F for filterable particulate matter along with the implementation of EGU CAIR requirements satisfy the BART requirements as demonstrated in this analysis.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The retrofit technologies reviewed included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC).

Step 2 – Eliminate Technically Infeasible Options.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

The removal of an additional 80% of filterable particulate matter emissions was assumed after existing controls with the installation of COHPAC. The replacement of existing ESPs with a fabric filter would yield a similar reduction but at an elevated cost. All other options would yield a progressively lower removal rate.

Step 4 – Evaluate Impacts and Document the Results.

Of the technologies reviewed, COHPAC provided the highest filterable particulate matter removal rate with the lowest $/ton cost. This cost was calculated to be $5,723.00/ton or $7,111,805.00 $/year per boiler. This includes an energy impact of 20,772 MWh/year per unit to run the booster fans required to operate the COHPAC device. The estimated useful life for this cost analysis was 20 years.

Step 5 – Evaluate Visibility Impacts.

The facility's CALPUFF modeling indicates that the 98th percentile delta-deciview improvement using this technology would be 0.177 dv at Otter Creek, 0.139 dv at Dolly Sods, 0.135 dv at Shenandoah and 0.053 at James River.

The lowest levelized annual dollars per deciview visibility improvement would be $121,000,000/dv at the Dolly Sods Wilderness Area. This analysis indicates that it would not be cost effective to install this BART technology or any of the lesser ones at this facility.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
Allegheny Energy Supply Company, LLC
Mitchell Power Station
50 Electric Way
New Eagle, PA 15067- 2050

TV Operating Permit #: 63-00016

To: Mark Wayner
Environmental Program Manager
Bureau of Air Quality Control
Southwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined

that an engineering analysis of VOC control options is not needed. EPA has determined that BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Mitchell Power Station consists of several generating boilers but only Unit 3 is subject to BART rerquirements. Unit 3 is rated at 288 MW net at an input rate of 2,988 MMBTU/hr. The facility used an EPA Method 5 stack tested filterable particulate emission rate of 0.033 lbs/MMBTu for their modelling and for calculating their annual emissions at 6132 hrs/yr of year 2013 estimated operating capacity. Unit 3 is presently controlled by a Buell Eng. Co. ESP, an American Standard ESP and a Chemico FGD system in series.

3. BART Analysis

The facility provided cost analysis data for a variety of filterable particulate matter control technologies. The retrofit technologies reviewed included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC). The estimated useful life for this cost analysis was 20 years. Of the technologies reviewed, COHPAC provided the highest filterable particulate matter removal rate with the lowest $/ton cost. This cost was calculated to be $20,186.00/ton or $4,088,691.00 $/year. This includes an energy impact of 7,395 MWh/year per unit to run the booster fans required to operate the COHPAC device.

The facility's CALPUFF modeling indicates that the 98th percentile delta-deciview improvement using this technology would be 0.008 dv at Otter Creek, 0.006 dv at Dolly Sods and 0.007 dv at Shenandoah.

The lowest levelized annual dollars per deciview visibility improvement would be $511,000,000/dv at the Otter Creek Wilderness Area. This analysis indicates that it would not be cost effective to install this BART technology at this facility. It would also not be cost effective if modeled at the existing permit limit of 0.1 lbs/MMBtu.

A three to five percent reduction from ESP enhancement would yield a 0.001 to 0.001 delta dv improvement respectively as reported by the facility in their BART analysis. Using the facility's one unit 3 to 5 percent annualized cost range of $93,633 to $400,000 per year yields a dollar per deciview improvement cost range of $93,633,000 to $400,000,000/delta dv.

4. Permit Conditions

Title V permit # 63-00016 requires the control equipment that achieves the actual emission rates used in this analysis. Therefore, present permit requirements including the existing limit of 0.1 lbs/MMbtu along with the implementation of EGU CAIR requirements satisfy BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The retrofit technologies reviewed included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC).

Step 2 – Eliminate Technically Infeasible Options.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

The removal of an additional 67% of filterable particulate matter emissions was assumed after existing controls with the installation of COHPAC. The replacement of existing ESPs with a fabric filter would yield a similar reduction but at an elevated cost. All other options would yield a progressively lower removal rate.

Step 4 – Evaluate Impacts and Document the Results.

Of the technologies reviewed, COHPAC provided the highest filterable particulate matter removal rate with the lowest $/ton cost. This cost was calculated to be $20,186.00/ton or $4,088,691.00 $/year. This includes an energy impact of 7,395 MWh/year per unit to run the booster fans required to operate the COHPAC device. The estimated useful life for this cost analysis was 20 years.

Step 5 – Evaluate Visibility Impacts.

The facility's CALPUFF modeling indicates that the 98^{th} percentile delta-deciview improvement using this technology would be 0.008 dv at Otter Creek, 0.006 dv at Dolly Sods and 0.007 dv at Shenandoah.

The lowest levelized annual dollars per deciview visibility improvement would be $511,000,000/dv at the Otter Creek Wilderness Area. This analysis indicates that it would not be cost effective to install this BART technology at this facility.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
EME Homer City Generation LP
EME Homer City Generating Station
1750 Power Plant Road
Homer City, PA 15748-8009

TV Operating Permit #: 32-00055

To: Mark Wayner
Environmental Program Manager
Bureau of Air Quality Control
Southwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined

that an engineering analysis of VOC control options is not needed. EPA has determined that BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

EME Homer City Generating Facility is an 1884 MW power plant with three BART affected coal fired boilers, Units 1, 2 and 3. All three units have ESPs and Unit 3 has FGD. Unit 1 has a partially rebuilt ESP while the Unit 2 ESP is scheduled for the same rebuild in 2007. The facility used 2002 stack testing results for Unit 1 filterable PM10 emissions calculations and projected the same emission rate for Unit 2 calculations. The recalculated facilty wide filterable PM10 emissions are as summarized below:

Unit 1	230.93 lbs/hr
Unit 2	230.93 lbs/hr
Unit 3	174.24 lbs/hr
	631.1 lbs/hr = 2764 TPY @ 8760

3. BART Analysis

The facility did not use the NESCAUM provided PM10 filterable emmission visibility impact analysis based upon actual 2001 through 2003 emissions but instead substituted the above most current recalculated PM10 filterable emissions and reran the modelling using the BART-specific versions of CALMET and CALPUFF that were posted at http://www.src.com . The results of the facility conducted modelling are as summarized below:

		2001		2002		2003	
PSD Class 1 Area		Max 24 hr	8th highest impact	Max 24 hr	8th highest impact	Max 24 hr	8th highest impact
Dolly Sods Wilderness Area	dv	0.10	0.04	0.07	0.03	0.08	0.04
Otter Creek Wilderness Area	dv	0.09	0.04	0.12	0.03	0.07	0.03
Shenandoah National Park	dv	0.17	0.09	0.16	0.09	0.10	0.07

The facility expressed the opinion that these results as tabulated above are minimal and that no action should be required. The facilty did not do a technical feasibility or economic analysis for PM10 control technology options based on this opinion.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s. It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide lesser percent reductions at costs that do not justify the associated possible reductions. Since this facility did not do a technical feasibility study it is assummed that COHPAC is technically feasible and a basic cost analysis for this option has been performed. COHPAC installations will require the use of booster fans which will consume energy. The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide current annual filterable PM10 emission rate of 631.1 lbs/hr after existing or projected ESP control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $18,800,000 for the three boiler total AIMS listed scfm of 4,700,000, the cost of additional filterable PM10 removed calculates to approximately $8,502 per ton. This cost is not justified where the maximum theoretical visibilty reduction would be approximately 0.17 deciview for the maximum 24 hr impact at Shenandoah National Park due to PM10 filterable emissions. The annualized cost of $18,800,000 translates to a minimum cost of $110,588,235/delta dv at the Shenandoah National Park. It also would not be cost effective at a modeled emission rate of 0.1 lbs/MMBtu, the existing permit limit.

A three to five percent reduction from ESP enhancement would yield a 0.0051 to 0.0085 delta dv improvement respectively. Using a three unit 3 to 5 percent annualized cost range of $225,000 to $1,200,000 per year yields a dollar per deciview improvement cost range of $44,117,647 to $141,176,470/delta dv.

4. Permit Conditions

TV Permit # 32-00055 together with the planned ESP upgrade for the Unit 2 requires the control equipment that achieves the actual emission rates used for this analysis. Therefore, the present permit condition of 0.1 lb/MMBtu along with the implementation of EGU CAIR requirements satisfy BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s.

Step 2 – Eliminate Technically Infeasible Options.

It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide lesser percent reductions at costs that do not justify the associated possible reductions.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

A COHPAC efficiency of 80% of the remaining filterable particulate matter after existing controls was assumed.

Step 4 – Evaluate Impacts and Document the Results.

COHPAC installations will require the use of booster fans which will consume energy. The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide current annual filterable PM10 emission rate of 631.1 lbs/hr after existing or projected ESP control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $18,800,000 for the three boiler total AIMS listed scfm of 4,700,000, the cost of additional filterable PM10 removed calculates to approximately $8,502 per ton.

Step 5 – Evaluate Visibility Impacts.

This cost is not justified where the maximum theoretical visibilty reduction would be approximately 0.17 deciview for the maximum 24 hr impact at Shenandoah National Park due to PM10 filterable emissions. The annualized cost of $18,800,000 translates to a minimum cost of $110,588,235/delta dv at the Shenandoah National Park.

Draft

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
June 27, 2008

Subject: Review Memo for BART Application
Exelon Power
Eddystone Generating Station
1 Industrial Highway
Eddystone, PA 19022-1524

TV Operating Permit #: 23-00017

To: David Altenderfer
Environmental Program Manager
Bureau of Air Quality Control
Northcentral Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Technical Support Section
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined

that an engineering analysis of VOC control options is not needed. EPA has determined that BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Eddystone Generating Station has identified two BART affected boilers, Units 3 and 4, rated at an input capacity of 4,116 MMBTU/hr each, both fired on #6 oil, #2 oil, natural gas or waste derived fuel. Neither unit presently has any control devices. Both units presently operate using good combustion pratcies and low sulfur fuels.

3. BART Analysis

The facility provided cost analysis data for the only technically feasible option for removal of filterable PM10 emissions from #6 oil-fired boilers, an ESP. Fabric Filters are not desirable for use on oil-fired boilers. The estimated useful life for this cost analysis was 20 years. The facility assumed a 98% filterable PM10 control efficiency reducing the filterable PM10 emission rate from 299.1 lbs/hr to 2.1 lbs/hr for a total filterable PM10 emissions reduction of 1,300.9 tons per year resulting in a cost of $9,985.2/ton reduction for both boilers. The annualized cost was calculated to be $12,989,308 for two ESPs with one common stack.

The facility's NESCAUM CALPUFF modeling results indicate a 0.146 delta deciview improvement for the maximum 24-hr impact at the Brigantine Wilderness area.

At an annualized cost of $12,989,308 the cost per deciview decrease is $88,967,863/delta dv at the Brigantine Wilderness Area utilizing the maximum 0.19 delta deciview effect controlled to a 98 % efficiency as displayed in Tables 6-1 and 6-2 of their submittal. This analysis indicates that it would not be cost effective to require this control option to achieve the modeled delta deciview impact. It would also not be cost effective at the permit emission level of 0.1 lb/MMBTU.

4. Permit Conditions

TV Permit # 23-00017 that requires the use of low sulfur fuels along with the implementation of EGU CAIR requirements and the existing permit level of 0.1 lbs/MMBtu meet the requirements for BART at this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Electrostatic Precipitators, Fabric Filters, Mechanical Collectors, Wet Scrubbers

Step 2 – Eliminate Technically Infeasible Options.

Fabric Filters not compatible with oil-fired boilers, Mechanical Collectors designed for larger particulate matter.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

The facility assumed a 98% filterable PM10 control efficiency reducing the filterable PM10 emission rate from 299.1 lbs/hr to 2.1 lbs/hr for a total filterable PM10 emissions reduction of 1,300.9 tons per year

Step 4 – Evaluate Impacts and Document the Results.

The estimated useful life for this cost analysis was 20 years. The facility assumed a 98% filterable PM10 control efficiency reducing the filterable PM10 emission rate from 299.1 lbs/hr to 2.1 lbs/hr for a total filterable PM10 emissions reduction of 1,300.9 tons per year resulting in a cost of $9,985.2/ton reduction for both boilers. The annualized cost was calculated to be $12,989,308 for two ESPs with one common stack.

Step 5 – Evaluate Visibility Impacts.

The facility's CALPUFF modeling results indicate a 0.092 delta deciview impact for the maximum 24-hr impact over a 3-year period, 22^{nd} highest at the Brigantine WA and 0.016 delta deciview impact for the maximum 24-hr impact over a 3-year period, 22^{nd} highest at the Shenandoah NP. The uncontrolled impact is 0.119 dv at Brigantine and 0.021dv at Shenandoah. However, these results are based upon one year's worth of modeling data

At an annualized cost of $12,989,308 / (0.190 dv - 0.044 dv) the cost per deciview decrease is $88,967,863/delta dv at the Brigantine Wilderness Area utilizing the maximum 0.19 worst day delta deciview effect controlled to a 98 % efficiency as displayed in Tables 6-1 and 6-2 of the Exelon submittal. This analysis indicates that it would not be cost effective to require this control option to achieve the modeled delta deciview impact improvement for the single worst day.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
First Energy Generation Corp., Bruce Mansfield
SR 168 S
Shippingport, PA 15077

TV Operating Permit #: 04-00235

To: Mark Wayner
Environmental Program Manager
Bureau of Air Quality Control
Southwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined that an engineering analysis of VOC control options is not needed. EPA has determined that

BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

First Energy Generation Corporation, Bruce Mansfield is an 2741 MW power plant with three BART affected coal fired boilers, Units 1, 2 and 3. Units 1 and 2 have scrubber trains rated at 99% PM10 efficiencies and 92.1 % SO2 efficiencies. Unit 3 has 95 % PM10 control ESPs in series with 92% PM10 and 96 % SO2 absorbers. The facility has installed low NOx burners and SCR which is presently operated during the ozone season. The facility reported the 2005 PM10 filterable emissions as reflective of their latest configurations. They are as follows:

Unit 1	179.4 tpy
Unit 2	237.3 tpy
Unit 3	298.7 tpy

3. BART Analysis

The facility performed the following feasibility and cost analysis: Due to space constraints an add-on wet ESP is the only feasible control technology. There would be some pressure drop which may require the use of booster fans to overcome and this would consume some power. Assumming 90 % PM10 efficiency and an annual cost of 73.12 million dollars per unit, for Unit 1 the cost would be $453,036 per ton of PM10 removed, for Unit 2 the cost would be $343,322 per ton and for Unit 3 the cost would be $271,993. The annual cost calculates to $219,360,000 for all three units. The estimated useful life for this cost analysis was 20 years.

The facility indicated that the CALPUFF data show that the maximum 24-hour deciview impact from Bruce Mansfield's combined PM10 filterable emissions from Units 1, 2 and 3 is 0.011 deciview for Otter Creek and 0.006 deciview for Dolly Sods as reported by NESCAUM. The lowest cost dv estimate is $2,215,757,576/delta dv at Otter Creek.

This analysis indicates that it would not be cost effective to require this control option to achieve this modeled delta deciview impact. This would also be true at the existing permit limit of 0.1 lbs/MMBtu.

Unit 3 is the only unit where ESP upgrade or enhancement could be considered. The existing dv impact from Unit 3 alone would be 0.005 dv. A three to five percent reduction from ESP enhancement would yield a 0.00015 to 0.00025 delta dv improvement respectively. Using a 3 to 5 percent annualized cost range of $75,000 to $400,000 per year yields a dollar per deciview improvement cost range of $ 500,000,000 to 1,600,000,000/delta dv.

4. Permit Conditions

The control equipment described in this analysis is required by TV Permit # 04-00235. The conditions of this permit, including the permit limit of 0.1 lbs/MMBtu, along with the implementation of EGU CAIR requirements, satisfy BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC)

Step 2 – Eliminate Technically Infeasible Options.

Due to space constraints a wet ESP is the only feasible control technology.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

A 90% Wet ESP control device efficiency was assummed for this analysis.

Step 4 – Evaluate Impacts and Document the Results.

There would be some pressure drop which may require the use of booster fans to overcome and this would consume some power. Assumming 90 % PM10 efficiency, for Unit 1 the cost would be $453,036 per ton, for Unit 2 the cost would be $343,322 per ton and for Unit 3 the cost would be $271,993. The annual cost calculated to $219,360,000 for all three units. The estimated useful life for this cost analysis was 20 years.

Step 5 – Evaluate Visibility Impacts.

The facility indicated that the CALPUFF data show that the maximum 24-hour deciview impact from Bruce Mansfield's combined PM10 filterable emissions from Units 1, 2 and 3 is 0.011 deciview for Otter Creek and 0.006 deciview for Dolly Sods. The lowest cost estimate is $1,994,181,818/delta dv at Otter Creek. This analysis indicates that it would not be cost effective to require this control option to achieve this modeled delta deciview impact.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
Reliant Energy, New Castle
120 Champion Way, Suite 200
Canonsburg, PA 15317-5817

TV Operating Permit #: 37-00023

To: John Guth
Environmental Program Manager
Bureau of Air Quality Control
Northwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined that an engineering analysis of VOC control options is not needed. EPA has determined that

DRAFT

BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Reliant Energy, New Castle is an 353 MW power plant with one BART affected coal fired boiler, Unit 5. This unit has an ESP. The facility used source specific emission factors used in the 2005 AIMS submittal and the maximum daily heat input recorded during a four and one-half rear period from May 2, 2002 through October 30, 2006 using certified continious emissions monitoring (CEM) data. The recalculated facilty wide filterable PM10 emissions for purposes of this determination are as summarized below:

Unit 1 49.4 lbs/hr = 216.2 TPY @ 8760

3. BART Analysis

The facility did not use the NESCAUM provided visibility impact analysis based upon actual 2001 through 2003 emissions but instead substituted the above recalculated PM10 filterable lbs/hr emissions rates and reran the modelling using the BART-specific versions of CALMET and CALPUFF that were posted at http://www.src.com . The results of the facility conducted modelling are as summarized below:

		2001		2002		2003	
PSD Class 1 Area		Max 24 hr	8th highest impact	Max 24 hr	8th highest impact	Max 24 hr	8th highest impact
Dolly Sods Wilderness Area	dv	0.01	0.00	0.01	0.00	0.01	0.00
Otter Creek Wilderness Area	dv	0.01	0.01	0.01	0.00	0.01	0.01
Shenandoah National Park	dv	0.02	0.01	0.01	0.01	0.01	0.00

The facility expressed the opinion that these results as tabulated above are minimal and that no action should be required. The facilty did not do a technical feasibility or economic analysis for PM10 control technology options based on this opinion.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s. It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide various percent reductions at costs that do not justify the associated possible reductions. Since this facility did not do a technical feasibility study the Department assummed that COHPAC is technically feasible and performed a basic cost analysis for this option. The estimated useful life for this cost analysis was 20 years. COHPAC installations would require the use of booster fans which will consume energy. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker

DRAFT

Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided unit annual filterable PM10 emission rate of 49.4 lbs/hr after existing control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $6,756,000 for the two boiler total AIMS listed scfm of 1,689,000 the cost of additional filterable PM10 removed calculates to approximately $39,030 per ton.

($4/scfm x 1689000 scfm) / (0.80 x (49.4 lbs/hr x 8760 hrs/yr x 1 ton/2000lbs)) = $39,030/ton annualized

This analysis shows that this additional cost is not cost effective where the maximum theoretical visibilty reduction would be approximately 0.02 deciview for the maximum 24 hr impact at the Shenandoah National Park. With the annualized cost of $6,756,000, the cost of additional control for filterable PM10 emissions on Unit 1 calculates to $337,800,0000/delta dv at Shenandoah National Park. It would also not be cost effective at the existing permit limit of 0.1 lbs/MMBtu

The existing dv impact from Unit 5 is 0.02 dv maximum 24 hr at Shenandoah. A three to five percent reduction from ESP enhancement would yield a 0.0006 to 0.0010 delta dv improvement respectively. Using a 3 to 5 percent annualized cost range of $75,000 to $400,000 per year yields a dollar per deciview improvement cost range of $ 125,000,000 to $400,000,000/delta dv.

4. Permit Conditions

TV Permit # 37-00023 requires the control equipment that achieves the actual emissions rate that was used in this analysis. Therefore, present permit conditions including the 0.1 lbs/MMBtu emission rate along with the implementation of EGU CAIR requirements satisfy BART requirements for this facility.

DRAFT

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s.

Step 2 – Eliminate Technically Infeasible Options.

It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide an various percent reductions at costs that do not justify the associated possible reductions.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

The COHPAC control efficiency was assumed to be 80% for this analysis.

Step 4 – Evaluate Impacts and Document the Results.

Since this facility did not do a technical feasibility study the Department assummed that COHPAC is technically feasible and performed a basic cost analysis for this option. The estimated useful life for this cost analysis was 20 years. COHPAC installations would require the use of booster fans which will consume energy. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided unit annual filterable PM10 emission rate of 49.4 lbs/hr after existing control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $6,756,000 for the two boiler total AIMS listed scfm of 1,689,000 the cost of additional filterable PM10 removed calculates to approximately $39,030 per ton.

Step 5 – Evaluate Visibility Impacts.

This analysis shows that this additional cost is not cost effective where the maximum theoretical visibilty reduction would be approximately 0.016 deciview for the maximum 24 hr impact at the Shenandoah National Park. With the annualized cost of $6,756,000, the cost of additional control for filterable pm emissions on Unit 1 calculates to $422,250,000/delta dv at Shenandoah National Park.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
PPL Generation LLC, Brunner Island
Brunner Island
York Haven, PA 17370

TV Operating Permit #: 67-05005

To: William Weaver
Environmental Program Manager
Bureau of Air Quality Control
Southcentral Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined that an engineering analysis of VOC control options is not needed. EPA has determined that

BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Brunner Island is a 1,483 Megawatt coal fired power plant. The facility has identified two BART affected boilers, Units 2 and 3. Unit 2 is rated at 3,790 MMBtu/hr heat input, 390 megawatt output and Unit 3 is rated at 7,239 MMBtu/hr heat input, 759 megawatt output. Both units are equiped with ESPs. The ESP was replaced in 2006 on Unit 3, the ESP on Unit 2 is scheduled for replacement by 2009. Unit 2 is expected to have FGD by 2009 while Unit 3 will have FGD by 2008. The Unit 2 FGD will also serve Unit 1 which is not a BART affected unit.

3. BART Analysis

The facility provided cost analysis data for a pulse jet fabric filter addition to the existing or planned ESPs. The retrofit technologies reviewed by the Department included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC). Of the technologies reviewed, COHPAC provided the highest filterable particulate matter removal rate with the lowest $/ton cost. The Department concurs with the facility's choice.

This cost analysis indicates that it would cost $208,732/ton of additional filterable PM10 removed on Unit 2 and $211,561/ton on Unit 3. There would be a pressure drop from the use of this technology that would require the use of booster fans to overcome and this would consume some energy. The estimated useful life for this cost analysis was 20 years.

The facility's CALPUFF modeling results based on maximum hourly throughput and the removal of additional filterable PM10 indicate a 0.038 delta deciview impact improvement for the maximum 98^{th} percentile deciview impact for the Brigantine WA, a 0.021 delta deciview impact improvement for the maximum 98^{th} percentile deciview impact for the Dolly Sods WA, a 0.022 delta deciview impact improvement for the maximum 98^{th} percentile deciview impact for the Otter Creek WA and a 0.034 delta deciview impact improvement for the maximum 98^{th} percentile deciview impact for the Shenandoah NP. This results in a lowest cost of $1,250,139,553/delta dv at the Brigantine Wilderness Area.

This analysis indicates that it would not be cost effective to require this additional control option for filterable particulate emissions to achieve this modeled delta deciview impact. It would also not be cost effective to install this control equipment if the facility were to emit at the existing permit limit of 0.1 lb/MMBtu for filterable PM emissions.

Since both BART affected units will have brand new state of the art ESPs, improvement and enhancement options have not been evaluated.

4. Permit Conditions

TV Permit # 67-05005 and Plan Approval # 67-05005F for installation of the Unit 2 ESP along with the implementation of EGU CAIR requirements and the existing permit limit of 0.1 lbs/MMBtu satisfy BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The retrofit technologies reviewed by the Department included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC).

Step 2 – Eliminate Technically Infeasible Options.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

Of the technologies reviewed, COHPAC provided the highest filterable particulate matter removal rate with the lowest $/ton cost. The Department concurs with the facility's choice. The addition of COHPAC would remove an additional 50% to 80% of the remaining filterable particulate matter after the existing controls.

Step 4 – Evaluate Impacts and Document the Results.

This cost analysis indicates that it would cost $208,732/ton of additional filterable PM10 removed on Unit 2 and $211,561/ton on Unit 3. There would be a pressure drop from the use of this technology that would require the use of booster fans to overcome and this would consume some energy. The estimated useful life for this cost analysis was 20 years.

Step 5 – Evaluate Visibility Impacts.

The facility's CALPUFF modeling results based on maximum hourly throughput and the removal of additional filterable PM10 indicate a 0.038 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Brigantine WA, a 0.021 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Dolly Sods WA, a 0.022 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Otter Creek WA and a 0.034 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Shenandoah NP. This results in a lowest cost of $1,250,139,553/delta dv at the Brigantine Wilderness Area.

This analysis indicates that it would not be cost effective to require this additional control option for filterable particulate emissions to achieve this modeled delta deciview impact.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
PPL Generation, LLC
Martins Creek Generating Station
Foul Rift Road
Martins Creek, PA 18063

TV Operating Permit #: 48-00011

To: Mark Wejkszner
Environmental Program Manager
Bureau of Air Quality Control
Northeast Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined

that an engineering analysis of VOC control options is not needed. EPA has determined that BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Martins Creek Generating Station is a 1970 Megawatt power plant operating two BART affected boilers, Units 3 and 4, rated at 835 megawatts each, fired on either natural gas, residual oil or both.

3. BART Analysis

The facility provided cost analysis data for the only two technically feasible options for removal of filterable PM10 emissions. These two options were ESPs or Venturi Scrubbers where Mechanical Collectors were considered to be ineffective and Fabric Filters were considered inappropriate due to the oily consistency of oil fired fly ash. The estimated useful life for this cost analysis was 20 years.

The results are $247,383/ton of filterable PM10 emissions removed for ESP control using a PM10 filterable emission rate of 0.03 lbs/MMBTU, a unit capacity of 7,721 MMBTU/hr, 1, 840 hrs/yr of operation, 80% ESP efficiency with 170.45 tons per year of filterable PM10 removed. It was assumed that no condensable PM would be removed.

The second option results are $151,335/ton of filterable PM10 emission removed for Venturi Scrubber control at the same emission rate, capacity, hours per year of operation, efficiency and removal rate.

The facility used the CALPUFF modeling procedures with three years of meteorological data to evaluate the impact of their units' visibility effects with and without control of filterable PM10 emissions only. The results (based on the 98^{th} percentile modeled impact) are as follows:

Brigantine WA, Base Case 0.667 dv, 80% control 0.046 dv, improvement 0.037 dv
Lye Brook WA, Base Case 0.406 dv, 80% control 0.028 dv, improvement 0.022 dv

The 0.667 and 0.406 existing deciview impacts listed above include the condensable portion of the PM10 emissions from these emission units. The filterable PM10 portions of these impact amounts are 0.046 and 0.028 deciviews respectively. The remaining portions of the existing deciview impacts are due to condensable emissions, mostly SO3, and are covered by the CAIR.

Using the most effective Venturi Scrubber annualized cost of $25,794,902 the visibility improvement cost calculates to $697,159,514/delta dv at the Brigantine Wilderness Area. This analysis indicates that it would not be cost effective to require this control option to achieve this modeled delta deciview impact. It would also not be cost effective at the existing permit level of 0.1 lb/MMBtu.

4. Permit Conditions

TV Permit # 48-00011 requires good combustion practice and the use of low sulfur fuels. These permit requirements including the permit limit of 0.1 lbs/MMBtu along with the implementation of EGU CAIR requirements meet BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

Electrostatic Precipitators, Fabric Filters, Mechanical Collectors, Wet Scrubbers

Step 2 – Eliminate Technically Infeasible Options.

Fabric Filters not compatible with oil-fired boilers, Mechanical Collectors designed for larger particulate matter.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

An 80% filterable particulate matter removal rate was assumed for this analysis.

Step 4 – Evaluate Impacts and Document the Results.

The facility provided cost analysis data for the only two technically feasible options for removal of filterable PM10 emissions. These two options were ESPs or Venturi Scrubbers where Mechanical Collectors were considered to be ineffective and Fabric Filters were considered inappropriate due to the oily consistency of oil fired fly ash. The estimated useful life for this cost analysis was 20 years.

The results are $247,383/ton of filterable PM10 emissions removed for ESP control using a PM10 filterable emission rate of 0.03 lbs/MMBTU, a unit capacity of 7,721 MMBTU/hr, 1, 840 hrs/yr of operation, 80% ESP efficiency with 170.45 tons per year of filterable PM10 removed. It was assumed that no condensable PM would be removed.

The second option results are $151,335/ton of filterable PM10 emission removed for Venturi Scrubber control at the same emission rate, capacity, hours per year of operation, efficiency and removal rate.

Step 5 – Evaluate Visibility Impacts.

The facility used the CALPUFF modeling procedures to evaluate the impact of their units' visibility effects with and without control of filterable PM10 emissions only. The results are as follows:

Brigantine WA, Base Case 0.667 dv total PM, 80% control 0.046 dv, improvement 0.037 dv
Lye Brook WA, Base Case 0.406 dv total PM, 80% control 0.028 dv, improvement 0.022 dv

Using the Venturi Scrubber annualized cost of $25,794,902 the impact cost calculates to $697,159,514/delta dv at the Brigantine Wilderness Area. This analysis indicates that it would not be cost effective to require this control option to achieve this modeled delta deciview impact.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
PPL Generation LLC
Montour
18 McMichael Road
Washingtonville, PA 17884

TV Operating Permit #: 47-00001

To: John Guth
Environmental Program Manager
Bureau of Air Quality Control
Northwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined

that an engineering analysis of VOC control options is not needed. EPA has determined that BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Montour Generating Station is a 762 Megawatt coal fired power plant. The facility has identified two BART affected boilers, Units 1 and 2. Unit 1 is rated at 6,772 MMBtu/hr heat input and Unit 2 is rated at 6, 954 MMBtu/hr heat input. Both units are equiped with ESPs and SCR. The ESPs were replaced in 2000 and 2001 during the installation of the SCRs. Both units are expected to have FGD by 2008.

3. BART Analysis

The facility provided cost analysis data for a pulse jet fabric filter replacement for the existing ESPs. The retrofit technologies reviewed by the Department included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC). Of the technologies reviewed, COHPAC provided the highest filterable particulate matter removal rate with the lowest $/ton cost. The estimated useful life for this cost analysis was 20 years. This cost analysis indicates that it would cost $123,000/ton of additional filterable PM10 removed as compared to the existing ESPs for one unit. Additional fan power would be required to overcome the pressure drop. The annualized cost per unit is $43,352,070, $86,704,140 for both units.

The facility's CALPUFF modeling results based on maximum hourly throughput and the removal of additional filterable PM10 indicate a 0.011 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Brigantine WA and a 0.007 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Shenandoah NP.

At an annualized cost of $86,704,140 and a delta deciview of 0.011 the total cost calculates to $7,882,194,545/delta dv at the Brigantine Wilderness Area. This analysis indicates that it would not be cost effective to require this control option to achieve the modeled delta deciview impact. It would also not be cost effective at the permit emission limit of 0.1 lbs/MMBtu.

A three to five percent reduction from ESP enhancement for Units 1 and 2 at the existing 98th percentile deciview impact of 0.022 deciview at Brigantine would yield a 0.00066 to 0.0011 delta dv improvement respectively. Using a 3 to 5 percent annualized cost range of $75,000 to $400,000 per year yields a dollar per deciview improvement cost range of $113,636,364 to $363,636,364/delta dv.

4. Permit Conditions

TV Permit # 47-00001 requires the control equipment that achieves the actual emission rates used in this analysis. Therefore, present permit conditions including the present permit limit of 0.1 lbs/MMBtu along with the implementation of EGU CAIR requirements meet the BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The retrofit technologies reviewed by the Department included fuel-related modifications, ESP upgrades, enhancements or replacement, replacement of the ESPs with fabric filters or compact hybrid particulate collectors (COHPAC).

Step 2 – Eliminate Technically Infeasible Options.

The facility provided cost analysis data for a pulse jet fabric filter in addition the existing ESPs. It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide an lesser or equivalent percent reductions but at costs that do not justify the associated possible reductions. The Department concurs with the facilities selection of a fabric filter in addition to the existing controls as being the most viable option.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

The facility assumed an additional 50% reduction of the remaining filterable particulate matter after existing controls.

Step 4 – Evaluate Impacts and Document the Results.

The estimated useful life for this cost analysis was 20 years. This cost analysis indicates that it would cost $123,000/ton of additional filterable PM10 removed as compared to the existing ESPs for one unit. Additional fan power would be required to overcome the pressure drop. The annualized cost per unit is $43,352,070 per unit, $86,704,140 for both units.

Step 5 – Evaluate Visibility Impacts.

The facility's CALPUFF modeling results based on maximum hourly throughput and the removal of additional filterable PM10 indicate a 0.011 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Brigantine WA and a 0.007 delta deciview impact improvement for the maximum 98th percentile deciview impact for the Shenandoah NP.

At an annualized cost of $86,704,140 and a delta deciview of 0.011 the total cost calculates to $7,882,194,545/delta dv at the Brigantine Wilderness Area. This analysis indicates that it would not be cost effective to require this control option to achieve the modeled delta deciview impact.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
Reliant Energy, Conemaugh
1442 Power Plant Road
New Florence, PA 15944-9154

TV Operating Permit #: 32-00059

To: Mark Wayner
Environmental Program Manager
Bureau of Air Quality Control
Southwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined that an engineering analysis of VOC control options is not needed. EPA has determined that

BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Reliant Energy, Conemaugh is an 1711 MW power plant with two BART affected coal fired boilers, Units 1and 2. Both units have ESPs and FGD. The facility used source specific emission factors from the 2005 AIMS submittal and the maximum daily heat input recorded during a five-year period from October 30, 2001 and October 30, 2006. The recalculated facilty wide filterable PM10 emissions for purposes of this determination are as summarized below:

Unit 1	86.2 lbs/hr
Unit 2	145 lbs/hr
	231.2 lbs/hr = 1012.7 TPY @ 8760

3. BART Analysis

The facility did not use the NESCAUM provided visibility impact analysis based upon actual 2001 through 2003 emissions but instead substituted the above recalculated PM10 filterable lbs/hr emissions rates and reran the modelling using the BART-specific versions of CALMET and CALPUFF that were posted at http://www.src.com . The results of the facility conducted modelling are as summarized below:

		2001		2002		2003	
PSD Class 1 Area		Max 24 hr	8th highest impact	Max 24 hr	8th highest impact	Max 24 hr	8th highest impact
Dolly Sods Wilderness Area	dv	0.06	0.02	0.05	0.02	0.03	0.02
Otter Creek Wilderness Area	dv	0.10	0.01	0.05	0.01	0.04	0.01
Shenandoah National Park	dv	0.08	0.05	0.06	0.03	0.07	0.03

The facility expressed the opinion that these results as tabulated above are minimal and that no action should be required. The facilty did not do a technical feasibility or economic analysis for PM10 control technology options based on this opinion.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s. It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options evaluated by the Department provide lesser percent reductions at costs that do not justify the associated possible reductions. The Department assummed that COHPAC is technically feasible and performed a basic cost analysis for this option as being the most viable. COHPAC installations would require the use of booster fans which will consume energy. The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide annual filterable PM10 emission rate of 231.2 lbs/hr after existing ESP control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $14,271,144 for the two boiler total AIMS listed scfm of 3,567,786, the cost of additional filterable PM10 removed calculates to approximately $14,093 per ton.

($4/scfm x 3567786 scfm) / (0.80 x (231.2 lbs/hr x 8760 hrs/yr x 1 ton/2000lbs)) = $14,093/ton annualized

This analysis shows that this additional cost is not cost effective where the maximum theoretical visibilty reduction would be approximately 0.10 deciview for the maximum 24 hr impact at the Otter Creek Wilderness area due to PM10 filterable emissions. The annual cost of $14,271,144 translates to a minimal cost of $142,271,144/delta dv at the Otter Creek Wilderness Area for the one day maximum effect. This option would also not be cost effective at the existing permit limit of 0.1 lbs/MMBtu for filterable PM emissions.

A three to five percent reduction from ESP enhancement would yield a 0.003 to 0.005 delta dv improvement respectively. Using a two unit 3 to 5 percent annualized cost range of $150,000 to $800,000 per year yields a dollar per deciview improvement cost range of $50,000,000 to $160,000,000/delta dv.

4. Permit Conditions

Title V Permit # 32-00059 that requires the ESPs that achieved the actual emission rates used in this analysis which were achieved at the existing permit limit of 0.1 lbs/MMBtu along with the implementation of EGU CAIR requirements satisfy the BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s.

Step 2 – Eliminate Technically Infeasible Options.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options evaluated by the Department provide lesser percent reductions at costs that do not justify the associated possible reductions. The Department assummed that COHPAC is technically feasible and performed a basic cost analysis for this option as being the most viable. A COHPAC efficiency of 80% removal of filterable particulate was assummed in this analysis.

Step 4 – Evaluate Impacts and Document the Results.

COHPAC installations would require the use of booster fans which will consume energy. The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide annual filterable PM10 emission rate of 231.2 lbs/hr after existing ESP control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $14,271,144 for the two boiler total AIMS listed scfm of 3,567,786, the cost of additional filterable PM10 removed calculates to approximately $14,093 per ton.

($4/scfm x 3567786 scfm) / (0.80 x (231.2 lbs/hr x 8760 hrs/yr x 1 ton/2000lbs)) = $14,093/ton annualized

Step 5 – Evaluate Visibility Impacts.

This analysis shows that this additional cost is not cost effective where the maximum theoretical visibilty reduction would be approximately 0.10 deciview for the maximum 24 hr impact at the Otter Creek Wilderness area due to PM10 filterable emissions. The annual cost of $14,271,144 translates to $142,271,144/delta dv at the Otter Creek Wilderness Area.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BARTApplication
Reliant Energy, Keystone
313 Keystone Lane
Shelocta, PA 15744-2305

TV Operating Permit #: 03-00027

To: Mark Wayner
Environmental Program Manager
Bureau of Air Quality Control
Southwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined that an engineering analysis of VOC control options is not needed. EPA has determined that

BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Reliant Energy, Keystone is an 1711 MW power plant with two BART affected coal fired boilers, Units 1and 2. Both units have ESPs. The facility used source specific emission factors developed as part of a compliance air emissions test program conducted from September 26 through Octover 4, 2006 and the maximum daily heat input recorded during a five-year period from May 1, 2002 through October 30, 2006 for Unit 1 and from October 30, 2001 through October 30, 2006 for Unit 2. The maximum daily heat input data was derived from the continuos emission monitoring (CEM) data. The recalculated facilty wide filterable PM10 emissions for purposes of this determination are as summarized below:

Unit 1	67.7 lbs/hr
Unit 2	123 lbs/hr
	190.7 lbs/hr = 835.3 TPY @ 8760

3. BART Analysis

The facility did not use the NESCAUM provided visibility impact analysis based upon actual 2001 through 2003 emissions but instead substituted the above recalculated PM10 filterable lbs/hr emissions rates and reran the modelling using the BART-specific versions of CALMET and CALPUFF that were posted at http://www.src.com . The results of the facility conducted modelling are as summarized below:

		2001		2002		2003	
PSD Class 1 Area		Max 24 hr	8th highest impact	Max 24 hr	8th highest impact	Max 24 hr	8th highest impact
Dolly Sods Wilderness Area	dv	0.06	0.02	0.04	0.02	0.04	0.02
Otter Creek Wilderness Area	dv	0.05	0.02	0.07	0.02	0.03	0.02
Shenandoah National Park	dv	0.08	0.05	0.07	0.05	0.05	0.03

The facility expressed the opinion that these results as tabulated above are minimal and that no action should be required. The facilty did not do a technical feasibility or economic analysis for PM10 control technology options based on this opinion.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s. It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide an lesser or equivalent percent reductions but at costs that do not justify the associated possible reductions. Since this facility did not do a technical feasibility study the Department assummed that COHPAC is technically feasible and performed a basic cost analysis for this option. COHPAC installations would require the use of booster fans which will consume energy. The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide annual filterable PM10 emission rate of 190.7 lbs/hr after existing control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $17,119,976 for the two boiler total AIMS listed scfm of 4,279,994 the cost of additional filterable PM10 removed calculates to approximately $25,621 per ton.

($4/scfm x 4279994 scfm) / (0.80 x (190.7 lbs/hr x 8760 hrs/yr x 1 ton/2000lbs)) = $25,621/ton annualized

This analysis shows that this additional cost is not cost effective where the maximum theoretical visibilty reduction would be approximately 0.064 deciview for the maximum 24 hr impact at the Shenandoah National Park. Using the annualized cost of $17,119,976 for both units the resulting cost calculates to a minimum $267,499,625/delta dv at Shenandoah National Park. This also indicates that this option is not cost effective at the existing permit level of 0.1 lbs/MMBtu.

A three to five percent reduction from ESP enhancement would yield a 0.0024 to 0.0040 delta dv improvement respectively. Using a two unit 3 to 5 percent annualized cost range of $150,000 to $400,000 per year yields a dollar per deciview improvement cost range of $62,500,000 to $100,000,000/delta dv.

4. Permit Conditions

TV Permit # 03-00027 requires the control equipment that achieves the actual emissions rates that were used in this analysis. Therefore, existing permit conditions including the 0.1 lb/MMBtu emission rate along with the implementation of EGU CAIR requirements satisfy BART requirements for this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s.

Step 2 – Eliminate Technically Infeasible Options.

It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide an lesser or equivalent percent reductions but at costs that do not justify the associated possible reductions.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

The COHPAC efficiency assumed for this analysis was 80%.

Step 4 – Evaluate Impacts and Document the Results.

The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide annual filterable PM10 emission rate of 190.7 lbs/hr after existing control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $17,119,976 for the two boiler total AIMS listed scfm of 4,279,994 the cost of additional filterable PM10 removed calculates to approximately $25,621 per ton.

Step 5 – Evaluate Visibility Impacts.

This analysis shows that this cost is not justified where the maximum theoretical visibilty reduction would be approximately 0.064 deciview for the maximum 24 hr impact at the Shenandoah National Park. Using the annualized cost of $17,119,976 for both units, the resulting cost calculates to a $267,499,625/delta dv at Shenandoah National Park.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
January 17, 2008

Subject: Review Memo for BART Application
Reliant Energy
Portland Generating Station
P. O. Box 238, River Road
Portland, PA 18351

TV Operating Permit #: 48-00006

To: Mark Wejksner
Environmental Program Manager
Northeast Regional Office

Joyce Epps
Director, Bureau of Air Quality

From: Joseph R. White, Air Quality Engineer

Through: Ramamurthy, Krishnan
Chief, Division of Permits
Bureau of Air Quality
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limits representing Best Available Retrofit Technology (BART) for certain facilities that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to facilities in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each unit subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the units, the remaining useful life of the units, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania facilities subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department has determined that an engineering analysis of VOC control options is not needed. EPA has determined that

BART requirements for EGUs (Electric Generating Units) covered by CAIR are satisfied by the CAIR requirements for NOx and SOx so an engineering analysis is not required for these pollutants. For Pennsylvania EGUs the only pollutant requiring an engineering analysis is filterable PM10.

2. Process Description:

Reliant Energy, Portland Generating Station has one BART affected boiler, Unit 2. Unit 2 is rated at an input of 2,511.6 MMBtu/hr. The facility calculated a filterable emission rate of 29 lbs/hr. This equates to an emission rate of 0.0115 lbs/MMBTu of filterable particulate using the rated input. The facility used the 2005 emission inventory and the maximum daily heat input recorded from the 5-year period from January 2000 through Decemver 2004 as extracted from the facilities certified continious emission monitoring (CEM) system. Unit 2 is equiped with an ESP which was installed in 1967 as recorded in PA AIMS database.

3. BART Analysis

The facility did not use the NESCAUM provided PM10 filterable emmission visibility impact analysis based upon actual 2001 through 2003 emissions but instead substituted the above recalculated PM10 filterable emissions and reran the modelling using the BART-specific versions of CALMET and CALPUFF that were posted at http://www.src.com . The results of the facilities modelling indicate that, for filterable particulate, the existing 24-hr maximum deciview impact is 0.01 at both the Brigantine and Lye Brook Wilderness areas.

The facility expressed the opinion that these results as tabulated above are minimal and that no action should be required. The facilty did not do a technical feasibility or economic analysis for PM10 control technology options based on this opinion.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s. It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide equivalent or lesser percent reductions at costs that do not justify the associated possible reductions. Since this facility did not do a technical feasibility study it is assummed that COHPAC is technically feasible and a basic cost analysis for this option has been performed. COHPAC installations will require the use of booster fans which will consume energy. The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide current annual filterable PM10 emission rate of 29 lbs/hr after existing ESP control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $1,929,000 for the Unit 2 AIMS listed scfm of 482251 the cost of additional filterable PM10 removed calculates to approximately $18,986.00 per ton.

This cost is not justified where the maximum theoretical visibilty reduction would be approximately 0.005 deciview for the maximum 24 hr impact at the Lye Brooks and Brigantine Wilderness Areas. Using the annualized COHPAC cost of $1,929,000 this calculates to $385,800,000/delta dv at either wilderness area. The cost would also not be justified at a modeled permit emission limit of 0.1 lb/MMBto for filterablr PM emissions.

The existing dv impact from Unit 2 is 0.010 dv. A three to five percent reduction from ESP enhancement would yield a 0.0003 to 0.0005 delta dv improvement respectively. Using a 3 to 5 percent annualized cost range of $75,000 to $400,000 per year yields a dollar per deciview improvement cost range of $ 250,000,000 to $800,000,000/delta dv.

4. Permit Conditions

TV Permit # 48-00006 requires the control equipment that achieves the actual emission rate that was used in this analysis. Therefore, present permit conditions including the existing permit limit of 0.1 lbs/MMBtu along with the implementation of EGU CAIR requirements satisfy BART requirements at this facility.

The Five Basic Steps of a Case-by-Case BART Analysis

Step 1 – Identify All Available Retrofit Control Technologies.

The Department considered a variety of filterable PM10 control technologies for use at all of Pennsylavania's EGUs for BART purposes. These technologies included fuel related changes, ESP upgrades and enhancements, replacement of ESPs with fabric filters and the addition of Compact Hybrid Particualte Collectors (COHPAC)s.

Step 2 – Eliminate Technically Infeasible Options.

It was determined that where technically feasible, COHPAC would provide the most significant percent reduction of filterable PM10 emissions at a cost that is significantly less than replacement of existing ESPs with enhanced ESPs or fabric filters. Other options provide equivalent or lesser percent reductions at costs that do not justify the associated possible reductions.

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.

For purposes of this evaluation the COHPAC efficiency was assumed to be 80%.

Step 4 – Evaluate Impacts and Document the Results.

COHPAC installations will require the use of booster fans which will consume energy. The estimated useful life for this cost analysis was 20 years. The minimal representative costs used for this analysis to represent the applicable COHPAC annualized costs were derived from EPA-CICA Fact Sheet, Fabric Filter, Mechanical Shaker Cleaned Type. Here, the depicted minimum annualized cost is $5 per scfm in 1998 dollars and this is adjusted to $6 for 2007. This value is then reduced to $4 per scfm assumming that COHPAC annualized costs are approximately two thirds of fabric filter annualized costs due basically to the variance in air to cloth ratios. Using the facility provided facility-wide current annual filterable PM10 emission rate of 29 lbs/hr after existing ESP control and assumming 8760 hrs/yr of operation, a COHPAC estimated efficiency of 80% and an annualized COHPAC cost of $1,929,000 for the Unit 2 AIMS listed scfm of 482251 the cost of additional filterable PM10 removed calculates to approximately $18,986.00 per ton.

Step 5 – Evaluate Visibility Impacts.

This cost is not justified where the maximum theoretical visibilty reduction would be approximately 0.005 deciview for the maximum 24 hr impact at the Lye Brooks and Brigantine

Wilderness Areas. Using the annualized COHPAC cost of $1,929,000 this calculates to $385,800,000/delta dv at either wilderness area.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Edward Wiener

Date: August 21, 2007

Subject: BART approval for Sunoco Chemicals, Frankford Plant

Company Description:

Sunoco Chemicals, Frankford Plant (Sunoco Chemicals) owns and operates a synthetic organic chemical manufacturing plant which produces phenol, acetone, and alpha methyl styrene through the oxidation of cumene. The chemical process equipment located at the facility includes oxidizers, process boilers, distillation columns, reaction vessels, storage tanks, pumps, valves, and flanges.

Applicability for BART:

Sunoco Chemicals is a chemical process plant, one of the BART-eligible source categories. The plant has units that were in existence before August 7, 1977 and commenced operation after August 7, 1962, and the units within the date range have the potential to emit 250 tons per year of at least one of the following visibility impairing pollutants: sulfur dioxide (SO2), nitrogen oxides (NOx), and particulate matter less than 10 microns (PM10). As a result, units within the above date range at the facility are BART-eligible. Pennsylvania decided not to allow modeling exemptions for BART. Therefore, all BART-eligible sources are subject to BART.

BART Analysis:

Boiler No. 3 (BL-703), a 381 MMBTU/hr boiler capable of burning No. 6 oil and natural gas, was installed in 1964 and is a BART-eligible source. The following table includes an analysis of the technically feasible control options:

Pollutant	Control	Control Efficiency	Impact Benefit (delta dv)	Cost Effectiveness ($/ton removed)	Cost for Improvement ($/dv)
NOx	FGR	40%			
NOx	ULNB	50%			
NOx	SNCR	72%			
NOx	SCR	85%	0.0760	40,495	67,480,093
NOx	ULNB + FGR	70%	0.0625	25,453	37,139,097
SO2	Wet Scrubber	90%	0.0301	2,836	29,439,689
PM	Baghouse	99.5%	0.0144	26,894	44,506,519

The facility's BART proposal did not provide an analysis of FGR and ULNB individually because they are rarely applied separately. The proposal did not provide an analysis of SNCR because the normal temperature range of the boiler is well below the optimal temperature range so the NOx control efficiency is expected to be well below normal.

The facility also has emergency generators, distillation columns, oxidation processes, reactors, bulk loading facilities, storage tanks, and cooling towers that were installed during the BART-eligibility period. These units are considered insignificant activities because they have minimal emissions with a negligible impact on visibility, and/or they emit only VOCs, which PA DEP and AMS do not have the capability to model for impact. The degree of visibility improvement that could be obtained by requiring additional controls on these sources is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

Conclusions and Recommendations:

Based on the five factors required for consideration in the BART analysis, AMS recommends no additional controls to reduce emissions of SO_2, NO_x and PM from the Sunoco Chemicals/Frankford Plant for purposes of BART.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Edward Wiener

Date: August 22, 2007

Subject: BART approval for Sunoco, Inc. (R&M)

Company Description:

Sunoco, Inc. (R&M) (Sunoco Refinery) owns and operates a petroleum refining facility in Philadelphia, Pennsylvania. The facility is comprised of three processing areas: Point Breeze, Girard Point, and Schuylkill River Tank Farm. Girard point processing area and Schuylkill River Tank Farm were formerly owned by Chevron. Equipment used at the facility includes storage tanks, heaters, boilers, reactors, distillation columns, heat exchangers, cooling towers, pumps, valves and flanges. The refinery currently processes crude oil into various products such as blended residual oils, home heating oils, kerosene, jet fuels, asphalt, butanes, gasoline, propane, propylene, benzene, and cumene.

Applicability for BART:

Sunoco Refinery is a petroleum refinery, one of the BART-eligible source categories and has units that were in existence before August 7, 1977 and commenced operation after August 7, 1962. The units within the date range have the potential to emit 250 tons per year of at least one of the following visibility impairing pollutants: sulfur dioxide (SO2), nitrogen oxides (NOx), and particulate matter less than 10 microns (PM10). As a result, units within the above date range at the facility are BART-eligible. Pennsylvania decided not to allow modeling exemptions for BART. Therefore, all BART-eligible sources are subject to BART.

BART Analysis:

Sunoco Refinery has numerous process heaters that are BART-eligible. The following table includes an analysis of the control options for NOx (some of the controls are not technically feasible for some of the heaters):

Unit	Rated Capacity (MMBTU/hr)	Control	Control Efficiency	Impact Benefit (delta dv)	Cost Effectiveness ($/ton removed)	Cost for Improvement ($/dv)
2H-8 Heater	49.6	UNLB/SCR	85.0%	0.0020	34,481	93,278,165
		ULNB	33.3%	0.0008	17,008	66,264,829
Unit 137 F-3 Heater	60.0	UNLB/SCR	97.5%	0.0228	12,571	24,662,223
		ULNB	To be installed (12/08)			
Unit 433 Iso. H-1 Heater	243.0	UNLB/SCR	92.9%	0.0024	32,049	150,638,298
		ULNB	Installed			
H-101 Heater	49.5	UNLB/SCR	92.9%	0.0024	39,098	173,337,178
		ULNB	68.5%	0.0019	6,207	27,285,518
H-201 Heater	242.0	UNLB/SCR	92.5%	0.0230	34,326	48,238,753
		ULNB	Installed			
13H-1 Heater	235.4	UNLB/SCR	90.6%	0.0115	27,481	134,326,699

		ULNB	58.3%	0.0074	4,924	25,730,886
2H-2 Heater	70.0	UNLB/SCR	94.7%	0.0083	10,429	38,780,522
		ULNB	76.5%	0.0068	2,898	11,321,875
2H-3 Heater	174.7	UNLB/SCR	94.4%	0.0169	13,390	51,895,239
		ULNB	75.2%	0.0135	1,775	7,021,833
2H-4 Heater	99.0	UNLB/SCR	94.7%	0.0111	11,355	42,113,981
		ULNB	76.5%	0.0090	3,261	12,727,696
2H-5 Heater	155.0	UNLB/SCR	94.7%	0.0184	14,261	55,117,625
		ULNB	76.5%	0.0149	2,148	8,502,180
2H-7 Heater	59.0	UNLB/SCR	93.8%	0.0063	11,398	41,624,288
		ULNB	72.4%	0.0049	2,721	10,498,749
PH-1 Heater	80.0	UNLB/SCR	94.1%	0.0043	20,383	73,944,412
		ULNB	73.7%	0.0034	7,737	30,191,668
PH-7 Heater	45.5	UNLB/SCR	94.9%	0.0039	16,381	57,726,642
		ULNB	77.3%	0.0032	8,254	32,090,515
PH-11 Heater	74.0	UNLB/SCR	93.3%	0.0054	17,279	61,550,487
		ULNB	70.3%	0.0040	6,455	25,322,044
PH-12 Heater	85.1	UNLB/SCR	92.2%	0.0033	33,747	114,926,362
		ULNB	65.2%	0.0024	16,413	64,046,760
11H-1 Heater	72.2	UNLB/SCR	90.9%	0.0034	23,180	88,551,307
		ULNB	59.6%	0.0024	10,073	43,424,611
11H-2 Heater	49.9	UNLB/SCR	90.4%	0.0037	21,862	69,455,190
		ULNB	57.2%	0.0023	11,147	43,610,187
12H-1 Heater	43.0	UNLB/SCR	89.9%	0.0004	23,399	73,247,399
		ULNB	55.3%	0.0014	12,033	46,954,526

A consent decree requires all process heaters at the facility to eliminate oil burning and to only burn refinery fuel gas with a hydrogen sulfide content of less than 0.1 gr/dscf by December 31, 2010, which will lower SO2 and PM10 emissions. Add-on SO2 and PM10 controls are not used in practice for process heaters according to EPA's RACT/BACT/LAER clearinghouse database, would be cost prohibitive, and would not result in a significant impact benefit.

The facility also has flares, cooling towers, miscellaneous process vents, storage tanks, wastewater processes, an alkylation unit, a cumene production unit, and a benzene production unit that were installed during the BART-eligibility period. These units are considered insignificant activities because they have minimal emissions with a negligible impact on visibility, and/or they emit only VOCs, which PA DEP and AMS do not have the capability to model for impact. The degree of visibility improvement that could be obtained by requiring additional controls on these sources is so small that no reasonable weighting of the five factors required by consideration in the BART analysis could justify additional controls under BART.

<u>Conclusions and Recommendations</u>:

Based on the cost and potential visibility improvement from additional controls, AMS proposes to determine that compliance with the requirements of the federally enforceable consent decree should satisfy BART for the Sunoco Refinery. [Consent decree filed June 16, 2005, in the United States District Court for the Eastern District of Pennsylvania between, on the one hand, the United States of America (on behalf of EPA), Plaintiff, and State of Pennsylvania, City of Philadelphia, State of Oklahoma, State of Ohio, Plaintiff/Intervenors and, on the other hand, Sunoco, Inc., Defendant.]

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Edward Wiener

Date: October 3, 2007

Subject: BART approval for Trigen - Edison Station

Company Description:

Trigen - Edison Station (Trigen – Edison) owns and operates a steam generating facility in Philadelphia, Pennsylvania. Equipment used at the facility includes boilers.

Applicability for BART:

Trigen - Edison has fossil-fuel boilers greater than 250 MMBTU/hr heat input, one of the BART-eligible source categories. Trigen – Edison has units that were in existence before August 7, 1977 and commenced operation after August 7, 1962. The units within the date range have the potential to emit 250 tons per year of at least one of the following visibility impairing pollutants: sulfur dioxide (SO2), nitrogen oxides (NOx), and particulate matter less than 10 microns (PM10). As a result, units within the above date range at the facility are BART-eligible. Pennsylvania decided not to allow modeling exemptions for BART. Therefore, all BART-eligible sources are subject to BART.

Boiler No. 3 and Boiler No. 4 are the BART-eligible sources at the facility. Each is a 335 MMBTU/hr boiler that burns No. 6 oil as primary fuel and No. 2 oil as ignition fuel. Boiler No. 3 was installed in 1970 and Boiler No. 4 was installed in 1969. In 2002, the boilers had the following actual emissions in tons per year:

	NOx	PM10	SO2
Boiler No. 3	42.7	1.38	50.7
Boiler No. 4	44.4	1.31	48.3

Based on NESCAUM CALPUFF modeling, the boilers had the following maximum impact values on a Class I area (Brigantine wilderness) in deciviews:

	Total	SO4	NO3	PM10
Boiler No. 3	0.0128	0.0065	0.0097	0.0011
Boiler No. 4	0.0131	0.0062	0.0101	0.0010
Total	0.0259	0.0128	0.0199	0.0021

BART Analysis:

The following table includes an analysis of the technically feasible control options (Cost Effectiveness range includes totals for Boiler No. 3 and Boiler No. 4, Cost for Improvement lists the cost for the highest Impact Benefit only):

Pollutant	Control	Control Efficiency	Impact Benefit (delta dv)	Cost Effectiveness ($/ton removed)	Cost for Improvement ($/dv)

NOx	LNB/ULNB	20%	0.0019-0.0020	5,936-6,620	23,230,500
NOx	OFA	25%	0.0024-0.0025	3,844-4,018	15,044,400
NOx	SNCR	35%	0.0034-0.0035	10,536-11,012	41,232,285
NOx	FGR	40%	0.0039-0.0040	3,732-3,901	14,605,500
NOx	SCR	90%	0.0087-0.0091	21,608-22,585	83,636,373
NOx	LNB/ULNB and OFA	40%	0.0039-0.0040	5,371-5,614	21,081,000
NOx	LNB/ULNB, OFA and SNCR	55%	0.0053-0.0056	10,610-11,091	40,783,035
NOx	LNB/ULNB, OFA and FGR	55%	0.0053-0.0056	6,620-6,920	25,445,357
SO2	No. 2 Fuel Oil	57%	0.0035-0.0037	24,975	316,817,297
SO2	Low Sulfur Diesel Oil	89%	0.0055-0.0058	19,843	236,023,620
SO2	Ultra Low Sulfur Diesel Oil	>99%	>0.0061-0.0064	18,665	<221,985,000

The facility's BART proposal did not provide an analysis of flue gas desulfurization or a wet scrubber because EPA's RACT/BACT/LAER Clearinghouse database indicates that these controls are not used for oil-fired boilers in practice. The proposal did not include an impact benefit or cost of improvement analysis for any of the control options. The numbers in the table above were calculated based on the NESCAUM CALPUFF modeling impact values and the total annualized costs listed in the proposal.

Conclusions and Recommendations:

The NESCAUM CALPUFF modeling analysis showed a baseline impact of 0.0128 delta dv for Boiler No. 3 and 0.0131 delta dv for Boiler No. 4 without controls. Based on consideration of cost and potential visibility improvement from additional controls, AMS proposes no additional controls to reduce emissions of SO2, NOx and PM from the boilers subject to BART at the Trigen – Edison Station as justified for purposes of BART.

CITY OF PHILADELPHIA
Department of Public Health
Environmental Protection Division
Air Management Services

InterOffice Memo

To: File

From: Edward Wiener

Date: October 3, 2007

Subject: BART approval for Trigen - Schuylkill Station

Company Description:

Trigen - Schuylkill Station (Trigen – Schuylkill) owns and operates a steam generating facility in Philadelphia, Pennsylvania. Equipment used at the facility includes boilers.

Applicability for BART:

Trigen - Schuylkill has fossil-fuel boilers greater than 250 MMBTU/hr heat input, one of the BART-eligible source categories. Trigen - Schuylkill has a unit that was in existence before August 7, 1977 and commenced operation after August 7, 1962. The unit within the date range has the potential to emit 250 tons per year of at least one of the following visibility impairing pollutants: sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter less than 10 microns (PM_{10}). As a result, the unit within the above date range at the facility is a BART-eligible source. Pennsylvania decided not to allow modeling exemptions for BART. Therefore, all BART-eligible sources are subject to BART.

Boiler No. 26 is the BART-eligible source at the facility. It is a 761 MMBTU/hr boiler that burns No. 6 oil as primary fuel and No. 2 oil as ignition fuel. The boiler was installed in 1971. In 2002, the boiler had the following actual emissions in tons per year:

	NOx	PM10	SO2
Boiler No. 26	61.5	8.08	111.7

Based on NESCAUM CALPUFF modeling, the boilers had the following maximum impact values on a Class I area (Otter Creek) in deciviews:

	Total	SO4	NO3	PM10
Boiler No. 26	0.0210	0.0124	0.0077	0.0009

BART Analysis:

The following table includes an analysis of the technically feasible control options:

Pollutant	Control	Control Efficiency	Impact Benefit (delta dv)	Cost Effectiveness ($/ton removed)	Cost for Improvement ($/dv)
NOx	LNB/ULNB	20%	0.0015	3,640	70,360,667
NOx	OFA	25%	0.0019	2,357	44,967,894
NOx	SNCR	35%	0.0027	6,461	121,417,407
NOx	FGR	40%	0.0031	2,289	42,810,645
NOx	SCR	90%	0.0069	10,605	200,528,696

NOx	LNB/ULNB and OFA	40%	0.0031	3,293	61,607,096
NOx	LNB/ULNB, OFA and SNCR	55%	0.0042	6,507	123,525,714
NOx	LNB/ULNB, OFA and FGR	55%	0.0042	4,060	77,070,238
SO2	No. 2 Fuel Oil	57%	0.0071	24,975	512,922,113
SO2	Low Sulfur Diesel Oil	89%	0.0110	19,843	386,624,909
SO2	Ultra Low Sulfur Diesel Oil	>99%	>0.0123	18,665	<358,837,154

The facility's BART proposal did not provide an analysis of flue gas desulfurization or a wet scrubber because EPA's RACT/BACT/LAER Clearinghouse database indicates that these controls are not used for oil-fired boilers in practice. The proposal did not include an impact benefit or cost of improvement analysis for any of the control options. The numbers in the table above were calculated by AMS based on the NESCAUM CALPUFF modeling impact values and the total annualized costs listed in the proposal.

Conclusions and Recommendations:

The NESCAUM CALPUFF modeling analysis showed a baseline impact of 0.0210 delta dv for Boiler No. 26 without controls. Based on consideration of the cost and potential visibility improvement from additional control, AMS proposes no additional controls to reduce emissions of SO2, NOx and PM from the boiler subject to BART at the Trigen – Schuylkill Station as justified for purposes of BART.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject: Review Memo for BART Application
AK Steel Corporation
Butler Works
P.O. Box 832
Butler, PA 16003

June 11, 2008

Operating Permit #: 10-00001

To: John Guth
Environmental Program Manager
Bureau of Air Quality Control
Northwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Daniel C. Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class 1 area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to make a determination of BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

AK Steel is an electric arc furnace steel production plant.
The following are the Source ID numbers of the affected units.

TABLE 1
2002 Actual Emissions

UNIT	**NOx (tpy)**	**PM10 (tpy)**	**SO2 (tpy)**
031 Boiler #15 (MTS)	5.2	0.3	0
102 Electric Arc Furnace #2	71.9	3.1	9.8
103 Electric Arc Furnace #3	73.5	3.1	10.1
104 Electric Arc Furnace #3	70.4	3.0	9.1
105 Shot Blast #4	0	1.6	0
114 #11 Centro Slab Grinder	0	1.6	0
115 #12 Centro Slab Grinder	0	1.1	0
118 #4 Pickle Line	4.3	1.3	0
127 #26 Carlite Acid Clean	6.8	0.5	0
136 AOD Reactor	8.5	5.4	0
137 Slab Heating Furnace #8	25.4	1.2	0
140 #2 Continuous Caster	1.2	0.3	0
142 Vacuum Degas	0	0	0
148 CRNO Line Anneal Furnace	12.9	0.9	0
160A RGO Drying Furnace	4.2	0.3	0
162 #26 Carlite Dry	0	0	0
247 Ladle Preheater #1	0	0	0
248 Ladle Preheater #2	1.8	0	0
249 Ladle Preheater #3	1.4	0	0
250 Ladle Preheater #4	1.8	0	0
Total:	**289.2**	**20.8**	**29.0**

3. NESCAUM CALPUFF modeling:

AK Steel has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P Protection of Visibility.

Based upon the NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 0.079 deciviews (dv). This impact is on the Shenandoah National Park.

The visibility impact of the units with respect to the Class I area affected is described in Tables 2 and 3. Table 2 contains the visibility impact modeled with the National Weather Service (NWS) platform and Table 3 contains the visibility impact modeled with the University of Maryland (MM5) platform.

TABLE 2. Maximum Daily Impact NWS Platform (dv)

Source ID	**Class 1 Area**	**Total**	**SO4**	**NO3**	**PM10**
031	Shenandoah	0.001	0.000	0.000	0.000
102	Shenandoah	0.013	0.001	0.011	0.000
103	Shenandoah	0.013	0.001	0.012	0.000
104	Shenandoah	0.012	0.001	0.011	0.000
105	Shenandoah	0.000	0.000	0.000	0.000
114	Shenandoah	0.000	0.000	0.000	0.000
115	Shenandoah	0.000	0.000	0.000	0.000
118	Shenandoah	0.000	0.000	0.000	0.000
127	Shenandoah	0.001	0.000	0.001	0.000
136	Shenandoah	0.001	0.000	0.001	0.000
137	Shenandoah	0.003	0.000	0.002	0.000
140	Shenandoah	0.000	0.000	0.000	0.000
142	Shenandoah	0.000	0.000	0.000	0.000
148	Shenandoah	0.001	0.000	0.001	0.000
160A	Shenandoah	0.000	0.000	0.000	0.000
162	Shenandoah	0.000	0.000	0.000	0.000
247	Shenandoah	0.000	0.000	0.000	0.000
248	Shenandoah	0.000	0.000	0.000	0.000
249	Shenandoah	0.000	0.000	0.000	0.000
250	Shenandoah	0.000	0.000	0.000	0.000
	Total:	**0.079**			

TABLE 3. Maximum Daily Impact MM5 Platform (dv)

Source ID	**Class 1 Area**	**Total**	**SO4**	**NO3**	**PM10**
031	Shenandoah	N/A	N/A	N/A	N/A
102	Shenandoah	0.017	0.001	0.016	0.000
103	Shenandoah	0.017	0.001	0.016	0.000

104	Shenandoah	0.016	0.001	0.015	0.000
105	Shenandoah	N/A	N/A	N/A	N/A
114	Shenandoah	N/A	N/A	N/A	N/A
115	Shenandoah	N/A	N/A	N/A	N/A
118	Shenandoah	N/A	N/A	N/A	N/A
127	Shenandoah	N/A	N/A	N/A	N/A
136	Shenandoah	0.001	0.000	0.001	0.000
137	Shenandoah	0.003	0.000	0.003	0.000
140	Shenandoah	N/A	N/A	N/A	N/A
142	Shenandoah	N/A	N/A	N/A	N/A
148	Shenandoah	0.001	0.000	0.001	0.000
160A	Shenandoah	N/A	N/A	N/A	N/A
162	Shenandoah	N/A	N/A	N/A	N/A
247	Shenandoah	N/A	N/A	N/A	N/A
248	Shenandoah	N/A	N/A	N/A	N/A
249	Shenandoah	N/A	N/A	N/A	N/A
250	Shenandoah	N/A	N/A	N/A	N/A
Generic Stack	Shenandoah	0.006	0.000	0.006	0.000
	Total:	**0.057**			

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants, but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a "best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART. Below is the five factor analysis, in detail, for the emissions units at this facility which had the greatest impact.

BART 5 Factor Analysis:
STEP – 1: Identify All Available Retrofit Control Technologies

Electric Arc Furnaces	Misc. Natural Gas Burners
SCR	Ultra Low NOx Burners
SNCR	

Ultra low NOx burners is the available retrofit control option with the practical potential for application to the miscellaneous natural gas burners for the control of NOx.

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

Ultra low NOx burners currently achieve a 65% reduction in NOx emissions compared to conventional natural gas burners.

Since neither SCR or SNCR were found to be in use for any electric arc furnaces in the RACT/BACT/LAER Clearinghouse they were determined to be technically infeasible.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Ultra Low NOx Burner provide a 65% improvement over the conventional natural gas burner.

STEP – 4: Evaluate Impacts and Document the Results

Cost Of Compliance: Ultra Low NOx Burner $12,800/ton, the Annualized Cost is $520,000. These calculations are based upon information obtained from EPA's AP42 Manual. The potential emissions reduction for this control was estimated to be 41 tons.

The existing useful life of this facility was not a factor since the facility is not expected to close within the expected life span of the control equipment. There are no direct energy impacts or non-air quality impacts associated with this control.

STEP – 5: Evaluate Visibility Impacts

The total deciview impact of this facility including all BART eligible units is 0.079 dv. The total NOx impact attributable to the burning of natural gas is 0.014 dv. The cost in terms of dollars per deciview for this facility just considering the cost of installing the ultra low NOx burner was calculated to be $37,143,000/dv.

The majority of their visibility impairing emissions were associated with the emissions from their three electric arc furnaces. The greatest total visibility impact of each of the three individually was 0.016 dv. The total impact from the three electric arc furnaces was 0.047 dv. The majority of that impact is attributed to the NOx emissions from those furnaces. Based on a review of current NOx emissions reduction approaches in the RACT/BACT/LAER Clearinghouse (RBLC) there does not appear to be adequate alternatives available for these emissions sources. Thus, no cost effectiveness calculations were performed for NOx. Since the total visibility impact of SO2 from the electric arc furnaces was 0.003 dv no cost effectiveness calculation was deemed necessary for SO2 from the electric arc furnaces.

5. Conclusion:

Based on the five factor analysis, the impact of this facility does not warrant additional control. I recommend the following determination of BART for the AK Steel facility: compliance with the existing operating permit for this facility. The current NOx limit for the three electric arc furnaces is 75.0 lb/hr. The current SOx limit for the three furnaces is 500 parts per million by volume concentration. The current particulate matter limit for the three furnaces has three parts. The first is 0.0036 grains per dry standard cubic feet. The second is 29.9 pounds per hour. The third is 130.8 tons per year.

cc: Northwest Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject: Review Memo for BART Application
Appleton Papers Inc./Spring Mill
100 Paper Mill Rd.
Roaring Spring, PA 16673

September 27, 2007

Operating Permit #: 07-05001

To: William Weaver
Environmental Program Manager
Bureau of Air Quality Control
Southcentral Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Daniel C. Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. <u>Background:</u>

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to make a determination of BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

Appleton is a pulp and paper production plant.
The following are the Source ID numbers of the affected units.

TABLE I
2002 Actual Emissions

UNIT	NOx (tpy)	PM10 (tpy)	SO2 (tpy)
036 #3 Power Boiler	242.6	81.4	450.1
101A Batch Digesters w/incinr.	0	0	0
103A Lime Kiln	4.6	6.2	0.2
107 Starch Unloading System	0	0	0
110 Lime Storage Bins	0	2.0	0
110A Lime Slaker	0	1.2	0
111 Brown Stock Washers	0	0	0
112 Knotters	0	0	0
119 No. 2 Paper Machine	0	0	0
Total:	**247.2**	**90.7**	**450.3**

3. NESCAUM/CALPUFF Modeling:

Appleton Paper has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P Protection of Visibility.

Based upon NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 0.089 deciviews (dv). This impact is on the Shenandoah National Park.

The visibility impact of the units with respect to the Class I area affected is described in Table II.

TABLE II. Maximum Daily Impact (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
036	Shenandoah	0.087	0.051	0.057	0.008
101A	Shenandoah	0.000	0.000	0.000	0.000
103A	Shenandoah	0.000	0.000	0.000	0.000
107	Shenandoah	0.000	0.000	0.000	0.000
110	Shenandoah	0.000	0.000	0.000	0.000
110A	Shenandoah	0.000	0.000	0.000	0.000

111	Shenandoah	0.000	0.000	0.000	0.000
112	Shenandoah	0.000	0.000	0.000	0.000
119	Shenandoah	0.000	0.000	0.000	0.000
Generic Stack*	Shenandoah	0.002	0.000	0.001	0.001
	Total:	**0.089**			

* CALPUFF MM5 modeled >90% of emissions in individual stacks; remainder modeled as "generic stack")

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants, but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a "best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART. Below is the five factor analysis, in detail, for the emissions unit at this facility which had the greatest impact.

BART 5 Factor Analysis:

STEP – 1: Identify All Available Retrofit Control Technologies

Power Boiler #3	
SO2	NOx
Wet Scrubber/Wet Flue Gas Desulfurization	Selective Catalytic Reduction (SCR)
Advanced Flue Gas Desulfurization	Selective Non-Catalytic Reduction (SNCR)
Dry Flue Gas Desulfurization (Spray Dryer Absorption)	Low NOx Burner (LNB) with SNCR
	LNB with Over Fire Air (OFA) and SCR

	Load Reduction
	Overfire Air
	Low NOx Burners
	LNB with OFA
	Reburn
	Low Excess Air
	Burners Out of Service
	Biased-Burner Firing

STEP – 2: Eliminate Technically Infeasible Options

Power Boiler #3	Technically Feasible/Infeasible
SO2	
Wet Scrubber/Wet Flue Gas Desulfurization	Infeasible - No known application on a unit this small.
Advanced Flue Gas Desulfurization	Infeasible – No known application on industrial boilers, No application on mixed fuel boilers like this one.
Dry Flue Gas Desulfurization (Spray Dryer Absorption)	Feasible
NOx	
Selective Catalytic Reduction (SCR)	Infeasible – This unit operates out of the effective temperature range of SCR.
Selective Non-Catalytic Reduction (SNCR)	Infeasible – The NOx concentration is too low for effective use of this technology, This is a varying load boiler, thus its temperature swings significantly, the temperature of the exhaust gas is outside the effective range for SNCR, There is no known application of this technology on stoker boilers.
Overfire Air	Infeasible – Operational constraints could cause over heating.
Low NOx Burners	Infeasible – Not applicable to stoker boilers.
Reburn	Infeasible – Relatively new process, No full scale applications on stoker boilers.
Low Excess Air	Infeasible – Operational constraints could cause over heating.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Power Boiler #3	SO2 Control Efficiency
Dry Flue Gas Desulfurization	94%

STEP – 4: Evaluate Impacts and Document the Results

It was determined that the cost of control for this device was not cost effective considering the commensurate visibility improvement.

Power Boiler #3 (SO2)	Cost Effectiveness ($/ton)	Cost of Visibility Improvement ($/dv)
	$3,487/ton	$51,200,000/dv

The existing useful life of this facility was not a factor since the facility is not expected to close within the expected life span of the control equipment. There are potentially significant energy impacts due to the increased energy at the facility to operate a dry scrubber. The waste stream from the scrubber would qualify as a non-air quality impact. This waste stream would need to be disposed of and would pose an additional burden to the facility.

STEP – 5: Evaluate Visibility Impacts

The total deciview impact of this facility, including all BART eligible units, was modeled to be 0.089 dv. The cost in terms of dollars per deciview for installing a dry flue gas desulfurization system at this facility was calculated to be $51,200,000/dv.

The CALPUFF NWS platform computer modeling results show the visibility impact on the Shenandoah National Park Class I area from this facility to be 0.089 dv. The emissions unit which had the most significant impact at Appleton was the Number 3 Power Boiler. The total contribution to visibility impairment by this unit was 0.087 dv. The SO2 contribution was 0.051 dv and the NOx contribution was 0.057 dv. Upon the review of NOx control technology none were found to be feasible for this source.

Several control options were considered for SO2 control for the power boiler. The most cost effective means of control considered was an SDA system. The resulting average cost effectiveness for installing the SDA system based on 2002 emissions was calculated to be $3,487/ton. The corresponding visibility improvement based on the installation of this technology over the baseline was estimated to be 0.048 dv. The cost of this control equipment in terms of visibility improvement was determined to be $51,200,000/dv.

5. Conclusion:

Based on the five factor analysis, the impact of this facility does not warrant additional control. I recommend the following determination of BART for the Appleton Paper facility: compliance with the existing operating permit for this facility. The following permit limits pertain to the Number 3 Power Boiler. The current NOx limit is 0.63 lbs/mmBTU. The current SOx limit for the power boiler is 4.0 lbs/mmBTU. The current particulate matter limit has two parts. First, for heat input between 2.5 and 50 mmBTU/hr, the limit is 0.4 lbs/mmBTU. Second, for heat input between 50 and 600 mmBTU/hr, the limit is calculated by multiplying 3.6 times the heat input raised to the –0.56 power.

cc: Southcentral Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject: Review Memo for BART Application
ConocoPhillips Trainer Refinery
4101 Post Road
Trainer, PA 19061

June 10, 2008

Operating Permit #: 23-00003

To: Francine Carlini
Environmental Program Manager
Bureau of Air Quality Control
Southeast Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Dan Husted, Air Quality Engineer

Through: Krish Ramamurthy
Chief, Permits Division
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

ConocoPhillips Trainer Refinery is an oil refinery located in Trainer, PA. It has twenty-one affected units. The following are the Source ID numbers of the affected units.

TABLE I
2002 Actual Emissions

UNIT		NOx (tpy)	PM10 (tpy)	SO_2 (tpy)
102	Claus Sulfur Recovery Plant	5.6	0.1	34.8
103	Main Flare	43.6	0.1	15.1
105	Marine Vessel Loading	0	0	0
111	Cooling Towers	0	16.0	0
125	#68 Ext. Float. 43M BBLS	0	0	0
137	#152 Int. Float 61M BBL	0	0	0
140	#155 Int. Float 63M BBLS	0	0	0
142	#157 Ext. Float 77M BBLS	0	0	0
143	#159 Ext. Float 79M BBLS	0	0	0
150	#168 Int. Float 79M BBLS	0	0	0
151	#169 Ext. Float 78M BBLS	0	0	0
163	#185 Ext. Float 150M BBLS	0	0	0
164	#186 Ext. Float 151M BBLS	0	0	0
184	#63 Fixed Roof TK 8M BBLS	0	0	0
193	#158 Fixed Roof TK 56M BBLS	0	0	0
737	Naphtha HDS Heater	27.0	0.5	0.1
738	Platformer Feed Heater	429.4	5.0	1.3
739	Isocracker 1st Stage Heater	10.5	0.2	0.8
740	Isocracker Splitter RBLR	26.2	0.5	2.1
741	VGO HDS Charge Heater	18.9	0.4	0.1
CO1	CO Boiler	536.9	113.4	2062.9
	Total:	**1098.1**	**136.2**	**2117.2**

The ConocoPhillips Trainer Facility is currently under an EPA consent decree that will produce significant emission reductions for the CO Boiler (Source ID number CO1). Of the BART affected units, this unit contributed approximately 49% of the actual 2002 NO_x emissions and 97% of the 2002 actual SO_2 emissions. The consent decree mandated the installation of a wet scrubber and enhanced SNCR on the Fluidized Catalytic Cracking Unit/CO Boiler. As a result, SO_2 emissions will not exceed 25 ppmvd based on a 365-day rolling average or 50 ppmvd based on a 7-day average, each at 0% oxygen. Additionally, PM emissions from the FCCU must meet the NSPS limit of 0.5 lb/1000 lb coke burn or lower. ConocoPhillips is in the process of conducting an ESNCR optimization study required under the consent decree. This will evaluate the effects of operating parameters on NOx emissions from the FCCU to evaluate the optimal operating levels to minimize NO_x emissions. When the optimization study is completed, ConocoPhillips is required to propose an emission limit for NO_x emissions from the FCCU by May 2009.

3. <u>NESCAUM CALPUFF modeling</u>:

The ConocoPhillips Trainer Refinery has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 1.104 deciviews (dv). This impact is on the Brigantine wilderness area.

Two of the BART affected units were determined to be the most significant sources of concern for regional haze at this facility. These two units are Source ID numbers 738 (Platformer Feed Heater) and CO1 (CO Boiler).

The visibility impact of the units with respect to the Class I area affected is described in Tables 2 and 3. Table 2 contains the visibility impact modeled with the National Weather Service (NWS) platform and Table 3 contains the visibility impact modeled with the University of Maryland (MM5) platform.

Table 2 – Maximum Daily Impact NWS Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
102	Brigantine	0.006	0.004	0.002	0.000
103	Brigantine	0.017	0.002	0.016	0.000
105	Brigantine	0.000	0.000	0.000	0.000
111	Brigantine	0.000	0.000	0.000	0.000
125	Brigantine	0.000	0.000	0.000	0.000
137	Brigantine	0.000	0.000	0.000	0.000
140	Brigantine	0.000	0.000	0.000	0.000
142	Brigantine	0.000	0.000	0.000	0.000
143	Brigantine	0.000	0.000	0.000	0.000
150	Brigantine	0.000	0.000	0.000	0.000
151	Brigantine	0.000	0.000	0.000	0.000

163	Brigantine	0.000	0.000	0.000	0.000
164	Brigantine	0.000	0.000	0.000	0.000
184	Brigantine	0.000	0.000	0.000	0.000
193	Brigantine	0.000	0.000	0.000	0.000
737	Brigantine	0.018	0.000	0.018	0.000
738	Brigantine	0.160	0.000	0.159	0.001
739	Brigantine	0.008	0.000	0.008	0.000
740	Brigantine	0.018	0.000	0.018	0.000
741	Brigantine	0.013	0.000	0.013	0.000
CO1	Brigantine	0.253	0.232	0.085	0.021
	Total:	**0.369**			

*NOTE: Total CALPUFF impact may not equal the sum of unit level impacts due to the non-linear nature of the deciview index.

Table 3 – Maximum Daily Impact MM5 Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
102	Brigantine	0.015	0.013	0.002	0.000
103	Brigantine	0.022	0.005	0.017	0.000
105	Brigantine	N/A	N/A	N/A	N/A
111	Brigantine	N/A	N/A	N/A	N/A
125	Brigantine	N/A	N/A	N/A	N/A
137	Brigantine	N/A	N/A	N/A	N/A
140	Brigantine	N/A	N/A	N/A	N/A
142	Brigantine	N/A	N/A	N/A	N/A
143	Brigantine	N/A	N/A	N/A	N/A
150	Brigantine	N/A	N/A	N/A	N/A
151	Brigantine	N/A	N/A	N/A	N/A
163	Brigantine	N/A	N/A	N/A	N/A
164	Brigantine	N/A	N/A	N/A	N/A
184	Brigantine	N/A	N/A	N/A	N/A
193	Brigantine	N/A	N/A	N/A	N/A
737	Brigantine	0.017	0.000	0.017	0.000
738	Brigantine	0.190	0.000	.0189	0.002
739	Brigantine	N/A	N/A	N/A	N/A
740	Brigantine	0.017	0.001	0.017	0.000
741	Brigantine	N/A	N/A	N/A	N/A
CO1	Brigantine	0.857	0.681	0.156	0.032
	Total:	**1.104**			

4. BART Analysis

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART

BART 5 Factor Analysis:

STEP – 1: Identify All Available Retrofit Control Technologies

Platformer Feed Heater (ID 738)		
NO_x	SO_2	PM
Water/Steam Injection	Fuel Specification	Good Combustion Practice
SNCR	Wet Scrubbing	Wet Scrubbing
ULNB		Cyclone
ULNB and SNCR		ESP
ULNB and SCR		FF

The above chart identifies the available retrofit control option with the practical potential for application to the Platformer Feed Heater for NOx, SOx, and PM.

CO Boiler (ID CO1)		
NO_x	SO_2	PM

None	None	None

The above chart identifies that there are no available retrofit control options that have practical potential for application to the CO Boiler for NOx, SOx, and PM.

STEP – 2: Eliminate Technically Infeasible Options

Platformer Feed Heater	Technically Feasible/Infeasible
NO_x	
Water/Steam Injection	Infeasible
SCR	Feasible
SNCR	Infeasible
ULNB	Feasible
ULNB and SNCR	Infeasible
ULNB and SCR	Feasible
SO_2	
Fuel Specification	Feasible
Wet Scrubbing	Infeasible
PM	
Wet Scrubbing	Infeasible
Cyclone	Infeasible
ESP	Infeasible
FF	Infeasible

SCR, ULNB, ULNB with SCR, and fuel specification are all considered technically feasible options because these control options have all been demonstrated as effective for process heaters.

Water/Steam Injection is considered technically infeasible because it reduces thermal efficiency in process heaters, and there are few full-scale retrofit or test trials of this technology in Platformer Feed Heater.

SNCR and ULNB with SNCR are both technically infeasible for the Platformer Feed Heater because the exhaust temperatures of the process heater would allow significant ammonia slip from SNCR.

Wet scrubbing is not feasible because it has not been installed and operated successfully for process heaters and is therefore considered technically infeasible.

PM10 will serve as a surrogate for PM2.5. The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on the affected units is so small that no reasonable weighing of the five factors required by consideration in the BART analysis could justify additional controls under BART.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Platformer Feed Heater	Control Effectiveness
NO_x Controls	
SCR	80%
ULNB	71%
ULNB and SCR	93.5%
SO_2 Controls	
Fuel Specification	Not considered further because the NSPS standard already meets BACT.

A control efficiency of 71% for an Ultra Low NOx Burner is representative of the achievable level for that particular control device. A control efficiency of 93.5% for an Ultra Low NOx Burner and SCR is representative of the achievable level for that particular combination of control devices.

SCR alone is economically inferior to SCR in combination with combustion controls because it would require larger amounts of ammonia. Therefore, SCR will be removed from consideration.

Fuel specification is not considered a feasible option because current NSPS standards already meet BACT for SO2 reduction.

STEP – 4: Evaluate Impacts and Document the Results

Platformer Feed Heater	Cost Effectiveness ($/ton)	Cost of Visibility Improvement ($/dv)
NO_x Controls		
ULNB	16,042	34,443,040
ULNB and SCR	74,488	316,482,090

Using SCR would cause amounts of unreacted ammonia to be emitted into the atmosphere. Ammonia is a PM10 precursor. Also, ammonia emissions would create ammonia salts to be emitted into the atmosphere as PM10. There are also safety issues associated with transporting and handling aqueous and anhydrous ammonia. There are also space issues with installing SCR, which would make this control option infeasible.

There are no energy or non-air quality impacts associated with ULNB at this unit. The remaining useful life of the unit was not calculated because there are no plans to shutdown the Platformer feed Heater in the foreseeable future.

STEP – 5: Evaluate Visibility Impacts

The Department analyzed installing ultra low NO_x burners (ULNB) on Platformer Feed Heater 738. The facility estimated that the cost effectiveness of this technology would be approximately $16,042/ton of NO_x removed (on an actual basis) or $34,443,040/dv improvement. The visibility improvement from this installation would be approximately 0.025 deciviews. The basis of the visibility impact is the modeling conducted by ConocoPhilips which was performed in accordance with NESCAUM's procedures and utilized the maximum daily impact. In addition, ConocoPhillips has already replaced a number of the Platformer Feed Heater burners with ULNBs. The remaining burners would be technically infeasible to replace with ULNBs because of the burner configurations.

5. <u>Conclusion:</u>

After careful review of the facility's engineering analysis, I recommend the following determination of BART for the ConocoPhillips Trainer Refinery: compliance with the terms of the EPA consent decree for the FCCU/CO Boiler (Source ID number CO1). The consent decree mandated the installation of a wet scrubber and enhanced SNCR on the Fluidized Catalytic Cracking Unit/CO Boiler. As a result, SO_2 emissions will not exceed 25 ppmvd based on a 365-day rolling average or 50 ppmvd based on a 7-day average, each at 0% oxygen. Additionally, PM emissions from the FCCU must meet the NSPS limit of 0.5 lb/1000 lb coke burn or lower. ConocoPhillips is also required to propose an emission limit for NO_x emissions from the FCCU by May 2009. These controls are the most stringent available and all possible improvements to these control devices will be made.

I further recommend compliance with the existing operating permit for the Platformer Feed Heater (Source ID number 738). The current NO_x emission limitation for the Platformer Feed Heater is 0.12 lbs/MMBtu and 394.2 tons in any 12 consecutive month period. The current SO_2 emission limitation for the Platformer Feed Heater is 0.011 lbs/mmBtu on an annual basis calculated quarterly.

cc: Southeast Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject: Review Memo for BART Application
Dyno Nobel Inc.
1320 Galiffa Dr.
Donora, PA 15033

September 27, 2007

Operating Permit #: 63-00070

To: Mark Wayner
Environmental Program Manager
Bureau of Air Quality Control
Southwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Daniel C. Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class 1 area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to make a determination of BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

Dyno Nobel is a nitric acid production plant.
The following are the Source ID numbers of the affected units.

TABLE I
2002 Actual Emissions

UNIT	NOx (tpy)	PM10 (tpy)	SO2 (tpy)
031 Murray No.2	8.0	0.8	0
035 AOP Cooling Tower	0	3.5	0
101 Ammonia Oxidation Plant	224.7	0.6	0
103B Prill Handling	0	1.0	0
104 Ammonium Nitrate Cooler	0	0.9	0
105 Ammonium Nitrate Predrier	0	1.6	0
106 Ammonium Nitrate Drier	0	1.1	0
107 Ammonium Nitrate Evaporate	0	1.8	0
108 Ammonia Nitrate Solvent Tank	0	11.6	0
109 Ammonia Nitrate Solvent Tank	0	0.8	0
Total:	**232.7**	**23.7**	**0**

3. NESCAUM CALPUFF modeling:

Dyno Nobel has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P Protection of Visibility.

Based upon NESCAUM CALPUFF modeling, the maximum combined impact of this source on a Class I area was 0.100 deciviews (dv). This impact is on the Dolly Sods wildlife area.

The visibility impact of the units with respect to the Class I area affected is described in Table II

TABLE II. Maximum Daily Impact (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
031	Dolly Sods	0.003	0.000	0.003	0.000
035	Dolly Sods	0.001	0.000	0.000	0.001
101	Dolly Sods	0.096	0.000	0.096	0.000
103B	Dolly Sods	0.000	0.000	0.000	0.000

104	Dolly Sods	0.000	0.000	0.000	0.000
105	Dolly Sods	0.000	0.000	0.000	0.000
106	Dolly Sods	0.000	0.000	0.000	0.000
107	Dolly Sods	0.000	0.000	0.000	0.000
108	Dolly Sods	0.000	0.000	0.000	0.000
109	Dolly Sods	0.000	0.000	0.000	0.000
	Total:	**0.100**			

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants, but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a "best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART. Below is the five factor analysis, in detail, for the emissions unit at this facility which was found to have the greatest impact.

BART 5 Factor Analysis:

STEP – 1: Identify All Available Retrofit Control Technologies

Ammonia Oxidation Plant
Extended Absorption
Nonselective Catalytic Reduction (NSCR)
Selective Catalytic Reduction (SCR)

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

All options are technically feasible.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Ammonia Oxidation Plant	NOx Control Effectiveness
Extended Absorption	95.8% (1)
Nonselective Catalytic Reduction (NSCR)	97% to 99.1% (1)
Selective Catalytic Reduction (SCR)	80% to 90% (2)

(1) EPA AP-42 Document, Volume 1 Fifth Edition
(2) EPA Document Number EPA-450/3-91-026

STEP – 4: Evaluate Impacts and Document the Results

Since the facility already employs NSCR to control NOx no additional control is necessary to meet BART.

STEP – 5: Evaluate Visibility Impacts

Since existing control is the best available technology this step is NA.

The primary purpose of this facility is to produce nitric acid. The CALPUFF NWS platform computer modeling found the total visibility impact of this facility to be 0.1 dv on the Dolly Sods Class 1 area. Upon reviewing the 2002 actual emissions of that facility it was determined that the NOx emissions from the ammonia oxidation plant make up the preponderance of the visibility impairing emissions from this facility. The ammonia oxidation plant currently uses non-selective catalytic reduction (NSCR) to control NOx emissions. This is the state of the art control technology for NOx from this type of source. According to AP-42 NSCR provides 97 to 99.1 percent NOx control efficiency over uncontrolled nitric acid plant NOx emissions. Since NSCR was found to be state of the art control technology for this type of source no cost effectiveness calculations were performed.

5. Conclusion:

Based on the five factor analysis, the impact of this facility does not warrant additional control. I recommend the following determination of BART for the Dyno-Nobel facility: compliance with the existing operating permit for this facility. The following emission limitations pertain to the ammonia oxidation plant. The current NOx limit is 396 tons in any 12 month period. Additionally, the current NO_2 limit is 5.5 lbs/ton of acid production with the acid product expressed as 100% HNO_3.

cc: Southwest Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject:	Review Memo for BART Application ISG Plate Llc/Coatesville 139 Modena Rd. Coatesville, PA 19320	June 11, 2008

Operating Permit #: 15-00010

To:	Francine Carlini Environmental Program Manager Bureau of Air Quality Control Southeast Regional Office	Joyce Epps Bureau Director Bureau of Air Quality Control

From: Daniel C. Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to make a determination of BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

ISG Plate is an electric arc furnace steel production plant.
The following are the Source ID numbers of the affected units.

TABLE I
2002 Actual Emissions

UNIT	**NOx (tpy)**	**PM10 (tpy)**	**SO2 (tpy)**
033 Br. Boilers: BH-B&W #3&4	3.9	0.1	0
034 Brandy Boiler: BH-B&W #4	0	0	0
104 /D/ Electric Furnace	82.1	67.4	207.8
142 #8 Batch heat Treat Furnace	0	0	0
159 Soaking Pit #35	0	0	0
160 Soaking Pit #36	0	0	0
161 37 Soaking Pit 140-206M	0	0	0
174 Green Anneal Grit Blaster & Baghouse	0	4.5	0
176 Vert. Blast Cont. Fin. & Baghouse	0	0.1	0
181 South Steel Yard & Baghouse	0	0.3	0
182 ACA Powder Cutting & Baghouse	0	6.2	0
183 Misc. Processes & Gas Use (10)	32.5	1.0	0.2
207 ICA Hot Top Cut Station & Baghouse	0	0.5	0
256 Steel Plate Acid Wash and Scrubber	0.2	0	0
270 Continuous Casting Spray Chamber	0	0	0
Total:	**118.7**	**80.1**	**208**

3. NESCAUM/CALPUFF Modeling:

ISG Plate has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P Protection of Visibility.

Based upon the NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 0.055 deciviews (dv). This impact is on the Brigantine wildlife area.

The visibility impact of the units with respect to the Class I area affected is described in Tables 2 and 3. Table 2 contains the visibility impact modeled with the National Weather Service (NWS) platform and Table 3 contains the visibility impact modeled with the University of Maryland (MM5) platform.

TABLE 2. Maximum Daily Impact NWS Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
033	Brigantine	0.002	0.000	0.002	0.000
034	Brigantine	0.001	0.000	0.001	0.000
104	Brigantine	0.031	0.012	0.022	0.000
142	Brigantine	0.000	0.000	0.000	0.000
159	Brigantine	0.001	0.000	0.001	0.000
160	Brigantine	0.002	0.000	0.002	0.000
	Brigantine	0.001	0.000	0.001	0.000
161	Brigantine	0.001	0.000	0.001	0.000
	Brigantine	0.001	0.000	0.001	0.000
174	Brigantine	0.000	0.000	0.000	0.000
176	Brigantine	0.000	0.000	0.000	0.000
181	Brigantine	0.000	0.000	0.000	0.000
182	Brigantine	0.000	0.000	0.000	0.000
183	Brigantine	0.010	0.000	0.010	0.000
207	Brigantine	0.000	0.000	0.000	0.000
256	Brigantine	0.004	0.000	0.004	0.000
270	Brigantine	0.000	0.000	0.000	0.000
	Total:	**0.053**			

TABLE 3. Maximum Daily Impact MM5 Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
033	Brigantine	N/A	N/A	N/A	N/A
034	Brigantine	N/A	N/A	N/A	N/A
104	Brigantine	0.050	0.033	0.018	0.000
142	Brigantine	N/A	N/A	N/A	N/A
159	Brigantine	N/A	N/A	N/A	N/A
160	Brigantine	N/A	N/A	N/A	N/A
	Brigantine	N/A	N/A	N/A	N/A
161	Brigantine	N/A	N/A	N/A	N/A
	Brigantine	N/A	N/A	N/A	N/A
174	Brigantine	N/A	N/A	N/A	N/A
176	Brigantine	N/A	N/A	N/A	N/A
181	Brigantine	N/A	N/A	N/A	N/A
182	Brigantine	N/A	N/A	N/A	N/A
183	Brigantine	0.006	0.000	0.006	0.000
207	Brigantine	N/A	N/A	N/A	N/A
256	Brigantine	0.002	0.000	0.002	0.000
270	Brigantine	N/A	N/A	N/A	N/A
Generic Stack		0.006	0.000	0.006	0.000
	Total:	**0.055**			

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants, but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a "best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART. Below is the five factor analysis, in detail, for the emissions unit at this facility which had the greatest impact.

BART 5 Factor Analysis:

STEP – 1: Identify All Available Retrofit Control Technologies

Electric Arc Furnace	
SO2	NOx
Wet Scrubber	Selective Catalytic Reduction
	Selective Non-Catalytic Reduction

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

Both NOx options were technically infeasible. Based on the RACT/BACT/LAER Clearinghouse (RBLC) no other steel making facilities utilize these controls technologies. Thus, neither of these technologies are in use on full scale operational electric arc furnaces.

Wet scrubbing was determined to be technologically feasible.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

<u>Electric Arc Furnace</u>	<u>Control Effectiveness</u>
Wet Scrubbing	90%

STEP – 4: Evaluate Impacts and Document the Results

It was determined that the cost of control for this device was not cost effective considering the commensurate visibility improvement.

Electric Arc Furnace (SO2)	Cost Effectiveness ($/ton)	Cost of Visibility Improvement ($/dv)
	$9,023/ton to $173,243/ton	$250,545,000/dv to $4,818,181,818/dv

The existing useful life of this facility was not a factor since the facility is not expected to close within the expected life span of the control equipment. There are potentially significant energy impacts due to the increased energy at the facility to operate a wet scrubber. The waste stream from the scrubber would qualify as a non-air quality impact. This waste stream would need to be treated and would pose an additional burden to the facility.

STEP – 5: Evaluate Visibility Impacts

The total deciview impact of the electric arc furnace attributable to SO2 was modeled to be 0.033 dv. The cost in terms of dollars per deciview for installing a dry flue gas desulfurization system at this facility was calculated to be from $250,545,454/dv to $4,818,181,818/dv.

The CALPUFF NWS platform computer modeling found the total visibility impact of this facility to be 0.055 dv on the Brigantine Class I area.

Cost effectiveness calculations were not generated for NOx controls since none were found to be technically feasible for electric arc furnaces. No application of NOx control for electric arc furnaces was found in the RBLC. A wet scrubber is technically feasible for the control of SO2 emissions from this source. The cost effectiveness numbers for SO2 control in this memo were calculated using information from EPA's Air Pollution Control Fact Sheet (EPA-452/F-03-016) for wet scrubbers. I estimated the cost effectiveness for installing a wet scrubber system to control S02 to be from $9,022/ton to $173,244/ton. These calculations are based on 2004 actual emissions. Thus, the dollars per deciview cost would range from 250 million dollars per deciview to 4,818 million dollars per deciview. Even at the low cost end of this range this control was determined not to be cost effective.

5. <u>Conclusion:</u>

Based on the five factor analysis, the impact of this facility does not warrant additional control. I recommend the following determination of BART: compliance with the existing operating permit for this facility. The current SO_2 limit from the electric arc furnace is 500 parts per million dry concentration based on volume. The current particulate matter limit from this unit through the main Baghouse E is 0.0052 grains per dry standard cubic feet. The current particulate matter limit from this unit through Baghouses A, B, and D is 0.02 grains per dry standard cubic foot.

cc: Southeast Regional Office
Central Office

.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject: Review Memo for BART Application
P.H. Glatfelter Company
Spring Grove Mill
228 S. Main St.
Spring Grove, PA 17362

May 8, 2008

Operating Permit #: 67-05004

To: William Weaver
Environmental Program Manager
Bureau of Air Quality
Southcentral Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality

From: Daniel C. Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NO_x, SO_2, PM_{10}, and $PM_{2.5}$. VOC and NH_3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH_3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to make a determination of BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

Pennsylvania Department of Environmental Protection (Department) requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal. The Department's November 17, 2006 letter to P.H. Glatfelter indicated that an engineering analysis of VOC control options was not needed. This was due to the technical inability to determine the extent of contribution by individual sources of VOCs. In addition, the Department did not require an engineering analysis for pollutants with a combined potential to emit less than the U.S. Environmental Protection Agency's (EPA) *de minimis* levels of 40 tons per year for NO_x and SO_2 or 15 tons per year of PM_{10}.

2. Process Description:

P.H. Glatfelter is a pulp and paper production plant.
The following are the Source ID numbers of the affected units.

TABLE I
2002 Actual Emissions

UNIT	**NOx (tpy)**	**PM_{10} (tpy)**	**SO_2 (tpy)**
035 #1 Power Boiler	576.0	48.3	3583.5
103 Fluo –Solids Calciner	102.7	28.3	0
111 Softwood Pulp Vents	0	0	0
113A Pulp Bleaching System Vents	0	0	0
115 Paper Machines	0	0	0
117 Blade Coater	0	0	0
119 Black Liquor Collection System	0	0	0
120 Cooking Liquor Preparation	0	0	0
130 Material Handling	0	58.0	0
Total:	**678.7**	**134.6**	**3583.5**

3. NESCAUM/CALPUFF Modeling:

P.H. Glatfelter has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P Protection of Visibility.

Based upon NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 0.694 deciviews (dv). This impact is on the Shenandoah National Park.

Modeling data provided by P.H. Glatfelter showed the total 98th percentile impact of all BART affected units at the facility to be 0.3 dv. The P.H. Glatfelter modeling utilized the three years worth of meteorological data needed for this modeling analysis.

The visibility impact of the units with respect to the Class I area affected is described in Table II.

TABLE II.
Maximum Daily Impact (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
035	Shenandoah	0.661	0.554	0.124	0.002
103	Shenandoah	0.026	0.000	0.024	0.003
111	Shenandoah	0.000	0.000	0.000	0.000
113A	Shenandoah	0.000	0.000	0.000	0.000
115	Shenandoah	0.000	0.000	0.000	0.000
117	Shenandoah	0.000	0.000	0.000	0.000
119	Shenandoah	0.000	0.000	0.000	0.000
120	Shenandoah	0.000	0.000	0.000	0.000
130	Shenandoah	0.000	0.000	0.000	NA
	Total:	**0.694**			

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants, but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion related to the units at P.H. Glatfelter to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition, for each source subject to BART identified in this review memo, the Department used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, the Department took into account the remaining useful life of the source and any existing control technology present at the source. For each source, the Department determined a "best system of continuous emission reduction" based upon its evaluation of these factors. The Department also established emission limits, consistent with the BART determination process. Below is the five factor analysis, in detail, for the emissions unit at this facility which had the greatest impact.

BART 5 Factor Analysis:
STEP – 1: Identify All Available Retrofit Control Technologies

Power Boiler #1	
SO_2	NO_x
Wet Scrubbing	Selective Catalytic Reduction (SCR)
Dry Scrubbing	Switch from Coal to Ultra Low Sulfur Diesel with Low NO_x Burner
Switch from Coal to Natural Gas	Switch from Coal to Natural Gas with Low NO_x Burner
Switch from Coal to Ultra Low Sulfur Diesel	Oxygen-Enhanced Combustion (OEC)
Semi-dry Scrubbing	Selective Non-catalytic Reduction (SNCR)
Switch from Coal to Lower Sulfur, 0.7%, Coal	Low NO_x Burners (LNB) with Secondary Overfire Air (SOFA)
	Flue Gas Recirculation

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

Power Boiler #1	Technically Feasible/Infeasible
SO_2	
Wet Scrubbing	Feasible
Dry Scrubbing	Feasible
Switch from Coal to Natural Gas	Feasible
Switch from Coal to Ultra Low Sulfur Diesel	Feasible
Semi-dry Scrubbing	Feasible
Switch from current Coal and No. 6 Fuel Oil with Lower Sulfur Coal and No. 6 Fuel Oil	Feasible
Switch from Current Coal to Lower Sulfur Coal	Feasible
NO_x	
Selective Catalytic Reduction (SCR)	Feasible
Switch from Coal to Ultra Low Sulfur Diesel with Low NO_x Burner	Feasible
Switch from Coal to Natural Gas with Low NOx Burner	Feasible
OEC	Feasible
Selective Non-catalytic Reduction (SNCR)	Feasible
Low NOx Burners (LNB) with Secondary Overfire Air (SOFA)	Feasible

Flue Gas Recirculation	Feasible

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Power Boiler #1	Control Effectiveness
NO_x Controls	
SCR	90%
Switch from Coal to Ultra Low Sulfur Diesel with Low NO_x Burner	82%
Switch from Coal to Natural Gas with Low NO_x Burner	68%
OEC	37%
SNCR	30% - Not considered further because it would provide a lesser level of control and would be more expensive than OEC.
Low NO_x Burners (LNB) with Secondary Overfire Air (SOFA)	Not considered further because it is already installed and in operation.
Flue Gas Recirculation	Not considered further since this technology is not expected to reduce NO_x further than currently installed controls.
SO_2 Controls	
Wet Scrubbing	90%
Dry Scrubbing	90%
Switch from Coal to Natural Gas	92%
Switch from Coal to Ultra Low Sulfur Diesel	90%
Semi-dry Scrubbing	90%
Switch from Current Coal and No. 6 Fuel Oil with Lower Sulfur Coal and No. 6 Fuel Oil	57%
Switch from Current Coal to Lower Sulfur Coal	56%

STEP – 4: Evaluate Impacts and Document the Results

It was determined that the cost of control for this unit was not cost effective considering the commensurate visibility improvement.

Power Boiler #1	Cost Effectiveness ($/ton)	98^{th} Percentile Modeled Visibility Improvement (dv)	Cost of Visibility Improvement ($/dv)

NOx			
SCR	10,627	0.013	423,458,923
Switch from Coal to Ultra Low Sulfur Diesel with Low NO_x Burner	75,056	0.012	2,952,215,333
Switch from Coal to Natural Gas with Low NO_x Burner	35,689	0.012	1,165,839,250
OEC	1,954	0.010	41,629,300
SO_2			
Wet Scrubbing	1,667	0.219	24,545,196
Dry Scrubbing	2,824	0.219	41,589,982
Switch from Coal to Natural Gas	4,255	0.223	62,735,744
Switch from Coal to Ultra Low Sulfur Diesel	10,975	0.219	161,765,224
Semi-dry Scrubbing	1,724	0.219	25,394,352
Switch from Current Coal and No. 6 Fuel Oil with Lower Sulfur, 0.7%, Coal and 0.5% Sulfur No. 6 Fuel Oil	2,304	0.141	33,212,212
Switch to Lower Sulfur Coal, (0.7%)	2,310	0.138	33,400,000

The existing useful life of this facility was not a factor since the facility is not expected to close within the expected life span of the control equipment. There are potentially significant energy impacts due to the increased energy needs at the facility to operate a wet scrubber. The waste stream from the scrubber would qualify as a non-air quality impact. This waste stream would need to be treated and would pose an additional burden on the facility.

STEP – 5: Evaluate Visibility Impacts

The 98th percentile deciview improvement expected by the installation of a wet scrubber system on the Number 1 Power Boiler was found to be 0.219 dv. The cost in terms of dollars per deciview at this facility for the installation of the wet scrubber was calculated to be $24,545,196/dv. The 98th percentile deciview improvement expected by operating the Number One Power Boiler existing OEC year round was found to be 0.010 dv. The cost in terms of dollar per deciview for this control approach was calculated to be $41,629,300/dv.

Discussion

The two main BART affected units that generated the most significant emissions were the Number 1 Power Boiler and the Fluo-Solids Calciner. The feasibility of three types of NO_x control options for the Calciner was evaluated. The options were low-NO_x burner technology, selective catalytic reduction, and selective non-catalytic reduction. None of these options were found to be technically feasible. Therefore, the BART 5 Factor Analysis for this source was stopped at Step 2. The Calciner currently utilizes a cyclone and two scrubbers to remove particulate matter and total reduced sulfide emissions.

The Number 1 Power Boiler is the source at P.H. Glatfelter that was found to have the most significant impact on visibility at the Shenandoah National Park. This unit's 98th percentile modeled impact was 0.284 dv. The two pollutants that generated the greatest impact from this source were SO_2 and NO_x.

Seven control technologies for NO_x from this emissions unit were evaluated. The most effective option considered in terms of emission reduction was selective catalytic reduction (SCR). The cost effectiveness of this technology was calculated to be $10,627/ton. The least effective technology considered in terms of emission reduction was operating the existing OEC system year round. However, considering visibility impacts combined with technology costs this approach was found to be the most cost effective NO_x control strategy. The average cost effectiveness of OEC year round was $1,954/ton and $41,629,300/dv.

Seven potential SO_2 control technologies for the Number 1 Power Boiler were evaluated. Wet scrubbing was found to be the most cost effective means of SO_2 control. Its control efficiency was estimated at 90%. The 98th percentile P.H. Glatfelter estimated visibility improvement attributed to installing a wet scrubber was modeled to be 0.219 dv. Although the cost effectiveness of wet scrubbing was calculated to be $1,667/ton, the cost effectiveness in terms of visibility improvement was $24,545,196/dv. The most effective option considered in terms of control efficiency was switching from coal to natural gas. The control efficiency of this approach was estimated to be 92% and its associated cost effectiveness was calculated to be $4,255/ton. Despite this option having the highest control efficiency it was not chosen as the best control option due to its high cost in terms of visibility improvement.

Based on a series of inquiries this reviewer made about the basis of their BART analysis, P.H. Glatfelter provided two revisions to their cost data and the basis of their cost calculations. Their most current cost analysis breakdown for the wet scrubber is in Table 4 of the third version of their cost analysis.

P.H. Glatfelter provided supporting data for the purchased equipment costs that would be associated with installing a wet scrubber. This included the cost of the scrubber itself and of the ancillary systems associated with the scrubber. Under direct installation costs their costs for everything, except the demolition and clean up of the building in the intended scrubber site, was $9,815,256. This is approximately 1.6 times their total purchased equipment costs.

Due to lack of available space for installing a wet scrubber at the existing locations P.H. Glatfelter estimated the cost of dismantling and removing existing structures where they would install the wet scrubber system to be approximately $4,000,000. P.H. Glatfelter provided an itemized breakdown for what that cost included. The breakdown is $1.4 million for asbestos abatement; $0.6 million for the clean-up of dead birds, bird feces, peeling paint, etc; $1.5 million for steel and concrete demolition; and $0.5 million for contingencies.

The initial P.H. Glatfelter BART analysis was based on a caustic scrubber system. However, it was determined that a caustic scrubber would cause the facility to exceed Pennsylvania water quality standards with respect to total dissolved solids. Thus, the revised cost analyses were based on using a lime-based scrubbing system.

The Number 1 Power Boiler shares a stack with three other boilers. Neither of the other two boilers that share that stack is BART eligible.

P.H. Glatfelter initially used an interest rate of 10% and ten years to determine their capital recovery factor for use in their cost calculations. Based on questions raised by the Department, P.H. Glatfelter revised their cost calculations using an amortization period of 15 years. This revision resulted in a decrease in the cost effectiveness value for the wet scrubber SO_2 control option.

Upon initial review of the BART cost analysis it appeared that the costs of the induced draft (ID) fan and the new stack were counted twice. They appeared in both the Purchased Equipment Cost section and the Direct Installation Cost section under Capital Costs. The mention of the ID Fan and the stack in the Direct Installation Costs section referred to the costs associated with installing these components, not the hardware a second time.

Based upon the data supplied, this reviewer finds P.H. Glatfelter's cost analysis to be representative of the reasonably expected costs for installing a wet scrubber system.

Since none of the other BART eligible sources were found to generate a modeled visibility impact the existing control technologies and emission limits were found to be BART.

Table III.
Summary of Power Boiler No. 1 Cost Effectiveness Calculations for NO_x and SO_2 Control

Unit	**Pollutant**	**2002 Emissions (tons)**	**NESCAUM Impact (dv)**	**Control Option**	**Annualized Cost of Control**	**Tons Removed (Actual)**	**Cost Effectiveness (Actual)**	**P.H. Glatfelter Estimated Visibility Improvement (dv) (Highest Day and 98th**	**Dollar/(dv) Cost 98th% Day**

								% Day)	
No. 1 Power Boiler	SO2	3584	0.554	Install a wet scrubber system. 90% Control	$5,375,398	3,225	$1,667/ton	0.458 / 0.219	24,545,196
	NOx	576	0.124	Year-round OEC. 37% Control	$416,293	213	$1,954/ton	0.016 //0.010	41,629,300

5. Conclusion:

The cost effectiveness of installing a wet scrubber system for SO_2 control on Number 1 Power Boiler, taking into account visibility improvement, was $24,545,196/dv. The cost effectiveness of operating the OEC system year-round for NO_x control on the Number 1 Power Boiler, taking into account visibility improvement, was $41,629,300/dv. This data, in addition to cost effectiveness values for emissions reduced and modeled visibility impacts, are shown in Table III.

Based on the five factor analysis, the impact of this facility does not warrant additional control. I recommend the following determination of BART for the P.H. Glatfelter facility: compliance with the existing operating permit for this facility. The following permit conditions pertain to the Number 1 Power Boiler. The current NO_x emission limitation is 0.66 lbs/mmBTU, based upon a 30 day rolling average. The current PM_{10} limitation for heat input between 50 and 600 mmBTU/hr is calculated by multiplying 3.6 times the heat input in terms of lbs/mmBTU raised to the –0.56 power. The current SO_x limitation has three provisions: the SO_x limit based on a thirty day running average is 3.7 lbs/mmBTU; the SO_x limit daily average not to be exceeded more than 2 days in any running 30 day period is 4.0 lbs/mmBTU; and the SO_x daily average not to be exceeded at any time is 4.8 lbs/mmBTU.

cc: Southcentral Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject: Review Memo for BART Application
Sunoco Inc.
100 Green St
PO Box 426
Marcus Hook, PA 19061

June 10, 2008

Operating Permit #: 23-00001

To: Francine Carlini
Environmental Program Manager
Bureau of Air Quality Control
Southeast Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Dan Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

Sunoco Marcus Hook Refinery is an oil refinery located in Marcus Hook, PA. It has thirty-six affected units.

The following are the Source ID numbers of the affected units.

TABLE I
2002 Actual Emissions

UNIT		NOx (tpy)	PM10 (tpy)	SO_2 (tpy)
045	12-3 DESULF. HEATER	6.1	0.5	0.1
075	17-2A,H-01 HEATER	153.8	6.2	0.7
076	17-2A,H-02 HEATER			
077	17-2A,H-03 HEATER			
078	17-2A,H-04 HEATER	4.5	0.3	
089	15-BH-7 BOILER	103.6	5.6	0.6
101	PLT. 10-4 FCC UNIT	1489.1	208.7	4373.9
104	12 PLANT FLARE	0.9	1.4	5.3
105	10 PLANT FLARE	0.6	1.0	4.7
110	PURGING, SAMPLING, ETC.			
111	COOLING TOWERS		42.0	
112	PROCESS DRAINS			
114	FACILITY-WIDE FUGITIVES			
121	TANK 139 INT FLOAT 6.5 MBBL			
146	TANK 344 INT FLOAT 180.67 MBBL			
147	TANK 351 INT FLOAT 180.67 MBBL			
148	TANK 352 INT FLOAT 180.69 MBBL			
149	TANK 353 INT FLOAT 197.95 MBBL			
150	TANK 354 INT FLOAT 197.99 MBBL			
151	TANK 355 INT FLOAT 198.95 MBBL			
181	TANK 593 INT FLOAT 130.1 MBBL			
203	TANK 12 FIXED ROOF 54 MBBL			
204	TANK 253 INT FLOAT 90.2 MBBL			
340	TANK 340 FIXED ROOF 198.8 MBBL			
349	TANK F-23 INT FLOAT 1.2 MBBL			
401	BENZENE BARGE LOADING			
402	BLIND CHANGING			
606	TANK 244 FIX ROOF 70 MBBL			
608	MARINE VESSEL LOADING			
609	TRUCK LOADING-TOLUENE/XYLENE			
610	TRUCK LOADING-TOLUENE			
612	TOLUENE-MARINE VESSEL			
613	GASOLINE-MARINE VESSEL LOADING			
614	NAPHTHA-MARINE VESSEL			
615	TRUCK LOADING - CYCLOHEXANE			
COB1	CO BOILER NO.1			

Total:	1758.6	265.7	4385.3

Source IDs 101 and COB1 will see significant reductions as a result of Consent Decree 05-CV-2866 with the USEPA. The consent decree mandated the installation of a wet scrubber and SCR on the FCCU/CO Boiler. This installation is required prior to 2013, but installation is expected sometime in 2009. Among the affected units, this unit contributed approximately 85% of the actual 2002 NO_x emissions, 99% of the 2002 actual SO_2 emissions, and 79% of the 2002 actual PM emissions. As a result, NO_x emissions from the FCCU unit will not exceed 20 ppmvd based on a 365-day rolling average or 40 ppmvd based on a 7-day rolling average, each at 0% oxygen and SO_2 emissions will not exceed 25 ppmvd based on a 365-day rolling average or 50 ppmvd based on a 7-day average, each at 0% oxygen. Additionally, PM emissions from the FCCU must meet the NSPS limit of 1 lb/1000 lb coke burn or lower.

3. <u>NESCAUM CALPUFF modeling</u>:

The Sunoco Marcus Hook Refinery has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 2.197 deciviews (dv). This impact is on the Brigantine wilderness area.

Three of the BART affected units were determined to be the most significant sources of concern for regional haze at this facility. These three units are Source ID numbers 075, 089, and 101. However, Source 089 was inactivated on 4/27/2005, so no further analysis was required for that boiler.

The visibility impact of the units with respect to the Class I area affected is described in Tables 2 and 3. Table 2 contains the visibility impact modeled with the National Weather Service (NWS) platform and Table 3 contains the visibility impact modeled with the University of Maryland (MM5) platform.

Table 2 – Maximum Daily Impact NWS Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
045	Brigantine	0.005	0.000	0.005	0.000
075	Brigantine	0.080	0.000	0.077	0.002
076		N/A	N/A	N/A	N/A
077		N/A	N/A	N/A	N/A
078	Brigantine	0.003	0.000	0.003	0.000
089		N/A	N/A	N/A	N/A
101	Brigantine	1.230	0.465	0.789	0.077
104	Brigantine	0.002	0.001	0.001	0.001
105	Brigantine	0.002	0.001	0.001	0.001
110		N/A	N/A	N/A	N/A
111		N/A	N/A	N/A	N/A
112		N/A	N/A	N/A	N/A

114		N/A	N/A	N/A	N/A
121		N/A	N/A	N/A	N/A
146		N/A	N/A	N/A	N/A
147		N/A	N/A	N/A	N/A
148		N/A	N/A	N/A	N/A
149		N/A	N/A	N/A	N/A
150		N/A	N/A	N/A	N/A
151		N/A	N/A	N/A	N/A
181		N/A	N/A	N/A	N/A
203		N/A	N/A	N/A	N/A
204		N/A	N/A	N/A	N/A
340		N/A	N/A	N/A	N/A
349		N/A	N/A	N/A	N/A
401		N/A	N/A	N/A	N/A
402	Brigantine	0.000	0.000	0.000	0.000
606		N/A	N/A	N/A	N/A
608		N/A	N/A	N/A	N/A
609		N/A	N/A	N/A	N/A
610		N/A	N/A	N/A	N/A
612		N/A	N/A	N/A	N/A
613		N/A	N/A	N/A	N/A
614		N/A	N/A	N/A	N/A
615		N/A	N/A	N/A	N/A
COB1		N/A	N/A	N/A	N/A
	Total:	**1.2918**			

*NOTE: Total CALPUFF impact may not equal the sum of unit level impacts due to the non-linear nature of the deciview index.

Table 3 – Maximum Daily Impact MM5 Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
045		N/A	N/A	N/A	N/A
075	Brigantine	0.085	0.000	0.082	0.003
076		N/A	N/A	N/A	N/A
077		N/A	N/A	N/A	N/A
078		N/A	N/A	N/A	N/A
089		N/A	N/A	N/A	N/A
101	Brigantine	2.114	1.436	0.803	0.100
104		N/A	N/A	N/A	N/A
105		N/A	N/A	N/A	N/A
110		N/A	N/A	N/A	N/A
111	Brigantine	0.019	0.000	0.000	0.019
112		N/A	N/A	N/A	N/A
114		N/A	N/A	N/A	N/A

121		N/A	N/A	N/A	N/A
146		N/A	N/A	N/A	N/A
147		N/A	N/A	N/A	N/A
148		N/A	N/A	N/A	N/A
149		N/A	N/A	N/A	N/A
150		N/A	N/A	N/A	N/A
151		N/A	N/A	N/A	N/A
181		N/A	N/A	N/A	N/A
203		N/A	N/A	N/A	N/A
204		N/A	N/A	N/A	N/A
340		N/A	N/A	N/A	N/A
349		N/A	N/A	N/A	N/A
401		N/A	N/A	N/A	N/A
402	Brigantine	0.000	0.000	0.000	0.000
606		N/A	N/A	N/A	N/A
608		N/A	N/A	N/A	N/A
609		N/A	N/A	N/A	N/A
610		N/A	N/A	N/A	N/A
612		N/A	N/A	N/A	N/A
613		N/A	N/A	N/A	N/A
614		N/A	N/A	N/A	N/A
615		N/A	N/A	N/A	N/A
COB1		N/A	N/A	N/A	N/A
Generic Stack	Brigantine	0.010	0.003	0.006	0.001
	Total:	**2.197**			

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

BART 5 Factor Analysis:

STEP – 1: Identify All Available Retrofit Control Technologies

17-2A,H-01 Heater (ID 075)		
NO_x	SO_2	PM
Water/Steam Injection	Fuel Specification	Good Combustion Practice
SNCR	Wet Scrubbing	Wet Scrubbing
ULNB		Cyclone
ULNB and SNCR		ESP
ULNB and SCR		FF

The above chart identifies the available retrofit control option with the practical potential for application to the 17-2A,H-01 Heater for NOx, SOx, and PM.

FCCU Unit and CO Boiler (IDs 101 and COB1)		
NO_x	SO_2	PM
None	None	None

The above chart identifies that there are no available retrofit control options that have practical potential for application to the FCCU Unit and CO Boiler for NOx, SOx, and PM.

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

17-2A,H-01 Heater (ID 075)	Technically Feasible/Infeasible
NO_x	
Water/Steam Injection	Infeasible
SNCR	Feasible

SCR	Feasible
ULNB	Feasible
ULNB and SNCR	Infeasible
ULNB and SCR	Feasible
SO_2	
Fuel Specification	Feasible
Wet Scrubbing	Infeasible
PM	
Wet Scrubbing	Infeasible
Cyclone	Infeasible
ESP	Infeasible
FF	Infeasible
Fuel Switching	Feasible

SNCR, SCR, ULNB, ULNB with SCR, and fuel specification are all considered technically feasible options because these control options have all been demonstrated as effective for process heaters.

ULNB with SNCR is not feasible because it has not been installed and operated successfully for process heaters and is therefore considered technically infeasible.

Wet scrubbing is not feasible because it has not been installed and operated successfully for process heaters and is therefore considered technically infeasible.

PM10 will serve as a surrogate for PM2.5. The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on the affected units is so small that no reasonable weighing of the five factors required by consideration in the BART analysis could justify additional controls under BART.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

17-2A,H-01 Heater (ID 075)	Control Effectiveness
NO_x Controls	
SCR	80%
SNCR	19%
ULNB	73%
ULNB and SCR	94%
SO_2 Controls	
Fuel Specification	Not considered further because NSPS standard

		already meets BACT.

A control efficiency of 73% for an Ultra Low NOx Burner is representative of the achievable level for that particular control device. A control efficiency of 94% for an Ultra Low NOx Burner and SCR is representative of the achievable level for that particular combination of control devices.

SNCR is an economically inferior option because it achieves very small NOx reductions with a higher cost than combustion controls. Therefore, it will be removed from consideration.

SCR alone is economically inferior to SCR in combination with combustion controls because it would require larger amounts of ammonia. Therefore, SCR will be removed from consideration.

Fuel specification is not considered a feasible option because current NSPS standards already meet BACT for SO2 reduction.

STEP – 4: Evaluate Impacts and Document the Results

17-2A,H-01 Heater (ID 075)	Cost Effectiveness ($/ton)	Cost of Visibility Improvement ($/dv)
NO_x Controls		
ULNB	4,791	9,159,501
ULNB and SCR	17,517	33,526,031

Using SCR would cause amounts of unreacted ammonia to be emitted into the atmosphere. Ammonia is a PM10 precursor. Also, ammonia emissions would create ammonia salts to be emitted into the atmosphere as PM10. There are also safety issues associated with transporting and handling aqueous and anhydrous ammonia. There are also space issues with installing SCR, which would make this control option infeasible.

There are no energy or non-air quality impacts associated with ULNB at this unit. The remaining useful life of the unit was not calculated because there are no plans to shutdown the 17-2A,H-01 Heater (ID 075) in the foreseeable future.

STEP – 5: Evaluate Visibility Impacts

The Department examined the possibility of the installation of an ULNB on Process Heater 075. Even though it was calculated that cost of an ULNB would be approximately $4791/ton of NO_x removed or $9,159,501/dv improvement, a complete heater rebuild would be required for the retrofit, which would make this option technically infeasible. This installation would cause an approximately 0.035 deciview visibility improvement. The basis of the visibility impact is the modeling conducted by Sunoco which was performed in accordance with NESCAUM's procedures and utilized the maximum daily impact. This is a relatively high cost for minimal visibility improvement.

5. Conclusion:

After careful review of the facility's engineering analysis, I recommend the following determination of BART for the Sunoco Marcus Hook Refinery: compliance with the terms of the EPA consent decree for the FCCU/CO Boiler (Source ID numbers 101 and COB1); and compliance with the existing operating permit for the 17-2A,H-01 Heater (Source ID number 075). The current NOx emission limitation for the heater is 0.25 lb/MMBtu (24 hour) when firing refinery gas. The current SO_2 emissions limitation for the heater is 500 ppmvd.

cc: Southeast Regional Office
Central Office

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES

Subject: Review Memo for BART Application
United Refining Company/Warren Plant
PO Box 780
Warren, PA 16365

June 11, 2008

Operating Permit #: 62-00017

To: John Guth
Environmental Program Manager
Bureau of Air Quality Control
Northwest Regional Office

Joyce Epps
Bureau Director
Bureau of Air Quality Control

From: Daniel Husted, Air Quality Engineer

Through: Krishnan Ramamurthy
Chief, Division of Permits
Bureau of Air Quality Control
Central Office

1. Background:

The Regional Haze regulation in 40 CFR 51.308(e) requires state implementation plans (SIPs) to contain emission limitations representing Best Available Retrofit Technology (BART) for certain sources that may reasonably be anticipated to cause or contribute to visibility impairment at a Class I area. The BART requirements apply to units that were in existence on August 7, 1977 but were not in operation before August 7, 1962 that collectively, at a facility, have the potential to emit more than 250 tons per year of a visibility impairing pollutant. Visibility impairing pollutants include: NOx, SO2, PM10, and PM2.5. VOC and NH3 may be visibility-impairing pollutants; however the Department has determined that modeling tools to assess the visibility impacts from VOC and NH3 adequately are not available at this time. The BART requirements only apply to sources in 26 specific categories listed in the Clean Air Act.

States are required to determine BART for each source subject to BART based on an analysis of the best system of continuous emission control technology available and associated emission reductions achievable. The analysis must take into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts, any pollution control equipment in use at the source, the remaining useful life of the source, and the degree of improvement in visibility which may reasonably be anticipated to result from use of the technology.

PA DEP requested that Pennsylvania sources subject to BART conduct the BART analysis required by the Regional Haze rule and submit a BART proposal.

2. Process Description:

United Refining Company/Warren Plant is an oil refinery located in Warren, PA. It has nine affected units.

The following are the Source ID numbers of the affected units.

TABLE I
2002 Actual Emissions

UNIT		NOx (tpy)	PM10 (tpy)	SO_2 (tpy)
034	BOILER NO.4	54.3	2.8	1.6
042	FCC HEATER (NEW UNIT)	15.2	1.1	0.5
049	EAST REFORMER HEATER	24.7	6.4	98.2
050	CRUDE HEATER - NORTH	103.9	48.6	748.2
051	PRETREATER HEATER	25.7	6.8	112.6
109	NSPS FUG EMISSIONS (VALVES/PUMPS/ETC)			
110	WASTEWATER FUGITIVE EMISSIONS			
206	FUEL STORAGE TANK #236			
207	FUEL STORAGE TANK #337			
	Total:	223.8	65.7	961.1

3. NESCAUM CALPUFF modeling:

The United Refining Company/Warren Plant has emission units at this facility that were originally constructed between 1962 and 1977. The total emissions from the date-eligible units of a single visibility impairing pollutant is over 250 tons per year, making all date-eligible units subject to the BART requirements that are a part of the Regional Haze rules specified in 40 CFR part 51, subpart P, Protection of Visibility.

Based upon NESCAUM CALPUFF modeling, the maximum combined impact of these units on a Class I area was 0.094 deciviews (dv). This impact is on the Presidential Range Dry River.

Two of the BART affected units were determined to be the most significant sources of concern for regional haze at this facility. These units are Source ID numbers 034 and 050.

The visibility impact of the units with respect to the Class I area affected is described in Tables 2 and 3. Table 2 contains the visibility impact modeled with the National Weather Service (NWS) platform and Table 3 contains the visibility impact modeled with the University of Maryland (MM5) platform.

Table 2 – Maximum Daily Impact NWS Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
034	Mingo Wilderness	0.002	0.000	0.001	0.000
042	Mingo Wilderness	0.000	0.000	0.000	0.000
049	Mingo Wilderness	0.006	0.006	0.001	0.000
050	Mingo Wilderness	0.047	0.044	0.003	0.001

051	Mingo Wilderness	0.007	0.007	0.001	0.000
109		N/A	N/A	N/A	N/A
110		N/A	N/A	N/A	N/A
206		N/A	N/A	N/A	N/A
207		N/A	N/A	N/A	N/A
	Total:	**0.059**			

*NOTE: Total CALPUFF impact may not equal the sum of unit level impacts due to the non-linear nature of the deciview index.

Table 3 – Maximum Daily Impact MM5 Platform (dv)

Source ID	Class 1 Area	Total	SO4	NO3	PM10
034	Shenandoah	0.006	0.000	0.006	0.000
042		N/A	N/A	N/A	N/A
049	Presidential Range	0.010	0.008	0.002	0.000
050	Presidential Range	0.068	0.060	0.007	0.001
051	Presidential Range	0.011	0.009	0.002	0.000
109		N/A	N/A	N/A	N/A
110		N/A	N/A	N/A	N/A
206		N/A	N/A	N/A	N/A
207		N/A	N/A	N/A	N/A
	Total:	**0.094**			

4. BART Analysis:

The Department performed a BART analysis in accordance with the Guidelines for BART Determinations Under the Regional Haze Rule issued by the EPA and available at http://www.epa.gov/air/visibility/actions.html#bart1. The guidelines provide a process for making BART determinations that States can use in implementing the regional haze BART requirements on a source-by-source basis, as provided in 40 CFR 51.308(e)(1). Pennsylvania must follow the guidelines in making BART determinations on a source-by-source basis for 750 megawatt (MW) power plants but are not required to use the process in the guidelines when making BART determinations for other types of sources. As a result, Pennsylvania retains the discretion to deviate from the guidelines as appropriate.

The Department's BART analysis took into account each of the five statutory factors required by the Clean Air Act (CAA). These factors are: the costs of compliance; the energy and non-air quality environmental impacts of compliance; any existing pollution control technology in use at the source; the remaining useful life of the source; and the degree of improvement in visibility which may reasonably be anticipated to result from the use of such technology. These statutory factors for BART were codified at 40 CFR 51.308(e)(1)(ii).

In addition for each source subject to BART identified in this review memo, Pennsylvania used the BART determination process under the guidelines to do the following: conduct an analysis of emissions control alternatives, which includes the identification of available, technically feasible retrofit technologies, and for each technology identified, an analysis of the cost of compliance, the energy and non-air quality environmental impacts, and the degree of visibility improvement in affected Class I areas resulting from the use of the control technology. As part of the BART analysis, Pennsylvania took into account the remaining useful life of the source and any existing control technology present at the source. For each source, Pennsylvania determined a ``best system of continuous emission reduction" based upon its evaluation of these factors. Pennsylvania also established emission limits, including a deadline for compliance, consistent with the BART determination process for each source subject to BART.

BART 5 Factor Analysis:

STEP – 1: Identify All Available Retrofit Control Technologies

Boiler Number 4 (ID 034)		
NO_x	SO_2	PM
FGR	None	None
SNCR		
SCR		
ULNB		

The above chart identifies the available retrofit control option with the practical potential for application to Boiler Number 4 for NOx, SOx, and PM.

Crude Heater North (ID 050)		
NO_x	SO_2	PM
ULNB	Fuel Switching	Fuel Switching

The above chart identifies the available retrofit control option with the practical potential for application to the Crude Heater North for NOx, SOx, and PM.

STEP – 2: Eliminate Technically Infeasible Options Identified under Step 1

Boiler Number 4	Technically Feasible/Infeasible
NO_x	
FGR	Feasible
SNCR	Feasible
SCR	Feasible
ULNB	Infeasible
Crude Heater North	
NO_x	
ULNB	Feasible

SO_2	
Fuel Switching	Feasible
PM	
Fuel Switching	Feasible

FGR, SNCR, and SCR are all considered technically feasible options for Boiler Number 4 because these control options have all been demonstrated as effective for boilers.

ULNB is not considered technically feasible for Boiler Number 4 because it would require a complete rebuild.

ULNB and fuel switching are considered technically feasible options for Crude Heater North because these control options have all been demonstrated as effective for process heaters.

PM10 will serve as a surrogate for PM2.5. The degree of visibility improvement that could be obtained by requiring additional particulate matter controls on the affected units is so small that no reasonable weighing of the five factors required by consideration in the BART analysis could justify additional controls under BART.

STEP – 3: Evaluate Control Effectiveness of Remaining Control Technologies

Boiler Number 4	Control Effectiveness
NO_x	
FGR	77%
SNCR	60%
SCR	75%
Crude Heater North	
NO_x	
ULNB	75%
SO_2	
Fuel Switching	99%

SNCR is an economically inferior to FGR because it achieves smaller NOx reductions with a higher cost. Therefore, it will be removed from consideration.

SCR is economically inferior to FGR because it would require large amounts of ammonia and cause ammonia slip. Therefore, SCR will be removed from consideration.

FGR would achieve 77% control efficiency. This is representative of the achievable emission reduction level for FGR.

A control efficiency of 75% for an Ultra Low NOx Burner on the Crude heater North is representative of the achievable level for that particular control device. A control efficiency of 99% for an fuel switching from residual oil to distillate oil on the Crude heater North is representative of the achievable level for that particular control option.

STEP – 4: Evaluate Impacts and Document the Results

Boiler Number 4	Cost Effectiveness ($/ton)	Cost of Visibility Improvement ($/dv)
NO_x		
FGR	2,200	67,000,000
Crude Heater North		
NO_x		
ULNB	3,266	50,000,000
SO_2		
Fuel Switching	4,441	55,000,000

The facility found no energy or non-air quality impacts associated with any of these control options. The remaining useful life of the sources were not calculated, so the Department has assumed that there are no plans to shutdown these sources in the foreseeable future.

STEP – 5: Evaluate Visibility Impacts

It would be possible to eliminate approximately 99% of the SO_2 by using distillate oil instead of residual oil in the facility's Crude Heater North. The cost of this change would be an estimated $4441/ton (on an actual basis) or $55 million/dv improvement for the Crude Heater North. This cost differs from an estimate provided in the April 16, 2007 MACTEC Report because MACTEC analyzed switching from low sulfur diesel fuel oil to ultra low sulfur diesel fuel oil. The Department looked at switching from residual oil to distillate oil. This change would eliminate 740 tons of SO_2.

The Department also examined installing an ultra low NO_x burner at Crude Heater North, source number 050. This technology would cost approximately $3266/ton of NO_x removed (on an actual basis) or $50 million/dv improvement, and it would improve visibility by 0.00525 deciviews.

The Department also found that flue gas recirculation on Boiler Number 4 is a possibility. However, the cost would be $2200/ton of NO_x (on an actual basis) or $67 million/dv improvement for a 0.0046 deciview visibility improvement.

The cost effectiveness calculations

5. Conclusion:

After careful review of the facility's engineering analysis, I recommend the following determination of BART for the United Refining Company/Warren Plant:

> Compliance with the existing operating permit for Boiler Number 4 (Source number 034). The current NO_x emissions limitation for the boiler is 0.173 lbs/MMBtu and 29.3 lbs/hr or 128.3 tpy based on a consecutive 12-month period. The current SO_2 emission limitation for the boiler is 4 lbs/MMBtu of heat input over any 1-hour period and 24.3 lbs/hr or 106.4 tpy based on a consecutive 12-month period.
>
> Compliance with the existing operating permit for Crude Heater-North (Source number 050). The current NO_x emissions limitation for the boiler is 0.226 lbs/MMBtu and 42.4 lbs/hr or 185.8 tpy based on a consecutive 12-month period. The current SO_2 emission limitation for the boiler is 4 lbs/MMBtu of heat input over any 1-hour period and 207.7 lbs/hr or 909.7 tpy based on a consecutive 12-month period.

cc: Northwest Regional Office
Central Office