



IN REPLY REFER TO:

# United States Department of the Interior

## NATIONAL PARK SERVICE

Air Resources Division

P.O. Box 25287

Denver, CO 80225



N3615 (2350)

February 23, 2012

Christina Fernandez, Associate Director  
Office of Air Program Planning  
Mailcode 3AP30  
U.S. Environmental Protection Agency Region III  
1650 Arch Street  
Philadelphia, Pennsylvania 19103

EPA Docket ID: EPA-R03-OAR-2011-0091

Dear Ms. Fernandez:

The National Park Service (NPS) has reviewed the Environmental Protection Agency's (EPA's) proposed "Approval and Promulgation of Air Quality Implementation Plans; Commonwealth of Virginia; Regional Haze State Implementation Plan."

We commend Virginia on the quality of the technical analyses evaluating source contributions to visibility impairment at Shenandoah National Park and in general support Virginia's long term strategy to improve visibility. Our enclosed comments address the reasonable progress analysis for the Mead Westvaco facility, which causes visibility impairment at four Class I areas in Virginia and West Virginia. Our enclosed technical analysis demonstrates that a spray dryer plus baghouse is cost-effective and would provide significantly greater visibility improvement for reasonable progress than the proposed modification of the existing scrubber.

We appreciate the opportunity to work closely with the Virginia Department of Environmental Quality and EPA Region 3 to make progress toward achieving natural visibility conditions at our National Parks and Wilderness Areas. For further information regarding our comments, please contact Don Shepherd at (303) 969-2075.

Sincerely,

Susan Johnson

Acting Chief, Policy, Planning and Permit Review Branch

Enclosure

cc:  
Mike Dodd, Director  
Air Division  
Virginia Department of Environmental Quality  
629 East Main Street, 8th Floor  
Richmond, Virginia 23219

## **NPS Comments on Reasonable Progress Analysis for MeadWestvaco Corporation February 23, 2012**

We recommend that EPA and Virginia reconsider the Reasonable Progress Analysis for MeadWestvaco. The source has significant impacts to visibility at four Class I areas in Virginia and West Virginia. Virginia's Area of Influence analysis demonstrates that MeadWestvaco is the single largest contributor to visibility impairment at James River Face Wilderness Area. Virginia has proposed incremental improvement in efficiency of the existing scrubber for reasonable progress. In the technical analysis below, we demonstrate that a spray dryer plus baghouse is cost-effective and would provide significantly greater visibility improvement than the incremental modification of the existing scrubber.

### **MeadWestvaco Corporation**

MeadWestvaco Packaging Resource Group (MeadWestvaco) operates an unbleached paper mill and specialty chemicals manufacturing operation in Covington, Virginia, approximately 104 km from Shenandoah National Park (NPS).<sup>1</sup> MeadWestvaco operates the coal-fired No. 9 Power Boiler with a dry-bottom electrostatic precipitator and a flue gas desulfurization (FGD) process. The boiler is also equipped with Low-NO<sub>x</sub> Burners. The No. 9 Power Boiler operates by combusting coal to produce steam for use in the Kraft pulping process. The boiler is a tangentially-fired and rated at 807 mmBtu/hr. While it primarily fires pulverized coal, it is also permitted to combust natural gas or No. 2 fuel oil during startup and flame stabilization events. Emissions exhaust through a common stack (i.e., "Tall Stack") that is shared with the Nos. 6-8 Power Boilers, which are not BART-eligible emission units.<sup>2</sup> The No. 9 Power Boiler is currently subject to NESHAP Subpart MM, as well as other permit limits. Because of the common stack, combined SO<sub>2</sub> emissions were limited to 3,300 lb/hr (3-hr avg.), 2,085 lb/hr (annual avg.), and 9,132.3 tpy.

### **MeadWestvaco BART Process**

MeadWestvaco submitted a BART analysis to VA DEQ on March 30, 2007. VA DEQ determined that the MeadWestvaco proposal represented BART for SO<sub>2</sub> for Power Boiler #9 on this basis:

As with the particulate control for the #9 boiler, the emission control for SO<sub>2</sub> includes three boilers that are not BART-eligible. There are actually two scrubbers, one located downstream of the #6 and #9 boilers with the second located downstream of the #7 and #8 boilers. The ductwork from the scrubbers merges to exhaust through the tall stack. An SO<sub>2</sub> CEM is located in the tall stack. Isolating the scrubber or emissions from the #9 boiler to have enforceable limits on only

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<sup>1</sup> Four additional Class I areas are located within 300 km:

- James River Face Wilderness Area- 50 km
- Otter Creek Wilderness Area - 129 km
- Dolly Sods Wilderness Area - 139 km
- Linville Gorge Wilderness Area - 265 km

<sup>2</sup> No. 6 Power Boiler (PWR006) - 550 mmBtu/hr coal boiler; No. 7 Power Boiler (PWR007) - 440 mmBtu/hr coal, wood boiler; No. 8 Power Boiler (PWR008) - 580 mmBtu/hr coal, wood boiler

the BART-eligible equipment is not physically possible in this case. Once again, the overall emission reduction will exceed the levels that would be achieved by controlling the #9 boiler alone since all of the boilers have the capacity to burn coal.<sup>3</sup>

VA DEQ issued a permit on February 23, 2009 incorporating these BART limits for the Tall Stack: 1,831 lb/hr (annual avg.) 8,020 tpy. (To ensure continuous effective operation of the scrubbers, the proposed SO<sub>2</sub> limit should include a short-term limit in the form of “lb/mmBtu” or “control efficiency” over a 30-day rolling average.) According to VA DEQ, visibility improvements realized by implementing BART emission control strategies in the permit are reflected below:

Class I Area	Baseline - Pre BART		After BART	
	98% dv	total days > 0.5 dv	98% dv	total days > 0.5 dv
James River Face	3.567	433	2.842	376
Shenandoah	1.941	237	1.491	167
Dolly Sods	1.379	93	0.987	61
Otter Creek	1.376	88	0.993	54
Totals*	8.263	851	6.313	658

\*added by NPS

VA DEQ shows that, after BART controls are implemented, MeadWestvaco causes 1.5 dv of visibility impairment at Shenandoah NP. Across the four Class I areas modeled, MeadWestvaco has a cumulative impact of 6.3 dv after BART; **MeadWestvaco would continue to have a substantial impact on visibility in at least four Class I areas.** We strongly urge a rigorous application of “reasonable progress measures that would have a meaningful impact on visibility in its Class I areas” be undertaken.

### **MeadWestvaco Reasonable Progress Analysis**

EPA’s reasonable progress guidance indicates that even if the State has demonstrated greater than the uniform rate of progress, the State must evaluate what additional controls are reasonable. In establishing a Reasonable Progress Goal (RPG) for a Class 1 Federal area located within a state, the State is required by CAA § 169A(g)(1) and 40 CFR 51.308(d)(1)(i)(A) to “[c]onsider the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected sources, and include a demonstration showing how these factors were taken into consideration in selecting the goal.

As noted by EPA in its FR Notice<sup>4</sup> regarding the Arkansas Regional Haze SIP: The preamble to the Rule (64 FR 35732) also makes clear that the **URP does not establish a “safe harbor”** for the State in setting its progress goals:

<sup>3</sup> VADEQ’s “Meadwestvaco Packaging Resource Group (#20328) BART Permit Engineering Analysis” February 13, 2009

<sup>4</sup> Federal Register / Vol. 76, No. 200 / Monday, October 17, 2011 / Proposed Rules

If the State determines that the amount of progress identified through the [URP] analysis is reasonable based upon the statutory factors, the State should identify this amount of progress as its reasonable progress goal for the first long-term strategy, unless it determines that additional progress beyond this amount is also reasonable. If the State determines that additional progress is reasonable based on the statutory factors, the State should adopt that amount of progress as its goal for the first long-term strategy.

**States do have discretion in setting RPGs, but are required to go beyond the URP analysis in establishing RPGs.**

In its January 25, 2012 FR Notice for Virginia's Regional Haze plan,<sup>5</sup> EPA states:

For the limited purpose of evaluating the cost of compliance for the reasonable progress assessment in this first regional haze SIP for the non-EGUs, VADEQ concluded that it was not equitable to require non-EGUs to bear a greater economic burden than EGUs for a given control strategy. Using CAIR as a guide, VADEQ used a cost of \$2,000 per ton<sup>6</sup> of SO<sub>2</sub> controlled or reduced as a threshold for cost effectiveness. Although the use of a specific threshold for assessing costs means that a state may not fully consider available emissions reduction measures above its threshold that would result in meaningful visibility improvement, EPA believes that the Virginia SIP still ensures reasonable progress. In proposing to approve Virginia's reasonable progress analysis, **EPA is placing great weight on the fact that there is no indication in the SIP submittal that Virginia, as a result of using a specific cost effectiveness threshold, rejected potential reasonable progress measures that would have had a meaningful impact on visibility in its Class I areas.** EPA notes that given the emissions reductions resulting from CAIR, Virginia's BART determinations, and the measures in nearby states, the **visibility improvements projected for the affected Class I area are in excess of that needed to be on the uniform rate of progress glidepath.** After the Commonwealth submitted its regional haze SIP on October 4, 2010, demonstrating that no additional controls on non-EGU sources identified in the AOI were reasonable because it was economically and/or technically infeasible, Virginia did additional analysis and found that a higher efficiency of control was reasonable at the MeadWestvaco Corporation. VADEQ submitted, on May 6, 2011, a permit to incorporate the additional 15 percent control for MeadWestvaco Corporation for achieving additional reasonable progress into their regional haze SIP.

As a part of the BART determination process Virginia determined that MeadWestvaco could get an additional 15 percent SO<sub>2</sub> reduction, which would be an additional RPG reduction. The new SO<sub>2</sub> limit for MeadWestvaco boilers number 6 through 9 submitted by VADEQ on May 6, 2011 is 1,556 lbs/hr and 6,817 tpy. MeadWestvaco must comply with the RPG limit by January 1, 2016.

EPA agrees with VADEQ's analyses and conclusions for the BART emission units located at the O-N Mineral, MeadWestvaco, and Georgia Pacific— Big Island facilities. EPA has reviewed the Virginia analyses and concluded they were conducted in a manner that is consistent with EPA's BART Guidelines.

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<sup>5</sup> Federal Register / Vol. 77, No. 16 / Wednesday, January 25, 2012 / Proposed Rules

<sup>6</sup> The VA SIP states, "After review of USEPA's CAIR cost analyses, Virginia determined that the CAIR SO<sub>2</sub> control costs vary by year of analysis (2010 vs. 2015) and may range from \$400 to \$3,400 per ton SO<sub>2</sub> removed. Ultimately, USEPA found a consistent marginal cost for both years at \$2,000 per ton. These values establish benchmarks against which cost effectiveness may be evaluated for reasonable progress in this round of regional haze planning." However, VA DEQ used \$1,200/ton for MeadWestvaco, as will be discussed later.

EPA appears to be arguing that VA DEQ was justified in its approach to "...not fully consider available emissions reduction measures above its threshold that would result in meaningful visibility improvement..." because:

- "there is no indication in the SIP submittal that Virginia, as a result of using a specific cost effectiveness threshold, rejected potential reasonable progress measures that would have had a meaningful impact on visibility in its Class I areas" and
- "the visibility improvements projected for the affected Class I area are in excess of that needed to be on the uniform rate of progress glidepath."

EPA's second point is contrary to EPA's position that the URP does not establish a "safe harbor."

We believe that VA DEQ did not properly evaluate additional SO<sub>2</sub> controls, and, as a result, "rejected potential reasonable progress measures that would have had a meaningful impact on visibility in its Class I areas." Virginia proposed to use **\$2,000/ton** as threshold for reasonable progress, yet this excerpt from VA DEQ's May 2, 2011 analysis for MeadWestvaco shows that VA DEQ used a much lower threshold there:

"Using an economic **cost threshold of \$1,200/ton SO<sub>2</sub> removed**, DEQ examined all stacks and their respective units identified in the step above for the potential of additional reductions for reasonable progress. Only MWV's Tall Stack appeared to have the potential for additional SO<sub>2</sub> reductions using this initial cost threshold."

For BART, VA DEQ determined that a **\$4,297/ton** cost represents BART to add a scrubber for SO<sub>2</sub> control from a power boiler at Georgia Pacific's Big Island facility where the reductions would result in a 2.0 dv improvement at James River Face at a cost of \$4,449,573/yr (or 2.2 million/dv). VA DEQ's thresholds seem substantially inconsistent. .

### **VA DEQ Reasonable Progress Rationale**

In order to understand VA DEQ's reasoning in making its Reasonable Progress determination for MeadWestvaco, on the next 3 pages of these comments we are providing pertinent excerpts (with **emphasis** added) from its May 2, 2011 Engineering Analysis:

"Reasonable progress is a required element of Virginia's SIP even though Virginia is surpassing visibility improvement benchmarks as indicated by the glide path...DEQ identified the Tall Stack at MWV as having a calculated impact over 1% on two Class I areas, Dolly Sods and James River Face. **For the James River Face, the MWV Tall Stack is the single largest calculated point source contributor to visibility impairment.**

The modeled visibility impacts comparing BART SO<sub>2</sub> emission limits (8,020 tpy) and the proposed reasonable progress limits (6,817 tpy) for the three impacted Class I areas are shown below:

**Table 1: 98th Percentile Deciview (dv) Visibility Impacts**

<b>Class I Area</b>	<b>BART</b>	<b>Reasonable Progress*</b>	<b>Improvement</b>
Shenandoah National Park	1.491 dv	1.412 dv	0.079 dv
Dolly Sods Wilderness Area	0.987 dv	0.888 dv	0.099 dv
James River Face Wilderness Area	2.842 dv	2.832 dv	0.010 dv

\*Although not shown by VA DEQ, the “Reasonable Progress” impact predicted by MeadWestvaco at Otter Creek Wilderness Area is 0.927 dv.

MWV has proposed an additional 15% control to satisfy reasonable progress requirements for this round of regional haze planning as follows:

- BART emission limits 1,831 lb/hr (annual avg.) 8,020 tpy
- Proposed reasonable progress limits 1,556 lb/hr (annual avg.) 6,817 tpy

DEQ is proposing to accept MWV’s plan for 15% additional control. The additional control will be achieved in part by adding more virgin caustic to the scrubber liquid. MWV also proposes to complete certain maintenance activities on the scrubbers during the next mill outage some time between 2013 and 2015.”

The following is a synopsis of the approach DEQ used to determine the sources where a reasonable progress review was appropriate:

- **Using an economic cost threshold of \$1,200/ton SO<sub>2</sub> removed**, DEQ examined all stacks and their respective units identified in the step above for the potential of additional reductions for reasonable progress. Only MWV’s Tall Stack appeared to have the potential for additional SO<sub>2</sub> reductions using this initial cost threshold.

Accordingly, DEQ requested a thorough review of possible control technologies for the Tall Stack. The technologies requested to be analyzed needed to control all four boilers exhausting to the Tall Stack, including Boiler #9, which was already subject to BART. **MWV submitted their response to the reasonable progress request on June 12, 2008,<sup>7</sup> and this response provided costs for the installation of a new caustic flue gas desulfurization unit (FGD)/wet scrubber, a lime spray dryer, the use of lower sulfur coal, and the upgrade of the existing wet scrubber for enhanced capture efficiency.** The following table summarizes the information found in this response, including control efficiencies analyzed:

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<sup>7</sup> We could not find this critical document in EPA’s docket, so we are including it in our comments.

**Table 2: Summary of Control Options for MWV's Tall Stack**

Control Technology	Reduction	Cost Impact (1)	Incremental Cost Impact		Comments
	%	\$/ton	\$/ton (2)	Million \$/dv (3)	
New Caustic FGD	90%	\$961	\$8,220	\$138	Total Capital Investment estimated at \$41,000,000.
Spray Dryer	90%	\$528	\$4,400	\$76	Total Capital Investment estimated at \$46,000,000.
Improve existing FGD	~15%	\$717	---	\$8	Costs are associated mainly with increased caustic use.
Switch to 1% S coal from 1.58% S coal	Varies	\$2,636			No incremental analysis provided since cost effectiveness is above \$1,200/ton removed.

*1*Cost impact based on SO<sub>2</sub> reductions assuming worst case coal quality (2.2% S) and maximum operating hours.

*2*Incremental \$/ton costs for emissions controls compared to reductions achieved through improving the existing FGD (an annual limitation of 6,817 tpy SO<sub>2</sub>).

*3*Incremental \$/dv costs for visibility improvements beyond those achieved through the BART limitations of 1,831 lbs SO<sub>2</sub>/hr and 8,050 tpy SO<sub>2</sub>.

**The estimated cost effectiveness in terms of \$/ton for a new caustic FGD, a new spray dryer, and improving the existing FGD are very reasonable and are well within the range of costs for the SO<sub>2</sub> control required by CAIR.** Incremental cost effectiveness in terms of \$/ton for installing either a new caustic FGD or a new spray dryer, as compared to the costs for improving the existing scrubber, are somewhat higher. Both a new caustic FGD and a new spray dryer require very large capital investments, whereas improving the existing FGD requires no capital investment. Also, cost effectiveness for a coal switch was determined to be above the \$1,200/ton threshold. **Incremental cost effectiveness in terms of \$/dv improvement are quite high for both the new caustic FGD and new spray dryer options.**

Cost effectiveness is only one aspect that must be considered for the reasonable progress determination. **Consideration must also be given to the level of visibility improvement expected within the regional haze planning cycle for 2018.** , ..[E]ven without the improvements expected from any additional reductions beyond BART from MWV's Tall Stack, both the James River Face Wilderness Area and the Shenandoah National Park are projected to have visibility improvements that surpass the improvement benchmarks for achieving natural conditions by 2064 on the 20% worst visibility days. Additionally, these data show that not only will visibility be protected on the 20% best days, but visibility is also expected to improve on 20% best visibility days in both Class I areas by 2018.

**Review of the expected visibility improvements associated with the first round of regional haze planning in conjunction with the guidelines provided by EPA's reasonable progress guidance support a conclusion that additional reductions for reasonable progress may be deferred to later planning periods.** This conclusion would rely upon programs such as CAIR or TR, federal onroad and nonroad programs, clean fuel programs, attainment planning control strategies, BART and other mandated strategies to facilitate the reasonable progress goal for Virginia's Class I areas.



However, the option to improve the existing FGD system for an additional 15% control of SO<sub>2</sub> emissions, resulting in a federally enforceable limit of 6,817 tpy SO<sub>2</sub>, not only had no capital costs but had a cost effectiveness of well under \$1,200/ton removed. Additionally, the necessary changes to support these improvements can be done during scheduled mill outages, thereby costing minimal downtime charges.

Based on this information, DEQ proposes that improvements to the existing scrubbers on the Tall Stack resulting in emission rates of 1,556 lbs SO<sub>2</sub>/hour and 6,817 tpy SO<sub>2</sub> constitute reasonable progress for the Tall Stack for this round of regional haze planning. **This determination is based on the following:**

- The significant capital investment necessary for the construction of a wet scrubber or spray dryer;
- The incremental cost effectiveness of either a wet scrubber or spray dryer over the costs associated with improvements at the existing wet scrubber;
- The significant emission reductions of visibility impairing pollutants from programs such as CAIR, BART, attainment planning endeavors, and federal onroad and nonroad measures, which are expected to result in 2018 visibility improvements that surpass the benchmarks for progress toward natural conditions on 20% worst visibility days at each Class I area;
- The EPA's reasonable progress guidance, which suggests that consideration may be given to the application of BART on units subject to reasonable progress requirements;
- Suggestions within this same guidance that indicate the significant emission reductions resulting from BART, CAIR, and other CAA programs may be all that are necessary to achieve reasonable progress in the first round of planning;
- Further suggestions in this same guidance that indicate deferral of emission reductions into future rounds of regional haze planning may be appropriate to ensure steady improvement toward reaching the national goal of natural conditions at Virginia's Class I areas; and
- The lack of capital investment costs and the minimal downtime costs associated with an improvement in current scrubber operations.”

(End of VADEQ excerpts).

#### **NPS Comments on the VA DEQ Reasonable Progress Analysis for MeadWestvaco**

We have several concerns with VA DEQ's Reasonable Progress analysis and conclusion for SO<sub>2</sub> for MeadWestvaco. For example, we believe that VA DEQ should have included the modeling results provided by MeadWestvaco<sup>8</sup> which show the expected impacts and improvements (in dv) that would result from 90% SO<sub>2</sub> scrubbing of the Tall Stack:

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<sup>8</sup> This July 10, 2009 document was not included in EPA's docket.

Class I Area	Baseline - Pre BART	BART	Reasonable Progress	Improvement	90% Reduction	Improvement from BART
Shenandoah National Park	1.941	1.491	1.412	0.079	1.181	0.310
Dolly Sods Wilderness Area	1.379	0.987	0.888	0.099	0.804	0.183
James River Face Wilderness Area *	3.567	2.842	2.832	0.010	2.814	0.028
Otter Creek Wilderness Area	1.376	0.993	0.927	0.066	0.740	0.253
Totals	8.263	6.313	6.059	0.254	5.539	0.774

\*It is likely that the relatively small improvements at James River Face are due to its proximity which does not allow time for transformation of SO<sub>2</sub> into sulfate particles. Impacts upon visibility at James River Face are probably dominated by primary particulates, as discussed later.

Although **90% SO<sub>2</sub> removal** would still result in residual visibility impairment at all four Class I areas, the 0.774 dv cumulative (see following discussion) improvement (versus BART impacts), and the 3.284 dv cumulative improvement from the baseline **“would have a meaningful impact on visibility.”**<sup>9</sup>

*Cost per Ton:* Even though VA DEQ concludes from its Table 2 (above) that, “The estimated cost effectiveness in terms of \$/ton for a new caustic FGD, a new spray dryer, and improving the existing FGD are very reasonable and are well within the range of costs for the SO<sub>2</sub> control required by CAIR,” it rejects all but the lowest capital cost option. Furthermore, taken at face value, the VA DEQ analysis shows that the Spray Dryer with Baghouse option has the lowest cost/ton. And, the VA DEQ cost analyses for replacing the existing scrubber<sup>10</sup> do not account for the elimination of the operating costs for that scrubber—our results (based upon MeadWestvaco’s June 12, 2008 submittal) are presented below:<sup>11</sup>

SO2 Control Option	Existing FGD	FGD Upgrade	New Caustic FGD		Spray Dryer w Baghouse	
			Total Cost	Incremental Cost	Total Cost	Incremental Cost
TCI (\$)			36,540,895	36,540,895	44,378,439	44,378,439
Total DAC (\$)	10,877,774	862,678	16,177,063	5,299,289	6,439,472	-4,438,302
Total Annual Cost (\$)	10,877,774	862,678	21,677,648	10,799,873	13,186,492	2,308,717
Removal Efficiency	65%	15%	90%	90%	90%	90%
Pollution Removed (TPY)	15,169	1,203	20,870	5,701	20,870	5,701
Cost per Ton of SO2 Removed (\$/ton)	717	717	1,039	1,894	632	405

In this particular case, both total costs/ton and incremental costs/ton are relatively low, and, in the case of the Spray Dryer with Baghouse, the incremental cost/ton is actually lower than the

<sup>9</sup> BART and VA DEQ’s proposed Reasonable Progress strategies are simply incremental upgrades to the existing scrubbers and, as such, the improvements are expressed incrementally. On the other hand, the 90% control options require total replacement of the scrubbers, and the resulting improvements could therefore be calculated versus uncontrolled conditions. In effect, a determination that Reasonable Progress is 90% control would supersede the BART determination.

<sup>10</sup> The existing scrubber is approximately 20 years old, which exceeds the 15-year life assumed by MeadWestvaco in estimating costs for a new scrubber. MeadWestvaco should not be allowed to use a scrubber that has already exceeded its expected lifetime to avoid replacement with a more-efficient control technology.

<sup>11</sup> See attached electronic workbooks for additional supporting details.

total cost/ton (because of the \$4 million annual operating cost saving). The “bottom line” is that a New Caustic FGD would cost an extra \$11 million per year and remove an extra 5,700 tpy of SO<sub>2</sub>, while a Spray Dryer with Baghouse would cost an extra \$3 million per year and remove an extra 5,700 tpy of SO<sub>2</sub>.<sup>12</sup>

Our analysis is based upon a comparison of the control alternatives versus the current scrubber configured to meet the current BART permit limit of 8,020 tpy. We established the baseline conditions as follows:

- Uncontrolled emissions of 23,189 tpy were taken from Table 1 of the June 12, 2008 MeadWestvaco submittal.
- Reaching the BART limit of 8,020 tpy requires a reduction of 15,169 tpy, or 65% of the uncontrolled emissions.
- MeadWestvaco and VA DEQ have estimated that the cost of upgrading the scrubber is \$717/ton removed.
- The Direct Annual Cost of the existing FGD (which is equal to the Total Annual Cost for this fully amortized equipment) was estimated by assuming the same cost/ton as for the FGD upgrade.

For a New Caustic FGD:

- The Total Capital Investment was taken from the footnote in Table 2 of the June 12, 2008 MeadWestvaco submittal. As recommended by EPA,<sup>13</sup> the quoted 1986 cost was adjusted to 2010\$ by applying the Chemical Engineering Plant Cost Index.
- The Total Direct Annual Cost was taken from Table 2 of the June 12, 2008 MeadWestvaco submittal.
- The Total Indirect Annual Cost was calculated from the revised TCI estimate described above.
- The Total Annual Cost was calculated by adding the Total DAC to the revised Total Indirect Annual Costs.
- The amount of pollution removed was estimated by multiplying the assumed (90%) control efficiency by the uncontrolled emissions.
- The cost/ton was estimated by dividing the Total Annual Cost by the tons of pollution removed.
- Incremental costs were calculated by subtracting the costs of the Existing FGD from the costs of a New Caustic FGD.
- Incremental benefits were calculated by subtracting the amount of pollution removed by the Existing FGD from the amount of pollution removed by the New Caustic FGD.
- Incremental cost/ton was the estimated by dividing the incremental Total Annual Cost by the incremental tons of pollution removed.

We estimate an incremental cost/ton of \$1,894 versus the VA DEQ estimate of \$8,220. While it is not clear how VA DEQ arrived at its incremental cost estimates, two factors may have affected those results:

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<sup>12</sup> PM<sub>10</sub> from Power Boiler #9 is limited to 0.07 lb/mmBtu, 166.4 lb/hr, and 728.9 tpy. It is likely that a baghouse would reduce PM<sub>10</sub> emissions to less than half this amount.

<sup>13</sup> Larry Sorrels, Economist, EPA OAQPS

- The costs of a new scrubber should be substituted for the costs of the existing scrubber, not simply added. VA DEQ may not have accounted for the \$10 million annual operating costs eliminated by eliminating the old scrubber.
- VA DEQ may have compared the costs of the New Caustic FGD to the Lime Spray Dryer or to the scrubber upgrade alternatives, instead of to the existing FGD base case.

For a new Lime Spray Dryer (LSD) with Baghouse, the steps were similar to those described above with these exceptions:

- The Total Capital Investment was taken from Table 4 of the June 12, 2008 MeadWestvaco submittal.
- The Total Direct Annual Cost was taken from Table 4 of the June 12, 2008 MeadWestvaco submittal.

We estimate an incremental cost/ton of \$405 versus the VA DEQ estimate of \$4,400. While it is not clear how VA DEQ arrived at its incremental cost estimates, two factors may have affected those results:

- The costs of a new Lime Spray Dryer plus Baghouse should be substituted for the costs of the existing scrubber, not simply added. VA DEQ may not have accounted for the \$10 million annual operating costs eliminated by eliminating the old scrubber. Replacement of the existing wet FGD with a new Lime Spray Dryer plus Baghouse would reduce annual operating costs by \$4 million.
- VA DEQ may have compared the costs of the Lime Spray Dryer or to the scrubber upgrade alternative, instead of to the existing FGD base case.

We also have a concern with the way in which the incremental cost analysis is used. According to EPA's BART Guidelines, "You should consider the incremental cost effectiveness in combination with the average cost effectiveness when considering whether to eliminate a control option...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..." Reviewing agencies are quite familiar with the concept of total average cost and expect to see costs in the \$2,000 – \$12,000 per ton range. However, incremental costs are rarely estimated and evaluated, so the much higher numbers that result appear quite high at first glance. For this reason, rigid use of incremental cost effectiveness will always result in the choice of the cheapest option if carried to the extreme. (For example, if only incremental costs were used to evaluate PM controls, it is likely that all controls more expensive than a multiple cyclone would be rejected.) To use incremental costs properly, they must be compared to incremental costs for similar situations.

*Cost per Deciview (dv):* In its Table 2, VA DEQ estimated incremental costs as high a \$138 million/dv; it is not clear how VA DEQ arrived at these values. We followed the guidance provided by EPA in its January 21, 2011 letter to the Nebraska Department of Environmental Quality, "a \$/dv analysis is likely to be less meaningful if the analysis does not take into account the visibility impacts at multiple Class I areas or ignores the total improvement (i.e., the frequency, magnitude, and duration of the modeled changes in visibility)." The table below presents both the total and incremental costs and benefits of the SO<sub>2</sub> control options.

SO2 Control Option	Existing FGD	FGD Upgrade	New Caustic FGD		Spray Dryer w Baghouse	
			Total	Incremental	Total	Incremental
Total Annual Cost (\$)	10,877,774	862,678	21,677,648	10,799,873	13,186,492	2,308,717
Visibility Improvement (dv)	1.950	0.254	5.539	0.774	5.539	0.774
Cost per Cumulative Deciview	5,578,346	3,396,370	3,913,639	13,953,325	2,380,663	2,982,839

Applying our \$3 - \$14 million/yr total cost estimates to the 5.539 dv cumulative total visibility improvements that would result from 90% SO<sub>2</sub> control versus baseline<sup>14</sup> yields a cumulative total cost-effectiveness of \$2.4 - \$3.9 million/dv, which is well below the \$18 - \$21 million/dv average of nationwide BART proposals and determinations. Likewise, applying our \$3 - \$14 million/yr incremental cost estimates to the 0.774 dv cumulative incremental visibility improvements that would result from 90% SO<sub>2</sub> control versus BART yields a cumulative incremental cost-effectiveness of \$3 - \$14 million/dv.

### Visibility Benefits of Reducing PM10

PM<sub>10</sub> from Power Boiler #9 is limited in the BART permit to 0.07 lb/mmBtu, 166.4 lb/hr, and 728.9 tpy. While the proposed improvements in the efficiency of the existing scrubber would not reduce PM<sub>10</sub>, MeadWestvaco estimates that a baghouse would reduce PM<sub>10</sub> emissions by more than 50%. The table below shows the visibility improvement that would result from a 50% reduction of Tall Stack PM<sub>10</sub> emissions from the baseline 0.14 lb/mmBtu down to the BART/MACT limit of 0.07 lb/mmBtu.

PM10 Reductions (from Section 7.2 of MeadWestvaco 2007 BVART report)

	Westvaco B100 <sup>15</sup>	PM MACT (B103) <sup>16</sup>	
	Table 7-3	Table 7-8	Table 7-9
Class I Area	Maximum (dv)	Maximum (dv)	Change (dv)
James River Face	3.567	2.967	0.600
Shenandoah	1.941	1.763	0.178
Dolly Sods	1.379	1.193	0.186
Otter Creek	1.376	1.214	0.162
Totals	8.263	7.137	1.126

If addition of a Spray Dryer and Baghouse reduces PM<sub>10</sub> emissions by half, then it is likely that an additional half deciview of improvement would be realized across the four Class 1 areas, with the largest improvement (0.3 dv) at James River Face. This would make the cost-effectiveness of the Spray Dryer with Baghouse option even more favorable.

<sup>14</sup> VA DEQ's proposed Reasonable Progress strategies are simply incremental upgrades to the existing scrubbers and, as such, the improvements are expressed incrementally. On the other hand, the 90% control options require total replacement of the scrubbers, and the resulting improvements should therefore be calculated versus uncontrolled conditions. In effect, a determination that Reasonable Progress is 90% control would supersede the BART determination.

<sup>15</sup> Baseline Scenario including Tall Stack emissions from all four Power Boilers as described in Table 7-1 and other BART-subject emission units described in Table 7-2

<sup>16</sup> Tall Stack (Nos. 6-9 Power Boiler) PM MACT to reduce emissions from 0.14 lb/mmBtu to 0.07 lb/mmBtu

## Level Playing Field

While we believe that 95% SO<sub>2</sub> reduction is feasible, the table below shows that proposed BART for coal-fired power boilers at other pulp and paper mills is 90% to 96%.

State	Company	Facility	Source	Control Technology	SO <sub>2</sub> % Reduction	SO <sub>2</sub> Limits
MD	New Page/Westvaco	Luke Paper	Power Boiler No. 25	BART: Spray Dryer Absorber or a Circulating Dry Scrubber	90%	
VA	MeadWestvaco	Covington	Power Boiler #9	BART: upgrade existing wet caustic scrubbers which control SO <sub>2</sub> emissions from all 4 power house boilers	additional 20% SO <sub>2</sub> reduction	1831 lb/hr (annual avg.) demonstrated daily; 8020 tons/yr (12-month rolling total)
VA	MeadWestvaco	Covington	Power Boiler #9	Reasonable Progress determination that additional upgrades could be made to the existing scrubber system by 2015 by adding virgin caustic to the scrubber liquid	additional 15% SO <sub>2</sub> reduction	1556 lb/hr (annual avg.) demonstrated daily; 6817 tons/yr (12-month rolling total)
VA	Georgia Pacific	Big Island	#4 Power Boiler	BART: caustic scrubber	design control efficiency of 90 percent	Annual SO <sub>2</sub> emissions will be limited to 219 tpy
WI	Georgia Pacific	Green Bay	Power Boilers B-26 and B-27	The final BART determination for SO <sub>2</sub> reflects fuel switching of petroleum coke from BART boilers B26 and B27, followed by circulating bed dry scrubbing technology at 93% control.	Overall SO <sub>2</sub> control efficiency, based on combination of fuel switching and dry scrubber control at 93%, is 95.8% for B26 and 93.8% for B27.	268 tons/30-day rolling average; 2,340 tpy

## Conclusions & Recommendations Regarding MeadWestvaco

- EPA’s proposal is contrary to EPA’s position that the URP does not establish a “safe harbor.” VA DEQ and EPA placed undue weight on the premise that the visibility improvements projected for the affected Class I areas are in excess of those needed to be on the uniform rate of progress glidepath, and therefore, a less-rigorous Reasonable Progress analysis was acceptable.
- “EPA is placing great weight on the fact that there is no indication in the SIP submittal that Virginia, as a result of using a specific cost effectiveness threshold, rejected potential reasonable progress measures that would have had a meaningful impact on visibility in its Class I areas.” We have shown that a 90% efficient scrubber could improve visibility by 0.8 – 1.3 dv beyond BART.
- VA DEQ was incorrect and inconsistent in applying its cost thresholds, and its conclusions are inconsistent with BART determinations for paper mill power boilers in VA and in other states.
- VA DEQ did not properly evaluate additional SO<sub>2</sub> controls and placed undue importance on “the significant capital investment necessary for the construction of a wet scrubber or spray dryer.”
- VA DEQ overestimated the costs of a New Caustic FGD and a new Spray Dryer with Baghouse, while we have shown that the costs of a New Caustic FGD and a new Spray Dryer with Baghouse are reasonable in terms of total and incremental costs per ton and per deciview.

- Even though VA DEQ determined that “the estimated cost effectiveness in terms of \$/ton for a new caustic FGD, a new spray dryer, and improving the existing FGD are very reasonable and are well within the range of costs for the SO<sub>2</sub> control required by CAIR,” it rejected more the effective controls because of excessive reliance on incremental costs which it (contrary to existing policy) perceived to be excessive. VA DEQ also failed to consider cumulative visibility benefits in determining that “Incremental cost effectiveness in terms of \$/dv improvement are quite high for both the new caustic FGD and new spray dryer options.”
- Not only would the Spray Dryer/Baghouse option be more-cost-effective than a new caustic scrubber, the ability of the baghouse to reduce particulate emissions well below current levels would likely result in significant visibility improvement at James River Face where particulate emissions from the Tall Stack are the primary cause of visibility impairment by the Covington mill. MeadWestvaco should be required to reduce SO<sub>2</sub> emissions from the Tall Stack by at least 90% and further reduce PM<sub>10</sub> emissions by at least another 50%. To ensure continuous effective operation of the scrubbers, the SO<sub>2</sub> limit should include a short-term limit in the form of “lb/mmBtu” or “control efficiency” over a 30-day rolling average.