United States Department of the Interior

FISH AND WILDLIFE SERVICE
National Wildlife Refuge System
Branch of Air Quality
7333 W. Jefferson Ave., Suite 375
Lakewood, CO 80235-2017

IN REPLY REFER TO:

FWS/ANWS-AR-AQ

August 2, 2010

Mr. John Hanger, Secretary
Pennsylvania Department of Environmental Protection
RCSOB 12th Floor, Box 8468
Harrisburg, PA 17105-8468

Dear Secretary Hanger:

On June 2, 2010, the Commonwealth of Pennsylvania submitted a revised draft implementation plan describing its proposal to improve air quality regional haze impacts at mandatory Class I areas across your region. We appreciate the opportunity to work closely with the Commonwealth through the initial evaluation, development, and, now, subsequent review of this plan. Cooperative efforts such as these ensure that, together, we will continue to make progress toward the Clean Air Act's goal of natural visibility conditions at all of our most pristine National Parks and Wilderness Areas for future generations.

This letter acknowledges that the U.S. Department of the Interior, U.S. Fish and Wildlife Service (FWS) and the National Park Service (NPS), have received and conducted a substantive review of your proposed Regional Haze Rule implementation plan in fulfillment of your requirements under the federal regulations 40 CFR 51.308(i)(2). Please note, however, that only the U.S. Environmental Protection Agency (EPA) can make a final determination regarding the document's completeness and, therefore, ability to receive federal approval from EPA.

As outlined in a letter to each State dated August 1, 2006, our review focused on eight basic content areas. The content areas reflect priorities for the Federal Land Management agencies, and we have enclosed comments associated with these priorities. We look forward to your response as per section 40 CFR 51.308(i)(3). For further information, please contact Tim Allen (FWS) at (303) 914-3802 or Pat Brewer (NPS) at (303) 969-2153.

TAKE PRIDE IN AMERICA

Again, we appreciate the opportunity to work with the Commonwealth of Pennsylvania and compliment you on your hard work and dedication to significant improvement in our nation's air quality values and visibility.

Sincerely,

Sandra V. Silva
Chief, Branch of Air Quality
U.S. Fish and Wildlife Service

Sincerely,

Christine L. Shaver
Chief, Air Resources Division
National Park Service

Enclosures

cc:
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FWS/ANRS-NR-AQ:SSilva:8/02/10:303-914-3801

U.S. Fish and Wildlife Service and National Park Service Comments
Pennsylvania Draft Regional Haze Rule State Implementation Plan
August 2, 2010

On April 22, 2008, the Commonwealth of Pennsylvania (PA) submitted a draft Regional Haze Rule State implementation plan (SIP), pursuant to the requirements codified in federal rule at 40 CFR 51.308(i)(2), to the U.S. Department of the Interior, U.S. Fish and Wildlife Service (FWS) and National Park Service (NPS). Shortly after receiving the draft SIP, the FWS and NPS Air Quality staff discussed concerns with the draft document during a telephone conference attended by PA Department of Environmental Protection (PADEP) staff. Subsequently, PA decided that the FWS and NPS concerns would be considered and another draft document would be sent to FWS and NPS at a future date.

We received the new draft on June 2, 2010. The FWS Branch of Air Quality and the NPS Air Resources Division staffs have conducted a substantive review of this most recent draft and our comments follow.

We look forward to the PADEP response as per section 40 CFR 51.308(i)(3), and as always, we are willing to work with the PADEP staff towards resolving the issues discussed below. For further information, please contact Tim Allen (FWS) at (303) 914-3802 or Pat Brewer (NPS) at (303) 969-2153.

Overall Comments

We commend PA for working with us to revise its April 2008 draft SIP to address many of the original concerns identified by previous consultation with the FWS and NPS. There is significant improvement in this revised draft in comparison to the previous document.

We continue to have concern over PA's approach towards meeting the controls identified by the Mid Atlantic Northeast Visibility Union (MANE-VU) Ask ("Ask"). Although we appreciate the Commonwealth's need to thoroughly review the effects of adopting additional major air quality controls, MANE-VU-generated progress goals are dependent on successful adoption and implementation of these controls. We believe that the Commonwealth's contribution to the success of the "Ask" is critical to achieving success in the region.

PA's Reasonable Progress consists of "pursuing, as appropriate and necessary, the four goals of the "Ask" Statement". We are concerned that commitments are only to "pursue" emission reductions, and there is no commitment to an enforceable mechanism that would ensure that the Commonwealth achieves these emission reductions.

We complement PADEP's discussion of the five factors in the Best Available Retrofit Technology (BART) analyses. However, it was not clear how PADEP applied the results of those five steps in making its final BART determination because all of the BART determinations led to conclusions that no additional controls represented BART, even when the five factor analysis led to results that have been accepted as BART by many other states. No indications

were given, nor could any be derived from the information presented, as to what level of cost and benefit, if any, would be acceptable as BART by PADEP.

PA does not specifically identify the inconsistency of using MANE-VU based Reasonable Progress Goal calculations. These final runs are based on Clean Air Interstate Rule (CAIR) and MANE-VU "Ask" control assumptions. These controls are presently not realized, nor are there commitments with implementation plans specified to accomplish these controls in the SIP. Therefore, more information should supplement the document that fully describes the uncertainty and whether the Commonwealth or the Regional Planning Organization has any efforts planned (or in progress) to minimize these uncertainties. Specifically addressing these future estimates with more specific projections in the Commonwealth's 2013 mid-term review is imperative.

Specific Comments

Section 5.0, Baseline and Natural Conditions
Section 6.0, Monitoring Strategy

PA does not have Class I areas, but does list Class I areas in the MANE-VU and Visibility and Tribal Association of the Southeast (VISTAS) States to which air pollution emissions from PA's sources contribute towards visibility impairment. It would be helpful to include a brief summary of IMPROVE data for the Class I areas that PA influences for the 20% worst and 20% best days. These data are available at the VIEWS website (http://views.cira.colostate.edu/web/). It is not clear if these data are present in section 6.2 that was omitted to reduce file size. It is also not clear if Section 6.4 is intended to meet the requirement to commit to future monitoring.

Section 8.0, BART

Due to the number of BART Sources in PA, the reviews were divided among the separate NPS and FWS Air Quality Offices. Please refer to Attachment 1 for the NPS BART review and Attachment 2 for the BART review of the sources done by FWS. As noted above, it was not clear to us how PADEP concluded what emission controls were feasible and cost-effective, and those that were not.

Section 9.0, Reasonable Progress Goals

PA and other MANE-VU states are using the modeled results for the "Ask" to set reasonable progress goals for 2018. It would be preferable to set reasonable progress goals based on the On the Books (OTB)/On the Way (OTW) assumptions. The MANE-VU scenario is problematic because it includes several control assumptions that are not reasonably OTW to implementation in the MANE-VU, MWRPO (Midwest Regional Planning Organization), and VISTAS states. Most problematic is MANE-VU's choice to unilaterally increase Electric Generating Unit (EGU) emissions in MRPO and VISTAS States without consideration of legally enforceable controls already in place in those States. Also of concern are the assumptions that MANE-VU States will reduce SO_2 from non-EGU sectors though low sulfur fuel requirements by 2018 and that MWRPO and VISTAS States will reduce SO_2 from their non-EGU sectors by comparable amounts. These reductions are not in progress. PA needs to address this discrepancy in its

discussion of Reasonable Progress, and it is good to read that PA will also be addressing the differences between reality and reasonable progress goals at the mid-course review.

The discussion PA supplied regarding the differences between the MANE-VU and VISTAS control assumptions used in setting 2018 reasonable progress goals was helpful.
PA should discuss how uncertainty in the federal CAIR program could affect the reasonable progress goals for the affected Class I areas. Please clarify whether PA's CAIR rule requires specific SO_2 and NO_x reductions independent of the status of the federal CAIR rule.

Section 10.0, Long Term Strategy

The Long Term Strategy Section is well written in that it defines the MANE-VU "Ask" and the major contributions to visibility impairment. There is a good discussion of related regulations and enforcement actions that will result in substantive emissions reductions in the Commonwealth. Although PA has committed to address this in the mid-course review, this SIP should still discuss the Commonwealth's efforts to implement the low sulfur fuel strategy of the MANE-VU "Ask".

We concur with PA's assessment that prescribed fire is a comparatively small contributor to visibility impairment in its geographic region and that residential wood smoke is the more important contributor. Does PA have plans to address residential wood smoke?

Attachment 1
To FWS/NPS Comments – Pennsylvania Draft Regional Haze SIP

NPS Best Available Retrofit Technology Comments

General Comments

We complement PA DEP for the clarity of its discussions of how it applied the five factors in the BART analyses in making its BART determinations. However, it was not clear how PA DEP applied the results of those five steps in making its final BART determinations because all of the BART determinations led to conclusions that no additional controls represented BART, even when the five factor analysis led to results that have been accepted as BART by many other states. No indications were given, nor could any be derived from the information presented, as to what level of cost and benefit, if any, would be acceptable as BART by PA DEP.

The core purpose of the BART program is to improve visibility in federal Class I areas, and BART is not necessarily the most cost-effective solution. Instead, BART represents a broad consideration of technical, economic, energy, and environmental (including visibility improvement) factors. We believe that it is essential to consider both the degree of visibility improvement in a given Class I area as well as the cumulative benefits of improving visibility across all of the Class I areas affected.

There are several Class I areas impacted by Pennsylvania's BART sources. We believe that it is appropriate to consider both the degree of visibility improvement in a given Class I area as well as the cumulative effects of improving visibility across all of the Class I areas affected. The same metric should not be used to evaluate the effects of reducing emissions from a BART source that impacts only one Class I area as for a BART source that impacts multiple Class I areas. Also, evaluating impacts at one Class I area, while ignoring others that are similarly significantly impaired, should not be done. Emissions savings from a source are benefits that will be spread well beyond only the most-impacted Class I area, and should be considered. While Pennsylvania presented data describing improvements to visibility at a specific Class I area that would result from the various control scenarios it investigated, the Commonwealth has not explained how it incorporated this information about impacts upon all Class I areas into its BART decision.

For example, Wyoming evaluated cumulative visibility improvement for both its BART and reasonable progress determinations—following are excerpts from those Wyoming determinations (with emphasis added):

- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged visibility improvement from the baseline **summed across the three Class I areas** achieved with LNB with separated OFA, upgraded wet FGD, and FGC for enhanced ESP (Post-Control Scenario A) was 1.070 Δdv from Unit 1, 0.199 Δdv from Unit 2, 1.068 Δdv from Unit 3, and 0.892 Δdv from Unit 4. [1]

[1] DEPARTMENT OF ENVIRONMENTAL QUALITY AIR QUALITY DIVISION BART Application Analysis AP-6040 May 28, 2009 NAME OF FIRM: PacifiCorp NAME OF FACILITY: Jim Bridger Power Plant

- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged 98th percentile visibility improvement from the baseline **summed across all four Class I areas** achieved with LNB with advanced OFA, dry FGD, and a new full-scale fabric filter, Post-Control Scenario A for each unit, was 3.558 Δdv from Unit 3 and 1.963 Δdv from Unit 4.[2]
- Visibility impacts were addressed in a comprehensive visibility analysis covering three visibility impairing pollutants and the associated control options. The **cumulative visibility improvement as compared to the baseline across Wind Cave NP and Badlands NP** achieved with new LNB with OFA at the 30-day limit of 0.23 lb/MMBtu (based on the 98th percentile modeled results) was 0.14 Δdv from each of the three units. The expected visibility improvement over the course of a full annual period would be even greater due to the annual BART limit that is based on 0.19 lb/MMBtu.[3]
- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged 98th percentile visibility improvement from the baseline **summed across both Class I areas** achieved with LNB with advanced OFA, wet FGD, and existing ESP with FGC (Post-Control Scenario A) was 1.716 Δdv from Unit 1 and 1.934 Δdv from Unit 2. [4]
- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged 98th percentile visibility improvement from the baseline **summed across both Class I areas** achieved with LNB with advanced OFA, upgrading the existing dry FGD, and a new full-scale fabric filter, Post-Control Scenario A for Unit 1, was 0.996 Δdv.[5]

Oregon considered cumulative benefits for the Boardman Power Plant SCR addition for reasonable progress:

> **Table 22: Visibility Modeling Results (percent improvement)** Total visibility impacts (sum of 98th percentile for all Class I areas)
>
> The BART guidelines recommend analyzing visibility improvement for the highest impacted Class I area with the assumption that any improvement in the worse impacted area would result in improvement in the lesser impacted areas. **However, since the Boardman Plant significantly impacts 14 Class I Areas within 300 kilometers, the Department tried to include other parameters that would assess the significance of the improvements for all Class I areas impacted. Therefore, the Department added the number of Class I areas with impacts greater than 1.0 delta deciview, the total delta deciviews for all Class I areas (98th percentile), and the average delta deciview**

[2] DEPARTMENT OF ENVIRONMENTAL QUALITY AIR QUALITY DIVISION BART Application Analysis AP-6041 May 28, 2009 NAME OF FIRM: PacifiCorp NAME OF FACILITY: Dave Johnston Plant

[3] DEPARTMENT OF ENVIRONMENTAL QUALITY AIR QUALITY DIVISION BART Application Analysis AP-6047 May 28, 2009 NAME OF FIRM: Basin Electric Power Cooperative NAME OF FACILITY: Laramie River Station

[4] DEPARTMENT OF ENVIRONMENTAL QUALITY AIR QUALITY DIVISION BART Application Analysis AP-6042 May 28, 2009 NAME OF FIRM: PacifiCorp NAME OF FACILITY: Naughton Power Plant

[5] DEPARTMENT OF ENVIRONMENTAL QUALITY AIR QUALITY DIVISION BART Application Analysis AP-6043 May 28, 2009 NAME OF FIRM: PacifiCorp NAME OF FACILITY: Wyodak Plant

for all Class I areas (98th percentile). As can be seen in Table 21, any one of the parameters is fairly representative of the other parameters perhaps with the exception of WFGD. Given these results, the Department does not believe that adding additional parameters, such as total deciview days, would result in any other conclusions and would probably just add confusion to the analysis (e.g., more days of impacts than are in a year). Using the results of the visibility modeling, the cost effectiveness of the control technologies is recalculated by relating the costs to deciview improvement (**Mt. Hood and all Class I areas**) as shown in the following 2 tables.[6]

Pennsylvania has ignored the other Class I areas where a given BART source is also causing or contributing to visibility impairment. The dollar cost per increment of visibility improvement would be substantially lower if full consideration is given to all affected Class I areas that would benefit from emission reductions. While we recognize that EPA has provided no guidance on this issue of assessing visibility benefits that would result in multiple Class I areas when emissions are reduced from a given BART source, we commend Wyoming and Oregon for their initiative in addressing the issue. We also recognize that there is no "perfect" method for addressing cumulative benefits, but we firmly believe that Pennsylvania must show how it considered the cumulative impact of the BART sources the affected Class I areas. We have suggested an approach to Pennsylvania that is consistent with available information and with the approach used by Wyoming and Oregon, and again request that Pennsylvania show how it has considered the cumulative benefits of potential BART reductions.

Based upon our reviews of BART analyses across the U.S., we believe that cost-per-deciview ($/dv) of visibility improvement is the most-common and most-useful parameter for assessing the cost-effectiveness of strategies to improve visibility in Class I areas. Our compilation[7] of BART analyses across the U.S. reveals that the **average cost/dv proposed by either a state or a BART source is $13 - $20 million**,[8] with a maximum of almost $50 million/dv proposed by Colorado at the Martin Drake power plant in Colorado Springs.

Comments on the BART determinations for individual facilities that are subject to BART follow. We are focusing our comments on the BART determinations for the cement and paper facilities because they have larger impacts than the other BART sources. (Also, Pennsylvania is the only state that has not proposed Selective Non-Catalytic Reduction (SNCR), or any additional controls, for all of its BART cement kilns.) We are also providing comments on some of the other BART sources. More detailed comments regarding our BART reviews follow.

[6] DEQ BART Report for the Boardman Power Plant Updated December 19, 2008

[7] See http://www.wrapair.org/forums/ssjf/bart.html

[8] For example, PacifiCorp has stated in its BART analysis for its Bridger Unit #2 that "The incremental cost effectiveness for Scenario 1 compared with the baseline for the Bridger WA, for example, is reasonable at $580,000 per day and $18.5 million per deciview."

AK Steel Corporation, Butler Works
BART 5 Factor Analysis:

STEP – 1: Identify All Available Retrofit Control Technologies
PA DEP: 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.
NPS: PA DEP should have included SCR in its analysis for the annealing furnace.[9]

STEP – 4: Evaluate Impacts and Document the Results
PA DEP: 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.
NPS: PA DEP should better explain these estimates.

Allegheny Ludlum Corporation, Brackenridge Facility
STEP – 4: Evaluate Impacts and Document the Results
PA DEP: Cost of Compliance: (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.

NPS: PA DEP should better explain these estimates.

Appleton Papers Inc. /Spring Mill
BART 5 Factor Analysis:
STEP – 1: Identify All Available Retrofit Control Technologies
NPS: PA DEP is incorrect in omitting Flue Gas Recirculation as a NO_X control option.[10]

STEP – 2: Eliminate Technically Infeasible Options

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[9] EPA **ALTERNATIVE CONTROLTECHNIQUES DOCUMENT -- NO_X EMISSIONS FROM IRON AND STEEL MILLS** At iron and steel mills, there are 2 SCR units in the U.S. An SCR unit is being used to control NO_X emissions from a gas-fired, radiant tube, continuous annealing furnace at a steel mini-mill in the United States. This furnace also has LNB's. Controlled emissions from this unit are about 33 ppm at 3 percent O_2. A second SCR unit, currently under construction, will be used to control NO_X emissions from an annealing furnace at an integrated steel plant in the United States. This furnace does not have LNB's. The unit has a guaranteed NO reduction of 90 percent.

[10] **BEST AVAILABLE RETROFIT TECHNOLOGYAT NON-EGU FACILITIES, April 19, 2010 WISCONSIN DEPARTMENT OF NATURAL RESOURCES** The Georgia Pacific Green Bay facility has a system of six boilers supplying power and electricity used in the manufacturing of consumer paper products. **Boiler B26 is a spreader stoker-fired unit manufactured by Babcock and Wilcox installed in 1962.** It is a two drum, balanced draft furnace, with a maximum rated heat input capacity of 350 mmBtu/hr. Boiler B26 burns washed coal 4 (eastern high and low fusion and western coals) and petroleum coke. After reviewing these potential options, the NO_x control approach with the largest emission reduction potential for each boiler is a **combination of flue gas recirculation and over-fire air (FGR/OFA) for boiler B26** and over-fire air (OFA) for boiler B27 followed by a full-sized selective catalytic reduction (SCR) system for treating the combined flue gas of both boilers. [emphasis added]

NPS: PA DEP is incorrect in stating that wet scrubbing is technically infeasible due to the size of Power Boiler #3. While the size of the boiler, and its emissions, will affect the economic feasibility of installing a wet scrubber, it will not affect the technical feasibility. Georgia Pacific is installing a wet scrubber on Power Boiler #4 at its Big Island, Virginia, paper mill. Mead Westvaco is upgrading the wet scrubber on the power boilers at its Covington, Virginia, paper mill.

STEP – 4: Evaluate Impacts and Document the Results
PA DEP: 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

NPS: PA DEP should better explain these estimates.

STEP – 5: Evaluate Visibility Impacts
PA DEP: 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.

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.

NPS: PA DEP should better explain these estimates.

Essroc Cement Corporation

Step 2 – Eliminate Technically Infeasible Options.
PA DEP: 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.

NPS: PA DEP is incorrect. As noted in our e-mail of 9/07/07 to PA DEP, Ash Grove Cement has installed a full-scale SNCR system on one of its Midlothian, Texas, kilns and, according to Ash Grove, "is achieving a 35% - 40% NO_X reduction on a consistent basis."[11]

[11] Overland Park, Kan., October 27, 2008, Ash Grove Cement Company Earns Working for Cleaner Air Award from North Texas Clean Air Coalition, Ash Grove Is First Texas Cement Manufacturer to Receive Award

Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies.
PA DEP: Removal efficiencies of the technically feasible NOx control technologies range from 18% to 35%.
NPS: PA DEP is incorrect. Both Colorado and Washington have proposed 40% NOx reductions for SNCR.

Step 4 – Evaluate Impacts and Document the Results.
PA DEP: The estimated cost of SNCR is $1,014 per ton of NOx removed.

NPS: PA DEP should better explain this estimate.

Step 5 – Evaluate Visibility Impacts.
PA DEP: 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, PA DEP does 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.

NPS: PA DEP is the only state to date to conclude that SNCR is not BART for a cement kiln. The results for the four other cement kiln BART analyses that we have reviewed are summarized below:

- Ash Grove has proposed to add SNCR at 35% control to its wet kiln in Montana City, MT.
- Holcim has proposed to add SNCR at 30% control to its wet kiln in Trident, MT.
- Colorado has proposed that CEMEX add SNCR at 40% control to its kiln near Lyons, CO.
- Washington Ecology has proposed that LeFarge add SNCR at 40% control to its wet kiln near Seattle, WA.

PA DEP has underestimated the effectiveness of SNCR and has provided no information on how it arrived at its cost estimates. Finally, even with these short-comings, the $1,014 per ton is lower than the $4,200/ton cost at Lefarge (WA) and the $7.5 million per deciview cost is below the national average of $13 million/dv for NO_X BART.

Recognizing Businesses That Do Their Share for Cleaner Air. Ash Grove's Midlothian plant is the first Texas cement manufacturer recognized in the five-year history of the program and received the award for the company's successful efforts to control nitrogen oxide (NOx) emissions. Ash Grove's Midlothian facility was one of the first wet process cement plants in the world to install Selective Non-Catalytic Reduction (SNCR) technology to successfully control ozone forming emissions.

Lehigh Cement/York Operations

Step 1 – Identify All Available Retrofit Control Technologies.
PA DEP: 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.
NPS: PA DEP's Table 3 is incomplete and does not include all of the eight NO_X control technologies identified by Lehigh in its January 2006 BART analysis. We are especially concerned that PA DEP omitted SNCR, which has been proposed as BART by every cement plant outside of PA that is subject to BART. PA DEP should explain why it omitted this critical technology.

Step 2 – Eliminate Technically Infeasible Options.
PA DEP: SNCR has not been used full time on long wet or long dry kiln systems.
NPS: PA DEP is incorrect. As noted in our e-mail of 9/07/07 to PA DEP, Ash Grove Cement has installed a full-scale SNCR system on one of its Midlothian, Texas, kilns and, according to Ash Grove, "is achieving a 35% - 40% NO_X reduction on a consistent basis."[12]

PA DEP: 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.

NPS: PA DEP is incorrect. Both Colorado and Washington have proposed 40% NOx reductions for SNCR.

Step 4 – Evaluate Impacts and Document the Results.
PA DEP: 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.

NPS: PA DEP failed to evaluate addition of SNCR without the Cadence fan system.

Conclusion:

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[12] Overland Park, Kan., October 27, 2008, Ash Grove Cement Company Earns Working for Cleaner Air Award from North Texas Clean Air Coalition, Ash Grove Is First Texas Cement Manufacturer to Receive Award Recognizing Businesses That Do Their Share for Cleaner Air. Ash Grove's Midlothian plant is the first Texas cement manufacturer recognized in the five-year history of the program and received the award for the company's successful efforts to control nitrogen oxide (NOx) emissions. Ash Grove's Midlothian facility was one of the first wet process cement plants in the world to install Selective Non-Catalytic Reduction (SNCR) technology to successfully control ozone forming emissions.

PA DEP: 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.

Step 5 – Evaluate Visibility Impacts.
PA DEP: 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.

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.

NPS: PA DEP is the only state to date to conclude that SNCR is not BART for a cement kiln. The results for the four other cement kiln BART analyses that we have reviewed are summarized below:

- Ash Grove has proposed to add SNCR at 35% control to its wet kiln in Montana City, MT.
- Holcim has proposed to add SNCR at 30% control to its wet kiln in Trident, MT.
- Colorado has proposed that CEMEX add SNCR at 40% control to its kiln near Lyons, CO.
- Washington Ecology has proposed that LeFarge add SNCR at 40% control to its wet kiln near Seattle, WA.

PA DEP has not evaluated SNCR and has provided no information on how it arrived at its cost estimates. Finally, even with these short-comings, the $10.1 million per deciview cost for the Cadence fan plus SNCR is below the national average of $13 million/dv for NO_X BART.

P.H. Glatfelter Company

STEP – 4: Evaluate Impacts and Document the Results
PA DEP: 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.
NPS: The third version revisions cited above were not received by NPS until they were requested on 7/28/10. Our review of those revisions has determined that PA DEP has overestimated the costs of wet scrubbing SO_2 from Power Boiler #1. The over-estimation results from several deviations from the OAQPS Control Cost Manual approach:

- PA DEP did not follow the Cost Manual in estimating installation costs. The Cost manual recommends multiplying the Purchased Equipment Cost (PEC) by 0.85 to estimate the Direct Installation Cost. Instead, PA DEP multiplied the PEC by a factor of 1.65.
- PA DEP assumed a 10% interest rate instead of the 7% rate recommended by the Cost Manual.
- PA DEP estimated operating labor time at 3 hours/shift versus the 0.5 hours/shift estimated by the Cost Manual.
- PA DEP estimated maintenance labor time at 1 hour/shift versus the 0.5 hours/shift estimated by the Cost Manual.
- The solid waste generation rate used by PA DEP is double the 8/17/2007 vendor estimate.

As a result of these deviations from the Cost Manual, PA DEP estimated a Total Annual Cost (TAC) of $5.4 million and cost-effectiveness = $1,667/ton of SO_2 removed. Our application of the Cost Manual (see electronic attachment) yielded a TAC = $3.6 million and cost-effectiveness = $1,127/ton of SO_2 removed.

STEP – 5: Evaluate Visibility Impacts

PA DEP: 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.

NPS: In addition to improving visibility at Shenandoah National Park (the Class I areas used by PA DEP), a similar visibility improvement was modeled at Brigantine Wildlife Refuge. PA DEP did not model additional visibility improvements at Dolly Sods and Otter Creek Wilderness Areas which had visibility impacts about half of those at Shenandoah and Brigantine.) The cumulative benefits of reducing SO_2 from Power Boiler #1 would be 0.44 dv at Shenandoah and Brigantine, with additional benefits at Dolly Sods and Otter Creek.

Conclusion:

PA DEP: 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.

NPS: Using the Cost Manual approach to estimate the cost of adding a 90% efficient wet scrubber to Power Boiler #1, the resulting cost-effectiveness at Shenandoah National Park is $17 million/dv is which is lower than the $20 million/dv average cost-effectiveness for all of the SO_2 controls we have seen proposed as BART nationwide. When one considers the cumulative benefits of improving visibility at the four Class I areas modeled by PA DEP, the cost-effectiveness drops below $9 million/dv, which is less than half of the $20 million/dv average cost-effectiveness for all of the SO_2 controls we have seen proposed as BART nationwide. We conclude that addition of a 90% efficient wet scrubber to Power Boiler #1 is BART.

ATTACHMENT 2
To NPS/FWS Comments – Pennsylvania Draft Regional Haze SIP

FWS Comments on Best Available Retrofit Technology (Section 8)

General Comments

No draft BART determination performed by the Pennsylvania Department of Environmental Protection (PADEP) resulted in a recommendation that BART controls be implemented on any emission unit. PADEP stated in Section 8.5.2 of the Proposed Revision to the State Implementation Plan for Regional Haze (June 2010) that, "The Department did not establish or utilize bright line thresholds for cost or for visibility improvement. Instead, the Department employed an approach that considered the multiple BART Guideline factors. As a result, sources with a higher degree of potential visibility improvement from control would justify higher cost controls. Conversely, only low cost controls would be justified for sources with a lower degree of potential visibility improvement." It seems that PADEP did not establish *any* objective criteria for determining the acceptability of a given control technology's cost effectiveness or cost of visibility improvement. The above PADEP statement would seem to imply that in the absence of *absolute* bright line thresholds, given all the BART sources in the State, visibility improvement at the *relatively* lowest cost facilities would result in BART controls at some subset of the BART-eligible units. Using that premise, it would seem reasonable that, at a minimum, the following facilities would qualify as the *relatively* lowest cost facilities for BART controls, in order of preference:

Lehigh Cement –Evansville Kilns #1 and #2	SNCR
CEMEX – Wampum Kiln #3	SNCR
Carmeuse Lime Kiln #5	SNCR
Carmeuse Lime Kiln #5	LNB
Sunoco Philadelphia Refinery Process Heater 2H-3	ULNB
CEMEX – Wampum Kiln #3	Water Injection
Sunoco Philadelphia Refinery Process Heater	2H-5 ULNB

It is interesting that in Pennsylvania (PA), NO_x controls on cement plants came out high in the BART cost rankings. Nationwide, many cement plants are controlling NOx from their kilns in their BART determinations, so in this sense if PA were to control NO_x from its cement plant kilns, the Commonwealth would be consistent with the rest of the nation.
Given the proximity of Class I areas to PA BART sources, many BART determinations showed the cost-effectiveness of visibility improvement was relatively expensive, even though the cost per ton of NO_x or SO_2 controlled was, in our opinion, very reasonable.
In judging cost-effectiveness of a given control technology as defined under the EPA BART Guidelines[1] in Step 4 (cost per ton of NO_x, SO_2 or particulate matter) and Step 5 (cost per deciview improvement), it is the position of the Federal Land Managers that if *either* of the cost-effective measures are reasonable then there is sufficient justification for implementing the control technology.

It's important to note that two facilities in PA (Lehigh Cement Company/Evansville and Glatfelter Pulp & Paper Mill) each have visibility impact on Brigantine National Wildlife Refuge and Shenandoah National Park of about 0.6 deciviews. Though PADEP concluded that cost per deciview of visibility improvement at one or the other Class 1 area exceeded what it considered reasonable for a single facility, deference should be given to the total impact on multiple Class 1 areas by a facility. In this particular case the additive cost per deciview improvement could bring a control technology within acceptable cost range, since cost per ton was already reasonable for several particular control technologies at these facilities.

Appendix J contains all of the PADEP Review Memos, but the original company BART determinations should also be in the record. Please make these available in an Appendix.

Please provide a discussion of how the five factors were used in making the BART determinations. Since there are so many sources, a summary based on source category may be sufficient with detailed information that could be included as an appendix.

On page 42, section 8.6, a large table lists BART eligible sources and their corresponding emission levels. It is not clear if these controls document existing levels or are implemented for BART. Please add a column that indicates whether these constitute new BART or existing controls.

Refineries

PADEP has declared in the RH SIP that the Refinery consent decree controls represent state-of-the-art-control and that this level of control constitutes BART.

<u>Sunoco Marcus Hook Refinery</u>
It is noted that the 2.197 deciview impact at the Brigantine Wilderness Class I area (using the MM5 modeling platform) by this refinery is the largest visibility impact of any facility in PA on a Class I area. The visibility improvement due to installation of the controls to be installed as part of the Environmental Protection Agency (EPA) Consent Decree (which is claimed to be BART) is not quantified. Please quantify this visibility improvement. The installation of Selective Catalytic Reduction (SCR) on the Fluidized Catalytic Cracking Unit (FCCU) under the Consent Decree should provide for excellent visibility improvement.

In comparing the Review Memo dated September 25, 2007, to the Review Memo dated June 10, 2008, the control efficiency assumption for using Ultra Low NO_x Burners (ULNB) on the process heaters went from 68% to 73%, respectively. However, the cost per ton and cost per deciview improvement shown under STEP 4 on page 8 did not change. A pro-rata calculation reflecting this change would show $8,532,138 per deciview improvement. This is not an unreasonable cost of visibility improvement. Also, the uncorrected $4,791 per ton of NO_x control seems to be about double the amount of some other such installations.

<u>United Refining Company</u>
In comparing the Review Memo dated September 25, 2007, to the Review Memo dated June 11, 2008, the only difference is that the latter added a Table 3 showing the visibility impact at the

Presidential Range to be about twice the impact at the Mingo Wilderness. However, cost per deciview improvement calculations went unchanged. It is, however, recognized that even a 2x reduction in the cost per deciview improvement would still result in very high values and would not change the conclusion.

The cost effectiveness figures for NO_x control via Ultra Low NO_x Burners at the Crude Heater are $3,266 per ton (PADEP 6/11/08 analysis). This seems high when compared with the $750 - $1,110 per ton costs developed in Table 3-6 in the MARAMA Assessment of Control Technology Options For Petroleum Refineries in the Mid-Atlantic Region (January 2007). The reason for such a discrepancy should be explained.

The Flue Gas Recirculation (FGR) alternative at $2,200 per ton of NO_x reduction might be considered to be reasonable if PADEP would consider the cost per ton to supersede consideration of a high cost per deciview improvement, as discussed in the General Comments section above.

Sunoco, Inc. – Philadelphia Refinery
Ultra Low NO_x burners on Heaters 2H-3 and 2H-5 seem reasonable on a cost per ton basis ($1,775 and 2,148, respectively) and the cost per deciview ($7.0MM and $8.5MM, respectively) is not considered as excessive. These controls should be implemented as BART.

ConocoPhillips Trainer Refinery
The Review Memo dated June 10, 2008 makes two references on pages 3 and 8 to setting a NO_x emission limit for the FCCU by May 2009. Since this date is past, the actual emission limit should be inserted or another date should be set.

Electric Generating Units

Pursuant to earlier comments by the Federal Land Managers, PADEP performed an additional BART analysis on behalf of most of the Electric Generating Units (EGU). This additional BART analysis considered an Electrostatic Precipitator enhancement alternative, along with an objective visibility improvement analysis of cost per deciview, rather than relying on the subjective argument of "imperceptibility to the human eye" of any visibility improvement. The PADEP analysis lacked backup data/information and references for arriving at the conclusions, but it could be argued that relatively small adjustments to the supporting data would likely not result in a different overall outcome.

The PADEP Review Memos for the EGUs (except for the Cheswick Plant) generally did not contain a final 'Conclusion' section as many other Review Memos did. We interpret the 'Conclusion' section as being a confirmation by PADEP management that the staff reviewer's recommendation was accepted as PADEP findings and conclusions. A more definitive statement by PADEP in Section 8.0 of the Proposed Revision to the State Implementation Plan for Regional Haze that all Review Memos are confirmed as PADEP conclusions could address this comment.

Reliant Energy/Portland Generating Station

The Company conclusion is that BART is the existing electrostatic precipitator. BART for NO_x and SO_2 is complying with requirements of the Clean Air Interstate Rule (CAIR). An assertion is made on page 1-1 that CAIR will also reduce emissions of sulfates/inorganic condensable PM_{10} emissions. CAIR does not regulate sulfates and no further reductions will occur at this plant anyway.

Allegheny Energy Supply/Hatfield Station Units 1, 2, and 3

The Company conclusion is that BART is existing control equipment, which is an electrostatic precipitator (ESP) and an under-construction Flue-gas desulfurization (FGD) system. BART for NO_x and SO_2 is CAIR. We commend Allegheny Energy Supply and its environmental consultant, EnviroMet for developing a *complete* BART determination with dominant alternatives and a least-cost envelope. It follows Appendix Y to Part 51 – Guidelines for BART Determinations Under the Regional Haze Rule – better than any other analysis that we have reviewed for PA.

The ESP Upgrade alternative of replacing T-R Sets and Controls looks to be a reasonable selection for BART given the $1,734 cost per ton figure. The $39 million cost per deciview at Otter Creek Wilderness may be high, but if visibility improvement at multiple Class 1 areas (i.e., Dolly Sods Wilderness, Shenandoah National Park and James River Face Wilderness) is considered, the cost of overall visibility improvement warrants further consideration.

PPL Generation LLC/Martins Creek SES Units 3 & 4

The Company conclusion is that BART is the use of existing #6 Fuel Oils. BART for NO_x and SO_2 is CAIR. Low annual capacity factors of units (21% & 15%, respectively) result in large control costs on a per ton basis when examining ESP and venturi scrubber technology. PADEP should develop emission limits commensurate with the low capacity use, given that the lower emissions were used, in part, to evade emission controls. The assumption of only 80% control efficiency for an ESP could be challenged with a more realistic 98% control efficiency, even though the Company made an argument for 80%. Nevertheless, it would not change the final conclusion that controls would be too expensive for the benefit. Neither the PPL Generation BART determination nor the PADEP BART determination indicates that the facility is closed. However, PADEP indicated on the FLM BART consultation conference call that the facility was closed. This should be documented in the BART determinations and in the permit limits for this facility.

Orion Power – Cheswick Plant

The PADEP Review Memo did not consider an upgrade to the existing ESP, but considered only the cost of a new baghouse. The EPA BART Guidelines[1] state that, ". . . you should consider ways to improve the performance of existing control devices, particularly when a control device is not achieving the level of control that other similar sources are achieving in practice with the same device. For example, you should consider requiring those sources with electrostatic precipitators (ESPs) performing below currently achievable levels to improve their performance."

[1] See 40 CFR Part 51, Appendix Y. See Section IV.D.Step 3.4.

Allegheny Energy – Mitchell Power Station
The reviewers did not locate a Company BART determination in the record. The PADEP Review Memo addressed the excessive cost of an ESP upgrade alternative.

Exelon Power – Eddystone Generating Station
The Exelon Power BART Evaluation document in section 5.5.1, and again on pages 9 and 10 of Appendix E, seemed to indicate that only one year of meteorological data was used in the meteorological modeling. Section 3 of PADEP's Review Memo seems to determine the visibility impact costs on a 98th percentile basis. If only one year of meteorological data was used, visibility impact costs should be based on the maximum 24-hour impact, rather than the 98th percentile value. We realize that the $141 million cost per deciview of improvement, even if modified by the above comment, would likely still be excessive. Nonetheless, it should still be corrected.

Cement Companies

Lehigh Cement Company/Evansville Pennsylvania Facility
PADEP's conclusion is that BART for particulate matter is the existing control equipment, which is a fabric filter meeting the National Emissions Standards for Hazardous Air Pollutants requirements (commonly refered to as "MACT" standards). PADEP concludes that no additional control equipment is justified for NO_x or SO_2 control.

A Selective Non-Catalytic Reduction (SNCR) system for the combined NO_x emissions from long dry preheater Kilns #1 and #2 should be given more consideration as being cost-effective. Certainly, the $627 per ton of NO_x removal is reasonable. The $14,267,800 per deciview improvement as shown in Table 3a and 3b of the PADEP Review Memo for BART Application is not unreasonable in the context of visibility improvement costs undertaken by some other BART determinations that have been made. Our most extensive information about the visibility costs of NO_x control for BART come from electric generation units. There are many instances of company-proposed BART NOx controls costing between $12 million and $35 million per deciview for visibility improvement at a single Class I area. In addition, as discussed in the General Comments above, a cost of $14,267,800 per deciview of visibility improvement and $627 per ton of NO_x control using SNCR for the Lehigh Cement – Evansville plant is one of the lowest costs-per-ton and visibility costs encountered among all of the BART determinations in PA. Therefore, if any BART controls are to be undertaken in the State, SNCR at this plant should be one of them.

An additional point should be made regarding visibility impact as measured by the calculation of cost per deciview. We continue to believe that it is appropriate to consider both the degree of visibility improvement in a given Class I area as well as the cumulative effects of improving visibility across all of the Class I areas affected. It simply does not make sense to use the same metric to evaluate the effects of reducing emissions from a BART source that impacts only one Class I area as for a BART source that impacts multiple Class I areas. And, it does not make sense to evaluate impacts at one Class I area, while ignoring others that are similarly significantly impaired. In this case, the visibility improvement of deploying SNCR on Kiln #1

and Kiln #2 should be aggregated over both Shenandoah National Park and Brigantine Wilderness Area. Using Table 3-5 of Lehigh Cement Company's original BART determination (January 2006), the visibility improvement (in 98th Percentile deciviews) of SNCR deployment was shown as follows:

	Shenandoah	Brigantine
Kiln #1	0.02	0.04
Kiln #2	0.02	0.04

The result is a cumulative 98th Percentile deciview impact due to the deployment of a common SNCR on both units of 0.12 deciviews. If the $971,310 annual cost of SNCR is divided by the 0.12 deciviews of visibility improvement, the result is $8,094,250 per deciview. This is well within a range deemed to be reasonable.

Lafarge Corporation/Whitehall Plant

PADEP's conclusion is that BART for particulate matter is the existing control equipment, which is a fabric filter meeting MACT, and that no additional control equipment is justified for NO_x or SO_2 control.

A Selective Non-Catalytic Reduction (SNCR) system for NO_x emissions from the dry preheater Kiln #2 should be given more consideration as being cost-effective. A cost of $1,804 per ton of NO_x removal might be considered to be reasonable. The $27,177,065 per deciview improvement as shown in the PADEP Review Memo for BART Application is somewhat high, but in consideration of the discussion in the General Comment section above, a reasonable cost per ton might be cause to recommend that the technology be deployed as BART, regardless of the cost per deciview.

Cemex/Wampum Cement Plant Kiln #3

Cemex determined that it could commit to water injection and process controls for 7% NO_x control and an as-yet undetermined technology for a 10% reduction in SO_2. The Company admitted that this is not a "typical" BART analysis and that CALPUFF modeling was not performed. In the absence of a full-company BART determination, PADEP performed a BART determination. PADEP concluded that SNCR at $1,014/ton NO_x reduction and $4,678,401 per deciview of visibility improvement is too expensive and no additional control of NO_x is warranted. The conclusion is incorrect. Both the $/ton and $/deciview are within an acceptable range for BART and should not be dismissed – especially in the absence of any state-defined guideline as to what cost ranges are considered acceptable for BART, per our discussion in the General Comments Section above. In addition, it seems that at a minimum, PADEP should accept the company's BART offer to install the water injection technology for a 7% NO_x reduction and an "as yet" determined 10% SO_2 control strategy, rather than concluding that no control technology is necessary.

Keystone Cement Company – Bath Facility

It was stated in the Keystone BART Proposal (page 2-5) that the anticipated shutdown of Kiln 2 was to occur no later than 2009. This shutdown is a result of a newpreheater/precalciner kiln that Keystone is constructing. However, PADEP listed proposed emission limits for Keystone Kiln 2

in the listing of proposed emission limits for each BART facility. Please confirm whether or not Kiln 2 has been shutdown, and, if so, the emission limits for Keystone Kiln 2 should be zero.

The following discussion of SNCR for Keystone Kiln 2 may be moot if it is to be replaced by a new kiln before the five year BART deadline. A Selective Non-Catalytic Reduction (SNCR) system for NO_x emissions from Kiln 2 should be given more consideration as being cost-effective. A cost of $1,014 per ton of NO_x removal might be considered to be reasonable. The $23,431,248 per deciview improvement as shown in the PADEP Review Memo for BART Application is somewhat high, but in consideration of the discussion in the General Comment section above, a reasonable cost per ton might be cause to recommend that the technology be deployed as BART, regardless of the cost per deciview.

Other Facilities

<u>Trigen-Philadelphia Energy Corp./Edison Boiler #3 & #4 & Schuylkill Boiler #26</u>
Trigen used a PADEP Reasonably Achievable Control Technology (RACT) benchmark limit of $1,500 per ton of NO_x as a bright line determination for judging the acceptability of BART control technologies in section 2.2.2. This is contrary to a statement in section 8.5.2 of the draft Pennsylvania Regional Haze SIP which states, "The Department did not establish or utilize bright line thresholds for cost or for visibility improvement." The $1,500 per ton cost would be within BART cost limits observed in national experience. The control effectiveness costs ($/ton) for various NO_x control alternatives are well developed, but seem consistently higher than commensurate values shown in EPA AirControlNET. Please discuss any differences or better document the references used to arrive at the stated costs. Lower, more reasonable costs could cause the Flue Gas Recirculation alternative to be a viable BART control.

Trigen did not further consider wet scrubber systems for SO_2 control as a BART alternative because it was not demonstrated in practice. Actually, wet scrubbing is successfully deployed on oil-fired boilers being operated in Japan, Cyprus and Korea. This should provide reason enough to perform cost analysis on this alternative.

<u>Carmeuse Lime, Inc./Annville Operation Lime Kiln #5</u>
PADEP proposed that no additional equipment be installed on Lime Kiln #5 for NO_x control, even though both low NO_x burners (LNB) and Selective Non-catalytic Reduction (SNCR) are technically feasible and cost-effective NO_x control alternatives for a long dry kiln. The Lafarge Cement Plant in Alpena, MI has proposed to install both technologies on five long dry kilns. Very recently, the literature has begun to accept that SNCR is a technically feasible alternative for NO_x control in long dry kilns. The most effective NO_x control is SNCR at a cost of $1,014 per ton of NO_x removed and $6,398,357 per deciview improvement at Dolly Sods Wilderness Area. LNB was shown to cost $1,318 per ton of NO_x removed and $8,315,000 annually per deciview improvement. All of the above figures are within reasonable cost per ton and cost per deciview improvement ranges for BART. Therefore, these control technologies should be considered.

The Portland Cement Association[2] noted that a relatively inexpensive, but effective NO_x control technique, is a 'high pressure air injection system' (also called a mixing air system) that can be installed on the kiln. Mixing air systems have shown significant emissions reduction up to 48% on the 13 kilns operating with this technology. This should have been considered among the BART NO_x control alternatives.

The proposed NO_x emission limit of 6.0 lb NO_x/ton of lime should be reconsidered if a NO_x control technology is accepted as BART.

United States Steel/Clairton Coke Works

Section 4 of the Review Memo stated that ACHD performed a BART analysis and the results are presented in that document. However, the record does not contain the detailed BART determination performed by ACHD on behalf of the Clairton Coke Works. Please provide this documentation in the record. Step 4 of the Review Memo states that annualized cost information was obtained from EPA's AP42 Manual. The EPA BART Guidelines state that, "The basis for equipment cost estimates also should be documented either with data supplied by an equipment vendor (i.e., budget estimates or bids) or by a referenced source (such as the *OAQPS Control Cost Manual*). In order to maintain and improve consistency, cost estimates should be based on the *OAQPS Control Cost Manual*, where possible. The *Control Cost Manual* addresses most control technologies in sufficient detail for a BART analysis."[3] You should assure that the cost estimates that were developed are accurate. Nevertheless, the cost per ton is very high, so minor changes in the costs will not likely change the final conclusions. In terms of cost per deciview improvement, please consider the effect on multiple Class I areas, rather than just Otter Creek, to determine the overall cost per deciview improvement.

ISG Plate, LLC – Coatesville

Section 4 of the Review Memo stated that PADEP performed a BART analysis and the results are presented in that document. However, the record does not contain the detailed BART determination performed by the Department on behalf of the ISG Plate – Coatesville Plant. Please provide that documentation in the record. PADEP should assure that the cost estimates that were developed are accurate as discussed above for the Clairton Coke Works. The cost per ton is very high, so relatively minor changes in the costs will not likely change the final conclusions.

Wet FGD for SO_2 control was analyzed in Step 3 of the Review Memo, but in Step 5 'dry' FGD is mentioned in the visibility analysis. This very possibly could be a typographical error. Wet FGD is capable of 98% removal, rather than the 90% assumed in the analysis, but again, even this change would not likely change the final conclusions.

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[2] "Summary of Control Techniques for Nitrogen Oxide" by Zephyr Environmental Corporation for the Portland Cement Association, 2008, p. 2.

[3] See 40 CFR Part 51, Appendix Y. The U.S. Environmental Protection Agency finalized its BART Guidelines on June 15, 2005, and published the preamble and final rule text in the Federal Register on July 6, 2005. The rulemaking action added Appendix Y to Part 51, titled "Guidelines for BART Determinations Under the Regional Haze Rule." See Section IV.D.Step 4.a.5.

In terms of cost per deciview improvement, please consider the effect on multiple Class I areas (i.e., Shenandoah National Park, Dolly Sods Wilderness Area and Otter Creek Wilderness Area), rather than just the Brigantine Wilderness Area, to determine the overall cost per deciview improvement.

Sunoco Chemicals – Frankford Plant

The cost analysis for NO_x and SO_2 control alternatives lacked detail in constructing the basis for Total Capital Investment. This information should be provided to allow a third party to check for reasonableness of the estimates. However, relatively minor adjustments to the NO_x alternatives would not likely result in a change to the final conclusion that the alternatives are too expensive. In the case of wet FGD for SO_2 control, $2,836 is not an unreasonable cost per ton of SO_2 removal, especially if a 98% control efficiency were used rather than the 90% figure assumed by the analysis. Again, if PADEP is willing to allow a reasonable cost per ton to supersede an excessively high cost of visibility improvement, then the wet FGD alternative could be considered.

No comments were made on:

Dyno Nobel, Inc. Nitric Acid Plant
First Energy Generation Corp – Bruce Mansfield Plant
PPL Generation LLC – Montour
Exelon Power - Eddystone Generating Station