



**NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF AIR QUALITY**

**BEST AVAILABLE RETROFIT TECHNOLOGY
PRELIMINARY DETERMINATION**

FOR

**PCS Phosphate
AURORA, BEAUFORT COUNTY
NORTH CAROLINA**

**THIS REVIEW WAS PERFORMED BY THE
AIR PERMITS SECTION
IN ACCORDANCE WITH 15A NCAC 2D .0543:
BEST AVAILABLE RETROFIT TECHNOLOGY**

October 12, 2007

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SECTION 1.0

INTRODUCTION

PCS Phosphate, Inc. is the world's largest fertilizer manufacturer. The Aurora facility is the largest integrated phosphate mine and chemical facility in the world. The facility operates a large number of processes for the production of fertilizer from the raw materials (e.g. phosphate rock from the mine) to intermediate products (e.g. sulfuric acid) to the finished products (e.g. diammonium phosphate). In addition, the facility manufactures and sells phosphoric acid and fluosilicic acid. PCS employs approximately 1,050 persons. The current operation, that is the active mine and manufacturing plant, occupy about 20,000 acres out of a total plant site of 50,000 acres. The facility is a Title V facility and operates under air permit 04176T34. PCS Phosphate submitted a BART evaluation Permit Application to the North Carolina Department of Environment and Environmental Resources Division of Air Quality Division of Air Quality (NCDAQ) on November 28, 2006.

The requirements for Best Available Retrofit Technology (BART) are set forth in 15A NCAC 2D .0543 "Best Available Retrofit Technology." This rule, currently State-Only enforceable, implements the BART provisions of 40 CFR 51.308(e) for emission sources that may cause or contribute to any visibility impairment in a mandatory Class I federal areas as determined using 40 CFR 51, Subpart P. "BART-eligible" sources are those sources built between 1962 and 1977 that have the potential to emit more than 250 tons per year of one or more visibility-impairing compounds including sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM), and volatile organic compounds (VOCs), and that fall within 26 industrial source categories (including Phosphate Rock Processing Plants). A review of the emission sources found that there were thirty one emission sources that were BART eligible.

Under the authority of 15A NCAC 2D .0543(c), a BART-eligible source can be exempted from the BART requirements based on dispersion modeling demonstrating that the source cannot reasonably be anticipated to cause or contribute to visibility impairment in a Class I area. The emissions from these sources were modeled using CALPUFF to determine if the emissions from the BART eligible emission sources contributed to perceptible visibility impairment to Class I areas. The results of this modeling indicated that the visibility impact of the BART eligible emission sources on the Swanquarter Class I area was 0.976 deciview (dv), which is greater than the threshold visibility value of 0.50 dv. This indicated that these emission sources contribute to visibility impairment to the Swanquarter Class I area. Since these emission sources could not be otherwise exempted from BART, a BART analysis was conducted in accordance with the requirements set forth in 15A NCAC 2D .0543.

1.1 BART Determination

The NCDAQ has made the determination that BART for the affected emission sources is **no additional controls**. DAQ also notes that even if additional controls were required, maximum reduction in visibility under all emission control scenarios, the resulting visibility impact on the Swanquarter Class I area would be reduced from 0.976 dv to 0.860 dv (0.116 dv reduction). NCDAQ proposes to issue an air permit with a specific permit condition that notes that the permittee has satisfied all of the requirements for BART and that no additional controls are

necessary. The remainder of this report contains a review by NCDAQ of the demonstration and analyses presented by PCS Phosphate. The response to the EPA comments may be found in Appendix A.

BART will be implemented through a modification to PCS Phosphate's Title V air permit. The Title V air permit application implementing BART must undergo adequate public participation. The NCDAQ solicits and encourages participation by the general public, industry, and other affected persons. Specific public notice requirements and a 30-day public comment period are required before the NCDAQ can take final action on this application. Appendix B contains a copy of the public notice.

SECTION 2.0

2.1 BART Affected Units

“BART-eligible” sources are those sources built between 1962 and 1977 that have the potential to emit more than 250 tons per year of one or more visibility-impairing compounds including sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM), and volatile organic compounds (VOCs), and that fall within 26 industrial source categories (including Phosphate Rock Processing). The PCS Phosphate operation contains thirty-one BART-eligible emission units. Listed below is a brief description of all the BART-eligible emission units that emit SO₂, NO_x, H₂SO₄ mist, or PM₁₀:

- **Sulfuric Acid Plant Nos. 3 and 4 (101, 102):** These double absorption plants produce sulfuric acid that is used in other production areas of the facility. Emissions of SO₂ are controlled by the double absorption process and emissions of sulfuric acid mist are controlled by mist eliminators. These units are in compliance with BACT limits and NSPS Subpart H emission limits for SO₂ and H₂SO₄ mist.
- **Lime Storage Silo Baghouse No. 4 (121):** This lime storage silo is located in the water treatment area and is controlled by a baghouse.
- **Calciner No. 1 (201):** This calciner is located in the mill area and processes phosphate rock. It is a vertical fluidized bed rock calciner and is permitted to fire coal, coke, “off-spec” used oils, used oil sludge, used glycols, and residual oil. The nominal throughput is 105.1 tons of feed per hour. The unit is controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator. This unit is in compliance with MACT Subpart AA PM limits.
- **Calciner No. 2 (202):** This calciner is located in the mill area and processes phosphate rock. It is a vertical fluidized bed rock calciner and is permitted to fire coal, coke, “off-spec” used oils, used oil sludge, used glycols, and residual oil. The nominal throughput is 105.1 tons of feed per hour. The unit is controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator. This unit is in compliance with MACT Subpart AA PM limits.
- **Calciner No. 3 (203):** This calciner is located in the mill area and processes phosphate rock. It is a vertical fluidized bed rock calciner and is permitted to fire coal, coke, and residual oil. The nominal throughput is 105.1 tons of feed per hour. The unit is controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator. This unit is in compliance with MACT Subpart AA PM limits.
- **Calciner No. 4 (204):** This calciner is located in the mill area and processes phosphate rock. It is a vertical fluidized bed rock calciner and is permitted to fire coal, coke, and residual oil. The nominal throughput is 105.1 tons of feed per hour. The unit is controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator. This unit is in compliance with MACT Subpart AA PM limits.

- **Calciner No. 5 (205):** This calciner is located in the mill area and processes phosphate rock. It is a vertical fluidized bed rock calciner and is permitted to fire coal, coke, and residual oil. The nominal throughput is 105.1 tons of feed per hour. The unit is controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator. This unit is in compliance with MACT Subpart AA PM limits.
- **Calciner No. 6 (206):** This calciner is located in the mill area and processes phosphate rock. It is a vertical fluidized bed rock calciner and is permitted to fire coal, coke, and residual oil. The nominal throughput is 105.1 tons of feed per hour. The unit is controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator. This unit is in compliance with MACT Subpart AA PM limits.
- **Rock Dryer (210):** The rock dryer fires fuel oil to dry wet phosphate concentrate in a fluidized bed system. It is controlled by a duplex cyclone followed by a venturi scrubber. This unit is in compliance with MACT Subpart AA PM limits.
- **Calcine Conveyor Transfer Station (CTS) (220):** This system transfers raw material from conveyor belt to conveyor belt and has enclosed transfer points to minimize fugitive emissions.
- **Calcine CTS baghouse (221):** This system transfers raw material from conveyor belt to conveyor belt and has enclosed transfer points. The baghouse controls fugitive dust emissions for transfers from belt 55 to 70-1.
- **Storage Silo Baghouses (222):** Calcined and dried rock is transferred between conveyor belts and storage silos and controlled with a baghouse on top of the storage silos.
- **Calcined/Dried Rock Transfer (223):** This system transfers raw material from conveyor belt to conveyor belt and has enclosed transfer points to minimize fugitive emissions.
- **Fugitives from Calciner Plant Area (291):** This emission point represents fugitive emissions from rock handling in the calciner area.
- **Diammonium Phosphate (DAP) No. 1 Plant (301):** Ammoniated phosphates are produced in the DAP plants by reacting anhydrous ammonia with phosphoric acid. This plant consists of a reactor, granulator, oil-fired dryer, material sizing and handling equipment, and cooler. The residual oil dryer has a nominal maximum input of 618 tons of fresh P_2O_5 and 275 tons of recycle per hour. These units are controlled by 4 Buell cyclones followed by a cyclonic/venturi type wet scrubber and a cyclonic-type tail gas scrubber. *Note that PCS has shut down this plant as required by its Title V permit; this plant is not included in this analysis.*
- **DAP No. 3 Plant (302):** Ammoniated phosphates are produced in the DAP plants by reacting anhydrous ammonia with phosphoric acid. This plant consists of first and second stage reactors, granulator, residual oil-fired dryer, material sizing and handling equipment, and a cooler. The dryer is controlled by a cyclone scrubber and a wet cyclonic scrubber. The sizing and handling equipment is controlled by a dual cyclone and a cyclonic wet scrubber installed in series. The cooler and other material handling points are controlled by a dual cyclone and a wet cyclonic scrubber. The reactors and granulator are controlled by a saturation chamber and a wet cyclonic scrubber installed in series. The scrubbers are vented

- to a cyclonic tail gas scrubber. This source is in compliance with 40 CFR 63, Subpart BB and BACT fluoride limits.
- **Superphosphoric Acid (SPA) No. 1, No. 2, No. 3, and No. 4 (330, 331, and 332):** Phosphoric acid is concentrated through one or two stage vacuum evaporation in the superphosphoric acid plants. SPA Plant Nos. 1 and 2 are each controlled by an eductor venturi type wet scrubber. The SPA plants No. 3 and No. 4 share one eductor venturi type scrubber. These sources are in compliance with 40 CFR 63, Subpart AA fluorides limits, Plants 3 and 4 are in compliance with BACT limits for SO₂, and Plant 4 is in compliance with NSPS Subpart U fluorides limits.
 - **Phosphoric Acid No. 1, No. 2, No. 3, and No. 4 Cross Flow Scrubber Stacks (401, 404, 406, and 409):** The Phosphoric Acid Plants produce green and amber phosphoric acid from the reaction of calcined or uncalcined phosphate rock and sulfuric acid. The phosphoric acid production is controlled by crossflow scrubbers. The phosphoric acid plants are in compliance with 40 CFR 63, Subpart AA, NSPS Subpart T, and BACT limits for fluoride.
 - **CTS- Grinder Loadout, Rock Loadout Station, CTS- Phosphate Rock Transfer Station Chute-Barge Rock Loadout, and Chute- Train Rock Loadout (650, 651, 652, 653, 655, and 656):** These emission units represent rock transfer points in the shipping area and are enclosed to minimize fugitive emissions.
 - **Rock Tower Loadout Facility (654):** Dried and calcined rock loadout enclosed transfer station where rock is transferred from conveyor belt 30 to the loadout chute located beneath a baghouse.

There are also several tanks in the shipping area tank farm (Emission Point ID 616) that are BART eligible units but do not emit SO₂, NO_x, H₂SO₄ mist, or PM₁₀. Many of the BART eligible units above are required to meet MACT, NSPS, and/or BACT emission limits and therefore are already well controlled.

2.2 BART exemption modeling analysis

The first step of the BART process was to determine if any of the affected BART-eligible sources could be exempted based on their contribution to visibility impacts on the Swanquarter Class I area. According to 40 CFR Part 51, Appendix Y, a BART-eligible source is considered to “contribute” to visibility impairment in a Class I area if the modeled 98th percentile change in *dv* is equal to or greater than the “contribution threshold.” The contribution threshold is understood to be 0.5 deciview and a threshold of 1.0 deciview is understood to cause visibility impairment. Any BART-eligible source determined to cause or contribute to visibility impairment in any Class I area is subject to a BART evaluation.

PCS Phosphate submitted a modeling protocol to NCDAQ on April 27, 2006. The objective of the modeling protocol was to obtain approval from NCDAQ on the modeling procedures that were used to conduct the BART exemption modeling for the PCS Phosphate facility. Upon review, DAQ requested that the protocol be revised since it deviated from the VISTAS protocol.

The revised protocol was submitted to DAQ on October 2, 2006. The final protocol incorporated guidance developed by VISTAS for conducting a BART modeling analysis. The results of the exemption modeling indicated that visibility impact from the emissions from the BART eligible emission sources on the affected Class I was 0.976 dv. Since this value exceeds the 0.5 dv contribution threshold for the Swanquarter Class I area, a BART evaluation must be conducted for each of the thirty one BART-eligible emission sources.

SECTION 3.0

REGULATORY ANALYSIS

3.1 Federal BART Applicability and Required Analysis

The Clean Air Act established goals for visibility in many national parks and wilderness areas. Through the 1977 amendments to the Clean Air Act, Congress set a national goal for visibility as “the prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution.” The Amendments required EPA to issue regulations to assure “reasonable progress” toward meeting the national goal. The Class I Areas affected by this facility is the Swanquarter National Wildlife Refuge.

One of the principal elements of the visibility protection provisions of the Clean Air Act addresses installation of best available retrofit technology (BART) for certain existing sources. “BART-eligible” sources are those sources built between 1962 and 1977 that have the potential to emit more than 250 tons per year of one or more visibility-impairing compounds including sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM), and volatile organic compounds (VOCs), and that fall within 26 industrial source categories (including Phosphate rock processing plants).

The BART requirements are found in 40 CFR 51.308(e) “*Best Available Retrofit Technology (BART) requirements for regional haze visibility impairment.*” In addition, the final BART implementation and guidance (40 CFR Part 51, Appendix Y) were published on July 6, 2005 and allow for a BART evaluation for any BART-eligible source that “emits any air pollutant which may reasonably be anticipated to cause or contribute to any impairment of visibility” in any mandatory Class I federal area. The guidance (40 CFR Part 51, Appendix Y) must only be followed by states for large fossil fuel fired electric steam generators, but is otherwise optional for other BART units.

According to 40 CFR Part 51, Appendix Y, a BART-eligible source is considered to “contribute” to visibility impairment in a Class I area if the modeled 98th percentile change in *dv* is equal to or greater than the “contribution threshold.” The contribution threshold is understood to be 0.5 deciview and a threshold of 1.0 deciview is understood to cause visibility impairment. Any BART-eligible source determined to cause or contribute to visibility impairment in any Class I area is subject to a BART evaluation.

Based on the results of the BART evaluations, States will develop Regional Haze State Implementation Plans (SIPs). States must submit plans to implement the Regional Haze Rule for EPA review and approval by January 2008.

3.2 North Carolina BART Applicability

The BART requirements are implemented through 15A NCAC 2D .0543 “Best Available Retrofit Technology.” This rule, currently State-Only enforceable, implements the BART provisions of 40 CFR 51.308(3) for emission sources that may cause or contribute to any visibility impairment in a mandatory Class I federal areas as determined using 40 CFR 51, Subpart P. “BART-eligible” sources are those sources built between 1962 and 1977 that have the potential to emit more than 250 tons per year of one or more visibility-impairing compounds including sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM), and volatile organic compounds (VOCs), and that fall within 26 industrial source categories (including Phosphate rock processing plants). A review of the emission sources found that there were thirty one emission sources that were BART eligible.

Under the authority of 15A NCAC 2D .0543(c), a BART-eligible source may be exempted from the BART requirements based on dispersion modeling demonstrating that the source cannot reasonably be anticipated to cause or contribute to visibility impairment in a Class I area. The emissions from these sources were modeled using CALPUFF to determine if the emissions from the BART eligible emission sources contributed to perceptible visibility impairment to Class I areas. The results of this modeling indicated that the emissions from the BART eligible emission sources contribute to visibility impairment at the Swanquarter Class I area.

Since these emission sources could not be otherwise exempted from BART, a BART analysis was conducted in accordance with the requirements set forth in 15A NCAC 2D .0543. Under this rule, NCDAQ has the maximum flexibility allowed under 40 CFR 51, Appendix Y.

3.3 Required Air Quality Permits

The BART requirements, if any, will be implemented through the Title V permitting process. Since BART will not be required for any of the BART-eligible sources, the Title V permit will be modified to indicate that there are no applicable BART requirements for the BART-eligible emission sources at PCS Phosphate.

SECTION 4.0

BEST AVAILABLE RETROFIT TECHNOLOGY ANALYSIS

4.1 Summary

The following table summarizes the results of the cost analyses for the BART eligible emission sources as provided in the BART evaluation Permit Application. DAQ has determined that the costs required to implement BART are prohibitive on both a \$/ton of pollutant controlled as well as in \$/deciview. If all controls are implemented at a capital cost of \$15.0 million with annual operating costs of \$6,727,958, the total emission would be reduced by 708.95 tons per year (\$ 9,490/ton) and the visibility impacts on the Swanquarter Class I area would be reduced by 0.116 dv, resulting in a cost effectiveness of \$ 81,811/ton/dv.

Table 4.1 PCS Phosphate BART Analysis				
BART Eligible Emission unit(s)	Existing regulation(s)	Existing controls	BART Control	Cost Effectiveness
Sulfuric Acid Plant Nos. 3 and 4 (101, 102)	BACT limits and NSPS Subpart H emission limits for SO ₂ and H ₂ SO ₄ mist.	double absorption process and emissions of sulfuric acid mist are controlled by mist eliminators	Dual Absorption Process with Cesium Promoted Catalyst SO₂ PM₁₀ (H₂SO₄ mist) current control technology represents BACT for PM₁₀ emissions from sulfuric acid plants NO_x No feasible controls for NO_x	\$4,108/ton SO ₂ (SA 3) \$5,584/ton SO ₂ (SA 4) (\$81,602/ton/dv)
Lime Storage Silo Baghouse No. 4 (121)		baghouse	There are no other feasible PM₁₀ control technologies for a source of this type and size. Therefore, BART is no additional control for this source.	
Calciner No. 1 (201) Calciner No. 2 (202) Calciner No. 3 (203) Calciner No. 4 (204) Calciner No. 5 (205) Calciner No. 6 (206)	MACT Subpart AA PM (all units)	The units are each controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator	PM₁₀ controls already in place which are the most stringent controls available SO₂ emissions are already controlled by the phosphate rock being dried and the existing venturi scrubber, additional SO ₂ control is impractical NO_x staged combustion	\$3,451/ton of NO _x reduction (\$156,842/ton/dv)

Table 4.1 PCS Phosphate BART Analysis				
BART Eligible Emission unit(s)	Existing regulation(s)	Existing controls	BART Control	Cost Effectiveness
Rock Dryer (210)	MACT Subpart AA PM	controlled by a duplex cyclone followed by a venturi scrubber	<p>potential retrofit control technologies for PM emissions from the rock dryer were not further evaluated since the unit is already equipped with the most stringent PM controls</p> <p>fluidized bed of rock provides approximately 90 percent inherent SO₂ control, and test data show that the SO₂ emissions are only 0.012 lb/MmBtu fuel oil fired. At this low emission rate, there would be no additional technically or economically feasible SO₂ emissions control option.</p> <p>NO_x staged combustion</p>	\$4,007/ton of NO_x (\$200,361/ton/dv)
Calcine Conveyor Transfer Station (CTS) (220)		enclosed transfer points to minimize fugitive emissions	PM₁₀ vent to a baghouse	\$161,060/ton PM₁₀ removed. (8,052,991/ton/dv)
Calcine CTS baghouse (221)		baghouse	no other technically feasible PM control technologies for sources of this type and size	
Storage Silo Baghouses (222)		baghouse	no other technically feasible PM control technologies for sources of this type and size	
Calcined/Dried Rock Transfer (223)		enclosed transfer points to minimize fugitive emissions	PM₁₀ vent to a baghouse	\$161,060/ton PM₁₀ removed. (8,052,991/ton/dv)
Fugitives from Calciner Plant Area (291):			no other technically feasible PM control technologies for sources of this type and size	
Diammonium Phosphate (DAP) No. 1 Plant (301)	Shut down as per Title V permit	<i>Note that PCS has shut down this plant as required by its Title V permit; this plant is not included in this analysis.</i>		

Table 4.1 PCS Phosphate BART Analysis				
BART Eligible Emission unit(s)	Existing regulation(s)	Existing controls	BART Control	Cost Effectiveness
DAP No. 3 Plant (302)	40 CFR 63, Subpart BB and BACT fluoride limits	The dryer is controlled by a cyclone scrubber and a wet cyclonic scrubber. The sizing and handling equipment is controlled by a dual cyclone and a cyclonic wet scrubber installed in series. The cooler and other material handling points are controlled by a dual cyclone and a wet cyclonic scrubber. The reactors and granulator are controlled by a saturation chamber and a wet cyclonic scrubber installed in series. The scrubbers are vented to a cyclonic tail gas scrubber.	additional PM control is technically infeasible and PM₁₀ emissions are already well controlled, BART for PM₁₀ emissions from the No. 3 DAP plant is no additional control. NO_x staged combustion SO₂ emission inherently low, additional SO₂ emissions control would be not technically or economically feasible	\$6,997/ton of NO _x (\$349,361/ton/dv)
Superphosphoric Acid (SPA) No. 1, No. 2, No. 3, and No. 4 (330, 331, and 332)	These sources are in compliance with 40 CFR 63, Subpart AA fluorides limits. Plants 3 and 4 are in compliance with BACT limits for SO ₂ , and Plant 4 is in compliance with NSPS Subpart U fluorides limits.	SPA Plant Nos. 1 and 2 are each controlled by an eductor venturi type wet scrubber. The SPA plants No. 3 and No. 4 share one eductor venturi type scrubber.	Due to the low levels of SO₂ emissions, there are no feasible retrofit control options;	

BART Eligible Emission unit(s)	Existing regulation(s)	Existing controls	BART Control	Cost Effectiveness
Phosphoric Acid No. 1, No. 2, No. 3, and No. 4 Cross Flow Scrubber Stacks (401, 404, 406, and 409)	40 CFR 63, Subpart AA, NSPS Subpart T, and BACT limits for fluoride	phosphoric acid production is controlled by crossflow scrubbers	caustic scrubber for controlling SO₂ emissions	\$10,974 per ton of SO₂ (\$213,462/ton/dv)
CTS- Grinder Loadout, Rock Loadout Station, CTS- Phosphate Rock Transfer Station Chute- Barge Rock Loadout, and Chute- Train Rock Loadout (650, 651, 652, 653, 655, and 656)		enclosed to minimize fugitive emissions	PM₁₀ emissions controlled by adding a baghouse to each of these emission points.	cost effectiveness ranges from over \$19,000/ton to almost \$3 million/ton PM₁₀ removed (\$2,271,849/ton/dv)
Rock Tower Loadout Facility (654)				

Note: The capital cost to install all feasible controls is \$15.0 million, and the annual operating cost is \$6.7 million. This represents a capital cost of \$81,811/ton/dv.

4.2 BART Analysis Overview

BART is defined as follows [40 CFR 51.301]:

“Best Available Retrofit Technology (BART) means an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each pollutant which is emitted by an existing stationary facility. The emission limitation must be established, on a case-by-case basis, taking into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use or in existence 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.”

The BART analysis was conducted with consideration of the six requirements identified above and the five steps identified in 40 CFR 51 Appendix Y “Guidelines for BART Determinations Under the Regional Haze Rule.” Again, these guidelines are not the exclusive means of defining BART for facilities other than Electric Generating Units. However, they provide a convenient structure to consider.

- Step 1—Identify All Available Retrofit Control Technologies,
- Step 2— Eliminate Technically Infeasible Options,
- Step 3— Evaluate Control Effectiveness of Remaining Control Technologies,
- Step 4— Evaluate Impacts and Document the Results, and
- Step 5—Evaluate Visibility Impacts.

Each of these steps is discussed in further detail in the sections presented below.

4.2.1 Step 1 – Identify All Available Retrofit Control Technologies

Appendix Y to 40 CFR 51 defines an available retrofit control option as an air pollution control technology with a practical potential for application to the emissions unit and the regulated pollutant under evaluation. Technologies available for compliance with Best Available Control Technology (BACT) or Lowest Achievable Emission Rate (LAER) regulations should be included as part of the BART analysis. Furthermore, technologies that are evaluated should include existing controls for the source category in question as well as the transfer of controls that have been applied to similar source categories and gas streams. However, control technologies which have not yet been applied to full scale operations are not required to be included in the evaluation.

Potentially applicable control technologies can be grouped into one of three categories:

- **Pollution Prevention.** As stated in the regulation this is “*use of inherently lower-emitting processes/practices, including the use of control techniques (e.g., low-NO_x burners) and work practices that prevent emissions and result in lower "production-specific" emissions.*”
- **Add-on Control Technologies.** “*Use of (and where already in place, improvement in the performance of) add-on controls, such as scrubbers, fabric filters, thermal oxidizers and other devices that control and reduce emissions after they are produced.*”
- **Combinations of the previous two categories.**

Sources that were used to determine the potentially applicable control technologies for the PCS Phosphate analysis include the Environmental Protection Agency’s RACT/BACT/LAER Clearinghouse (RBLC) and control technology vendors.

4.2.2 Step 2 – Eliminate Technically Infeasible Options

Step 1 of the BART analysis identifies all of the control technologies that are potentially available for the BART eligible emission units. In step 2 of the analysis this list is further refined to include only those technologies which are technically feasible. Appendix Y of 40 CFR 51 defines a technically feasible control technology as:

“Control technologies are technically feasible if either (1) they have been installed and operated successfully for the type of source under review under similar conditions, or (2) the technology could be applied to the source under review. Two key concepts are important in determining whether a technology could be applied: "availability" and

"applicability." ...a technology is considered "available" if the source owner may obtain it through commercial channels, or it is otherwise available within the common sense meaning of the term. An available technology is "applicable" if it can reasonably be installed and operated on the source type under consideration. A technology that is available and applicable is technically feasible."

Control technologies that are deemed technically infeasible in this step of the evaluation must include specific data stating that the technology is either commercially unavailable or outline the specific circumstances that preclude its application. Facilities may demonstrate that a particular technology is infeasible due to *"unresolvable technical difficulties with applying the control to the source (e.g., size of the unit, location of the proposed site, operating problems related to specific circumstances of the source, space constraints, reliability, and adverse side effects on the rest of the facility)."*

Implications of cost effectiveness should not be included in this step of the analysis.

4.2.3 Step 3 – Evaluate Control Effectiveness of Remaining Control Technologies,

Control technologies determined to be not technically infeasible in step 2 of the analysis are further evaluated in step 3. As stated in the guidance, the two main issues in step 3 of the process are as follows:

- Making sure that you express the degree of control using a metric that ensures an “apples to apples” comparison of emissions performance levels among options, and
- Giving appropriate treatment and consideration of control techniques that can operate over a wide range of emission performance levels.

The analysis should be based on the maximum level of control that a technology is capable of achieving.

4.2.4 Step 4 – Evaluate Impacts and Document the Results

For the control technologies determined to be commercially available and technically feasible, the affected facility must conduct the following analyses to select the control technology that meets the requirements of BART.

The analysis evaluates four impacts that would potentially result from the installation of a control technology.

- Impact analysis part 1: Costs of compliance,
- Impact analysis part 2: Energy impacts,
- Impact analysis part 3: Non-air quality environmental impacts, and
- Impact analysis part 4: Remaining useful life.

Appendix Y to 40 CFR 51 presents detailed guidelines for conducting the evaluation of each potential impact. The analysis presented later in this section for each available and technically feasible control technology identified for the BART eligible emission units follows these guidelines with the greatest flexibility.

4.2.5 Step 5 – Evaluate Visibility Impacts

Once the facility has completed the steps outlined above and an available, technically feasible control technology has been selected, then the visibility improvements are evaluated in this final step.

Baseline emissions and the visibility impacts are compared to the predicted visibility impacts from the emission sources with the control technology installed. If the net visibility improvement is less than that which would contribute to visibility impairment (as defined in the preamble to Appendix Y) then there is no need for the facility to implement the control technologies because the resulting visibility impacts would be negligible.

4.3 BART Analysis for Sulfuric Acid (SA) Plants Nos. 3 and 4

The SA Plants Nos. 3 and 4 (Emission Point IDs 101 and 102) emit PM₁₀/H₂SO₄ mist, SO₂, and NO_x. As stated previously, the units use the double absorption process to control SO₂ and mist eliminators to control H₂SO₄ mist (PM₁₀) to meet BACT and NSPS limits for SO₂ and H₂SO₄ mist. The principal steps in the sulfuric acid production process consist of burning sulfur (S) in air to form sulfur dioxide (SO₂), combining the sulfur dioxide with oxygen (O₂) to form sulfur trioxide (SO₃), and combining the sulfur trioxide with water (H₂O) to form a solution containing sulfuric acid (H₂SO₄).

4.3.1 Sulfur Dioxide Emissions

Sulfur dioxide is formed when elemental sulfur is sprayed into a horizontal spray-type burner, the sulfur dioxide gas exits the burner compartment at a higher temperature than the optimum for conversion and it enters a heat recovery boiler to be cooled off. Upon exiting the recovery boiler, the sulfur dioxide rich gas enters the first converter where it is partially converted to SO₃. Not all the SO₂ is converted to SO₃; the conversion into SO₃ is a function of the catalyst and oxygen present during the reaction.

A summary of recent BACT determinations for SO₂ emissions from sulfuric acid plants is provided in Table 4-2.

RBLC ID	Process Name	Control Method Description
FL-0172	Sulfuric Acid Plant, Double Absorption Method	Double absorption towers/fiber mist eliminators. Emission limit in lb/ton of 100% H ₂ SO ₄ produced. Additional basis: NSPS.
FL-0194	Sulfuric Acid Plant, Double Absorption Process	Double absorption part of process.
FL-0197	Sulfuric Acid Plant, Contact Process	Double absorption process. Limit is on 24 hr basis. Limit is lb/ton of 100% H ₂ SO ₄ per day.
FL-0210	Sulfuric Acid Plant	Double absorption towers/fiber mist eliminators. Emission limit in lb/ton of 100% H ₂ SO ₄ produced.
ID-0015	300 Sulfuric Acid Plant (single contact process)	Dynawave reverse-jet scrubber followed by an Ammsox packed-bed ammonia scrubber.
ID-0015	400 Sulfuric Acid Plant	Double contact process
NC-0088	Sulfuric Acid Plant, No. 4	Dual absorption catalyst
NC-0099	Sulfuric Acid Plant No. 3	Fiberglass packed mist eliminators and a mesh pad installed on the final absorbing tower.

The prevalent control technology for SO₂ emissions from sulfuric acid plants is a dual absorption system with a catalyst, which is employed at SA Plants Nos. 3 and 4. Other technologies have been identified as potentially applicable control technologies for SO₂ emissions from sulfuric acid plants. The following technologies are evaluated:

- Sodium Sulfite-bisulfite scrubbing
- Molecular sieve
- Ammonia scrubbing
- Dual absorption process with cesium catalyst

Sodium Sulfite-Bisulfite Scrubbing

In the sodium sulfite-bisulfite scrubbing process, SO₂ is removed by scrubbing the exhaust gases with a sodium sulfite solution. The resulting sodium bisulfite solution is fed to a heated crystallizer where sodium sulfite crystals are formed with the release of SO₂ and water vapor. The crystals are separated from the mother liquor and dissolved in the recovered condensate for recycle to the absorber. The recovered wet SO₂ is recycled to the acid plant. In all processes employing sulfite-bisulfite absorption even without regeneration, some portion of the sulfite is oxidized to sulfate, from which SO₂ cannot be regenerated in the heating sequence. This sulfate must be purged from the system. Some thio-sulfate can also be formed in the process. The extent of oxidation is dependent on several factors (some which may be difficult to control) such as the oxygen content of the gas stream, the temperature and residence time of the liquor in the recovery sections, and the presence of contaminants that may act as oxidizing catalysts. The formation of oxides, which readily precipitate from solution, can result in plugging and operational problems. Since promulgation of the NSPS for sulfuric acid manufacturing, two plants have used the sodium sulfite-bisulfite control technology. The sodium sulfite-bisulfite system at one of the plants experienced operational difficulties and was subsequently replaced by an ammonia scrubber. The other plant is a part of an Army ammunition production facility and has not been used since 1994.

Sodium sulfite-bisulfite control technology is rejected from further consideration in this analysis because it has not been demonstrated commercially as providing reliable emissions control of less than 4.0 lb SO₂/ton of 100 percent H₂SO₄ produced at a sulfur-burning sulfuric acid manufacturing plant. SA Plants 3 and 4 are currently limited to 4.0 lb SO₂/ton H₂SO₄ by NSPS Subpart H and have daily SO₂ mass emission limits that are equivalent to 3.8 lb SO₂/ton H₂SO₄ at production capacity.

Molecular Sieves

This process utilizes a proprietary molecular sieve system in which SO₂ is adsorbed on synthetic zeolites. The adsorbed material is desorbed by purified hot tail gas from the operating system and sent back to the acid plant. Since the promulgation of the sulfuric acid plant NSPS, one new unit was built with a molecular sieve system to control SO₂. However, extensive operational difficulties with the system caused this plant to be retrofitted with a dual absorption system for SO₂ control. The dual absorption system was retrofitted in January 1979 and has operated satisfactorily since that time. Since molecular sieve control technology has not been commercially demonstrated, this option is considered technically infeasible for reducing SO₂ emissions from SA Plants 3 and 4 and is rejected from further consideration.

Ammonia Scrubbing

The ammonia scrubbing process uses anhydrous ammonia (NH₃) and make-up water in a two-stage scrubbing process to remove SO₂. The typical SO₂ removal efficiency of this control technology is not as high as conventional dual absorption technology; however, several facilities in the U.S. have used this technology to meet the NSPS for sulfuric acid manufacturing plants.

According to MECS, Inc., sulfur-burning sulfuric acid manufacturing plants that have used ammonia scrubbing technology have applied the technology as a retrofit to “existing” plants that were based on single absorption technology that had to improve emissions control to achieve the NSPS limit of 4.0 lb SO₂/ton of 100 percent H₂SO₄ produced and comply with the more stringent state limit of 3.8 lb SO₂/ton of 100 percent H₂SO₄ produced. Due to operational difficulties and high costs associated with operating ammonia scrubbing systems, all but two single absorption plants using ammonia scrubbing technology have been shut down, and the two existing plants still in operation are required to meet the both the NSPS emission limit of 4.0 lb SO₂/ton of 100 percent H₂SO₄ produced and the state limit of 3.8 lb SO₂/ton of 100 percent H₂SO₄ produced. Consequently, ammonia scrubbing is rejected from this analysis because it is commercially undemonstrated on dual absorption plants, because of operational difficulties that have been experienced by other sulfuric acid manufacturers, and because it is unknown whether additional control of SO₂ emissions would be achieved by a retrofit with this type of system.

Dual Absorption Process with Cesium Promoted Catalyst

Dual absorption technology is widely accepted as BACT for sulfuric acid plants. Conceptually, dual absorption is the addition of another converter and absorbing tower to the exhaust from a single absorption plant. Vanadium-based catalysts are used in virtually all existing dual absorption systems, including SA Plants Nos. 3 and 4. Cesium-promoted catalysts have recently been used, and provide higher levels of control. There are no by-products or waste scrubbing materials produced by the dual absorption process. Spent catalyst is not treated as hazardous waste. The cesium-promoted catalyst was developed specifically for lower temperature operations which can lead to greater SO₂ conversion and hence lower SO₂ emissions to the atmosphere. The cesium salt promoter reduces the required operating temperature for the sulfuric acid catalyst by as much as 40°C (70°F). Higher SO₂ conversion is possible at lower temperatures as long as the catalyst is “active.” The cesium-promoted catalysts are sufficiently active at these lower temperatures (390-410°C/735-770°F) to take advantage of this conversion “opportunity.”

PCS Phosphate conducted analyses based on this retrofit technology for SA Plants Nos. 3 and 4 using the existing vanadium catalyst in beds 1, 2, and 3 to reduce the bed inlet temperature (saving energy and start-up time) followed by cesium catalyst in beds 4 and 5 (at a low inlet temperature) to maximize the SO₂ conversion and provide SO₂ emission reductions. PCS indicated that they made an inquiry regarding the retrofit of the existing vanadium-based control systems at SA Plants Nos. 3 and 4 with cesium catalyst was made to MECS, Inc. to specifically determine the feasibility of reducing SO₂ emissions to 2.0 lb SO₂/ton H₂SO₄ (the level of control a new plant would likely be able to reach). In order to achieve this reduction the existing vanadium catalyst in beds 1, 2, and 3 would have to be replenished, and that in beds 4 and 5 would have to be removed, properly disposed of, and replaced with super cesium catalyst. PCS indicated that, according to MECS, Inc., this magnitude emissions reduction would also require a decrease in Plant Nos. 3 and 4 production levels from a throughput of 2000 ton H₂SO₄/day and 1850 ton H₂SO₄/day, respectively, down to 1650 ton H₂SO₄/day per plant. This level of emission reduction has been rejected as a feasible control option because decreasing the production rates is not economical or practical.

PCS also investigated the feasibility of reducing the SO₂ emissions in plants 3 and 4 to 3.5 lb SO₂/ton H₂SO₄. An inquiry into this magnitude of emissions reduction was also submitted to MECS, Inc. This magnitude emissions reduction requires the replenishment of vanadium

catalyst in beds 1, 2, and 3, and also requires the purchase and installation of super cesium catalyst in beds 4 and 5. This reduction is feasible as it does not require a decrease in the productivity of the plants. The economic impacts of modifying the catalyst beds in both SA plants 3 and 4 was determined by PCS. The capital cost is \$1,441,100 for plant No.3 and \$1,447,308 for plant No. 4. The annual operating costs would be \$451,852 and \$564,014 for plants 3 and 4 respectively.

Installing these controls would result in a visibility improvement of 0.059 dv. The cost effectiveness of this control technology retrofit is \$4,108/ton SO₂ and \$5,584/ton SO₂ for SA plants 3 and 4, respectively (calculated based on a reduction from 3.8 to 3.5 lb/ton). The overall cost effectiveness would be \$4,815/ton, and \$81,610 /ton/dv.

4.3.2 PM₁₀ Emissions

The PM₁₀ emissions from sulfuric acid plants are made up primarily of sulfuric acid mist. Sulfuric acid mist is created when sulfur trioxide combines with water vapor at a temperature below the dew point of sulfuric acid. SA Plant 3 currently has vertical panel mist eliminators followed by a horizontal mesh pad, but is being retrofitted with vertical tube mist eliminators to control H₂SO₄ mist. SA Plant 4 uses vertical tube mist eliminators to control H₂SO₄ mist. They are subject to the NSPS limit of 0.15 lb H₂SO₄ mist/ton of 100 percent H₂SO₄ produced and BACT limits of 7.5 lb/hr apiece. The following section discusses other technologies available for H₂SO₄ mist control and their potential application to SA Plants Nos. 3 and 4.

RBLC entries for PM₁₀ emissions from sulfuric acid plants show that the H₂SO₄ mist control technology used in sulfuric acid plants is in the form of mist eliminators (there is one entry for a scrubber to control PM₁₀, but scrubbers do not typically provide much control of sulfuric acid mist emissions, and this entry is RACT for a single-contact process where SO₂ was also evaluated). H₂SO₄ mist elimination control technologies considered in this BART analysis include:

- Electrostatic Precipitators (Wet or Dry);
- Vertical Panel Mist Eliminators; and
- Horizontal Dual Pad Mist Eliminators

Electrostatic Precipitators

Electrostatic precipitators (ESPs) are frequently used in the purification section of spent acid plants; however, there are no sulfuric acid plants using ESPs to control H₂SO₄ mist emissions. ESPs are not used as control devices in sulfuric acid plants primarily due to their relatively large size and high costs when compared to fiber mist eliminators. Mist eliminators can achieve control efficiencies similar to the efficiencies that would likely be achieved with ESPs at only a fraction of the cost.

Since ESP technology has not been demonstrated commercially as H₂SO₄ mist control technology in sulfuric acid plants and is much less cost effective than mist eliminators, this option is rejected from further consideration in this analysis.

Vertical Panel Mist Eliminators

Panel mist eliminators use fiber panel elements mounted in a polygon framework, closed at the bottom by a slightly conical drain pan equipped with an acid seal pot to prevent the bypass of gas. The polygon top is surmounted with a circular ring that is usually installed in the absorption

tower and welded to the inside of the absorption tower head. The gas flows horizontally through the bed and requires a high superficial velocity since it uses an impact mechanism for collection of H₂SO₄ mist particles. Since a high superficial gas velocity is required, this technology is not ideal for the varying loads found at sulfuric acid plants. As production rate decreases, load to the panel mist eliminators decreases, which lowers gas velocity across the pads and increases H₂SO₄ mist emissions and stack opacity.

Manufacturers of panel mist eliminators usually guarantee an emission rate of only 0.375 lb H₂SO₄ mist/ton of 100 percent H₂SO₄ produced, which is higher than the NSPS standard of 0.15 lb H₂SO₄ mist/ton of 100 percent H₂SO₄ produced. Moreover, vertical panel mist eliminators are widely known to be a less effective technology than vertical tube mist eliminators. SA Plant 3 currently has vertical panel mist eliminators followed by a horizontal mesh pad, but is being retrofitted with vertical tube mist eliminators to control H₂SO₄ mist. SA Plant 4 uses vertical tube mist eliminators to control H₂SO₄ mist. Since vertical panel mist eliminators are less efficient than vertical tube mist eliminators this technology is removed from further analysis.

Horizontal Dual Pads

The principle of horizontal dual pad mist eliminators is similar to panel mist eliminators except dual pad eliminators have two circular fiber beds held by stainless steel screens that are oriented horizontally in a vertical cylindrical vessel. These units also use high velocity impaction for mist collection, which also results in an unsatisfactory performance for H₂SO₄ mist control. Dual pad mist eliminators typically reduce H₂SO₄ mist emissions to 0.375 lb H₂SO₄ mist/ton of 100 percent H₂SO₄ produced, which is higher than the relevant NSPS and less effective than vertical tube mist eliminators. SA Plant 3 currently has vertical panel mist eliminators followed by a horizontal mesh pad, but is being retrofitted with vertical tube mist eliminators to control H₂SO₄ mist. SA Plant 4 uses vertical tube mist eliminators to control H₂SO₄ mist.

As the current control technology represents BACT for PM₁₀ emissions from sulfuric acid plants and recent stack testing results were less than 0.05 lb H₂SO₄ mist/ton of 100 percent H₂SO₄ produced, no additional H₂SO₄ mist control is proposed for BART for SA Plants 3 and 4.

4.3.3 Nitrogen Oxides Emissions

Nitrogen oxides (NO_x) are formed from the reaction of nitrogen (N₂) and oxygen (O₂) within the combustion air, creating thermal NO_x. Increased quantities of oxygen in the combustion zone result in greater amounts of NO_x formation. Once formed, the decomposition of NO_x at lower temperatures, although thermodynamically favorable, is kinetically limited. Thus, NO_x control strategies are based upon reducing formation of NO_x within the combustion zone by reducing the combustion temperature, oxygen concentration in the high temperature combustion zone, and the gas residence time at high temperatures.

Currently, there are no NO_x add-on control technologies used at sulfuric acid plants according to EPA's RBLC. However, the following control technologies were evaluated for technical feasibility:

- Selective Catalytic Reduction (SCR)
- Selective Non-Catalytic Reduction (SNCR)

A brief description of each technology and the reasons why those technologies are considered technically infeasible are provided below.

Selective Catalytic Reduction (SCR)

SCR is typically used for NO_x control on large utility boilers. The SCR process chemically reduces the NO_x molecule into molecular nitrogen and water vapor. A nitrogen-based reagent such as ammonia or urea is injected into the ductwork, downstream of the combustion unit. The waste gas mixes with the reagent and enters a reactor module containing catalyst. The hot flue gas and reagent diffuse through the catalyst. The reagent reacts selectively with the NO_x within a specific temperature range and in the presence of the catalyst and oxygen. The NO_x reduction reaction is effective only within a given temperature range. The optimum range depends on the type of catalyst used and the flue gas composition. Optimum temperatures vary from 480°F to 800°F. SCR has been applied mostly to coal and natural gas-fired utility boilers ranging in size from 250 to 8,000 **mmBtu/hr**.

Capital costs are significantly higher than other types of NO_x controls due to the large volume of catalyst that is required. SCR is not technically feasible for application to sulfuric acid plants because of the high outlet temperature required. The outlet temperature of SA Plants Nos. 3 and 4 is about 152 °F.

Selective Non-Catalytic Reduction (SNCR)

The SNCR process is based on the chemical reduction of the NO_x molecule into molecular nitrogen and water vapor. The reduction occurs when a reagent such as ammonia or urea is injected into the post combustion flue gas at temperatures ranging from 1600°F to 2100°F. In the SNCR, the reduction occurs within the combustion unit, which acts as the reaction chamber. SNCR is usually applied to boilers using coal, oil, gas, biomass and waste ranging in size from 50 to 6,000 **MmBtu/hr**. This technology has not been applied to sulfuric acid plants. As the outlet temperature of SA Plants Nos. 3 and 4 is about 152 °F, the use of SNCR is not technically feasible for sulfuric acid plants and is not considered for further analysis. In addition, there is the unwanted reaction of ammonia with sulfur compounds to form ammonium sulfates in the reaction chamber.

Because there are no feasible retrofit technologies for NO_x emissions from sulfuric acid plants, BART is no additional control.

4.4 BART Analysis for Lime Storage Silo Baghouse

This lime storage silo (Emission Point ID 121) has small emissions of PM₁₀ and is controlled by a baghouse. Baghouses are typically used in industry to control these types of particulate matter sources. There are no other feasible PM₁₀ control technologies for a source of this type and size. Therefore, BART is no additional control for this source.

4.5 BART Analysis for Calciners

The Nos. 1-6 Calciners (IDs 201-206) are located in the mill area and process phosphate rock. They are vertical fluidized bed rock calciners, and each is controlled by two duplex cyclones exhausting to a fixed throat venturi type wet scrubber exhausting to a wet electrostatic precipitator. Each calciner is in compliance with MACT Subpart AA PM limits.

4.5.1 PM₁₀ Emissions

Particulate matter is emitted from the calciners primarily as phosphate rock dust that is entrained in the exhaust stream. Currently, only a few types of add-on control are commercially implemented for PM₁₀ emissions from calciners, including electrostatic precipitators (ESP), wet scrubbers, and baghouses. However, Appendix Y to 40 CFR 51 states the following:

“If you find that a BART source has controls already in place which are the most stringent controls available (note that this means that all possible improvements to any control devices have been made), then it is not necessary to comprehensively complete each following step of the BART analysis in this section. As long as these most stringent controls available are made federally enforceable for the purpose of implementing BART for that source, you may skip the remaining analyses in this section, including the visibility analysis in step 5.”

Recent stack testing showed emissions from each calciner range from 0.04 to 0.29 lb PM/ton feed; emissions are less than the MACT limit of 0.08 gr/dscf. Therefore, potential retrofit control technologies for PM emissions from the calciners were not further evaluated since the units are already equipped with the most stringent PM controls and the operation of these controls is required by the facility’s Title V Operating Permit.

4.5.2 Sulfur Dioxide Emissions

Sulfur dioxide is formed in the calciners as a by-product of fuel combustion. In the calcining process, SO₂ is partially removed from the combustion gases when SO₂ reacts with the wet phosphate rock being dried. Phosphate rock is rich in oxygenated calcium compounds and reacts with SO₂ to form calcium sulfates/sulfites. Additional SO₂ is thought to be removed in the existing venturi scrubber where calcium oxides may be present due to recirculation of the scrubbing liquor. The use of a scrubber coincides with the SO₂ control methodology found in a search of the EPA’s RBLC for kilns and calciners in the mineral products industry.

Additionally, the actual SO₂ emissions from each calciner at PCS are less than 10 tpy. Because SO₂ emissions are already controlled by the phosphate rock being dried and the existing venturi scrubber, additional SO₂ control is impractical and has not been evaluated here.

4.5.3 Nitrogen Oxides Emissions

Nitrogen oxides are emitted from the calciners as a by-product of fuel combustion. The calciners use conventional combustion techniques and NO_x emissions are uncontrolled. The temperature of the heated air from the calciner exhaust is approximately 160°F. Although SCR, NSCR, and SNCR are highly effective NO_x reduction technologies in various industries, they are not applicable to phosphate rock calciners and are rejected as BART based on technical infeasibility. Elevated temperatures and/or low particulate loading are essential for use of these technologies. First, temperature requirements range from 600 to 800°F for SCR, 700 to 1500°F for NSCR, and 1600 to 2200°F for SNCR. The calciner exhaust temperature of approximately 160°F is substantially below the required temperatures for any of these technologies. Second, low particulate loading is needed to prevent deactivation of SCR and NSCR catalysts. The calciner exhaust contains some particulate loading and likely contains phosphorus compounds, which deactivate NO_x reduction catalysts. Consequently, the use of SCR, SNCR, and NSCR technologies are not considered technically feasible for phosphate rock calciners.

EPA's RBLC database for technologies used on kilns and calciners in other mineral processing industries yielded feasible and successfully implemented alternatives to SCR, SNCR, and NSCR. These alternatives include staged combustion and low-NO_x burners. Although staged combustion and low-NO_x burners are both technically feasible NO_x control techniques, cost effectiveness was evaluated for only staged combustion because the cost of low-NO_x burners is expected to be approximately equal to a staged combustion system, while achieving the same NO_x reduction. Low-NO_x burner technology for fuel oil combustion typically reduces NO_x emissions by 18 to 20 percent. While low-NO_x burners could be used in the calciners, low-NO_x burners were not included in the cost analyses because of the similarities to staged combustion in cost and reduction efficiency. PCS indicates that, from previous experience in other industries, the annual costs of low-NO_x burners are typically slightly more than staged combustion systems and, in this particular case, the annual cost of low-NO_x burners is also expected to be very similar to that of staged combustion.

Staged combustion is a technology commonly used to reduce NO_x emissions in a variety of industries. This technology could also be retrofitted to the calciners' combustion system. In staged combustion, combustion temperatures are kept lower in the burner zone by firing under fuel rich conditions and introducing staged air after the burner zone to complete combustion at reduced temperatures. A retrofit NO_x reduction system incorporating recirculation of drying air for staged combustion was evaluated as part of previous BACT analyses performed on the calciners. In the current combustion system, additional make-up air is added after the combustion zone to reduce and maintain acceptable temperatures in the drying vessel. The retrofit staged combustion system would remove the recirculation gas from a point after the make-up air is added and return the gas to the combustion zone after the burner zone in order to complete combustion of the fuel. PCS indicated that they were not able to obtain a guaranteed emission level or reduction efficiency from the vendor that they consulted for system design. However, PCS indicated that a 20 percent control efficiency is typical for staged combustion (for coal firing, this represents a reduction from 31.6 lb/hr per calciner to 25.3 lb/hr per calciner, or 138.4 tpy per calciner to 110.8 tpy per calciner).

The cost evaluation for the staged combustion option followed the procedures outlined in the EPA control cost manual. A half percent fuel penalty was assumed for heat losses incurred from gas recirculation. Total capital and annual costs are estimated to be \$150,000 and \$95,516, respectively. The cost effectiveness is estimated to be \$3,451/ton of NO_x reduction. The visibility improvement resulting from the installation of NO_x controls would be 0.022 dv (\$156,852/ton/dv).

4.6 BART Analysis for Rock Dryer

The phosphate rock dryer (ID 210) fires fuel oil to dry phosphate rock from approximately 10 percent moisture to less than 1 percent moisture in a fluidized bed system. It is controlled by a duplex cyclone followed by a venturi scrubber. The rock dryer is in compliance with MACT Subpart AA PM limits. Appendix Y to 40 CFR 51 states the following:

“If you find that a BART source has controls already in place which are the most stringent controls available (note that this means that all possible improvements to any control devices have been made), then it is not necessary to comprehensively complete each following step of the BART analysis in this section. As long as these most stringent

controls available are made federally enforceable for the purpose of implementing BART for that source, you may skip the remaining analyses in this section, including the visibility analysis in step 5.”

Recent stack testing showed emissions were 0.05 lb PM/ton feed, which is less than the MACT limit of 0.215 lb/ton. Therefore, potential retrofit control technologies for PM emissions from the rock dryer were not further evaluated since the unit is already equipped with the most stringent PM controls and the operation of these controls is required by the facility’s Title V Operating Permit.

The rock dryer also emits small amounts of SO₂ and NO_x emissions from fuel oil combustion; maximum fuel oil combustion is 620 gal/hr. However, the fluidized bed of rock provides approximately 90 percent inherent SO₂ control, and test data show that the SO₂ emissions are only 0.012 lb/MmBtu when fuel oil is fired. At this low emission rate, there would be no additional technically or economically feasible SO₂ emissions control option.

NO_x control options for the rock dryer are the same as those for the calciners in that staged combustion is the best suited control technology to reduce NO_x emissions. A 20 percent control efficiency is typical for staged combustion (for fuel oil firing, this represents a reduction from 34.1 lb/hr to 27.3 lb/hr, or 149.4 tpy to 119.6 tpy). The control costs evaluation follows the procedures outlined in the EPA control cost manual. A half percent fuel penalty was assumed for heat losses incurred from gas recirculation. Total capital and annual costs are estimated to be \$150,000 and \$119,816, respectively. The estimated visibility improvement would be 0.02 dv. The cost effectiveness of NO_x reduction is estimated to be \$4,007/ton of NO_x reduction and \$200,361/ton/dv.

4.7 BART Analysis for Calciner Area Rock Handling Sources

The Calcine CTS baghouse (ID 221) and the storage silo baghouse (ID 222) have small emissions of PM₁₀. Enclosures and/or baghouses are typically used in industry to control these types of particulate matter sources. There are no other technically feasible PM control technologies for sources of this type and size.

The Calcine CTS (ID 220) and the Calcined/Dried Rock Transfer (ID 223) sources represent transfer points on conveyor belts. These transfer points are enclosed to minimize fugitive emissions. The only additional technically feasible control would be to vent these transfer points to a baghouse, resulting in a visibility improvement of 0.02 dv. The estimated costs for this control option are not cost effective; The total annual cost for each transfer point is estimated to be \$188,440 and the cost effectiveness is \$161,060/ton PM₁₀ removed, and \$8,053,000/ton/dv.

The Calciner Area Fugitives source (ID 291) potential PM-10 emissions are estimated at 0.11 tons per year. Additional control is not technically or economically feasible, and likely would not provide a visibility improvement at Swanquarter, as the emissions reduced would only be a tenth of a ton. Therefore, BART is no additional control for the calciner area fugitives.

4.8 BART Analysis for Diammonium Phosphate (DAP) Plants

As previously stated, DAP Plant No. 1 (ID 301) has been shut down in accordance with PCS's Title V permit provisions. DAP Plant No. 3 (ID 302) is used to produce ammoniated phosphates by reacting anhydrous ammonia with phosphoric acid. DAP No. 3 can produce DAP, mono-ammonium phosphate (MAP), granulated triple superphosphate (GTSP), or partially acidulated phosphate rock (PAPR). This plant consists of first and second stage reactors, granulator, residual oil-fired dryer, material sizing and handling equipment, and a cooler. The dryer is controlled by a cyclone scrubber and a wet cyclonic scrubber. The sizing and handling equipment is controlled by a dual cyclone and a cyclonic wet scrubber installed in series. The cooler and other material handling points are controlled by a dual cyclone and a wet cyclonic scrubber. The reactors and granulator are controlled by a saturation chamber and a wet cyclonic scrubber installed in series. The scrubbers are vented to a cyclonic tail gas scrubber. This source is in compliance with 40 CFR 63, Subpart BB and BACT fluoride limits.

In all four processes, the ammoniated phosphate slurry is sprayed into a granulator vessel where it is mixed with a recycled product stream in a rotating cylindrical vessel to produce a granular product. The granular product is then dried in the dryer, screened in the materials sizing and collection equipment to separate product-size granules, cooled and sprayed with a light oil prior to shipment or storage. Oversized granules are ground in enclosed chain mills prior to being recycled to the granulator along with undersize granules.

The processes described above generate product-bearing off gases from the reactors, the granulator, the dryer, the material sizing and handling equipment, and the cooler. Product dust from the dryer, the material sizing and handling equipment, and the cooler is collected in the dryer cyclone, the dust cyclone, and the cooler cyclone, respectively. The dust collected by the cyclones is returned to the process. The exhaust gas from the three cyclones is directed in series to three parallel cyclone scrubbers (dryer scrubber, dust scrubber, and cooler scrubber). Fumes and dust from the reactors and granulator are controlled by a two stage scrubbing unit (dual mole scrubber) consisting of a venturi scrubber (high mole stage) followed by a cyclonic scrubber (low mole stage). The primary purpose of the venturi scrubber is to capture and recycle ammonia to the process. The exhaust from the four primary scrubbers is combined prior to passing through the tail gas scrubber. The tail gas scrubber also provides some ammonia emissions control.

4.8.1 PM₁₀ Emissions

Particulate matter is emitted from DAP process equipment primarily as entrained fertilizer dust. As evidenced by the discussion above, the process units within DAP No. 3 are very well controlled for PM, utilizing multiple cyclones and scrubbers in parallel and in series. These controls meet MACT requirements. A search of the EPA's RBLC showed the IMC-Agrico DAP plant utilizes scrubbers as BACT.

Although the existing control technology meets the MACT standards for fluorides and provides sufficient PM control, many forms of add on PM control were considered for this analysis, including fabric filters, dry ESPs, and wet ESPs. The use of fabric filters for additional PM control has been determined to be infeasible because the emission stream has a high moisture content, which would likely cause condensation in the fabric bag, leading to bag blinding. Additional control using a dry ESP is considered infeasible because dry ESP control is undemonstrated on DAP plants and may be incompatible with exhaust stream characteristics.

The exhaust stream in the common header after the primary scrubbing systems is saturated with moisture and could contain hydrofluoric acid at concentrations that could be corrosive to the ESP. Additional control using a wet ESP is not considered further because wet ESP control is undemonstrated on DAP plants and is considered technically infeasible due to high maintenance (e.g., difficulties in keeping essential components clean for proper operation) and operational difficulties leading to problems in maintaining compliance with design/permitted emission levels.

Current stack test data show that PM₁₀ emissions are 0.123 lb/ton P₂O₅ input (2005 average emissions of 4.3 lb/hr), which is much lower than the most recent BACT determination. Therefore, as application of additional PM controls is technically infeasible and PM₁₀ emissions are already well controlled, BART for PM₁₀ emissions from the No. 3 DAP plant is no additional control.

4.8.2 Nitrogen Oxides Emissions

NO_x emissions result from fuel oil combustion in the dryer. Although SCR, NSCR, and SNCR are highly effective NO_x reduction technologies in other industries, they are not applicable to the DAP dryer and are rejected as BART based on technical infeasibility. Elevated temperatures and/or low particulate loading are essential for use of these technologies. First, temperature requirements range from 600 to 800°F for SCR, 700 to 1500°F for NSCR, and 1600 to 2200°F for SNCR. The dryer exhaust temperature of 170 to 200°F is substantially below the required temperatures for any of these technologies. Second, low particulate loading is needed to prevent poisoning of SCR and NSCR catalysts. The dryer exhaust contains substantial particulate loading, which may be difficult to reduce without further lowering exhaust temperature. The exhaust likely contains phosphorus compounds, which are severe catalyst deactivators. Consequently, the use of SCR, SNCR, and NSCR technologies are not considered technically feasible.

Although staged combustion and low-NO_x burners are both technically feasible NO_x control techniques, only staged combustion is evaluated here because the cost of low-NO_x burners is expected to be approximately equal to a staged combustion system, while achieving a lower NO_x reduction efficiency. Staged combustion is a technology commonly used to reduce NO_x emissions in a variety of industries. This technology could be retrofitted to the DAP dryer combustion system. In staged combustion, combustion temperatures are kept lower in the burner zone by firing under fuel rich conditions and introducing “staged air” after the burner zone to complete combustion at reduced temperatures.

The design of the NO_x reduction system that was evaluated incorporates recirculation of drying air for staged combustion. In the current combustion system, additional “make-up” air is added after the combustion zone to reduce and maintain acceptable temperatures in the drying vessel. The staged combustion system considered would remove the recirculation gas from a point after the make-up air is added and return the gas to the combustion zone after the burner zone in order to complete combustion of the fuel. A 20 percent control efficiency is typical for staged combustion and would decrease emissions from 60.9 tpy to 48.6 tpy.

The costs for control were evaluated using the procedures outlined in the EPA control cost manual and EPA’s New Source Review manual. A half percent fuel penalty was assumed for heat losses incurred from gas recirculation. Total capital and annual costs are estimated to be

\$150,000 and \$85,364, respectively, and would result in a visibility improvement of 0.02 dv. The cost effectiveness of NO_x reduction is estimated to be \$6,997/ton of NO_x reduction, and \$349,850/ton/dv.

4.8.3 Sulfur Dioxide Emissions

Stack test data show that SO₂ emissions are minimal from DAP production due to inherent ammonia scrubbing (0.009 lb/ton P₂O₅ input), with actual emissions on the order of 1 ton per year. Therefore, no additional SO₂ emissions control would be technically or economically feasible. Ammonia emissions are also minimized from the DAP Plant No. 3 as the scrubbers are in place for both emissions control and for ammonia capture and recycle to the process. Therefore, BART for DAP No. 3 is no additional control, as the plant is already well-controlled and additional control is not cost effective.

4.9 BART Analysis for Superphosphoric Acid (SPA) Plants

The superphosphoric acid (SPA) production process concentrates various grades of phosphoric acid by removing water. SPA plants 1 and 2 have two stage, falling film evaporators that can operate in parallel, series, or stand alone. SPA plants 3 and 4 have forced circulation, single stage evaporators. SPA plants 1 and 2 each have a venturi scrubber that controls fluoride emissions from the product storage tank and evaporator hotwell and discharges through stack IDs 330 and 331, respectively. SPA plants 3 and 4 share a common venturi scrubber that controls fluoride emissions from the product storage tanks and evaporator hotwells and discharges through stack ID 332. The only BART compound emitted by the SPA plants is SO₂.

Sulfur dioxide (SO₂) is emitted during concentration of phosphoric acid due to vaporization of residual SO₂ in the acid. Stack testing at SPA plant Nos. 1 and 2 indicates that SO₂ concentrations present in stack gas are typically less than 10 ppmv. Actual emissions from all four plants combined are less than 3 tpy SO₂. Essentially no SO₂ is removed in the venturi scrubbers that control fluoride emissions from the plants due to the extremely low concentrations of SO₂ present in the off-gases and due to the fact the pond water used in the scrubbers is slightly acidic, which creates no “driving force” for SO₂ removal. Due to the low levels of SO₂ emissions, there are no feasible retrofit control options; therefore, BART for the SPA plants is no additional control.

4.10 BART Analysis for Phosphoric Acid (PA) Plants

PCS produces green and amber phosphoric acid in four trains from the reaction of phosphate rock and sulfuric acid. The BART-Eligible units in the PA Plants are PA No. 1, No. 2, No. 3, and No. 4 Cross Flow Scrubber Stacks (IDs 401, 404, 406, and 409). The only BART compound emitted by these units is SO₂.

4.10.1 Sulfur Dioxide Emissions

Sulfur dioxide is emitted from the reactors during the digestion of the phosphate rock with sulfuric acid. Currently, reactor exhausts are treated in crossflow packed bed scrubbers (one for each of the four plants) using pond water as the scrubbing media. Since SO₂ is readily absorbed in water, some SO₂ evolved in the reactors is removed by the scrubbers. Based on previous stack

testing conducted by PCS Phosphate, sulfur dioxide concentrations from the crossflow scrubbers during green and amber phosphoric acid production are approximately 35 to 65 parts per million volume (ppmv). Additional SO₂ removal is difficult at such low concentrations. The RBLC does not contain any previous BACT decisions for SO₂ control from phosphoric acid manufacturing. Therefore, engineering knowledge was used to establish BART options to be evaluated. The most effective methods of removing SO₂ from gas streams include absorption in various liquids, sorption by solids, and gas phase conversions. Absorption in liquids (scrubbing) is the most effective method of reducing SO₂ emissions from phosphoric acid plants. The scrubbing technologies considered in this analysis as being potentially applicable are:

- Ammonia Scrubbing,
- Dual Alkali Scrubbing, and
- Caustic Scrubbing.

Ammonia Scrubbing

The ammonia scrubbing process involves reacting ammonia with SO₂ in a scrubber. The by-product of this process is ammonium sulfate, which typically requires disposal due to its inferior value as a fertilizer. Industries that have used ammonia scrubbing have typically achieved SO₂ removal efficiencies of around 95 percent; however, the efficiency of this technology would be lower at the phosphoric acid plants due to the relatively low concentration of SO₂ in the crossflow scrubber exhaust.

Although use of ammonia scrubbing for SO₂ control has been demonstrated in other industries, it has never been demonstrated on a phosphoric acid plant and may therefore not be technically feasible for this reason. More importantly, however, ammonia scrubbing systems have proven to be fraught with operational difficulties and the vast majority of U.S. installations have been shut down due to these problems. Because this technology has not been demonstrated at phosphoric acid plants and that many ammonia scrubbing systems have previously proven to be unreliable, ammonia scrubbing was rejected from further consideration in this analysis.

Dual Alkali Scrubbing

In this process, SO₂ is treated with soluble alkaline solutions, such as sodium sulfite or sodium hydroxide. The product of this reaction is reacted with a second alkaline material (normally lime or limestone) to precipitate the absorbed SO₂ as an insoluble calcium sulfite or sulfate and to regenerate the absorbent solution. Several alkali combinations are possible; however, sodium/calcium based is the most frequently used alkali combination.

This technology has not been demonstrated at phosphoric acid plants. Further, due to the low exhaust concentrations and the fact that, compared to other industries using this technology, relatively small quantities of SO₂ are being emitted, dual alkali would be less cost effective than a caustic scrubbing system.

Caustic Scrubbing

With the caustic scrubber option, the exhaust from each existing phosphoric acid plant crossflow scrubber would be vented to a separate, new caustic scrubber. The design would include a horizontal SO₂ scrubber vessel (including a mist eliminator) and associated tanks, pumps, and piping necessary to circulate the caustic solution and filter the sulfate/sulfite salts produced. New stacks and fans also would be necessary, as the existing stacks come directly off of the existing

crossflow scrubbers and addition of a caustic scrubber would increase the pressure drop of the exhaust gas. The design exit SO₂ concentration of a new scrubber was estimated to be approximately 10 ppmv, based on a maximum inlet SO₂ concentration provided to the vendor of 100 ppmv (90 percent control). Use of caustic in the existing scrubbers is not possible because of plugging and fouling issues and because the pond water used in the scrubbers is also used in various phosphoric acid operations and is critical to maintaining necessary process temperatures.

The total capital cost of one system for Phosphoric Acid Train No. 3 was estimated to be \$2,650,125. The total annual cost for the scrubbing system is approximately \$865,187. The cost effectiveness of the scrubbing system is \$10,974 per ton of SO₂ removal, based on an actual SO₂ emission rate of 20 lb/hr for PA Train No. 3. This cost would vary somewhat for the other 3 trains, but can be considered representative for purposes of this analysis. The overall annual operating cost assuming equal costs for all of the trains would be \$3,460,748, and would result in a SO₂ reduction of 265.8 tons and a visibility improvement of 0.061 dv. This equates to a cost effectiveness of \$13,020/ton, and \$213,443/ton/dv.

4.11 BART Analysis for Shipping Area Rock Handling Sources

The Rock Tower Loadout Facility (ID 654) has very small PM₁₀ emissions (0.257 lb/hr) that are controlled by a baghouse. Enclosures and/or baghouses are typically used in industry to control these types of particulate matter sources. There are no other technically feasible PM control technologies for sources of this type and size.

The CTS-Grinder Loadout, Rock Loadout Station, CTS-Phosphate Rock Transfer Station Chute-Barge Rock Loadout, and Chute-Train Rock Loadout (IDs 650, 651, 652, 653, 655, and 656) emission units represent rock transfer points in the shipping area and are enclosed to minimize fugitive emissions. The only additional technically feasible control would be to vent each of these transfer points to a baghouse. The annualized cost for adding a baghouse to each of these emission points is \$188,440. The cost effectiveness ranges from over \$19,000/ton to almost \$3 million/ton PM₁₀ removed. Therefore, BART for these emission sources is no additional controls./

APPENDIX A
Response to EPA Comments on Bart Permit Application



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

MAR 02 2007

Ms. Sheila Holman
Division of Air Quality
North Carolina Department of
Environment and Natural Resources
1641 Mail Service Center
Raleigh, NC 27699-1641

Dear Ms. Holman:

Thank you for the opportunity to review the proposed Best Available Retrofit Technology (BART) technology evaluation for the PCS Phosphate – Aurora, North Carolina facility (PCS) dated November 2006. Enclosed are our comments on the PCS document. Enclosure 1 describes our comments on the control and cost analyses. Enclosure 2 details our comments on the modeling analysis. Enclosure 3 provides some clarifications to certain statements made in the PCS document. The enclosure labeled as "Attachment A" provides additional information to support comment #3 of Enclosure 2.

We appreciate your transmittal of this package for our consideration. If you have questions regarding this letter, please contact Michele Notarianni of the Region 4 staff at (404) 562-9031.

Sincerely,

A handwritten signature in cursive script that reads "Kay T. Prince".

Kay T. Prince
Chief
Air Planning Branch

Enclosures

Enclosure 1: Control and Cost Analyses

1. Pollution Prevention (P2) and Process Changes:

When identifying all available retrofit control technologies, the "Guidelines for BART Determinations Under the Regional Haze Rule" (BART Guidelines) clarify that consideration should be given not only to add-on controls but also improvement in the performance of existing controls and P2. The analysis does not discuss the facility's evaluation of options for P2 and process changes for the BART-eligible units, with the exception of staged air combustion.

2. Cesium Catalyst Use at Sulfuric Acid (SA) Plants 3 and 4:

In Section 4.2.1, options to control sulfur dioxide (SO₂) emissions from SA Plants 3 and 4 are discussed. Specifically, use of cesium catalyst in beds 4 and 5 following existing vanadium catalyst in beds 1, 2, and 3 is analyzed. Based on our knowledge of this facility and of acid plant processes, we have the following comments regarding the analysis of this option presented on page 4-5.

- The document should explain how it was determined on which beds to install the cesium catalyst at the sulfuric acid plants. The facility should include an option that considers installation of cesium catalyst on one bed instead of two beds to determine what effect this would have on both emissions reduced and the costs of control.
- The document should explain why the production rate would decrease if the cesium catalyst was installed at the sulfuric acid plants, particularly since decreased production rates serve as the basis for rejection of a reduction of SO₂ emissions to 2.0 pounds of SO₂ per ton of sulfuric acid produced (lb SO₂/ton H₂SO₄).
- The BART Guidelines state that the most stringent emission control level that the technology is capable of achieving must be taken into account (1st col., 70 FR 39166, July 6, 2005). The facility identified this most stringent level as 2.0 lb SO₂/ton H₂SO₄. It is our understanding from at least one vendor that cesium catalyst could reduce SO₂ emissions to 1.31 lb SO₂/ton H₂SO₄. The State may want to explore this possibility further by checking with vendors.
- The discussion regarding the "subsequent theoretical analysis" (p.4-5) evaluates the feasibility of reducing the SO₂ emissions from SA Plants 3 and 4 from 3.8 to 3.5 lb SO₂/ton H₂SO₄. The document should explain what emission rates were reviewed at the sulfuric acid plants and why those emission rates were selected. The BART Guidelines note that while the most stringent control level must be considered as one of the control options, it may be useful to consider less stringent levels of control where these levels have widely varying costs and other impacts (2nd col., 70 FR 39166, July 6, 2005). The State may want to evaluate emission rates between 2.0 and 3.5 lb SO₂/ton H₂SO₄ for their technical feasibility.

- It would be helpful for the document to include the turnaround schedule of the SA plants and describe the activities conducted during the turnaround. Additionally, a description of how often PCS changes the current vanadium catalyst at the SA plants would be informative to understand the basis for the some of the costs in Tables 4-2 and 4-3. For example, if PCS uses its catalyst beds to their maximum life, consideration might be given to aligning installation of the cesium catalyst with removal of spent vanadium catalyst during a plant turnaround period to minimize cost of installation.
- Use of cesium catalyst requires lower operating temperatures, which should result in savings in fuel costs. This should be included in the analysis when evaluating the economic feasibility of this control option.
- On page 4-5, it appears that a summary is provided of two sets of "theoretical analyses" for use of cesium promoted catalysts. We suggest that the theoretical analyses, including the economic analyses, be included with the determination.
- The document should clarify whether the analysis was performed for standard or super Cesium-enriched catalyst.

3. BART-Eligible Emission Units:

It would be helpful to include a list either in the document or to provide it separately that shows what emission units were evaluated for BART eligibility at the PCS facility, and the data that either supported or did not support their inclusion/exclusion (i.e., dates of construction, potential emissions of visibility-impairing pollutants). Doing so will help clarify why certain units are/are not included for review in the document.

4. Lost Production Costs:

There is no indication of whether the facility considered ways to mitigate the costs attributed to 10 days of "Lost Production" listed in Table 4-14 (\$1,649,250). These costs account for approximately 62 percent of the total capital costs for a new SO₂ scrubbing system following a phosphoric acid crossflow scrubber. For example, the facility should consider the effects on lost production if potential controls were installed during an already planned plant shutdown for maintenance, or when one of the units is off-line. Also, the possibility of increasing production significantly prior to and following the shut down to offset any lost production should be discussed. It is not clear whether the facility considered these types of possibilities and their effects on lost production costs.

5. Capital Recovery and Contingencies:

a) The facility should justify its capital recovery cost assumptions (i.e., equipment life and rate of return) listed in Tables 4-2, 4-3, 4-9, 4-10, 4-11, 4-13, 4-14 and 4-

15. If these assumptions differ from the EPA Cost Manual, the document should provide justification.

b) Tables 4-14 and 4-15 list a contingency factor of fifteen and three percent, respectively. We recommend that the document provide a justification for any contingency factors used since there can be considerable variation in contingency factors across technologies, processes, and conditions at individual sites. The justification of a contingency factor should clarify the reason for the specific percentage applied.

6. Piping Costs in Table 4-14

The piping costs listed in Table 4-14 do not appear to correctly use the piping factor provided in Chapter 1 in Section 5 of EPA's Cost Manual. The factor applied to piping is 0.30 multiplied by the purchased equipment cost (B). The PCS document lists two types of piping, each applying a factor of 0.30B. This, in essence, is double counting the piping costs and is not an appropriate use of the Cost Manual piping cost factor. If the facility does not want to use the Cost Manual factor as described, the facility could instead provide specific cost estimates for the two types of piping listed.

7. Incremental Maintenance Costs:

Tables 4-9, 4-10, 4-13 list "incremental maintenance costs" with a factor of "2.75 percent of TCC" (total capital costs) based on the Cost Manual. We are unclear from where in the Cost Manual the factor of "2.75 percent of TCC" is derived. Also, if this cost category refers to additional maintenance costs associated with operation of a control device, we agree it should be part of the direct annual costs. As such, we believe these costs should not be based on capital costs as depicted by the factor description.

8. References in the Cost Tables

In the cost tables provided in the document, there are references to vendor quotes listed in the "Basis" and "Basis/Comments" sections. To aid review of the document, we suggest that the document include the vendor quotes (e.g., "E-mail from John Horne" cited in Tables 4-2 and 4-3) as part of the document.

Enclosure 2: Modeling Analysis

1. Modeling Scenario #2 Visibility Estimates – Table 5-5

The modeled visibility impacts for Scenario #2 reflect the reduction of SO₂ emissions from Sulfuric Acid Plants 3 and 4 from 3.8 lb SO₂/ton H₂SO₄ to 3.5 lb SO₂/ton H₂SO₄. EPA's Comment # 2 in Enclosure 1 indicates that use of the cesium catalyst could reduce SO₂ emission rates to between 2.0 and 3.5 lb SO₂/ton H₂SO₄. If it is determined that lower SO₂ emission rates are feasible and appropriate, the modeling for Scenario #2 should be redone to evaluate the visibility impacts. A SO₂ emission rate of 2.0 lb SO₂/ton H₂SO₄ would likely result in a significant reduction of the modeled visibility impacts at the Swanquarter Class I area.
2. Baseline PM Emission Rates – Table 3-5

The baseline PM emission rates for Source ID#'s 201 through 206 (Calciners #1-#6) listed in Table 3-5 are different than those presented in the October 2, 2006, BART Exemption Modeling Report. This appears to be a result of a change in the throughput from 113.5 tons feed/hr to 105.1 tons feed/hr. It is not understood why the throughput during the baseline condition would be different than that used in the October 2, 2006, BART Exemption Modeling Report. An explanation should be provided for these differences.
3. Modeled Stack Parameters for Source ID #'s 437 and 654 – Table 5-1

The modeled stack parameters for Source ID # 437 (Calcined Rock CTS Baghouse) and Source ID# 654 (Rock Tower Loadout Baghouse) are different than those presented in the October 2, 2006, BART Exemption Modeling Report. An explanation should be provided for these differences.
4. Use of the New IMPROVE Equation – Section 5.8
 - (a) Section 5.8 of the determination report indicates that visibility impacts presented in the report were developed using the New IMPROVE equation as implemented in an external spreadsheet created by Dr. Ivar Tombach. The report does not provide any discussion of the rationale for using the New IMPROVE algorithm instead of the default IMPROVE algorithm that is contained in CALPOST. The report should provide justification for using the new algorithm.
 - (b) The report should reference the fact that the spreadsheets are contained on the CD that was submitted with the report. The version of the spreadsheet that is contained on the CD is different than that used in the October 2, 2006, BART Exemption Modeling Report in that it does not include the nitrogen dioxide term that is contained in the New IMPROVE Algorithm. EPA Region 4's position on the use of the New IMPROVE algorithm is that any methodology used to implement the algorithm must address the entire algorithm (See additional discussion of this issue is contained in Attachment A – "U.S. EPA Region 4 Review of the VISTAS Methodology for Implementing the New IMPROVE Equation with CALPUFF for BART Modeling"). EPA Region 4's comments on

the October 2, 2006, BART Exemption Modeling Report indicated that additional supporting documentation was needed to allow the use of the spreadsheet that incorporates the nitrogen dioxide term. These comments were not meant to suggest that PCS Phosphate should use the older form of the spreadsheet that does not include the nitrogen dioxide term, but that additional explanation was needed to allow use of the new spreadsheet. The nitrogen dioxide term may be especially important when comparing different control options since some of the options would reduce the NO_x emissions and thus would affect the estimated nitrogen dioxide concentration. The rationale for using a methodology that does not include the nitrogen dioxide term should be provided by PCS Phosphate.

5. Visibility Impact Thresholds (Section 4.1.5, P. 4-3; Section 1.2, P. 1-1)
Section 4.1.5 provides a summary of Step 5 of the BART Guidelines. The second paragraph of this section states: "If the net visibility improvement is less than the comparison threshold, then there is no need for the facility to implement the control technologies because the resulting visibility impacts would be negligible." The BART Guidelines do not make such an assertion. Rather, the Guidelines provide flexibility to the States with setting thresholds and weighing each of the BART factors. (See 70 FR 39170, 1st col., July 6, 2005.) All of the statutory factors should be used in the determination of whether or not BART controls are needed. Visibility improvement based on modeling results is only one of the factors that should be assessed in this decision.

Similarly, the document states on page 1-1 of Section 1.2 that, "...the additional controls will not result in a visibility improvement that EPA has states is perceivable to the human eye..." This statement implies that the controls are not considered to make enough of an improvement in visibility at the Class I areas identified in the report. We note, however, that there is no bright line for evaluating in the BART determination analysis the degree of visibility improvement that is considered significant enough to warrant BART controls. Rather, a State has flexibility in setting absolute thresholds and determining the weight and significance to be assigned to each BART factor. (See 70 FR 39170, 1st col., July 6, 2005.) Also, this statement does not recognize that a source may be *contributing* to visibility impairment at a Class I area. A source is contributing to visibility impairment if its impacts are 0.5dv or higher, which is below the 1.0dv threshold referenced by the document as what is perceivable to the human eye.

6. Results tables specified in the VISTAS Protocol
The VISTAS Protocol provides standard table formats for presenting modeling results. There should be a table showing number of days and number of receptors with impact greater than 0.5 deciview (dv) for each Class 1 area, and for each year, number of days and number of receptors with impact greater than 1.0 dv for each Class 1 area for the entire 3-yr period, and the maximum 24-hr impact during the 3-yr period. These tables were provided in the facility's BART Exemption Modeling Report, but have not been included in the November 2006

document. It is suggested that similar tables be included in the determination report. Also, documentation that addresses the development of the baseline modeling should be included in the determination report. This may be in the BART exemption modeling report. It is suggested that the complete BART Exemption Modeling Report be included as an appendix to the determination report.

Enclosure 3: Text Clarifications

Below are clarifications we wish to note on certain statements in the text. (The location of the text in the document is identified in parentheses.)

1. Definitions

(a) *Just Noticeable Change* (Section 2.1, P. 2-1)

The document provides selected definitions from 40 CFR 51. We wish to clarify that the definition provided in Section 2.1 for *Just Noticeable Change* is not from the Definitions section of the Regional Haze regulations (40 CFR 51.301, "Definitions"). Including this definition appears misleading since it discusses the concept of Line-of-Sight (LOS). We recommend excluding this definition since, as the report indicates elsewhere in Section 1, this specific approach is not appropriate for BART modeling purposes.

(b) *Potential to Emit (PTE) Thresholds* (Section 2-2, P. 2-2)

The PTE threshold provided for BART –eligible sources should be corrected to be consistent with the CFR to read as follows, "...the potential to emit ~~more than~~ 250 tons per year or more..." (See 40 CFR 51.301, "Definitions," *Existing stationary facility*.)

(c) *BART-eligible units* (Section 3.2, P. 3-3)

The document states that, "There are...tanks...that are BART eligible units but do not emit SO₂, NO_x, H₂SO₄ mist, or PM₁₀." We note that this statement appears misleading, as these units are not considered BART-eligible because they do not emit any visibility-impairing pollutants.

2. Due date for Regional Haze SIPs (Section 2.2, P. 2-3)

The document identifies a due date for Regional Haze SIPs of January 2008. To clarify, the due date for Regional Haze SIPs specified in the Regional Haze regulations at 40 CFR 51.308 (b) is: "...no later than December 17, 2007."

3. Cost Effectiveness Numbers (Section 4.2.1, P.4-5)

On page 4-5 of the document, the cost effectiveness values for reducing SO₂ emissions from SA Plants 3 and 4 are slightly different than the corresponding values in Tables 4-2 and 4-3. The values presented in the text are \$4,108/\$5,584 per ton SO₂, and the corresponding values in the tables are \$4,127/\$5,568 per ton SO₂, respectively. These differences should be clarified, and also correlated to the values in Tables 1-1 and 1-2.

There is also a discrepancy of values listed in Tables 1-1 and 1-2 with some of the corresponding values computed in the detailed cost analysis tables listed further in that section. One suggestion to facilitate review and to minimize these discrepancies is to add a column to Tables 1-1 and/or 1-2 that lists the cost analysis table number along with the modeled scenario number.

4. Permit Changes (Section 4.4.1, P.4-9)

The document asserts that emissions from the calciner are less than the Maximum Achievable Control Technology (MACT) standard for particulate matter (PM), and that this level of control is already required in the facility's Title V operating permit. The BART Guidelines say if the most stringent control available is adopted, it must be made federally enforceable for purposes of BART. This should be described in the SIP narrative and when the Title V permit is reopened in accordance with the schedule in 40 CFR part 70 or 40 CFR part 71, the statement of basis for this control should be modified to include a statement that these controls and operating conditions also serve to satisfy BART for PM.

ATTACHMENT A

U.S. EPA Region 4 Review of the VISTAS Methodology for Implementing the New IMPROVE Equation with CALPUFF for BART Modeling

The original Interagency Monitoring of Protected Visual Environments (IMPROVE) algorithm for estimating light extinction from particle speciation data tends to underestimate light extinction for the highest haze conditions and overestimate it for the lowest haze conditions. It uses a ratio of organic compound mass to carbon mass of 1.4, though the literature indicates that the ratio is higher especially in remote areas. It also does not include a term for sea salt, which is important at sites near the ocean coasts. As a result of these limitations, the IMPROVE Steering Committee commissioned the development of a new IMPROVE algorithm, which they adopted for use in December 2005. It is our understanding that some sources want to use the new IMPROVE equation to take advantage of sea salt and site-specific Rayleigh scattering for BART modeling in Region 4. A new methodology is needed to process the mass concentrations from CALPOST using the new IMPROVE equation so that the Best Available Retrofit Technology (BART) analyses could consider both the old and new IMPROVE equations.

The U.S. Environmental Protection Agency (EPA) and the Federal Land Managers (FLMs) from the National Park Service and the U.S. Fish and Wildlife Service have determined that adding site-specific data (e.g. sea salt and site-specific Rayleigh scattering) in the old IMPROVE equation, for a hybrid approach is not recommended. A methodology to post-process CALPUFF/CALPOST data to implement the entire new IMPROVE equation with CALPUFF is needed. The new IMPROVE equation cannot be directly implemented using the existing version of the CALPUFF model without additional post-processing or model revision. The Visibility Improvement - State and Tribal Association for the Southeast (VISTAS) tasked Dr. Ivar Tombach to develop such a methodology. The State of North Carolina submitted a request for the review of this methodology to EPA and the FLMs.

The VISTAS methodology for implementing the new IMPROVE equation using existing CALPUFF/CALPOST output is contained in a spreadsheet developed by Dr. Ivar Tombach. The VISTAS procedure is essentially a modification of CALPOST, which provides the calculations of the light extinction from the CALPUFF output. This proposed VISTAS methodology constitutes a non-regulatory modeling application requiring compliance with section 3.2 of Appendix W, Part 51: *Guideline on Air Quality Models*. Requests for using this alternative method should be made by each individual State allowing time for EPA Region 4 approval prior to the public hearing on the State's Regional Haze State Implementation Plan (SIP) submittal. A generic approval for all applications of this alternative method will not be provided. EPA approval will be granted on a case-by-case basis, considering the merits of the State's request including supporting documentation for using the alternative methodology for the BART modeling.

Documentation to support the use of the VISTAS methodology is needed and should include the following.

- A rationale for why the new IMPROVE equation is needed for the application (e.g., the old IMPROVE algorithm does not account for the impact of sea salt on background conditions which can be important for coastal sites);
- An evaluation, specific to the Class I areas being examined for the modeling demonstration, of the new vs. old equations performance when compared to measured/monitored values (e.g., as provided in "Revised IMPROVE Algorithm for Estimating Light Extinction from Particle Speciation Data" found on http://vista.cira.colostate.edu/IMPROVE/Publications/GrayLit/019_RevisedIMPROVEEq/RevisedIMPROVEAlgorithm3.doc); and
- A detailed description of the procedures used in the modified-post processing methodology (e.g., spreadsheet or other post-processing calculations with explicit discussion on the limitations and assumptions in developing the data inputs).

Additionally, consistency should be maintained when applying the new vs. old equations when calculating natural background, current, and future visibility impacts at Class I areas. For example, if the new IMPROVE equation is used to calculate the natural background visibility impact for a Class I area for the BART modeling, the new IMPROVE equation should also be used to calculate the BART source's current and future impact on visibility.

The VISTAS methodology contained in the spreadsheet developed by Dr. Ivar Tombach appropriately implements the features of the new IMPROVE equation, with the exception of the nitrogen dioxide term. The methodology provides an adequate procedure for calculating the bimodal split for sulfates, nitrates and organics. This is accomplished by following the procedures for calculating the large and small fractions based on a concentration cutpoint of $20 \mu\text{g}/\text{m}^3$, as recommended in the technical support document for the new IMPROVE algorithm ("Revised IMPROVE Algorithm for Estimating Light Extinction from Particle Speciation Data" found on http://vista.cira.colostate.edu/IMPROVE/Publications/GrayLit/019_RevisedIMPROVEEq/RevisedIMPROVEAlgorithm3.doc). The methodology also incorporates the new size-fraction specific $f(\text{RH})$ factors contained in the technical support document. These new procedures are used to calculate the visibility impacts from the source and also to adjust natural background values (to account for sea salt and the bimodal split of sulfates, nitrates and organics). The background value is appropriately added to the source concentration for determining the correct size fraction for sulfates, nitrates and organics. The calculated visibility impacts are then compared with the adjusted natural background visibility to determine the change in visibility impact for the comparison with the threshold value.

As noted above, the methodology does not adequately address the nitrogen dioxide (NO_2) term in the new IMPROVE equation. It indicates that the NO_2 term is small and

insignificant. This may not be the case in each specific application. NO₂ concentrations are not readily available from CALPUFF/CALPOST when using the default MESOPUFF II chemistry option. Therefore, EPA Region 4 has determined that it would be acceptable to use the total NO_x concentration as a surrogate for NO₂ (i.e., conservatively assume that all NO_x is NO₂). The total NO_x concentration can easily be obtained by turning on the switch to produce NO_x concentration output when running CALPOST—no changes to the CALPUFF modeling are needed. The NO_x concentration is obtained in CALPOST using the following option in Input Group 1 of the CALPOST Input File: ! ASPEC = NOX !. With the addition of this recommendation for addressing the NO₂ term, we believe the VISTAS methodology to incorporate the new IMPROVE equation is acceptable on a case-by-case basis and upon consultation with the EPA Regional Office.

Enclosure 1: Control and Cost Analyses

1. Pollution Prevention (P2) and Process Changes:

When identifying all available retrofit control technologies, the “Guidelines for BART Determinations Under the Regional Haze Rule” (BART Guidelines) clarify that consideration should be given not only to add-on controls but also improvement in the performance of existing controls and P2. The analysis does not discuss the facility’s evaluation of options for P2 and process changes for the BART-eligible units, with the exception of staged air combustion.

PCS Phosphate Response

PCS Phosphate has evaluated our control evaluation and has not identified any additional industry pollution prevention practices that could be employed for the BART eligible units at the Aurora facility. The facility maintains all process equipment and control devices on a continuous basis as outlined in the Title V operating permit in order to minimize emissions. This proper operation and maintenance minimizes air emissions. In addition, the raw materials used in the processes are required and fixed, and thus, raw material substitution is not a feasible option.

2. Cesium Catalyst Use at Sulfuric Acid (SA) Plants 3 and 4:

In Section 4.2.1, options to control sulfur dioxide (SO₂) emissions from SA Plants 3 and 4 are discussed. Specifically, use of cesium catalyst in beds 4 and 5 following existing vanadium catalyst in beds 1, 2, and 3 is analyzed. Based on our knowledge of this facility and of acid plant processes, we have the following comments regarding the analysis of this option presented on page 4-5.

- The document should explain how it was determined on which beds to install the cesium catalyst at the sulfuric acid plants. The facility should include an option that considers installation of cesium catalyst on one bed instead of two beds to determine what effect this would have on both emissions reduced and the costs of control.

PCS Phosphate Response

Installation of the super cesium catalyst is dependent on several factors, most importantly, inlet temperature. Based on conversations with MECS, Inc., the cesium catalyst is specifically designed for lower temperature operations. The SA Plants 3 and 4 have the ability to lower the final pass inlet temperatures, therefore, installation of the super cesium catalyst was considered for beds four and five.

If the super cesium catalyst were installed in only one bed; the plants would have to further operate at lower production rates to achieve the lower emission rates. This option was rejected as a feasible control scenario because decreasing the

production rate is neither economical nor practical from a market demand standpoint as the plants currently operate at maximum capacity.

- The document should explain why the production rate would decrease if the cesium catalyst was installed at the sulfuric acid plants, particularly since decreased production rates serve as the basis for rejection of a reduction of SO₂ emissions to 2.0 pounds of SO₂ per ton of sulfuric acid produced (lb SO₂/ton H₂SO₄).

PCS Phosphate Response

In order for the super cesium catalyst to achieve the desired reduction levels, a target catalyst loading must be achieved. The catalyst loading is defined as the liters of catalyst required per ton of sulfuric acid produced. SA plants No. 3 and 4 at the Aurora facility are existing units with fixed catalyst volumes, therefore, the only variable that could be changed to meet the 2 pounds of SO₂ emission rate per ton of sulfuric acid produced is to significantly reduce the production rate.

- The BART Guidelines state that the most stringent emission control level that the technology is capable of achieving must be taken into account (1st col., 70 FR 39166, July 6, 2005). The facility identified this most stringent level as 2.0 lb SO₂/ton H₂SO₄. It is our understanding from at least one vendor that cesium catalyst could reduce SO₂ emissions to 1.31 lb SO₂/ton H₂SO₄. The State may want to explore this possibility further by checking with vendors.

PCS Phosphate Response

The response to this comment is similar to the description presented above. To achieve a desired emission rate, a target catalyst loading must be obtained. The SA Plants No. 3 and No. 4 are equipped with catalyst beds that are fixed in size. A 1.31 lb SO₂/ton H₂SO₄ emission rate would not be achievable on these plants.

- The discussion regarding the “subsequent theoretical analysis” (p.4-5) evaluates the feasibility of reducing the SO₂ emissions from SA Plants 3 and 4 from 3.8 to 3.5 lb SO₂/ton H₂SO₄. The document should explain what emission rates were reviewed at the sulfuric acid plants and why those emission rates were selected. The BART Guidelines note that while the most stringent control level must be considered as one of the control options, it may be useful to consider less stringent levels of control where these levels have widely varying costs and other impacts (2nd col., 70 FR 39166, July 6, 2005). The State may want to evaluate emission rates between 2.0 and 3.5 lb SO₂/ton H₂SO₄ for their technical feasibility.

PCS Phosphate Response

The SA Plants No. 3 and No. 4 recently obtained PSD air permits and BACT emission limits that are equivalent to 3.8 lb/ton averaged over 24-hours. As part of the BACT analysis as well as the BART analysis, the vendor MECS, Inc. was contacted to determine the lowest emission rate that the existing plants could achieve with super cesium catalyst without having a production penalty. In each analysis, it was determined that a super cesium catalyst in the 4th and 5th beds could achieve 3.5 lbs/ton. However, the cost to retrofit with super cesium catalyst was determined to be cost prohibitive and NCDAQ issued PSD permits for the equivalent 3.8 lb/ton emission rate. This continues to be the case for the BART evaluation.

- It would be helpful for the document to include the turnaround schedule of the SA plants and describe the activities conducted during the turnaround. Additionally, a description of how often PCS changes the current vanadium catalyst at the SA plants would be informative to understand the basis for the some of the costs in Tables 4-2 and 4-3. For example, if PCS uses its catalyst beds to their maximum life, consideration might be given to aligning installation of the cesium catalyst with removal of spent vanadium catalyst during a plant turnaround period to minimize cost of installation.

PCS Phosphate Response

PCS performs turnarounds on our sulfuric acid plants on a 2 year cycle. We are evaluating going to a three year cycle. During a turnaround, they inspect the plant and make repairs based on inspections during the turnaround. As a normal practice, they screen the entire first pass. Based on catalyst samples from the previous turnaround and pressure drop surveys, they screen one additional pass and screen the top section of (scalp) the remaining passes. Based on inspections during turnaround, they may decide not to scalp one or all of the passes not screened. New catalyst is loaded on the top of each bed screened or scalped to replace catalyst lost during the screening process.

As a general practice, PCS does not replace entire beds of catalyst. The screening process typically removes about 10% to 25% of the catalyst, depending on catalyst age and condition. This results in replacement of part of each bed every time it is screened.

As an example, over the previous 10 years, PCS has added 77,650 liters of new catalyst to the first pass of the No. 3 SA Plant. PCS has added 77,960 liters of new catalyst to the first pass of the No. 4 SA Plant. This equates to replacement of 132% of the nominal catalyst volume of 59,000 liters in the first pass of each plant. By placing the new catalyst on the top, we maximize conversion. The new catalyst should have the highest activity and is effective at lower inlet temperatures. The older catalyst, which may have lower activity, migrates to the bottom of the bed. The higher temperatures near the bottom of the bed make activity less important.

Downstream passes are replaced more slowly, as they are not completely screened every turnaround, but they still go through the gradual replacement process. The first pass serves as an effective filter for any contaminants entering with the sulfur or combustion air. Also, since they operate at lower outlet temperatures, the downstream beds of catalyst should experience slower aging and loss of activity than the first pass.

PCS feels this process provides a more consistent high level of conversion than the alternative of operating a bed of catalyst until it reaches the end of its life and then replacing the entire bed. To ensure that catalyst activity is acceptable, PCS has periodically requested MECS to come on site and evaluate catalyst activity using their Pegasys process. This test evaluates the actual performance of each bed of catalyst during operation. It can sometimes identify problems which sampling and visual observation may miss.

PCS rarely replaces an entire bed of catalyst. They replaced the first bed catalyst in No. 6 Sulfuric in 1990 after a process problem had impacted the catalyst so that none of a bed was considered acceptable for reuse.

- Use of cesium catalyst requires lower operating temperatures, which should result in savings in fuel costs. This should be included in the analysis when evaluating the economic feasibility of this control option.

PCS Phosphate Response

In the sulfur-burning sulfuric acid production process, liquid elemental sulfur is sprayed into a horizontal spray-type sulfur burner. Combustion air is drawn through a drying tower to remove moisture and is blown into the sulfur burner where it reacts with the sulfur to form sulfur dioxide.

The formation of sulfur dioxide in this process is an exothermic reaction. In order to begin the conversion process the gas stream must be cooled. To achieve this cooling, the gas is cooled in the primary heat recovery boiler that recovers the heat as steam. The gas then proceeds to a super heater where a portion of the steam produced in the primary and secondary heat recovery boilers is further elevated in temperature (superheated). Steam generated from the sulfuric acid plant is used in various process applications throughout the plant site and to generate electrical power in the cogeneration facility.

In summary, there are no fuel savings through the use of a lower operating temperature catalyst.

- On page 4-5, it appears that a summary is provided of two sets of "theoretical analyses" for use of cesium promoted catalysts. We suggest that the

theoretical analyses, including the economic analyses, be included with the determination.

PCS Phosphate Response

As stated earlier, MECS, Inc. performed an evaluation of the retrofit possibilities for the plants and determined that the most effective control option without production penalties would be to install super cesium catalyst in the 4th and 5th beds.

- The document should clarify whether the analysis was performed for standard or super Cesium-enriched catalyst.

PCS Phosphate Response

The analyses were performed with the potential installation of the super cesium catalyst.

3. BART-Eligible Emission Units:

It would be helpful to include a list either in the document or to provide it separately that shows what emission units were evaluated for BART eligibility at the PCS facility, and the data that either supported or did not support their inclusion/exclusion (i.e., dates of construction, potential emissions of visibility-impairing pollutants). Doing so will help clarify why certain units are/are not included for review in the document.

PCS Phosphate Response

“BART-eligible” emission units are those built between 1962 and 1977 that have the potential to emit more than 250 tons per year of one or more visibility-impairing compounds including sulfur dioxide (SO₂), nitrogen oxides (NO_x), particulate matter (PM), and volatile organic compounds (VOC), and that fall within 26 industrial source categories (including phosphate fertilizer manufacturing). The PCS Phosphate Aurora Facility conducted the following analysis in 2004 at the request of the North Carolina Division of Air Quality (NCDAQ). Table 1-1 presents the analysis conducted for all emission units at the facility. Table 1-2 presents a summary listing of the units meeting the BART eligibility requirements.

Table 1-1. Summary of BART-Eligibility Analysis Prepared for PCS Phosphate Aurora Facility (2004)

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
Sulfuric Acid Plants															
S-3	Double-absorption sulfuric acid plant No. 3 (1850 tons per day nominal capacity)	101	1/14/1974	TRUE	Y	--	--	14.08	40.52	8.67	25.32	397.66	1,387.00	0.00	0.61
S-4	Double-absorption sulfuric acid plant No. 4 (1850 tons per day nominal capacity)	102	10/10/1975	TRUE	Y	--	--	20.97	40.52	9.21	25.32	600.68	1,283.34	0.00	0.61
S-5	Double-absorption sulfuric acid plant No. 5 (3600 tons per day nominal capacity)	103	3/13/1982	FALSE											
S-6	Double-absorption sulfuric acid plant No. 5 (3800 tons per day nominal capacity)	104	12/20/1985	FALSE											
BW-2	One (1) distillate oil-fired boiler (99.56 million Btu per hour nominal capacity)	110-new	2003	FALSE											
BW-1	One (1) distillate oil-fired boiler (125 million Btu per hour nominal capacity)	111	1/1/1975	TRUE	Y	--	--	1.19	78.80	0.06	3.94	1.89	166.60	0.01	0.79
417-503-462	Lime silo No. 4 at water treatment area	121	1/1/1973	TRUE	Y	--	--	--	--	0.69	0.70	--	--	--	--
417-755-462	Lime silo No. 5 at water treatment area	122	1/1/1982	FALSE											
417-756-462	Lime silo No. 6 at water treatment area	123	1/1/1982	FALSE											
Mill Area															
339-051	vertical fluidized bed phosphate rock calciner unit No. 1 (105.1 tons per hour nominal feed); coal/coke/"off-spec" used oils, used oil sludge/used glycols/ residual oil-fired	201	7/1/1966	TRUE	Y	--	--	65.50	138.28	21.52	363.54	12.12	187.25	0.20	0.44

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
339-052	vertical fluidized bed phosphate rock calciner unit No. 2 (105.1 tons per hour nominal feed); coal/coke/"off-spec" used oils, used oil sludge/used glycols/ residual oil-fired	202	7/1/1966	TRUE	Y	--	--	70.40	138.28	30.06		0.02		0.20	0.44
339-053	vertical fluidized bed phosphate rock calciner unit No. 3 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	203	10/1/1966	TRUE	Y	--	--	68.50	138.28	72.00		0.02		0.20	0.44
339-054	vertical fluidized bed phosphate rock calciner unit No. 4 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	204	10/1/1966	TRUE	Y	--	--	55.01	138.28	48.79		0.01		0.20	0.44
339-055	vertical fluidized bed phosphate rock calciner unit No. 5 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	205	1/1/1976	TRUE	Y	--	--	58.07	138.28	38.15		0.01		0.20	0.44
339-056	vertical fluidized bed phosphate rock calciner unit No. 6 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	206	1/1/1976	TRUE	Y	--	--	71.11	138.28	67.73		0.02		0.20	0.44
332-120	Residual oil-fired phosphate rock dryer (250 tons per hour nominal capacity)	210	1/1/1966	TRUE	Y	--	--	1.30	149.36	1.50	235.43	0.00	13.69	0.01	0.74
341-300	Coal/coke pulverizer and thermal dryer system (20 tons per hour nominal capacity)	215	1/1/1983	FALSE											
Belt 39 to 70.1	Calcined rock CTS (Fugitive)	220	1/1/1966	TRUE	Y	--	--	--	--	1.20	3.46	--	--	--	--
Belt 55 to Belt 70.1	Calcined rock CTS Baghouse	221	1/1/1974	TRUE	Y	--	--	--	--	1.80	1.80	--	--	--	--

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
Belt 21 to Belt 23 or Belt 24	Storage silo baghouse	222	1/1/1966	TRUE	Y	--	--	--	--	1.30	1.31	--	--	--	--
Belt 22 to Belt 23 or Belt 24	Storage silo baghouse														
339-809-464	Calcined/dried rock CTS (Fugitive)	223	1/1/1966	TRUE	Y	--	--	--	--	1.20	3.46	--	--	--	--
224	One (1) polymer storage bin	224	1/1/1996	FALSE											
225	One (1) lime storage silo	225	1/1/1985	FALSE											
F290	Mill Concentrator Fugitives	290	7/1/1966	TRUE	N										
F291	Calciner Plant Area Fugitives	291	7/1/1966	TRUE	Y	--	--	--	--	0.11	0.11	--	--	--	--
F292	Surge Pond Aerator	292	7/1/1966	TRUE	N										
341-100	Coal/coke railcar unloader (75 tons per hour nominal capacity)	294a	1/1/1983	FALSE											
341-110, 341-111, 341-112, 341-120	Three (3) parallel conveyor belts which transfer to one (1) single belt conveyor	294b	1/1/1983	FALSE											
341-140	Single belt conveyor	294c	1/1/1983	FALSE											
341-130	Coal/coke crusher (75 tons per hour nominal capacity)	294d	1/1/1983	FALSE											
341-200 341-201	Two (2) coal/coke storage silos (1086 tons, nominal capacity each)	294e	1/1/1983	FALSE											
341-230	One (1) conveyor belt	294f	1/1/1983	FALSE											
Fertilizer Production Area															

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
504-107 504-016	Diammonium Phosphate Plant No. 1 combustion chamber and residual oil-fired dryer (Nominal maximum input rates of 618 tons fresh P2O5 and 275 tons of product per hour)	301	12/1/1966	TRUE	Y	56.50	186.70	3.72	32.11	14.64	152.25	0.27	138.30	0.03	0.18
504-009 504-001 504-058 504-059 504-060 504-061 504-043 504-042 504-002	Diammonium Phosphate Plant No. 1 cooler and material sizing and handling equipment (process screen feed drag conveyor, four (4) double-decked process screens, east cage mill, west cage mill, and recycle drag conveyor)	301													
504-016 504-009	Diammonium Phosphate Plant No. 1 residual oil-fired dryer(20 million Btu per hour nominal maximum heat input) and a cooler	301													
504-030 504-032	Diammonium Phosphate Plant No. 1 reactor and granulator	301													
504-030	Diammonium Phosphate Plant No. 1 reactor, granulator, residual oil-fired dryer and cooler.	301													
504-032															
504-016															
504-019															
511-085 511-086 511-070	Diammonium Phosphate Plant No. 3 first stage reactor, second stage reactor, and granulator	302	7/1/1974	TRUE	Y	149.50	453.13	17.29	60.71	14.29	58.15	0.64	160.50	0.04	0.31
511-032	Diammonium Phosphate Plant No. 3 residual oil-fired dryer	302													
511-008 511-009 511-010 511-011 511-016 511-017 511-038 511-039 511-041 511-093 511-094 511-095 511-096	Diammonium Phosphate Plant No. 3 process sizing and handling equipment (four (4) chain mills, screen feed drag conveyor, recycle drag conveyor, recycle elevator, dryer elevator, product elevator, and four (4) double-deck product screens)	302													
511-025	Diammonium Phosphate Plant No. 3 cooler and other miscellaneous material handling points	302													

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
511-107B 511-103 511-104 511-106	Diammonium Phosphate Plant No. 3 cyclonic scrubber, the two stage dryer wet cyclonic scrubber, the dust wet cyclonic scrubber, and the cooler wet cyclonic scrubber	302													
505-104	Diammonium Phosphate Plant No. 2 residual oil-fired dryer	303	1/1/1980	FALSE											
505-107 505-114 505-110 505-143	Diammonium Phosphate Plant No. 2 material sizing and handling equipment (eight (8) process screens, one (1) scalping screen, one (1) recycle drag conveyor, and a product bin)	303													
505-111	Diammonium Phosphate Plant No. 2 cooler	303													
505-123C 505-123B	Diammonium Phosphate Plant No. 2 equipment cyclone and cooler duplex cyclone	303													
505-103 505-121	Diammonium Phosphate Plant No. 2 granulator and reactor	303													
505-117 505-118	Diammonium Phosphate Plant No. 2 cooler venturi wet scrubber and reactor-granulator venturi wet scrubber	303													
APP-1	Ammonium Polyphosphate Plant	304	1989	FALSE											
AFP-1	One (1) filter press	305	2003	FALSE											
511-045	Diammonium Phosphate Plant No. 3 GTSP phosphate rock silo	310	3/1/1976	TRUE	Y	--	--	--	--	0.52	4.51	--	--	--	--
PA Pilot No. 1	Phosphoric Acid Pilot Plant No. 1	315	1978	FALSE											
PA Pilot No. 2	Phosphoric Acid Pilot Plant No. 2	316	1978	FALSE											
318	Technical Services Dust Collection System	318	9/1/1979	FALSE											

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
Superphosphoric Acid Production Area															
451-418 and 451-409	Superphosphoric acid plant No. 1	330	11/1/1966	TRUE	Y	--	--	--	--	--	--	0.49	5.48	--	--
451-701 and 451-809	Superphosphoric acid plant No. 2	331	1/1/1971	TRUE	Y	--	--	--	--	--	--	1.33	9.13	--	--
451-316 and 451-308	Superphosphoric acid plant No. 3	332	1/1/1976	TRUE	Y	--	--	--	--	--	--	0.54	18.25	--	--
451-916 and 451-940	Superphosphoric acid plant No. 4	332													
FPR-1 FPR-2	No. 1 filter press/filter press repulp tank and No. 2 filter press/filter press repulp tank	335 and 336	9/1/1985	FALSE											
453-485	One (1) potassium permanganate silo	340	3/1/1990	FALSE											
453-468	One (1) clay additive storage silo	341	3/1/1990	FALSE											
DAP1WH1	Warehouse No. 1 for DAP 1	390	1/1/1967	TRUE	Y	33.90	33.90	--	--	--	--	--	--	--	--
DAP2WH2	Warehouse No. 2 for DAP 2	390													
DAP3WH3	Warehouse No. 3 for DAP 3	390													
	Fertilizer Plant Area Fugitives	391, 392	1/1/1967	TRUE	Y	20.72	20.72	--	--	--	--	--	--	--	--
Phosphoric Acid Production Area															
421-201 421-000 421-325 421-324 421-327 421-326 421-223 421-232 421-218 421-330	Reactor Train No. 1; tilting pan (Bird) filter No. 1; tilting pan (Bird) filter No. 1 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 1 seal tanks.	401	12/1/1966	TRUE	Y	--	--	--	--	--	--	21.70	88.70	--	--
441-000	Belt filter No. 1	402	4/1/1981	FALSE											
441-000 442-000 441-031	Belt filter No. 1, belt filter No. 2, and belt filter No. 1 seal tanks	403	4/1/1981	FALSE											

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
422-201 422-000 422-325 422-324 422-327 422-326 422-223 422-232 422-218 422-330	Reactor Train No. 2; tilting pan (Bird) filter No. 2; tilting pan (Bird) filter No. 2 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 2 seal tanks.	404	12/1/1966	TRUE	Y	--	--	--	--	--	--	26.40	88.70	--	--
442-000	Belt filter No. 2 filtrate separator	405	12/1/1985	FALSE											
423-201 423-000 423-325 423-324 423-327 423-326 423-223 423-232 423-218 423-330	Reactor Train No. 3; tilting pan (Bird) filter No. 3; tilting pan (Bird) filter No. 3 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 3 seal tanks.	406	1/1/1972	TRUE	Y	--	--	--	--	--	--	34.10	175.20	--	--
443-000	Belt filter No. 3 filtrate separator	407	9/1/1986	FALSE											
443-000 444-000 444-031	Belt filter No. 3, belt filter No. 4, and belt filter No. 4 seal tanks	408	9/1/1986	FALSE											
424-201	Reactor Train No. 4; fluosilicic acid (H2SiF6) recycle tank; tilting pan (Bird) filter No. 4; tilting pan (Bird) filter No. 4 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 4 seal tanks.	409	10/1/1975	TRUE	Y	--	--	--	--	--	--	14.10	102.60	--	--
428-753															
424-000 424-325 424-324 424-327 424-326 424-223 424-232 424-218 424-330															

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy
444-000	Belt filter No. 4	410	10/1/1980	FALSE											
040 and 020	Two (2) phosphoric acid storage tanks	421	10/1/1980	FALSE											
032, 033, 034, 060, and 035	Four (4) phosphoric acid storage tanks and one (1) green acid sludge tank	422	12/1/1980	FALSE											
429-002 421-115	Two (2) phosphate rock jet conveyors on reactor train No. 1	430	1/1/1988	FALSE											
429-005 422-115	Two (2) phosphate rock jet conveyors on reactor train No. 2	431	4/1/1988	FALSE											
429-152 429-001 429-004 429-151	Phosphate rock storage silo No. 1 and three (3) transfer points	434	7/1/1985	FALSE											
429-150	Phosphate rock transfer house	437	12/1/1966	TRUE	Y	--	--	--	--	2.39	1.20	--	--	--	--
426-156 433-158 433-165	One (1) slurry mix tank, one (1) clarifier, and one (1) defluorinated acid pump tank	450	5/1/1993	FALSE											
426-154	One (1) diatomaceous earth silo	451	4/1/1980	FALSE											
ES461 ES462	One (1) phosphoric acid recirculation water cooling tower consisting of two (2) fans	461 and 462	7/1/1992	FALSE											
None	Phosphoric Acid Plant Fugitives	491	1/1/1966	TRUE	N										
30	Two (2) phosphoric acid storage tanks (phosphoric acid tank farm), two (2) HFSA tanks, and one (1) carbon slurry tank	492	1/1/1966	TRUE	N										
31															
428-440															
428-442															
433-182															
Purified Acid Production Area															
	All sources		1989, 2002	FALSE											
DFP Production Area															
	All sources		2001	FALSE											
Shipping Area															
Ammonia Unloading	Ammonia Railroad Unloading	601, 602, and 603	1/1/1966	TRUE	Y	47.17	47.17	--	--	--	--	--	--	--	--
Ammonia Tanks	Ammonia Storage Tanks	604 and 605	1/1/1981	FALSE											
Sulfur Unloading	Sulfur Railroad Unloading	610, 611, 612, 613, and 614	1/1/1966	TRUE	N										
Railcar Wash 1	Railcar Wash Station No. 1	615	1/1/1966	TRUE	N										

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?	NH3 2002 Actual, tpy	NH3 PTE, tpy	NOx 2002 Actual, tpy	NOx PTE, tpy	PM10 2002 Actual, tpy	PM10 PTE, tpy	SO2 2002 Actual, tpy	SO2 PTE, tpy	VOC 2002 Actual, tpy	VOC PTE, tpy			
T-002 to T-012 T-014 to T-019	Thirty-three (33) phosphoric acid storage tanks (shipping tank farm)	616	1/1/1966	TRUE	Y	1.06	1.06	--	--	--	--	--	--	5.30	21.2			
T-021 to T-029																		
T-44																		
T-050 to T-052																		
T-054 to T-056																		
453-458	One (1) superphosphoric acid aging tank (shipping tank farm)	616																
AT2	One (1) superphosphoric acid aging tank (shipping tank farm)	616																
497-4-105	One (1) superphosphoric acid and clay additive mix tank (shipping tank farm)	616																
453-115 453-412	No. 1 filter press feed tank	616																
	No. 2 filter press feed tank and																	
	No. 3 filter press feed tank																	
VSEP Tank	One (1) 5,000 gallon VSEP feed tank	616																
Black Lomag	One (1) 110,000 gallon Black Lomag tank	616																
Permeate Tank	One (1) 1,000 gallon permeate tank	616																
Concentrate Tank	One (1) 1,000 gallon concentrate tank	616																
552-003	Three (3) liquid sulfur storage tanks	616																
552-005																		
552-050																		
Railcar Wash 2	Railcar Wash Station No. 2	617	1/1/1966	TRUE	N													
F650	CTS - Grinder Rock Loadout	650	1/1/1966	TRUE	Y	--	--	--	--	0.00	0.07	--	--	--	--			
F651	CTS - Grinder Rock Loadout	651	1/1/1966	TRUE	Y	--	--	--	--	0.00	0.07	--	--	--	--			
F652	Rock Loadout Transfer Station	652	1/1/1966	TRUE	Y	--	--	--	--	0.00	4.01	--	--	--	--			
F653	CTS - Phosphate Rock Transfer Station	653	1/1/1966	TRUE	Y	--	--	--	--	0.00	4.01	--	--	--	--			
F654	Rock Tower Loadout facility	654	1/1/1966	TRUE	Y	--	--	--	--	0.00	1.13	--	--	--	--			
F655	Chute-Barge Rock Loadout	655	1/1/1966	TRUE	Y	--	--	--	--	0.00	4.01	--	--	--	--			
F656	Chute-Train Rock Loadout	656	1/1/1966	TRUE	Y	--	--	--	--	0.00	9.70	--	--	--	--			
Miscellaneous Sources																		
214-613	Mine Pit Diesel Generator	801	2001	FALSE														
326-800-484	Calciner Building Diesel Generator	802	not installed	FALSE														
Sum						309	743	447	1,232	336	903	1,112	3,825	7	27			

Table 1-2. Summary of Units Potentially BART-Eligible

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?
S-3	Double-absorption sulfuric acid plant No. 3 (1850 tons per day nominal capacity)	101	1/14/1974	TRUE	Y
S-4	Double-absorption sulfuric acid plant No. 4 (1850 tons per day nominal capacity)	102	10/10/1975	TRUE	Y
BW-1	One (1) distillate oil-fired boiler (125 million Btu per hour nominal capacity)	111	1/1/1975	Shutdown	Y
417-503-462	Lime silo No. 4 at water treatment area	121	1/1/1973	TRUE	Y
339-051	vertical fluidized bed phosphate rock calciner unit No. 1 (105.1 tons per hour nominal feed); coal/coke/"off-spec" used oils, used oil sludge/used glycols/ residual oil-fired	201	7/1/1966	TRUE	Y
339-052	vertical fluidized bed phosphate rock calciner unit No. 2 (105.1 tons per hour nominal feed); coal/coke/"off-spec" used oils, used oil sludge/used glycols/ residual oil-fired	202	7/1/1966	TRUE	Y
339-053	vertical fluidized bed phosphate rock calciner unit No. 3 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	203	10/1/1966	TRUE	Y
339-054	vertical fluidized bed phosphate rock calciner unit No. 4 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	204	10/1/1966	TRUE	Y
339-055	vertical fluidized bed phosphate rock calciner unit No. 5 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	205	1/1/1976	TRUE	Y
339-056	vertical fluidized bed phosphate rock calciner unit No. 6 (105.1 tons per hour nominal feed); coal/coke / residual oil-fired	206	1/1/1976	TRUE	Y
332-120	Residual oil-fired phosphate rock dryer (250 tons per hour nominal capacity)	210	1/1/1966	TRUE	Y
Belt 39 to 70.1	Calcined rock CTS (Fugitive)	220	1/1/1966	TRUE	Y
Belt 55 to Belt 70.1	Calcined rock CTS Baghouse	221	1/1/1974	TRUE	Y
Belt 21 to Belt 23 or Belt 24	Storage silo baghouse	222	1/1/1966	TRUE	Y

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?
339-809-464	Calcined/dried rock CTS (Fugitive)	223	1/1/1966	TRUE	Y
F290	Mill Concentrator Fugitives	290	7/1/1966	TRUE	N
F291	Calciner Plant Area Fugitives	291	7/1/1966	TRUE	Y
F292	Surge Pond Aerator	292	7/1/1966	TRUE	N
504-107 504-016	Diammonium Phosphate Plant No. 1 combustion chamber and residual oil-fired dryer (Nominal maximum input rates of 618 tons fresh P2O5 and 275 tons of product per hour)	301	12/1/1966	Shutdown	Y
511-085 511-086 511-070	Diammonium Phosphate Plant No. 3 first stage reactor, second stage reactor, and granulator	302	7/1/1974	TRUE	Y
511-045	Diammonium Phosphate Plant No. 3 GTSP phosphate rock silo	310	3/1/1976	TRUE	Y
451-418 and 451-409	Superphosphoric acid plant No. 1	330	11/1/1966	TRUE	Y
451-701 and 451-809	Superphosphoric acid plant No. 2	331	1/1/1971	TRUE	Y
451-316 and 451-308	Superphosphoric acid plant No. 3	332	1/1/1976	TRUE	Y
DAP1WH1	Warehouse No. 1 for DAP 1	390	1/1/1967	Shutdown	Y
	Fertilizer Plant Area Fugitives	391, 392	1/1/1967	Shutdown	Y
421-201 421-000 421-325 421-324 421-327 421-326 421-223 421-232 421-218 421-330	Reactor Train No. 1; tilting pan (Bird) filter No. 1; tilting pan (Bird) filter No. 1 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 1 seal tanks.	401	12/1/1966	TRUE	Y

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?
422-201 422-000 422-325 422-324 422-327 422-326 422-223 422-232 422-218 422-330	Reactor Train No. 2; tilting pan (Bird) filter No. 2; tilting pan (Bird) filter No. 2 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 2 seal tanks.	404	12/1/1966	TRUE	Y
423-201 423-000 423-325 423-324 423-327 423-326 423-223 423-232 423-218 423-330	Reactor Train No. 3; tilting pan (Bird) filter No. 3; tilting pan (Bird) filter No. 3 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 3 seal tanks.	406	1/1/1972	TRUE	Y
424-201	Reactor Train No. 4; fluosilicic acid (H ₂ SiF ₆) recycle tank; tilting pan (Bird) filter No. 4; tilting pan (Bird) filter No. 4 primary vacuum pump installed on primary vacuum separator; secondary vacuum pump installed on secondary vacuum separator; (2) barometric condensers vacuum pumps; barometric condensers hotwell; and tilting pan (Bird) filter No. 4 seal tanks.	409	10/1/1975	TRUE	Y
429-150	Phosphate rock transfer house	437	12/1/1966	TRUE	Y
None	Phosphoric Acid Plant Fugitives	491	1/1/1966	TRUE	N
30	Two (2) phosphoric acid storage tanks (phosphoric acid tank farm), two (2) HFSA tanks, and one (1) carbon slurry tank	492	1/1/1966	TRUE	N
Ammonia Unloading	Ammonia Railroad Unloading	601, 602, and 603	1/1/1966	TRUE	Y
Sulfur Unloading	Sulfur Railroad Unloading	610, 611, 612, 613, and 614	1/1/1966	TRUE	N
Railcar Wash 1	Railcar Wash Station No. 1	615	1/1/1966	TRUE	N

Emission Source ID No.	Emission Source Description	Emission Point ID No.	Date of Operation	BART Eligible?	Emits BART Compounds?
T-002 to T-012 T-014 to T-019	Thirty-three (33) phosphoric acid storage tanks (shipping tank farm)	616	1/1/1966	TRUE	N
Railcar Wash 2	Railcar Wash Station No. 2	617	1/1/1966	TRUE	N
F650	CTS - Grinder Rock Loadout	650	1/1/1966	TRUE	Y
F651	CTS - Grinder Rock Loadout	651	1/1/1966	TRUE	Y
F652	Rock Loadout Transfer Station	652	1/1/1966	TRUE	Y
F653	CTS - Phosphate Rock Transfer Station	653	1/1/1966	TRUE	Y
F654	Rock Tower Loadout facility	654	1/1/1966	TRUE	Y
F655	Chute-Barge Rock Loadout	655	1/1/1966	TRUE	Y
F656	Chute-Train Rock Loadout	656	1/1/1966	TRUE	Y

4. Lost Production Costs:

There is no indication of whether the facility considered ways to mitigate the costs attributed to 10 days of “Lost Production” listed in Table 4-14 (\$1,649,250). These costs account for approximately 62 percent of the total capital costs for a new SO₂ scrubbing system following a phosphoric acid crossflow scrubber. For example, the facility should consider the effects on lost production if potential controls were installed during an already planned plant shutdown for maintenance, or when one of the units is off-line. Also, the possibility of increasing production significantly prior to and following the shut down to offset any lost production should be discussed. It is not clear whether the facility considered these types of possibilities and their effects on lost production costs.

PCS Phosphate Response

Table 4-14 refers to the Phosphoric Acid Train No. 3. PA Train 3 routinely operates at maximum capacity to meet the production demands of the facility; therefore, there are not significant blocks of time to conduct the modification when one unit is off-line.

5. Capital Recovery and Contingencies:

a) The facility should justify its capital recovery cost assumptions (i.e., equipment life and rate of return) listed in Tables 4-2, 4-3, 4-9, 4-10, 4-11, 4-13, 4-14 and 4-15. If these assumptions differ from the EPA Cost Manual, the document should provide justification.

PCS Phosphate Response

Please refer to the following excerpt from page 2-13 of EPA’s Cost Control Manual:

*“Analysts use the interest rate to estimate the time value of money. It can be thought of as a **return on investment or the cost of borrowing**. The interest rate employed in this Manual differs from that used in non-governmental financial analyses. It represents a **social interest rate** established by the Office of Management and Budget (OMB) for the comparison of public policy issues.*

OMB sets the social interest rate for governmental analyses and it is currently set at seven percent.

*However, **the social rate of interest is not appropriate for industry**. When choosing between alternative air pollution control devices, the industrial planner must not only take into consideration the costs of each device, they must also understand how the **cost of each device fits into the financial structure of their business**. Furthermore, a number of air regulations allow sources of pollution to petition for extensions on deadlines, variances from the regulation, or exemption from installing*

*control devices, based upon the economic impact that equipment would have upon the source. In these cases, **the source may find it useful to apply their own interest rate to the calculation of control costs.** Common interest rates used by industry and accepted by the EPA for source petitions include the **business' current borrowing rate, the current prime rate, and other acceptable industrial rates of return.**"*

The application of a 7% interest rate is not appropriate for this analysis, and furthermore, the EPA Cost Control Manual does not require the use of 7% as discussed above. The 15% rate is being used to account for the project costs as well as for the lost capital available for funding other projects that could have positive return on investment at the facility.

b) Tables 4-14 and 4-15 list a contingency factor of fifteen and three percent, respectively. We recommend that the document provide a justification for any contingency factors used since there can be considerable variation in contingency factors across technologies, processes, and conditions at individual sites. The justification of a contingency factor should clarify the reason for the specific percentage applied.

PCS Phosphate Response

As stated in EPA's Cost Control Manual:

*"Probably the **most subjective part** of a cost estimate occurs when the **control system is to be installed on an existing facility.** Unless the original designers had the foresight to include additional floor space and room between components for new equipment, the installation of retrofitted pollution control devices can impose an additional expense to "shoe-horn" the equipment into the right locations."*

Table 4-14 details the costs associated with the installation of a scrubber on PA Train No. 3. Retrofit installations of scrubbing systems frequently require additional changes and modifications (i.e., piping, fans, etc) that were not included in the original cost estimates. Therefore, a contingency factor (or retrofit factor) of 15% was used in the analysis. Table 4-15 details the installation of a fabric filter on units 650-656. Retrofit installations of fabric filters should be much easier than the installation of a wet scrubber, therefore, a contingency factor (or retrofit factor) of 3% was used in the analysis.

6. Piping Costs in Table 4-14

The piping costs listed in Table 4-14 do not appear to correctly use the piping factor provided in Chapter 1 in Section 5 of EPA's Cost Manual. The factor applied to piping is 0.30 multiplied by the purchased equipment cost (B). The PCS document lists two types of piping, each applying a factor of 0.30B. This, in essence, is double counting the piping costs and is not an appropriate use of the Cost Manual piping cost factor. If the facility does not want to use the Cost Manual factor as described, the facility could instead provide specific cost estimates for the two types of piping listed.

PCS Phosphate Response

One of the entries is accounting for the piping associated with routing utilities to the proposed scrubber. This includes compressed air and water for operation of the scrubber. The second entry is accounting for ductwork associated with routing the exhaust to the scrubber. These are separate items and are not "double-counting" the piping costs associated with the installation of the scrubber.

7. Incremental Maintenance Costs:

Tables 4-9, 4-10, 4-13 list "incremental maintenance costs" with a factor of "2.75 percent of TCC" (total capital costs) based on the Cost Manual. We are unclear from where in the Cost Manual the factor of "2.75 percent of TCC" is derived. Also, if this cost category refers to additional maintenance costs associated with operation of a control device, we agree it should be part of the direct annual costs. As such, we believe these costs should not be based on capital costs as depicted by the factor description.

PCS Phosphate Response

Higher maintenance costs associated with low-NOx burner systems is well known in the industry. This is because the more precise control of peak flame temperatures needed to minimize NOx formation requires more strict burner performance requirements and, therefore, resulting in higher maintenance costs. Some EPA cost methodologies break out increased maintenance costs into 1) maintenance labor, typically a number of hours per shift, and 2) maintenance capital, typically considered a percentage of maintenance labor. It has been our experience that in situations where only intermittent labor activities are needed, such as for a low-NOx burner, manufacturers will frequently apply an overall "percent of capital cost" to give customers an idea of true maintenance cost.

8. References in the Cost Tables

In the cost tables provided in the document, there are references to vendor quotes listed in the "Basis" and "Basis/Comments" sections. To aid review of the document, we suggest that the document include the vendor quotes (e.g., "E-mail from John Horne" cited in Tables 4-2 and 4-3) as part of the document.

PCS Phosphate Response

We have attached information received from vendors.

Enclosure 2: Modeling Analysis

1. Modeling Scenario #2 Visibility Estimates – Table 5-5

The modeled visibility impacts for Scenario #2 reflect the reduction of SO₂ emissions from Sulfuric Acid Plants 3 and 4 from 3.8 lb SO₂/ton H₂SO₄ to 3.5 lb SO₂/ton H₂SO₄. EPA's Comment # 2 in Enclosure 1 indicates that use of the cesium catalyst could reduce SO₂ emission rates to between 2.0 and 3.5 lb SO₂/ton H₂SO₄. If it is determined that lower SO₂ emission rates are feasible and appropriate, the modeling for Scenario #2 should be redone to evaluate the visibility impacts. A SO₂ emission rate of 2.0 lb SO₂/ton H₂SO₄ would likely result in a significant reduction of the modeled visibility impacts at the Swanquarter Class I area.

PCS Phosphate Response

Emission rates lower than 3.5 lb/ton are not feasible without a production penalty, thus no modeling analyses were performed for lower emission rates.

2. Baseline PM Emission Rates – Table 3-5

The baseline PM emission rates for Source ID#'s 201 through 206 (Calciners #1-#6) listed in Table 3-5 are different than those presented in the October 2, 2006, BART Exemption Modeling Report. This appears to be a result of a change in the throughput from 113.5 tons feed/hr to 105.1 tons feed/hr. It is not understood why the throughput during the baseline condition would be different than that used in the October 2, 2006, BART Exemption Modeling Report. An explanation should be provided for these differences.

PCS Phosphate Response

Recent stack performed at PCS was performed at a maximum achievable production rate of 105.1 tons feed per hour. Thus, the permit has been revised with the lower production rates to be consistent with stack testing and permit requirements.

3. Modeled Stack Parameters for Source ID #'s 437 and 654 – Table 5-1

The modeled stack parameters for Source ID # 437 (Calcined Rock CTS Baghouse) and Source ID# 654 (Rock Tower Loadout Baghouse) are different than those presented in the October 2, 2006, BART Exemption Modeling Report. An explanation should be provided for these differences.

PCS Phosphate Response

Source ID# 654 is no longer used at the facility. We inadvertently reported the stack parameters for Source ID #437 incorrectly in Table 5-1 of the BART evaluation report.

4. Use of the New IMPROVE Equation – Section 5.8

(a) Section 5.8 of the determination report indicates that visibility impacts presented in the report were developed using the New IMPROVE equation as

implemented in an external spreadsheet created by Dr. Ivar Tombach. The report does not provide any discussion of the rationale for using the New IMPROVE algorithm instead of the default IMPROVE algorithm that is contained in CALPOST. The report should provide justification for using the new algorithm.

(b) The report should reference the fact that the spreadsheets are contained on the CD that was submitted with the report. The version of the spreadsheet that is contained on the CD is different than that used in the October 2, 2006, BART Exemption Modeling Report in that it does not include the nitrogen dioxide term that is contained in the New IMPROVE Algorithm. EPA Region 4's position on the use of the New IMPROVE algorithm is that any methodology used to implement the algorithm must address the entire algorithm (See additional discussion of this issue is contained in Attachment A – "U.S. EPA Region 4 Review of the VISTAS Methodology for Implementing the New IMPROVE Equation with CALPUFF for BART Modeling"). EPA Region 4's comments on the October 2, 2006, BART Exemption Modeling Report indicated that additional supporting documentation was needed to allow the use of the spreadsheet that incorporates the nitrogen dioxide term. These comments were not meant to suggest that PCS Phosphate should use the older form of the spreadsheet that does not include the nitrogen dioxide term, but that additional explanation was needed to allow use of the new spreadsheet. The nitrogen dioxide term may be especially important when comparing different control options since some of the options would reduce the NO_x emissions and thus would affect the estimated nitrogen dioxide concentration. The rationale for using a methodology that does not include the nitrogen dioxide term should be provided by PCS Phosphate.

PCS Phosphate Response

The modeling methodology was reviewed and approved in the modeling protocols submitted to the NCDAQ. In addition, the New IMPROVE equation was approved and provided to us by NCDAQ for use in the BART modeling report.

5. Visibility Impact Thresholds (Section 4.1.5, P. 4-3; Section 1.2, P. 1-1)
Section 4.1.5 provides a summary of Step 5 of the BART Guidelines. The second paragraph of this section states: "If the net visibility improvement is less than the comparison threshold, then there is no need for the facility to implement the control technologies because the resulting visibility impacts would be negligible." The BART Guidelines do not make such an assertion. Rather, the Guidelines provide flexibility to the States with setting thresholds and weighing each of the BART factors. (See 70 FR 39170, 1st col., July 6, 2005.) All of the statutory factors should be used in the determination of whether or not BART controls are needed. Visibility improvement based on modeling results is only one of the factors that should be assessed in this decision.

Similarly, the document states on page 1-1 of Section 1.2 that, "...the additional controls will not result in a visibility improvement that EPA has states is perceivable to the human eye..." This statement implies that the controls are not

considered to make enough of an improvement in visibility at the Class I areas identified in the report. We note, however, that there is no bright line for evaluating in the BART determination analysis the degree of visibility improvement that is considered significant enough to warrant BART controls. Rather, a State has flexibility in setting absolute thresholds and determining the weight and significance to be assigned to each BART factor. (See 70 FR 39170, 1st col., July 6, 2005.) Also, this statement does not recognize that a source may be *contributing* to visibility impairment at a Class I area. A source is contributing to visibility impairment if its impacts are 0.5dv or higher, which is below the 1.0dv threshold referenced by the document as what is perceivable to the human eye.

PCS Phosphate Response

The Regional Haze Rule defines “visibility impairment” as “any humanly perceptible change in visibility from that which would have existed under natural conditions” (see Federal Register Vol. 64, No. 126, page 35764). EPA states numerous times in the preamble and the rule that these thresholds are humanly perceptible thresholds (see Federal Register Vol. 70, No. 128, page 39119, footnote 28 and page 39120, footnote 32). This is the basis for using human perception in the report.

In order to evaluate the various control scenarios as part of the BART evaluation, the change in visibility was determined for the mill as compared to natural conditions as required by the BART rule. Thus, since we are required by the BART rule to evaluate the impact that our emissions would have on natural visibility conditions at each Class I area, it must be assumed that no other sources of air emissions would exist other than those from sources at the mill for the purpose of the analysis. According to 40 CFR Part 51, Appendix Y, an individual BART-eligible source is considered to “contribute” to visibility impairment in a Class I area if the modeled 98th percentile change in dv is equal to or greater than the “contribution threshold.” The contribution threshold is 0.5 deciview. Since the modeled change in visibility for each control scenario is less than the 0.5 dv contribution threshold as compared to natural conditions, it is appropriate to state that a control scenario would not result in a humanly perceptible change as compared to natural conditions.

Furthermore, the existing regional haze in the subject Class I areas is on the order of 35 dv. Based on the modeling analyses performed in the BART evaluation, the greatest change in visibility is 0.383 dv. This would be less than a 1% reduction in regional haze as compared to existing regional haze conditions. Based on the magnitude of costs for the control scenarios with minimal improvement in visibility, BART would be no further controls.

6. Results tables specified in the VISTAS Protocol

The VISTAS Protocol provides standard table formats for presenting modeling results. There should be a table showing number of days and number of receptors

with impact greater than 0.5 deciview (dv) for each Class 1 area, and for each year, number of days and number of receptors with impact greater than 1.0 dv for each Class 1 area for the entire 3-yr period, and the maximum 24-hr impact during the 3-yr period. These tables were provided in the facility's BART Exemption Modeling Report, but have not been included in the November 2006 document. It is suggested that similar tables be included in the determination report. Also, documentation that addresses the development of the baseline modeling should be included in the determination report. This may be in the BART exemption modeling report. It is suggested that the complete BART Exemption Modeling Report be included as an appendix to the determination report.

PCS Phosphate Response

The BART Exemption Modeling Report has been previously submitted to NCDAQ. Additional copies may be provided upon request.

Enclosure 3: Text Clarifications

Below are clarifications we wish to note on certain statements in the text. (The location of the text in the document is identified in parentheses.)

1. Definitions

(a) *Just Noticeable Change* (Section 2.1, P. 2-1)

The document provides selected definitions from 40 CFR 51. We wish to clarify that the definition provided in Section 2.1 for *Just Noticeable Change* is not from the Definitions section of the Regional Haze regulations (40 CFR 51.301, “Definitions”). Including this definition appears misleading since it discusses the concept of Line-of-Sight (LOS). We recommend excluding this definition since, as the report indicates elsewhere in Section 1, this specific approach is not appropriate for BART modeling purposes.

PCS Phosphate Response

PCS Phosphate acknowledges the requested change. If the North Carolina Division of Air Quality requests a complete amended document then the change will be incorporated into the text.

However, PCS Phosphate continues to maintain that the line-of-sight approach is the technically appropriate refined method for evaluating visibility impacts for BART exemption modeling when comparing a single source to the humanly perceptible change value of 1 deciview. Furthermore, this is consistent with the definition and scientific basis of a deciview. An approximate one (1.0) deciview change was defined by Pitchford and Malm (1992) as a “just noticeable change” to a human when the background visual range equals the line-of-sight (LOS) of the observer.

According to L. Willard Richards in “Use of the Deciview Haze Index as an Indicator for Regional Haze,” if a shorter LOS distance than the background visual range (natural conditions) is used in performing the calculations then a higher extinction value, or deciview, is needed to cause a “just noticeable change.” In other words, when the LOS is less than the background visual range, then it would require a higher deciview value in order to be a “just noticeable change.” Thus, in order to more accurately compare the impact of a single source on a Class I area for comparison to the deciview thresholds, the deciview change would need to be calculated along the human line-of-sight that is equal to the background visual range as opposed to a single receptor point in the Class I area. The modeling we included in the BART evaluation calculates the change over a shorter distance than the background visual range and thus overestimates the impact that the BART eligible units have on each Class I area.

(b) *Potential to Emit (PTE) Thresholds* (Section 2-2, P. 2-2)

The PTE threshold provided for BART –eligible sources should be corrected to be consistent with the CFR to read as follows, “...the potential to emit ~~more than~~ 250 tons per year or more...” (See 40 CFR 51.301, “Definitions,” *Existing stationary facility*.)

PCS Phosphate Response

PCS Phosphate acknowledges the requested change. If the North Carolina Division of Air Quality requests a complete amended document then the change will be incorporated into the text.

(c) *BART-eligible units* (Section 3.2, P. 3-3)

The document states that, “There are...tanks...that are BART eligible units but do not emit SO₂, NO_x, H₂SO₄ mist, or PM₁₀.” We note that this statement appears misleading, as these units are not considered BART-eligible because they do not emit any visibility-impairing pollutants.

PCS Phosphate Response

PCS Phosphate acknowledges the requested change. If the North Carolina Division of Air Quality requests a complete amended document then the change will be incorporated into the text.

2. Due date for Regional Haze SIPs (Section 2.2, P. 2-3)

The document identifies a due date for Regional Haze SIPs of January 2008. To clarify, the due date for Regional Haze SIPs specified in the Regional Haze regulations at 40 CFR 51.308 (b) is: “...no later than December 17, 2007.”

PCS Phosphate Response

PCS Phosphate acknowledges the requested change. If the North Carolina Division of Air Quality requests a complete amended document then the change will be incorporated into the text. We would note that this is only an editorial change, both statements are correct as written.

3. Cost Effectiveness Numbers (Section 4.2.1, P.4-5)

On page 4-5 of the document, the cost effectiveness values for reducing SO₂ emissions from SA Plants 3 and 4 are slightly different than the corresponding values in Tables 4-2 and 4-3. The values presented in the text are \$4,108/\$5,584 per ton SO₂, and the corresponding values in the tables are \$4,127/\$5,568 per ton SO₂, respectively. These differences should be clarified, and also correlated to the values in Tables 1-1 and 1-2.

There is also a discrepancy of values listed in Tables 1-1 and 1-2 with some of the corresponding values computed in the detailed cost analysis tables listed further in that section. One suggestion to facilitate review and to minimize these discrepancies is to add a column to Tables 1-1 and/or 1-2 that lists the cost analysis table number along with the modeled scenario number.

PCS Phosphate Response

During report preparation and review, the calculations in Tables 4-2 through 4-15 were updated, but some of the \$/ton numbers in the text and Tables 1-1 and 1-2 for individual control scenarios were inadvertently not updated in the final report. We have attached revised Tables 1-1 and 1-2 with corrected \$/ton numbers and references to the individual control cost tables. The overall result of the analysis is not changed.

4. Permit Changes (Section 4.4.1, P.4-9)

The document asserts that emissions from the calciner are less than the Maximum Achievable Control Technology (MACT) standard for particulate matter (PM), and that this level of control is already required in the facility's Title V operating permit. The BART Guidelines say if the most stringent control available is adopted, it must be made federally enforceable for purposes of BART. This should be described in the SIP narrative and when the Title V permit is reopened in accordance with the schedule in 40 CFR part 70 or 40 CFR part 71, the statement of basis for this control should be modified to include a statement that these controls and operating conditions also serve to satisfy BART for PM.

PCS Phosphate Response

The submitted document included a request to incorporate the presented emission levels as BART into the Title V operating permit for PCS Phosphate.

APPENDIX B

Public Notice for BART Title V Air Permit Modification

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT & NATURAL RESOURCES
PUBLIC NOTICE AND NOTICE OF INTENT TO ISSUE AIR QUALITY PERMITS

Notice is hereby given for a public hearing to be heard by the North Carolina Department of Environment and Natural Resources (DENR), Division of Air Quality (DAQ), concerning the proposed Regional Haze state implementation plan (SIP) and preliminary best available retrofit technology (BART) determinations. DAQ also hereby gives notice of intent to issue an Air Quality Permit to each of the facilities noted in the information section below.

PURPOSE: The hearing is intended to inform interested parties on the Regional Haze SIP including BART determinations and intent to issue related Air Quality Permits.

DATES AND LOCATIONS: November 13, 2007, 6:30 p.m., Asheville-Buncombe Technical Community College Main Campus, 1st Floor Lecture Room, Simpson Administrative Building, 340 Victoria Road, Asheville, NC 28801.

November 15, 2007, 6:30 p.m., at the DENR Washington Regional Office, 943 Washington Square Mall, DENR Hearing Room, Washington, NC, 27889.

COMMENT PROCEDURES: All persons interested in these matters are invited to attend the public hearing. Any person desiring to comment is requested to submit a written statement for inclusion in the record of proceedings at the public hearing. The hearing officer may limit oral presentation lengths if many people want to speak. The hearing record will remain open until November 26, 2007, to receive additional written statements.

INFORMATION: Copies of the proposed Regional Haze SIP, the BART determinations, related permit reviews and draft permits, and a summary of initial Federal Land Managers comments on the Regional Haze SIP may be downloaded at <http://daq.state.nc.us/planning/nc.sip.shtml>. The documents may also be reviewed at the offices of the North Carolina Department of Environment and Natural Resources, Division of Air Quality, located in:

Raleigh, Planning Section	(919) 715-7670
Raleigh, Permits Section	(919) 715-6237
Asheville Regional Office	(828) 296-4500
Washington Regional Office	(252) 946-6481

Comments should be sent to and additional information concerning the hearings or the proposals may be obtained by contacting:

Ms. Laura Boothe
Acting Chief, Planning Section
Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641
Phone: (919) 733-1488
Fax: (919) 715-7476

daq.publiccomments@ncmail.net (Note: In the subject line type Regional Haze SIP)

The following two facilities have submitted BART determinations under 15A NCAC 02D .0543 Best Available Retrofit Technology for DAQ to review and have applied for an Air Quality Permit which meets the requirements specified in 15A North Carolina Administrative Code 02Q .0300:

PCS Phosphate Company
1530 NC 306 South
Aurora, NC 27806
Beaufort County
Permit # 04176 T34 App# 0700071.06D

Blue Ridge Paper Company
175 Main Street
Canton, NC 28716
Haywood County
Permit # 08961 – T09 App# 440159.06E

Comments should be sent to and additional information regarding the Air Quality Permits may be obtained by contacting:

Mr. Donald van der Vaart, Ph. D., P.E.
Chief, Air Permits Section
Division of Air Quality
1641 Mail Service Center
Raleigh, NC 27699-1641
Attn: Permits Section
Phone: (919) 715-6253
Fax: (919) 733-5317

All comments received by November 26, 2007 will be considered in the final determinations regarding these Air Quality Permits.

Date: _____

B. Keith Overcash, P.E., Director