United States Department of the Interior

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

IN REPLY REFER TO:

FWS/ANWS-AR-AQ

July 23, 2010

Mr. James Brooks, Director
Bureau of Air Quality
State of Maine Department of Environmental Protection
17 State House Station
Augusta, Maine 04333-0017

Dear Director Brooks:

On June 13, 2010, the State of Maine submitted a draft implementation plan describing its proposal to improve air quality regional haze impacts at mandatory Class I areas across your region. We appreciate the opportunity to work closely with the State through the initial evaluation, development, and, now, subsequent review of this plan. Cooperative efforts such as these ensure that, together, we will continue to make progress toward the Clean Air Act's goal of natural visibility conditions at all of our most pristine National Parks and Wilderness Areas for future generations.

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

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

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

Sincerely,

Sandra V. Silva

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

Sincerely,

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

Enclosures

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Fish and Wildlife Service and National Park Service
Department of Interior Comments
State of Maine Draft Regional Haze Rule State Implementation Plan
July 23, 2010

The Fish and Wildlife Service (FWS) and National Park Service (NPS) would like to thank the State of Maine for their efforts towards an effective and interactive consultation with the Federal Land Managers on their Regional Haze Implementation Plan (RHSIP). Furthermore, we appreciate the State's efforts in addressing our comments on the preliminary draft document that we received back in 2009. Through cooperative efforts, the draft RH SIP is one of the best examples of a comprehensive and well written draft of the MANE-VU States.

We would like to further commend the State for addressing most, if not all, of the "MANE-VU Ask" ("Ask") identified by the MANE-VU Regional Planning Organization (RPO). On numerous occasions, the FWS and NPS have expressed concerns with the lack of "Ask" implementation language in many of MANE-VU State RHSIPs. These omissions have led to less than ideal expectations on our part that controls will be realized overall in the MANE-VU Region. The State of Maine not only appears to have addressed the "Ask", but has done an exemplary job of describing the State's intent to meet Maine's share of emission controls.

Overall Comments

As mentioned above, we have concern over the success of the MANE-VU Region realizing the overall emission reductions expected by the "Ask". Although Maine is actively implementing controls of the "Ask", many States are not. There is a good possibility that reasonable progress goals that States' are setting based on full implementation of these "Ask" will not be achieved without honestly discerning which emission reductions will take place and which ones will not.

It is our recommendation that Maine consider providing discussion and additional plots of the reasonable progress goals without the "Ask" that are based on either "on the way (OTW)/on the books (OTB)" or "better than on the way" scenarios. An additional presentation, taking more realistic emission reductions into consideration, would offer a better representation of the span of control being implemented in the region. Although, we recognize that it is not within Maine's power to get other States to comply with the "Ask", none the less, the State should access whether or not Pennsylvania, Ohio, Massachusetts, and New York will meet their share of the "Ask", and communicate and incorporate these findings. This is important given that these States were identified as key contributors to Maine's Class I areas.

Specific Comments

Chapter 1, *Introduction*

Section 1.8: The State identifies a suite of analysis methods to produce a weight of evidence approach to basic source apportionment. Although we commend the weight of evidence approach, the FWS and NPS does not consider MANE-VU's application of the CALPUFF model as within recommended modeling practices. As such, the use of non-standard models or

configurations, customarily require a performance evaluation that demonstrates beneficial use, which was not presented in Maine's SIP.

Chapter 8, *Emission Inventory*
We commend Maine for being the first MANE-VU State to implement the low sulfur fuel strategy.

It would be helpful to the reader if an explanation could be given as to why SO_2 emissions for EGUs increase between the 2018 OTB/OTW inventory and the final modeling inventory.

We recommend that Maine add text to clarify which emission reductions assumed in the final modeling inventory (Table 8-4) are being implemented. Added language would explain questions such as: is the final modeling inventory for non-EGUs point and area source SO_2 emissions accurate for Maine's actual implemented controls, and are all the Best Available Retrofit (BART) emissions included in these inventories?

Chapter 10, *Best Available Retrofit Technology*
An overarching concern is that it is not clear from the Maine BART documents (posted 6/29/10) how it applied any of the five factors in the BART analyses in making its BART determinations. For example, MAINE does not appear to have given much weight to the visibility benefits that could be realized from the control strategies evaluated. At least, it is not clear how Maine applied this factor in developing its BART conclusions. As we shall discuss later, there appears to be great inconsistency[1] among the methods used by Maine to assess and evaluate costs and benefits that would result from the various control strategies chosen by Maine as representing BART.

The individual company BART determinations were not found in the record. Please add an Appendix to the State Implementation Plan for Regional Haze and include these documents to aid third-party reviewers to deal with the complete record.

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

There are at least six Class I areas impacted by Maine's BART sources. We believe that it is appropriate to consider both the degree of visibility improvement in a given Class I area as well as the cumulative effects of improving visibility across all of the Class I areas affected. The same metric should not be used to evaluate the effects of reducing emissions from a BART source that impacts only one Class I area as for a BART source that impacts multiple Class I areas. Also, evaluating impacts at one Class I area, while ignoring others that are similarly significantly impaired should not be done. Emissions savings from a source are benefits that will be spread well beyond only the most-impacted Class I area, and should be considered. While Maine

[1] For example, MEDEP calculates cost/ton for the Androscoggin paper mill but does not calculate cost/dv. However, for the Wyman power plant, MEDEP calculates cost/dv but does not calculate cost/ton.

presented data describing improvements to visibility at a specific Class I area that would result from the various control scenarios it investigated, the State has not explained how it incorporated this information on impacts upon all Class I areas into its BART decision.

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

- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged visibility improvement from the baseline **summed across the three Class I areas** achieved with LNB with separated OFA, upgraded wet FGD, and FGC for enhanced ESP (Post-Control Scenario A) was 1.070 Δdv from Unit 1, 0.199 Δdv from Unit 2, 1.068 Δdv from Unit 3, and 0.892 Δdv from Unit 4. [2]
- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged98_{th} percentile visibility improvement from the baseline **summed across all four Class I areas** achieved with LNB with advanced OFA, dry FGD, and a new full-scale fabric filter, Post-Control Scenario A for each unit, was 3.558 Δdv from Unit 3 and 1.963 Δdv from Unit 4.[3]
- Visibility impacts were addressed in a comprehensive visibility analysis covering three visibility impairing pollutants and the associated control options. The **cumulative visibility improvement as compared to the baseline across Wind Cave NP and Badlands NP** achieved with new LNB with OFA at the 30-day limit of 0.23 lb/MMBtu (based on the 98_{th} percentile modeled results) was 0.14 Δdv from each of the three units. The expected visibility improvement over the course of a full annual period would be even greater due to the annual BART limit that is based on 0.19 lb/MMBtu.[4]
- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged 98_{th} percentile visibility improvement from the baseline **summed across both Class I areas** achieved with LNB with advanced OFA, wet FGD, and existing ESP with FGC (Post-Control Scenario A) was 1.716 Δdv from Unit 1 and 1.934 Δdv from Unit 2. [5]
- Visibility impacts were addressed in a comprehensive visibility analysis covering all three visibility impairing pollutants and associated control options. The cumulative 3-year averaged 98_{th} percentile visibility improvement from the baseline **summed across both Class I areas** achieved with LNB with advanced OFA, upgrading the existing dry FGD, and a new full-scale fabric filter, Post-Control Scenario A for Unit 1, was 0.996 Δdv.[6]

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

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

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

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

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

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

> **Table 22: Visibility Modeling Results (percent improvement)** Total visibility impacts (sum of 98th percentile for all Class I areas)
>
> The BART guidelines recommend analyzing visibility improvement for the highest impacted Class I area with the assumption that any improvement in the worse impacted area would result in improvement in the lesser impacted areas. **However, since the Boardman Plant significantly impacts 14 Class I Areas within 300 kilometers, the Department tried to include other parameters that would assess the significance of the improvements for all Class I areas impacted. Therefore, the Department added the number of Class I areas with impacts greater than 1.0 delta deciview, the total delta deciviews for all Class I areas (98th percentile), and the average delta deciview for all Class I areas (98th percentile).** As can be seen in Table 21, any one of the parameters is fairly representative of the other parameters perhaps with the exception of WFGD. Given these results, the Department does not believe that adding additional parameters, such as total deciview days, would result in any other conclusions and would probably just add confusion to the analysis (e.g., more days of impacts than are in a year). Using the results of the visibility modeling, the cost effectiveness of the control technologies is recalculated by relating the costs to deciview improvement (**Mt. Hood and all Class I areas**) as shown in the following 2 tables.[7]

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

Based upon our reviews of BART analyses across the U.S., we believe that cost-per-deciview ($/dv) of visibility improvement is the most-common and most-useful parameter for assessing the cost-effectiveness of strategies to improve visibility in Class I areas. Our compilation[8] of BART analyses across the U.S. reveals that the **average cost/dv proposed by either a state or a BART source is $13 - $20 million**,[9] with a maximum of almost $50 million/dv proposed by Colorado at the Martin Drake power plant in Colorado Springs.

Section 10.7.2: In the Best Available Retrofit Technology (BART) determination section for FPL Energy Wyman, LLC, three unlabeled tables identify visibility benefits based on 1st and 8th high values (page 110). Our understanding is that the quality and quantity of meteorology used during the BART determinations fall within the recommended modeling practices. Maine voluntarily agreed to limit evaluations to 1st high values in lieu of generating 3 years of quality

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

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

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

meteorological input. Please communicate that the State did not use the 8th high to base their BART conclusion.

Comments on the BART determinations for individual facilities that are subject to BART follow. We are focusing our comments on the BART determinations for the Verso Androscoggin and FPL Wyman facilities because they have larger impacts than the other BART sources. We are also providing comments on the other BART sources.

Verso Androscoggin Paper Mill

The Power Boiler #1 and #2, and the Waste Fuel Incinerator (WFI) units at Verso Androscoggin Paper Mill are BART eligible. Both SCR and SNCR are evaluated for each of these units as BART options for controlling NO_x emissions. In each case, we have concerns with the cost estimation methodologies used: annual reagent and catalyst costs are significantly above what should be expected, capital recovery factor calculations use annual interest rates nearly double the standard of EPA's *OAQPS Air Pollution Cost Control Manual*, and recovery periods only half as long, and there are unexplained differences between the company's proposal and the Maine cost estimates. In summary, our data indicates that both SCR and SNCR should be considered as viable NO_x BART conclusions for these units, and that lower sulfur residual oils should be more fully evaluated as an SO_2 BART option for the Power Boilers. We also have several questions regarding the SO_2 BART conclusion for the WFI. Please see the detailed comments contained in Attachment 1 for specifics.

FPL Energy Wyman Station

Power Boilers #3 and #4 at the FPL Energy Wyman Station are BART-eligible units. The State's SO_2 BART analysis appears to be the only BART analysis conducted by Maine in which cost-effectiveness was not evaluated in terms of annual cost/ton of pollutant removed. Instead, Maine appears to have relied solely upon annual cost/deciviews (dv) of visibility improvement. While we encourage the use of the $/dv metric, it was not properly calculated nor applied in this case. Using the data available in the BART analyses, we assessed the cost per ton of SO_2 reduced by the BART options, as well as corrected $/dv calculations. Based upon the results, we believe that it is reasonable to conclude that 0.5% - 0.3% sulfur fuels are BART for the FPL boilers. See the discussion in Attachment 2 to these comments for further details.

SAPPI SD Warren Paper Mill

We are confused as to the BART status for Power Boiler #1 at the SAPPI SD Warren Paper Mill. While the company-prepared BART analysis (September 2009) did not mention this unit, the January 21, 2010, Maine BART analysis does identify and analyze BART controls for Power Boiler #2. The final Maine BART analysis for the facility, posted on June 29, 2010, is again silent on this unit. Please explain the BART eligibility status for the SAPPI SD Warren Paper Mill Power Boiler #1, and include any appropriate BART determination in the final SIP. Supporting information for this comment is included in Attachment 3 to these comments.

Domtar Industries, Inc. – Woodland Mill

The State did a good job of reflecting the five-factor BART protocol in the Departmental Findings of Fact and Order for Domtar Industries, Inc. – Woodland Mill. Section II makes reference from the company BART determination to a Dry Electrostatic Precipitator BART alternative estimated to cost $4,640 per ton of particulate matter removed. It also makes reference to the Selective Non-Catalytic Reduction (SNCR) BART alternative estimated by the company to cost $7,360 per ton of NO_x removed. If the detailed information correctly supports the values shown above, then it may be reasonable to conclude that the cost per ton of removal was excessive. Maine seemed to rely solely upon the MANE-VU visibility data to evaluate in a general way the visibility impact of a given unit on nearby Class I areas, but individual modeling of each BART alternative was not performed. In the case of the Woodland Mill it seemed that by concluding that an alternative was not cost-effective on a cost per ton basis, Maine believes that the specific cost of visibility improvement was not necessary. Normally, the visibility cost step is performed, even if cost per ton is deemed to be excessive. Existing SO_2 controls on Power Boiler #9 and the Lime Kiln seemed to be considered 'top controls', so further cost analysis was not necessary.

Lincoln Paper

As we understand Maine proposes that Lincoln be allowed to burn 2% S fuel oil. Additionally, SO_2 emissions from the recovery boiler shall be controlled to 141 ppmv (dry basis) @ 8% O_2 on a 24-hour block average basis when firing only black liquor or when firing a combination of black liquor and oil. The recovery boiler fires #6-fuel oil. Oil fired in the recovery boiler alone shall not exceed 0.7% sulfur by weight or 2.0% sulfur by weight when firing a combination of black liquor and oil. The recovery boiler is fired with fuel oil for startup purposes (in order to initiate Black Liquor Solids (BLS) firing) in addition to shutdowns and other events which require the addition of oil firing.

Maine should explain why use of lower sulfur (0.7% S) fuel (that is already used when the recovery furnaces fires 100% #6 oil) would incur a capital cost that made use of that fuel all the time too expensive. The Lincoln Paper BART determination is deficient because it does not evaluate the use of 0.7% fuel oil at all times.

Dragon Cement

Based upon the 6/29/10 BART analysis, Maine has determined that for NO_x, Dragon shall operate an SNCR (Selective Non-Catalytic Reduction) system to reduce NO_x emissions from the calciner to achieve a 45% control efficiency. NO_x emissions from the kiln system shall be limited to 350.0 lb/hr on a 90 day rolling average and 1533.0 tons/year on a 12 month rolling total basis.

We concur.

Katahdin Paper

Maine is limiting emissions from Katahdin paper's only BART source to < 250 tpy to exempt it from BART.

We concur.

Red Shield Old Town Fuel & Fiber

Maine is limiting emissions from Red Shield's Old Town Fuel & Fiber's only BART sources to < 250 tons/year to exempt it from BART.

We concur.

Rumford Paper

Maine is limiting emissions from Rumford Paper to less than 250 tons per year so as to exempt it from BART.

Please assure that Departmental Findings of Fact and Order or other federally enforceable documents are promulgated to define the emission limitations and place them in the official BART record.

Verso Bucksport paper mill

MEDEP is capping the Verso Bucksport paper mill out of BART, but did not post the actual permit that does so.

Please post the pertinent permit.

Chapter 11, *Reasonable Progress Goals*

By setting reasonable progress goals based on the "Ask", rather than the OTW/OTB inventory, the MANE-VU States have made it more difficult to demonstrate that they have implemented the controls necessary to meet the reasonable progress goals. It would be helpful for Maine to discuss whether or not the OTW/OTB controls were sufficient to meet the uniform rate of progress at the Maine Class I areas.

Section 11.3, Additional Reasonable Controls: On page 133, the statement is made that MANE-VU States have up to 10 years to implement reasonable controls. We believe this to be incorrect statement. It is our understanding that the regional haze rule requires the controls to be in progress (e.g., BART determination or rule requirement) when the RHSIP is submitted as final.

Table 11-5 summarizes SO_2 emissions in 2002 and 2018 modeling inventory for 12 sources that were assumed to be required to install BART controls. A similar table which summarizes actual BART reductions for Maine sources would be extremely helpful.

MANE-VU indicated that emissions were backfilled in the final inventory calculations in order to fully meet the Clean Air Act Interstate Rule (CAIR) cap. When this backfill method was applied to sources outside of MANE-VU emission rates for some sources were overestimated, ignoring State rules and consent decrees. Please explain in more detail how Maine consulted with these non-MANE-VU States and how the results from this consultation were reconciled in making these emission control decisions.

Chapter 12, *Long Term Strategy*

Section 12.7.2: Please identify whether the State implements a smoke management plan. If so, identify whether the program is voluntary or mandatory and whether the impacts to the Class I areas are considered during the process.

Table 12-1 lists non-CAIR BART facilities that were modeled. Please confirm the modeled emissions are consistent with the actual BART determinations.

It should be stated earlier in the document that Maine will be fully meeting the "Ask" by 2018. Providing a statement to this effect at the beginning of the document will address reader questions earlier in the review of RHSIP.

Section 12.12: The State has done a good job discussing its commitment to ensure that the New Source Review/ Prevention of Significant Deterioration (PSD) Program in the State will work towards the interests of their regional haze goal by including Section 12.12. This section links reasonable progress for visibility to the Prevention of Significant Deterioration requirements.

ATTACHMENT 1
To NPS/FWS Comments - Maine Draft Regional Haze SIP

NPS Comments Regarding Verso Androscoggin Paper Mill BART Evaluation
July 23, 2010

Power Boilers #1 & #2: NO_x

The following statement by Verso is misleading:

> *The Androscoggin Mill followed the guidance and procedures outlined in 40 CFR Part 51, Appendix Y and the OAQPS Air Pollution Cost Control Manual. Supporting cost evaluation spreadsheets are provided in Attachment C, Table Nos. C-1, C-2, C-3, and C-4.*

While we applaud Verso's intent to use the Cost Manual, the actual Verso approach appears to have borrowed the Cost Manual method for evaluating wet scrubbers and applied it to SCR and SNCR, which we believe is inappropriate.

In actuality, there is no *OAQPS Air Pollution Cost Control Manual* (Cost Manual) procedure for evaluating costs for SCR or SNCR for **oil-fired** EGUs. The procedures described by the Cost Manual are intended for use with **coal-fired** boilers > 250 mmBtu/hr. So we adapted them to oil-fired boilers (see electronic attachment), but the cost algorithms for the Direct Capital Costs are from the Cost Manual coal-boiler method and therefore questionable.

Even if we accept the Verso approach as a default, it still contains some highly questionable estimates for SCR, and Verso clearly did not follow the Cost Manual:

- If we assume that Power Boilers #1 & #2 are capable of producing about 68 MW each, then the Total Capital Investment (TCI) per kW is about $115 for SCR, which is in the middle of the $50 - $260/kW range for coal-fired EGUs. We have applied an adapted Cost Manual approach which estimates a slightly higher TCI. We will provide an electronic Excel workbook containing that data via e-mail to MEDEP staff.
- Verso has estimated an annual reagent cost of $414,000/boiler. This exceeds the $54,000 annual reagent cost that the Cost Manual procedure estimates. Verso must justify this estimate.
- Verso has estimated an annual catalyst replacement cost of $155,000/boiler. Since this exceeds the $92,000 annual catalyst replacement cost that the Cost Manual procedure estimates for the 330 MW Naughton Unit #3 (that Wyoming is requiring to install SCR as BART), the Verso estimate appears to be very high. Our adapted Cost Manual method estimates catalyst volume at 88 m3, a 24,000 hour catalyst life, and an annual Catalyst Replacement Cost = $41,000/boiler. Furthermore, because most catalyst vendors do not charge for recovery of the spent catalyst, that $30,000 annual cost also appears unfounded.
- Verso's Capital Recovery Factor (12.4% interest over a 10-year SCR life) is inflated. The Cost Manual recommends 7% interest over a 20-year SCR life.
- Verso estimates an annual cost of $5.1 million to control both boilers[1] versus our estimate of $1.1 million for each boiler, and Verso estimates $7,361/ton versus our $3,070/ton.

[1] Verso assumed a $0.08/kWh cost for electricity.

According to Maine Department of Environmental Protection (MEDEP):

> *The cost effectiveness numbers in the table above are based on controlling NO_x emissions from Power Boilers #1 and #2 at the control effectiveness rates indicated in the table from the highest estimated two year average annual emissions between 2002 and 2008. In recent years (2008 and 2009) these boilers have been operating close to only 20% of the time, which for example, would result in an actual cost effectiveness of $16,313 per ton of NO_x removed with the installation of SCR.*

MEDEP estimates cost-effectiveness at $5,271/ton versus the $7,361/ton estimated by Verso; we request an explanation for this difference. Furthermore, if MEDEP intends to consider the reduced operation of these boilers in the economic analysis, those reduced operational parameters should be made federally enforceable if they affect the outcome of the analysis.

Because BART is a visibility improvement program, we believe that cost/deciview ($/dv) is a very important parameter. In this case, for the four Class I areas evaluated by Verso, SCR would improve visibility by a total of 4.6 dv. (We would also like to see the visibility improvements that would occur in the other two Class I areas.) This results in a cost-effectiveness value of less than 0.5 million/dv, which is quite reasonable compared to the average $13 - $20 million/dv that we are seeing accepted by states and sources that are proposing reductions under BART. Even if one considers only the visibility improvement at Acadia National Park, the addition of SCR results in a cost-effectiveness value of $1.3 million/dv. This leads to the conclusion that SCR is BART for the Androscoggin power boilers.

The same situation applies to SNCR. The actual Verso approach appears to have borrowed the Cost Manual method for evaluating wet scrubbers and applied it to SNCR, which we believe is inappropriate. Even if we accept the Verso approach as a default, it still contains some highly questionable estimates for SNCR:

- If we assume that Power Boilers #1 & #2 are capable of producing about 68 MW each, then the Total Capital Investment (TCI) per kW is about $47 for SNCR, which is on the high end of the $29 - $45/kW range we are seeing in proposals to install SNCR on coal-fired EGUs (See http://www.wrapair.org/forums/ssjf/bart.html). We have applied an adapted Cost Manual approach which estimates a $26/kW. We will provide an electronic Excel workbook containing that data via e-mail to MEDEP staff. Verso should provide vendor quotes to support its higher-than expected estimates.
- Verso has estimated a Direct Annual Cost (DAC) of $0.55 million/boiler. Since this exceeds the $0.12 million DAC that the Cost Manual procedure estimates, the Verso estimate appears to be very high. The biggest difference is in Verso's estimate of almost $0.5 million/year/boiler for reagent versus the Cost Manual estimate of $0.06 million/yr.
- Verso's Capital Recovery Factor (12.4% interest over a 10-year SNCR life) is inflated. The Cost Manual recommends 7% interest over a 20-year SCR life.
- Verso estimates an annual cost of $2.6 million to control both boilers[2] versus our estimate of $0.29 million for each boiler, or Verso's $9,758/ton versus our $2,128/ton.

[2] Verso assumed a $0.08/kWh cost for electricity.

MEDEP estimates cost-effectiveness at $5,973/ton versus the $9,758/ton estimated by Verso; we request an explanation for this difference.

In this case, for the four Class I areas evaluated by Verso, SNCR would improve visibility by a total of 4.3 dv. (We would also like to see the visibility improvements that would occur in the other two Class I areas.) This results in a cost-effectiveness value of less than 0.13 million/dv, which is quite reasonable compared to the average $13 - $20 million/dv that we are seeing accepted by states and sources that are proposing reductions under BART. Even if one considers only the visibility improvement at Acadia National Park, the addition of SCR results in a cost-effectiveness value of $0.41 million/dv. This leads to the conclusion that SNCR could also be a candidate for BART for the Androscoggin power boilers if SCR is rejected.

Power Boilers #1 & #2: SO_2

Some comments on Verso's BART analysis for SO_2 from the Androscoggin mill Power Boilers #1 & #2.

Power Boilers #1 & #2 wet scrubber cost analysis

- Verso's Purchased Equipment Costs are not supported or justified.
- Is there a state sales tax exemption for pollution control equipment?
- Verso's Maintenance costs are not supported or justified.
- Verso's Utilities costs are not supported or justified.
- Can Verso use waste caustic from the mill to augment caustic purchases? (We are seeing this at other mills.)
- Verso's annualized costs do not make sense--the numbers do not work out as presented.[3]
- Verso overestimated the interest rate and underestimated equipment life. According to the OAQPS Control Cost Manual, the correct interest rate is 7% and the correct equipment life is 15 years.

Verso's Power Boilers #1 & #2 lower sulfur fuels analysis is incomplete. For example,[4] FPL evaluated 1%S residual, 0.5% S residual and 0.3% S residual fuel oils for its Wyman facility, Verso should at least evaluate the lower sulfur residual oils.

Waste Fuel Incinerator (WFI): NO_x

We adapted *the OAQPS Air Pollution Cost Control Manual* (Cost Manual) procedure for evaluating costs for SCR or SNCR for oil-fired EGUs to oil-fired EGUs (see electronic attachment), but the cost algorithms for the Direct Capital Costs are from the Cost Manual coal-boiler method and therefore questionable. So, even if we accept the Verso approach as a default, it still contains some highly questionable estimates for SCR:

- If we assume that the WFI is capable of producing about 48 MW, then the Total Capital Investment (TCI) per kW is about $165 for SCR, which is in the middle of the $50 -

[3] Verso assumed a $0.08/kWh cost for electricity.

[4] In Massachusetts, sources evaluated 1%S residual, 0.5% S residual, 0.3% S residual, 0.3% S distillate, 0.05% S distillate, and 0.0015% S distillate.

$260/kW range for coal-fired EGUs. We have applied an adapted Cost Manual approach which estimates a slightly lower TCI. We will provide an electronic Excel workbook containing that data via e-mail to MEDEP staff.

- Verso has estimated an annual reagent cost of $286,000. This exceeds the $72,000 annual reagent cost that the Cost Manual procedure estimates.
- Verso's Capital Recovery Factor (12.4% interest over a 10-year SCR life) is inflated. The Cost Manual recommends 7% interest over a 20-year SCR life.
- Verso estimates an annual cost of $2.4 million to control the WFI[5] versus our estimate of $0.9 million, or Verso's $5,092/ton versus our $1,986/ton.

MEDEP estimates cost-effectiveness at $4,676/ton versus the $5,092/ton estimated by Verso; we request an explanation for this difference.

Because BART is a visibility improvement program, we believe that cost/deciview ($/dv) is a very important parameter. In this case, for the four Class I areas evaluated by Verso, SCR would improve visibility by a total of 1.0 dv. (We would also like to see the visibility improvements that would occur in the other two Class I areas.) This results in a cost-effectiveness value of less than $1 million/dv, which is quite reasonable compared to the average $13 - $20 million/dv that we are seeing accepted by states and sources that are proposing reductions under BART. Even if one considers only the visibility improvement at Acadia National Park, the addition of SCR results in a cost-effectiveness value of $2.3 million/dv. This leads to the conclusion that SCR is BART for the Androscoggin WFI.

The same situation applies to SNCR. So, even if we accept the Verso approach as a default, it still contains some highly questionable estimates for SNCR:

- Although Verso stated that SNCR could achieve 35% control, its cost analysis is based upon 30% control.
- If we assume that the WFI is capable of producing about 48 MW, then the Total Capital Investment (TCI) per kW is about $65 for SNCR, which is above the high end of the $29 - $45/kW range we are seeing in proposals to install SNCR on coal-fired EGUs. We have applied an adapted Cost Manual approach which estimates a $31/kW. We will provide an electronic Excel workbook containing that data via e-mail to MEDEP staff. Verso should provide vendor quotes to support its higher-than expected estimates.
- Verso has estimated a Direct Annual Cost (DAC) of $0.41 million. Since this exceeds the $0.13 million DAC that the Cost Manual procedure estimates, the Verso estimate appears to be high. The biggest difference is in Verso's estimate of almost $0.34 million/year per boiler for reagent versus the Cost Manual estimate of $0.07 million/yr.
- Verso's Capital Recovery Factor (12.4% interest over a 10-year SNCR life) is inflated. The Cost Manual recommends 7% interest over a 20-year SNCR life.
- Verso estimates an annual cost of $1.1 million to control the WFI[6] versus our estimate of $0.27 million, or Verso's $7,009/ton versus our $1,757/ton.

[5] Verso assumed a $0.07/kWh cost for electricity.
[6] Verso assumed a $0.07/kWh cost for electricity.

MEDEP estimates cost-effectiveness at $5,944/ton versus the $7,009/ton estimated by Verso; we request an explanation for this difference.

In this case, for the four Class I areas evaluated by Verso, SNCR would improve visibility by a total of 0.2 dv. (We would also like to see the visibility improvements that would occur in the other two Class I areas.) This results in a cost-effectiveness value of less than 1.4 million/dv, which is quite a bargain compared to the average $10 - $20 million/dv that we are seeing accepted by states and sources that are proposing reductions under BART. Even if one considers only the visibility improvement at Acadia National Park, the addition of SCR results in a cost-effectiveness value of $2.7 million/dv. This leads to the conclusion that SNCR could also be a candidate for BART for the Androscoggin power boilers if SCR is ruled out.

Waste Fuel Incinerator (WFI): SO_2

This is what Verso says about SO_2 BART for the Androscoggin Waste Fuel Incinerator:

> *When No. 6 fuel oil is fired at significant levels, **the Mill adds caustic to the wet scrubber** to meet the SO2 emission limit for the WFI.*
>
> ***SO2 BART ANALYSIS***
> ***Identify BART***
> *The WFI has very low SO2 emissions due to the inherent alkalinity (i.e., SO2 control) of the primary fuel and the small amount of fuel oil used in the WFI. In addition during the limited amount of time that No. 6 fuel oil is used to provide a significant amount of the heat for the WFI, **caustic is added to the wet scrubber**. Since there are only 50 tons of SO2 to control annually, the addition of caustic to the wet scrubber would end up controlling a very small amount of emissions on an annual basis. Considering visibility, the low, pre-control visibility impacts from the WFI mean that any visibility reductions associated with post-control of SO2 emissions would be **imperceptible**. Based on the information developed in the Impacts Analysis, the Androscoggin Mill believes that **there is no SO2 BART** determination for SO2 from the WFI.*

Is Verso saying that it does not want its current procedure of adding caustic to the wet scrubber when burning fuel oil to be considered BART, but will keep doing it anyway? If so, that is clearly wrong because BART would include this practice as a technically- and economically-feasible option, as proven by Verso. Finally, a control option does not have to produce a perceptible improvement to be viable.

ATTACHMENT 2
To NPS/FWS Comments - Maine Draft Regional Haze SIP

NPS Comments Regarding FPL Energy Wyman Station BART Evaluation

July 20, 2010

Beginning in 2006, capacity utilization of, and emissions from Units #3 & #4 dropped so much that, assuming that trend continues, it would likely be cost-prohibitive to make any substantial capital expenditures to reduce emissions. Furthermore, as noted by Maine Department of Environmental Protection (MEDEP), NO_X emissions are already so low as to make any significant additional expenses economically infeasible. So, we shall focus our comments on reducing SO_2 emissions by switching to lower sulfur fuels.

$\underline{SO_2}$
This appears to be the only BART analysis conducted by MEDEP in which cost-effectiveness was not evaluated in terms of annual cost/ton of pollutant removed. Instead, MEDEP appears to have relied solely upon annual cost/deciviews (dv) of visibility improvement. While we encourage the use of the $/dv metric, it was not properly calculated nor applied in this case.

MEDEP also evaluated the BART strategies on the basis of incremental cost/dv. While that is certainly a valid and useful parameter, it must be used with caution and its results placed into the proper perspective. The basic premise underlying the incremental cost analysis is to identify those strategies that contribute relatively little environmental benefit in proportion to their cost. Because, in most cases, the cost of pollution control rises exponentially with control efficiency, the slope of the cost curve will also increase. For this reason, rigid use of incremental cost effectiveness will always result in the choice of the cheapest option if carried to its ultimate extent. (For example, if this approach were used to evaluate PM controls, it is likely that all controls more expensive than a multiple cyclone would be rejected.) According to the NSR Workshop manual, "As a precaution, the difference in incremental costs among dominant alternatives cannot be used by itself to argue one dominant alternative is preferred to another." Instead, it should be used to compare closely performing options.[7]

However, FPL did evaluate the costs and benefits of several SO_2 reduction options, including the use of lower sulfur fuels. In doing so, FPL included estimates of the annual costs and emission reductions for each option, as well as the cost/ton for each of those options; those results are contained in Tables 5-3 thru 5-5 of the FPL BART analysis. We used the data from FPL's Table 5-3 to generate the cost-benefit data, and have summarized our results below. We will provide an electronic Excel workbook containing that data under e-mail to MEDEP staff.

[7]BART Guidelines: "You should consider the incremental cost effectiveness in combination with the average cost effectiveness when considering whether to eliminate a control option" and "You should exercise caution not to misuse these [average and incremental cost effectiveness] techniques…[but consider them in situations where an option shows]…slightly greater emission reductions…"

Wyman #3 (2007 - 2008)

Fuel Sulfur (%)	1	0.7	0.5	0.3
Increased Annual Fuel Cost	$ 175,306	$ 206,243	$ 835,283	$ 1,722,127
SO2 Emission Reductions (tpy)	270	351	405	459
SO2 Reductions Cost-Effectiveness ($/ton)	$ 650	$ 588	$ 2,064	$ 3,755
Greatest Visibility Improvement (dv)	0.99	1.43	1.78	2.15
Cost-Effectiveness ($/dv)	$ 177,077	$ 144,226	$ 469,260	$ 800,989
Cumulative Visibility Improvement (dv)	2.61	4.26	5.26	6.28
Cumulative Cost-Effectiveness ($/dv)	$ 67,167	$ 48,414	$ 158,799	$ 274,224

Wyman #4 (2007 - 2008)

Fuel Sulfur (%)			0.5	0.3
Increased Annual Fuel Cost			$ 2,910,880	$ 7,014,743
SO2 Emission Reductions (tpy)			250	499
SO2 Reductions Cost-Effectiveness ($/ton)			$ 11,656	$ 14,045
Greatest Visibility Improvement (dv)			0.41	0.84
Cost-Effectiveness ($/dv)			$ 7,099,707	$ 8,350,885
Cumulative Visibility Improvement (dv)			1.60	3.38
Cumulative Cost-Effectiveness ($/dv)			$ 1,819,300	$ 2,075,368

Our results differ from those presented by MEDEP because we used the most-recent (2007 – 2008) average fuel use data provided by FPL instead of the maximum two-year average. We did this because the most-recent two years are much more representative of anticipated reduced operation of these units. While use of the reduced-capacity operation data did not affect the $/ton estimate (which MEDEP did not include), it has a great effect on the $/dv estimate because of the reduced annual costs.

Our results indicate that, on a $/ton basis, use of 0.7% sulfur oil is the most cost-effective. However, BART is not necessarily the most cost-effective solution. Instead, the $2,000/ton cost of switching Unit #3 to 0.5 % sulfur oil would be considered reasonable by most states.

As noted above, MEDEP appears to have relied solely upon $/dv of visibility improvement. However, the baseline for estimating the increased costs of lower sulfur fuels (2% sulfur) is different from the baseline for existing visibility impacts (1.6% S). Therefore, the visibility benefits are underestimated because the baseline impacts are underestimated. MEDEP has also presented 98th percentile visibility values despite using only one year of meteorological data—that is misleading because, when only one year is modeled, only the maximum values are to be used.

Because BART is a visibility improvement program, we believe that cost/deciview ($/dv) is a very important parameter. In this case, for the six Class I areas evaluated by FPL, lower-sulfur (0.5% - 0.3% S) fuels would improve visibility by a total of 6.9 – 9.7 dv. This results in a cost-effectiveness value of $0.2 – 2.1 million/dv, which is relatively inexpensive compared to the average $13 - $20 million/dv that we are seeing accepted by states and sources that are proposing reductions under BART. Even if one considers only the visibility improvement at Acadia

National Park, the lower-sulfur fuels result in cost-effectiveness values of $0.5 – 8.4 million/dv. This leads to the conclusion that 0.5% - 0.3% sulfur fuels are BART for the FPL boilers.

ATTACHMENT 3
To NPS/FWS Comments - Maine Draft Regional Haze SIP

NPS Comments Regarding SAPPI SD Warren Paper Mill BART Evaluation

July 20, 2010

Page 63 of the 2/06/09 draft of Maine Department of Environmental Protection (MEDEP) RH SIP contains Table 8-2 titled "Modeled Impacts...of Maine BART-Eligible Sources..." That table shows a 0.75 dv impact at Acadia and 0.78 dv at Moosehorn from Power Boiler #1 at the SAPPI SD Warren Paper mill.

The September 2009 company BART report did not evaluate Power Boiler #1.

The MEDEP BART analysis (1/21/10) listed Power Boiler #1 as a BART source and included a BART determination for it.

The MEDEP BART analysis (posted 6/29/10) did not mention Power Boiler #1.

Why was Power Boiler #1 omitted from the BART determination?