United States Department of the Interior
NATIONAL PARK SERVICE
Air Resources Division
P.O. Box 25287
Denver, CO 80225

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IN REPLY REFER TO:

July 11, 2011

N3615 (2350)

Jane Spann
Regulatory Development Section
Air Planning Branch
Air, Pesticides, and Toxics Management Division
U. S. Environmental Protection Agency, Region 4
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

EPA Docket ID: EPA-R04-OAR-2009-0786

Dear Ms. Spann:

The National Park Service (NPS) has reviewed the Environmental Protection Agency's (EPA's) proposed "Approval and Promulgation of Air Quality Implementation Plans; State of Tennessee; Regional Haze State Implementation Plan" (SIP). Overall, we agree with the technical analyses provided by the State of Tennessee to support the reasonable progress goal for Great Smoky Mountains National Park (NP). Significant emissions reductions are being made in Tennessee and other contributing states. Tennessee's progress goal for the 20% haziest days (23.5 deciview, dv) provides greater visibility improvement by 2018 than the uniform rate of progress (25.8 dv) for Great Smoky Mountains NP. We note, based on the most recent monitoring data, that visibility on the 20% haziest days in 2009 (23.2 dv) was better than the visibility goal set by Tennessee for 2018.

We reviewed Tennessee's initial draft SIP and provided comments in December 2007. Since that time, we have gained considerable information on the feasibility and costs of emissions control technology for Best Available Retrofit Technology for industrial sources. We provide the enclosed comments on the BART determination for the Alcoa facility in Alcoa, Tennessee, based on information that was not available to us in our previous review. We request that EPA consider this more recent information on the feasibility of controlling sulfur dioxide emissions from the potlines at Alcoa as you finalize the Alcoa BART determination.

We appreciate the opportunity to work closely with the State of Tennessee and EPA Region 4 to make progress toward achieving natural visibility conditions at our National Parks and Wilderness Areas. For further information regarding our comments, please contact Pat Brewer at (303) 969-2153.

Sincerely,

Carol McCoy
Chief, Air Resources Division

Enclosure

cc:
Barry Stephens, Director
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National Park Service (NPS) Comments[1] on
EPA's Proposed Best Available Retrofit Technology (BART) Determination for Alcoa's Tennessee Operations (Alcoa) primary aluminum smelter
July 11, 2011

The NPS submitted comments to the State of Tennessee in December 2007 with regard to the BART determination for Alcoa Tennessee (Alcoa). Since then we have reviewed BART determinations for industrial facilities across the country, including Alcoa facilities in Indiana, Maryland, and Washington, and have gained additional insights to feasible controls and costs. Below are updated comments on Alcoa Tennessee.

Alcoa is a primary aluminum smelter facility located in Blount County, Tennessee. The facility produces primary aluminum metal and the primary aluminum reduction emission unit groups at Alcoa were constructed in 1969 and 1972. The aluminum smelting process produces emissions of particulate matter (PM), fluorides, sulfur dioxide (SO_2), carbon monoxide, nitrogen oxides (NO_X), and hydrocarbons. The pollutants considered to be visibility-impairing are PM, SO_2, and NO_X.

Initial modeling of visibility impairment was done following the Visibility Improvement - State and Tribal Association of the Southeast (VISTAS) Regional Planning Organization modeling protocol, which specified use of a 4-km grid. However, Alcoa used a 1-km grid in its "refined" modeling analysis. Modeled visibility impacts of baseline emissions show impacts on the 8th highest day in any year (the 98th percentile value) to be greater than 0.5 deciviews (dv) at two Class I areas (Great Smoky Mountains National Park and Joyce Kilmer/Shining Rock Wilderness Area). The highest impact was 1.31 dv at Great Smoky Mountains National Park. The modeled 98th percentile visibility impact from each of the two emissions units is approximately 0.53 dv in Great Smoky Mountains National Park. More than 90% of the projected impact from the potlines is attributable to emissions from the potroom primary control devices, with the remainder from the potroom roofs. More than 95% of the potroom primary control device impact is from emissions of SO_2. For these reasons, we shall confine our comments to reducing SO_2 emissions from the potlines.

Primary Aluminum Reduction Process Description

Alcoa's primary aluminum reduction operations include two potlines and an electrode manufacturing operation made up of a paste production and green anode baking operation. The potline operation manufactures metallic aluminum by the electrolytic reduction of alumina in center-worked prebake cells. Direct electrical current, passing between anodes and the cathode, electrolytically reduces the alumina to aluminum and oxygen. Molten aluminum is deposited and accumulates over time at the cathode beneath a layer of molten cryolite bath. Periodically the molten aluminum is siphoned from beneath the cryolite bath and processed to achieve specific metal properties or is retained as pure aluminum. The product aluminum is solidified into intermediate or final products.

Existing Potline Emissions Control

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[1] Electronic files are included separately.

The potlines at Alcoa consist of four potroom groups of electrolytic reduction cells connected in series that produce molten aluminum. Each potline is comprised of 164 Alcoa technology reduction cells with 32 anodes per cell. Emissions from each potline group are captured and controlled with a primary control system.

The primary control system employed at the Alcoa potlines is a fluid-bed reactor type system with fabric filtration downstream of the reactor beds. Smelting grade alumina is introduced into one end of the Alcoa designed A-398 reactor. The alumina is fluidized by potline fume exhausted into the reactor through a series of perforated plates. Gaseous fluoride and a limited amount of SO_2 are adsorbed onto the alumina surface. Fabric filtration devices are positioned atop the reactor compartments to collect entrained alumina particles and other PM present in the gas stream. Total fluoride and particulate removal efficiencies >99% are achieved by the control system. Each control device has eight reactor sections, or compartments, and one or two stacks per compartment. The system at Alcoa is large, treating approximately 2,000,000 actual cubic feet per minute (acfm) of 200°F exhaust gases.

Any uncaptured fume is emitted as fugitive secondary emissions through the roof monitor atop the potroom buildings.

The BART analysis consists of five steps:

Step 1 – Identify all available retrofit control technologies.

We agree that Alcoa identified a reasonable suite of control options. The table below shows the number of SO_2 control systems operating on Electric Generating Units in 2010 (according to EPA's Clean Air Markets Database). Similar systems may be applicable to the Alcoa potlines.

SO2_CONTROL_INFO	No. in Operation in 2010
Dry Lime Flue Gas Desulfurization (FGD)	79
Dual Alkali	5
Magnesium Oxide	3
Sodium Based	18
Wet Lime FGD	115
Wet Limestone	180
	400

We are focusing upon those options that are the most promising.

Limestone Slurry Forced Oxidation

Limestone slurry forced oxidation (LSFO) is used extensively in the utility Flue Gas Desulfurization (FGD) market. The raw material is finely ground limestone. There are a number of suppliers of LSFO technology. The most commonly used equipment is an open, multi-level, countercurrent spray tower scrubber equipped with spray nozzles to inject the limestone slurry droplets into the gas stream. Liquor is collected at the bottom of the tower and sparged with air to oxidize the calcium sulfite to calcium sulfate to enhance the settling properties of the calcium sulfate. Recirculation pumps circulate the scrubbing liquor to the spray nozzles. The bleed from the scrubber is sent to a dewatering system to remove excess moisture. For an aluminum smelter, the process will produce either solid gypsum waste or commercial-grade gypsum suitable for reuse as a cement additive. Only a very small purge or blowdown stream is required.

Limestone Slurry Natural Oxidation

Limestone slurry natural oxidation (LSNO) is very similar to LSFO. The major difference is the absence of an oxidation stage. The gypsum/calcium sulfite product is essentially a waste product with limited possibilities of use for agricultural purposes.

Conventional Lime Wet Scrubbing

Conventional lime wet scrubbing is also similar to LSFO except that the raw material is hydrated lime or quick lime that is either slaked on-site or purchased in the slaked form. The system typically uses forced oxidation, although natural oxidation is possible. The process will produce either solid gypsum waste or commercial-grade gypsum suitable for reuse as a cement additive.

Conventional Sodium Scrubbing

An alkaline solution of either soda ash or sodium hydroxide is pumped into the scrubbing tower and recirculated through a network of spray nozzles. Atomized droplets contact the up-flowing gas containing SO_2.

Step 2 – Eliminate technically infeasible control technologies.

Limestone Slurry Forced Oxidation (LSFO) was determined to be a technically feasible wet scrubbing retrofit control option for the potroom reactors even though it is not ideally suited for scrubbing SO_2 concentrations that are less than or equal to 100 ppm.

Alcoa appears to have improperly rejected lime- or sodium-based scrubbers for further analysis:

> Lime- or sodium-based scrubbers could also be used, but lime and sodium are less desirable reagents considering that these reagents are much more expensive. The high solubility of sodium compounds also would have higher solid and liquid waste disposal cost because there is no receiving stream near the Alcoa facility where sodium-containing wastewater could be discharged directly without pre-treatment. Other types of limestone-based scrubbers could also be used, and costs for these systems would be similar. An advantage of the forced oxidation process is that the spent slurry is oxidized to gypsum, which dewaters more efficiently, resulting in less waste materials requiring disposal. Thus, an LFSO scrubber was determined to be the most appropriate control device for the cost analysis.

LSFO was selected by Alcoa to be the best choice of the wet scrubbing technologies. As a result, Alcoa did not evaluate sodium-based scrubbing. We believe that Alcoa has prematurely eliminated sodium-based scrubbing from the BART process.

According to Alcoa, conventional sodium scrubbing has been installed in at least 12 aluminum smelters around the world. An alkaline solution of either soda ash or sodium hydroxide is pumped into the scrubbing tower and recirculated through a network of spray nozzles. Atomized droplets contact the up-flowing gas containing SO_2. Alcoa says that, where this technology has been deployed, the liquid effluent containing dissolved salts, including sodium and fluorides, has been discharged into a large receiving stream or an open body of water without treatment. However, the need for wastewater treatment is not a technical feasibility issue, but should have been addressed in the cost analyses.

According to a report prepared for Environment Canada[2] sodium-based scrubbing has been installed at five primary aluminum plants (four in the U.S.[3] and one in Ardal, Norway), including the Alcoa primary aluminum smelter in Massena, NY.

Danieli Corus commissioned two of the largest wet scrubbers in the world. As part of the Alcoa St. Lawrence Reduction Plant, at Massena, NY, the fume treatment center included two wet scrubbers for the removal of SO_2. At that time, these were the largest wet scrubbers ever built at an aluminum plant. They use soda ash (sodium carbonate) as the reagent and the liquid effluent is a sodium sulfate solution. Both wet scrubbers are open spray towers with a low pressure drop and are designed to handle any solids in the liquor.[4]

Furthermore, sodium-based scrubbing has recently been determined to be technically feasible by one BART source[5] and by one PSD source[6] in the US. While we agree that wastewater treatment is necessary, that issue can addressed in the economic analysis.

Sodium-based throwaway (once through) scrubbing systems are the overwhelming choice for FGD systems installed on industrial boilers.[7] For industrial boilers, the most prevalent wet-FGD system is the sodium-based scrubber. Sodium scrubbers employ a sodium based solution as the scrubbing medium. These systems comprise about 98% of all industrial wet FGD applications. Most sodium-based scrubbers currently in use on industrial boilers are on oil field steam generators. However, even after eliminating such applications as oil field steam generators, paper mills, soda ash, and textile plants, sodium-based scrubbers represent about 70% of the total wet FGD systems operating. The second most prevalent wet FGD technology is the dual-alkali process. Dual alkali scrubbers represent about 1% of the industrial wet FGD population.[8]

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[2] Environment Canada Report 605311, Section e, "Assessment of technologies for the prevention and control of SO_2 emissions", 2008

[3] Massena, NY; Hawkesville, KY, Goldendale, WA; The Dalles, OR

[4] Danieli Corus http://www.danieli-corus.com/en/aluminium-wet.php

[5] Columbia Fall Aluminum Company (MT)

[6] Rio Tinto Alcan (KY)

[7] Environmental Engineering Dictionary, Fourth Edition, Government Institutes, 2005, p322, http://books.google.com/books?id=f1lnQwrvOSEC&pg=PA322&lpg=PA322&dq=industrial+boiler+sodium+scrubbing&source=bl&ots=LQN5GPgqzI&sig=pQYaD9jip_WJlD9pudL-IJVU8VA&hl=en&ei=jUULTt2dAojq0gGknZ2kAQ&sa=X&oi=book_result&ct=result&resnum=6&ved=0CF0Q6AEwBQ#v=onepage&q=industrial%20boiler%20sodium%20scrubbing&f=false

[8] Handbook of Pollution Control Processes, Robert Noyes, Robert Noyes publications, 1991, p83 http://books.google.com/books?id=jEETS1_CFzkC&pg=PA83&lpg=PA83&dq=industrial+boiler+sodium+scrubbing&source=bl&ots=oUd-VKWblM&sig=dpMfE-MKz4sf-1_kKEQMsHsMizU&hl=en&ei=jUULTt2dAojq0gGknZ2kAQ&sa=X&oi=book_result&ct=result&resnum=7&ved=0CGAQ6AEwBg#v=onepage&q=industrial%20boiler%20sodium%20scrubbing&f=false

Sodium-based scrubbing is widely used, is used in the primary aluminum industry (including Alcoa), and should not have been neglected in the Alcoa BART analysis.

Step 3 – Evaluate the control effectiveness of remaining control technologies.
We agree that 95% control is reasonable for wet scrubbing.[9]

Step 4 – Evaluate impacts and document the results.

Not only did Alcoa improperly eliminate sodium-based scrubbing from its cost analysis, it did not follow the EPA Control Cost Manual[10] (Cost Manual).

Wet scrubber costs were estimated based on cost quotes received by Alcoa from two FGD equipment vendors. Both vendors provided cost proposals for wet scrubbing systems based on LSFO scrubbers. Neither of the two LSFO vendors provided a comprehensive installed cost estimate. Both preliminary designs were based on a central scrubbing center as the least-cost approach, where exhaust from all dry scrubbing systems would be ducted to a centralized scrubbing system. Both design estimates presented by Alcoa were based on systems that would provide 100% availability of emissions control on each day of the year, given that potlines cannot be easily shutdown and restarted for control system outages. To achieve this 100% availability, the proposed designs includes two scrubber towers, one to be active, and one to be held in reserve.

The capital and total annualized costs for a potline wet scrubber system as presented by Alcoa was \$192 - \$242 million and \$35 - \$43 million per year, respectively. The wet scrubber cost effectiveness was \$6,700 - \$8,300 per ton of SO_2 removed. (A lower cost option based on a single absorber tower for Alcoa, Tennessee, was analyzed by the Washington State Department of Ecology, as discussed later.)

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[9] B&W PGG offers multiple solutions for acid gas control. Our limestone, lime and sodium-based scrubbing systems can achieve extremely high removal efficiencies, in many cases greater than 98%. Industrial Air Quality Control Solutions, Babcock & Wilcox http://www.babcock.com/library/pdf/E1013211.pdf

[10] According to EPA's BART Guidelines, "the basis for equipment cost estimates should be documented, either with data supplied by an equipment vendor (i.e., budget estimates or bids) or by a referenced source (such as the OAQPS Control Cost Manual, Fifth Edition, February 1996, 453/B-96-001). In order to maintain and improve consistency, cost estimates should be based on the OAQPS Control Cost Manual, where possible. The Control Cost Manual addresses most control technologies in sufficient detail for a BART analysis. The cost analysis should also take into account any site-specific design or other conditions identified above that affect the cost of a particular BART technology option."

EPA's belief that the Control Cost Manual should be the primary source for developing cost analyses that are transparent and consistent across the nation and provide a common means for assessing costs is further supported by this November 7, 2007, statement from EPA Region 8 to NDDAQ:

> The SO_2 and PM cost analyses were completed using the CUECost model. According to the BART Guidelines, in order to maintain and improve consistency, cost estimates should be based on the OAQPS Control Cost Manual. Therefore, these analyses should be revised to adhere to the Cost Manual methodology.

We believe that Alcoa has overestimated many of its costs. For example, a review of Alcoa's "Handling & Erection" costs reveals that they are double the $30.7 million costs estimated by application of the Cost Manual. While we recognize that primary aluminum plants can present obstacles to erection of major new installations, we have observed that every Alcoa-based cost analysis we have received[11] has made exactly the same assumption. Because a BART analysis is meant to be site-specific, Alcoa should not apply a "one-assumption-fits-all" approach to this major cost item.

As part of the documentation[12] provided by Alcoa for its Intalco primary aluminum smelter to the Washington State Department of Ecology, Alcoa included a BART analysis that was based upon an estimated Total Capital Investment (TCI) of $130 million for FGD on its Tennessee facility. This is substantially lower than the $192 - $242 million TCI presented by Alcoa.

Alcoa has also overestimated its $1.2 million annual labor costs by assuming that operation of a new wet scrubber would require several new operators full-time. While it may be true that several operators would be involved in the operation of the scrubbing system, it has been our observation that modern pollution control systems are typically run from the same highly-automated central control room from where the bulk of the plant's major functions are also controlled. We believe it is far more likely that the 0.5 additional hours per shift and $33,000 annual labor costs estimated by the Cost Manual are a better reflection of the current state of technology.

Alcoa has tried to justify its $1.3 million annual Maintenance Materials cost by referencing a report prepared for the National Lime Association[13] for a scrubber on a boiler.[14] Alcoa should provide an explanation of why the National Lime Association report is relevant to its operations.[15] According to the Cost Manual, the Maintenance Materials cost is normally equal to the Maintenance Labor cost estimate ($33,000).

Considering the reliability of modern SO_2 scrubbers, we do not believe that a redundant absorber is necessary for this relatively clean gas stream and relatively steady operating conditions. A single absorption tower design option was included in one of the two original Tennessee plant scrubber system proposals by Babcock Power (Babcock), but not presented in Alcoa's BART proposal. This design would cost less, but would eliminate having a backup scrubber tower. Babcock estimated that the single tower design reduced the TCI by 28.1 percent, or to 71.9 percent of their two scrubber system

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[11] Alcoa (TN); Alcoa (IN): Eastalco (MD): Intalco (WA)

[12] Alcoa Primary Metals USA Pre-Feasibility Report SO2 Scrubbing for the INTALCO Primary Aluminum Smelter H-325640 2 November 5, 2007, Table 10.

[13] WET FLUE GAS DESULFURIZATION TECHNOLOGY EVALUATION PROJECT NUMBER 11311-000 PREPARED FOR NATIONAL LIME ASSOCIATION JANUARY 2003 PREPARED BY Sargent & Lundy

[14] Cost for low sulfur boiler system with 1.7 macfm inlet/1.5 macfm outlet (Sargent & Lundy LLC 2003)

[15] While Intalco is correct in noting that the Alcoa-based BART reviews also used costs generated from the Sargent & Lundy report, we do not believe that any of those results are valid.

proposal.[16] We applied this cost reduction to the Alcoa cost estimate, and included additional cost reductions in annual operating labor and maintenance labor as much as practical. The resulting capital and total annualized costs were \$122 - \$153 million and \$21 - \$26 million, respectively. This gave a cost effectiveness of \$3,900 - \$5,000 per ton of SO_2 removed assuming an identical SO_2 removal rate.

ALCOA (TN) Potline LSFO Wet Scrubber

Vendor 1

with backup module			without backup module
Calculated	**ALCOA est.**	**ALCOA/NPS**	**ALCOA/NPS**
Purchased equipment costs	$ 76,794,400	$ 76,794,400	$ 55,318,400
Direct installation costs	$ 95,993,000	$ 65,275,240	$ 47,020,640
Total Direct Costs	$ 172,787,400	$ 142,069,640	$ 102,339,040
Indirect Costs (installation)	$ 19,198,600	$ 26,878,040	$ 19,361,440
Total Capital Investment	$ 191,986,000	$ 168,947,680	$ 121,700,480
Operating labor	$ 302,220	$ 18,889	$ 18,889
Maintenance	$ 2,172,000	$ 32,850	$ 32,850
Direct Annual Costs	$ 4,806,974	$ 2,384,381	$ 2,384,381
Indirect Annual Costs	$ 30,243,003	$ 25,338,498	$ 18,261,121
Total Annual Cost	$ 35,049,977	$ 27,722,879	$ 20,645,502
Emission reduction (TPY)	5,234	5,234	5,234
Cost/ton removed ($/T)	$ 6,697	$ 5,297	$ 3,945

Vendor 2

with backup module			without backup module
Calculated	**ALCOA est.**	**ALCOA/NPS**	**ALCOA/NPS**
Purchased equipment costs	$ 96,854,400	$ 96,854,400	$ 69,761,600
Direct installation costs	$ 121,068,000	$ 82,326,240	$ 59,297,360
Total Direct Costs	$ 217,922,400	$ 179,180,640	$ 129,058,960
Indirect Costs (installation)	$ 24,213,600	$ 33,899,040	$ 24,416,560
Total Capital Investment	$ 242,136,000	$ 213,079,680	$ 153,475,520
Operating labor	$ 302,220	$ 18,889	$ 18,889
Maintenance	$ 2,172,000	$ 32,850	$ 32,850
Direct Annual Costs	$ 5,549,906	$ 3,127,424	$ 3,127,424
Indirect Annual Costs	$ 37,755,203	$ 31,949,234	$ 23,020,851
Total Annual Cost	$ 43,305,109	$ 35,076,658	$ 26,148,275
Emission reduction (TPY)	5,234	5,234	5,234
Cost/ton removed ($/T)	$ 8,275	$ 6,702	$ 4,996

If we accept Alcoa's estimates for the cost of the scrubber with backup module and auxiliary equipment, and use Cost Manual default values for the remaining expenses, we arrive at capital and total annualized costs of \$169 - \$213 million and \$28 - \$35 million,

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[16] BART DETERMINATION SUPPORT DOCUMENT FOR ALCOA INTALCO WORKS FERNDALE, WASHINGTON Prepared by Washington State Department of Ecology Air Quality Program August 2009, p15.

respectively. This gives a cost effectiveness of \$5,300 - \$6,700 per ton of SO_2 removed (Our calculations based upon the Cost Manual are enclosed in the **Appendix A** electronic ("Scrubber cost" files.).

Because Alcoa did not complete the BART analysis for sodium-based scrubbing, we believe that its BART analysis is incomplete.

Step 5 – Evaluate visibility impacts.

A baseline Class I area visibility impact analysis was performed on the BART-eligible emission units at Alcoa using the CALPUFF model with 4-km grid spacing as recommended by VISTAS. Six Class I areas (Great Smoky Mountains National Park, Cohutta Wilderness, Joyce Kilmer-Slickrock Wilderness, Linville Gorge Wilderness, Shining Rock Wilderness, and Mammoth Cave National Park) are located within the 300-km radius around the facility.

Contrary to VISTAS guidance, "refined" modeling using a 1-km grid spacing was prepared for visibility impacts at the Class I areas where the combined impacts from the BART-eligible emission units were forecast to be equal to or greater than the screening threshold limit of 0.5 dv (at Great Smoky Mountains National Park and Joyce Kilmer-Slickrock Wilderness Area).

An evaluation of the potential improvement in visibility that would result from application of feasible pollution prevention/add-on control options was done. One-kilometer grid CALPUFF modeling of the individual emission units with the control options applied was performed. In general, this modeling was the same as the baseline modeling except stack data and emission data associated with the application of the feasible pollution prevention/add-on controls were used as model inputs.

The baseline modeling results indicate that the highest 98th percentile visibility impact from Alcoa's BART-eligible sources at Great Smoky Mountains National Park with 3% sulfur in the coke was 1.31 dv. The post-control modeling results indicate that the highest 98th percentile visibility impact from Alcoa's BART-eligible sources at Great Smoky Mountains National Park with wet scrubbers installed on the potlines was 0.60 dv in 2001.

However, because of Alcoa's use of the 1-km grid, we question the validity of its modeling results.

Determine BART

For potline SO_2 emissions, Alcoa proposed BART to be a maximum of three percent sulfur in the coke used to manufacture anodes.

Alcoa rejected the use of wet scrubbing technology as BART to reduce potline SO_2 emissions because of its costs. For the proposed two absorption tower design, the average annualized cost was \$7,500 per ton of SO_2 removed. The average capital and total annualized costs were estimated to be $217 million and $39 million per year, respectively.

As discussed earlier, a single absorption tower design option was evaluated by NPS. The resulting capital and total annualized costs were $122 - $153 million and $21 - $26 million, respectively. This gave a cost effectiveness of $3,900 - $5,000 per ton.

BART is not necessarily the most cost-effective solution. Instead, it represents a broad consideration of technical, economic, energy, and environmental (including visibility improvement) factors. For example, Oregon DEQ has established a cost/ton threshold of $7,300 based upon the premise that improving visibility in multiple Class I areas warrants a higher cost/ton than where only one Class I area is affected. In their BART proposal for San Juan Generating Station (SJGS), New Mexico used a range from $5,946/ton to $7,398/ton. Colorado uses $5,000/ton, New York uses $5,500/ton, and Wisconsin is using $7,000 - $10,000/ton as its BART threshold.[17] EPA has proposed Selective Catalytic Reduction (SCR) at the Four Corners Power Plant at $2,600 - $2,900/ton, and at SJGS at $1,600-1,900/ton. In this context, we believe that wet scrubbing of potline emissions is BART at Alcoa.

Recommendations & Conclusions

- Alcoa should have conducted a full five-step analysis of sodium-based scrubbing for potline SO_2 emissions.
- Alcoa appears to have overestimated costs for LSFO scrubbing. Alcoa should have used the EPA Control Cost Manual to estimate costs, or better document and justify costs that deviate from the Cost Manual approach. Alcoa should justify the need for a redundant scrubbing module, or revise its estimates to eliminate it.
- Alcoa should provide modeling results consistent with established modeling procedures for all Class I areas within 300 km for the base case as well as the 95% potline SO_2 removal case. Alcoa should explain how it objectively evaluated the resulting visibility benefits to all of those Class I areas.
- Wet scrubbing of potline emissions is BART at Alcoa.

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[17] "The Department used cost-per-ton reduced as the primary metric for determining the BART level of control. The upper limit for this metric was $7,000 to $10,000 per ton, which reflects historical low-end costs for controls required under BACT." BEST AVAILABLE RETROFIT TECHNOLOGY AT NON-EGU FACILITIES April 19, 2010, WISCONSIN DEPARTMENT OF NATURAL RESOURCES