STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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Verso Androscoggin LLC
Franklin County
Jay, Maine
A-203-77-11-M

Departmental
Findings of Fact and Order
Regional Haze
Best Available Retrofit Technology
Determination

After staff investigation reports and other documents in the applicant's file in the Bureau of Air Quality, pursuant to 38 M.R.S.A, § 344, § 582, § 590 and § 603, the Department finds the following facts:

I. Registration

A. Introduction

FACILITY	Verso Androscoggin LLC
INITIAL LICENSE NUMBER	A-203-70-A-I
LICENSE TYPE	BART Determination
NAICS CODES	322121
NATURE OF BUSINESS	Pulp and Paper Mill
FACILITY LOCATION	Jay, Maine
INITIAL LICENSE ISSUANCE DATE	January 12, 2005
AMENDMENT ISSUANCE DATE	November 2, 2010
LICENSE EXPIRATION DATE	January 12, 2010

Best Available Retrofit Technology (BART) is defined in 38 MRSA §582, sub-§5-C as an emission limitation based on the degree of reduction achievable through the application of the best system of continuous emission reduction for each visibility-impairing air pollutant that is emitted by an existing stationary facility. The emission limitation must be established, on a case-by-case basis, taking into consideration the technology available, the costs of compliance, the energy and non-air quality environmental impacts of compliance, any pollution control equipment in use or in existence at the source, the remaining useful life of the source, and the degree of improvement in visibility that may reasonably be anticipated to result from the use of such technology.

A facility is determined to have BART eligible emission units if the following criteria outlined in the Regional Haze Rule found in 40 CFR, Part 51 are met:

1. The facility falls into one of the 26 source specific categories identified in the Clean Air Act (CAA) of 1977,
2. The facility has emission units that entered operation in the 15 years prior to the adoption of the CAA, and
3. The facility has the potential to emit more than 250 tons/year of a single visibility impairing pollutant (VIP) from units that fall under criteria #2.

B. <u>BART Eligible Emission Units</u>

The following emission units have been determined to be BART eligible under 40 CFR, Part 51 for the Verso Androscoggin LLC (Verso Androscoggin) facility:

Emission Unit	Unit Capacity	Date of Start-up
Power Boiler #1 (PB #1)	680 MMBtu/hr	1965
Power Boiler #2 (PB #2)	680 MMBtu/hr	1967
Waste Fuel Incinerator (WFI)	480 MMBtu/hr on biomass and 240 MMBtu/hr on oil	1976
Recovery Boiler #1 (RB #1)	2.50 MMlbs/day of dry BLS	1965
Recovery Boiler #2 (RB #2)	3.44 MMlbs/day of BLS	1976
Smelt Dissolving Tank #1 (SDT #1)	2.50 MMlbs/day of dry BLS	1965
Smelt Dissolving Tank #2 (SDT #2)	3.44 MMlbs/day of dry BLS	1975
"A" Lime Kiln ("A" LK)	72 MMBtu/hr	1965
"B" Lime Kiln ("B" LK)	72 MMBtu/hr	1975
Flash Dryer	84 MMBtu/hr	1964

C. <u>Background Information on BART Rules and Guidance</u>

Section 169A of the Clean Air Act (CAA) includes a requirement to prevent and remedy impairment of visibility in Class I areas. Impairment of visibility is defined as a reduction of visual range and atmospheric discoloration. To implement the requirements of Section 169A of the CAA, in 1999 the Environmental Protection Agency (EPA) promulgated regulations as part of *Requirements for Preparation, Adoption, and Submittal of Implementation Plans* (40 CFR Part 51). The applicable sections in 40 CFR Part 51 include Section 302 (*Implementation Control Strategies for Reasonably Attributable Visibility Impairment*) and Section 308 (*Regional Haze Program Requirements*). In addition, EPA promulgated guidance in Appendix Y to 40 CFR Part 51 (*Guidelines for BART Determinations Under the Regional Haze Rule*). The initial regulations were challenged and in 2005 EPA issued final regulations that serve as the basis for Verso Androscoggin's BART analysis. Although the guidance contained in Appendix Y was written for states to use in the development of visibility State Implementation Plans (SIP), many sources have used this guidance to conduct case-by-case BART analyses.

The Northeast States for Coordinated Air Use Management (NESCAUM) and the Mid Atlantic/Northeast Visibility Union (MANE-VU) Regional Planning Organization (RPO) conducted preliminary visibility modeling to develop a strategy for addressing visibility analyses for which they were responsible. The Department has incorporated guidance from both 40 CFR Part 51 Appendix Y and the MANE-VU RPO in outlining the expectations for sources within Maine that are required to address the Regional Haze Rules. The primary difference between the EPA guidance and the Department's guidance involves the Department's use of a threshold of 0.1 deciviews (dv) as the level below which a source's emissions are not considered to cause or contribute to visibility impairment on a 24-hour basis. The Department guidance also differs from EPA guidance in requiring consideration of the peak 24-hour visibility impacts rather than the 98th percentile 24-hour impacts due to the current availability of a single year of meteorological data versus multiple years (i.e., three years).

Pursuant to 38 MSRA §603-A, sub-§8; for those BART eligible units determined by the Department to require additional sulfur dioxide reductions to improve visibility, the reductions must:

1. Occur no later than January 1, 2013; and
2. Either:
    a. Require the use of fuel oil containing no more than 1% sulfur by weight; or,
    b. Be equivalent to a 50% reduction in sulfur dioxide emissions from a BART eligible unit based on a BART eligible unit source emission baseline determined by the Department under 40 CFR, Section 51.308 (d)(3)(iii)(2006) and 40 CFR, Part 51, Appendix Y (2006).

The methodology used by Verso Androscoggin to evaluate BART for their BART eligible sources involved case-by-case analyses assessing the availability of technologies capable of sufficiently reducing emissions of a specific pollutant as well as an assessment of the economic, energy, and environmental impacts of each technology. This process is similar to the "top-down" best available control technology (BACT) approach used in new source review (NSR) evaluations. Verso Androscoggin also consulted other guidance documents and resources, including BART determinations for other affected sources; the RACT/BACT/LAER Clearinghouse (RBLC); discussions with the Department as well as other state environmental agencies, review of the Regional Haze regulation preamble; and examples presented in Appendix Y of 40 CFR Part 51. The case-by-case BART analysis included visibility modeling at six (6) Class I areas within 300 kilometers (km) of Verso Androscoggin. The approach used by Verso Androscoggin included the following five basic steps:

Step 1 – Identify all available retrofit control technologies

Step 2 – Eliminate technically infeasible options

Step 3 – Evaluate control effectiveness of remaining control technologies

Step 4 – Evaluate cost, energy, and environmental impacts

Step 5 – Evaluate visibility impacts of each control technology

II. BART Evaluations and Determinations

The short term (lb/hr) emission rates used in the visibility modeling analysis and annual (tons/year or TPY) emission rates used in the control cost effectiveness analysis are listed in the table below.

	NO_x		SO_2		PM_{10}	
Source	lb/hr	TPY	lb/hr	TPY	lb/hr	TPY
PB #1 & #2	475.60	766.18	2050.45	3626.22	92.80	239.23
WFI	129.60	513.97	0.96	50.30	33.60	162.35
RB #1 & #2	153.13	638.28	287.75	356.87	59.38	230.20
SDT #1	--	--	0.30	1.05	9.86	25.70
SDT #2	--	--	0.24	3.86	3.62	14.20
"A" LK	20.70	59.50	0.28	1.15	21.09	49.50
"B" LK	16.02	48.50	1.85	2.55	22.66	47.0
Flash Dryer	11.76	22.78	25.54	25.50	5.0	21.90

A. Power Boilers #1 & #2

Power Boilers #1 and #2 are each rated at 680 MMBtu/hr and began operation in 1965 and 1967, respectively. Power Boilers #1 and #2 are licensed to fire #6 fuel oil, #2 fuel oil, and used oil. The license currently limits the sulfur content of the fuel oil to no more than 1.8%, by weight. In addition, each boiler is equipped with low NO_x burners. Nitrogen oxides (NO_x), sulfur dioxide (SO_2), and particulate matter (PM_{10}) are the visibility impaired pollutants (VIPs) emitted by Power Boilers #1 and #2 that require a BART analysis.

The operation of the two boilers is related to whether or not and how the cogeneration plant (three natural gas fired turbines) at the Mill is operating. Typically when the cogeneration plant is operating, Power Boilers #1 and #2 do not operate. When the cogeneration plant is not operating, both boilers are operated, however, one boiler will typically carry the bulk of the load and the other boiler is idled or run at low load. There are occasions when both boilers operate at high load, but this is not a routine operating mode.

BART Evaluation

1. NO_x

Verso Androscoggin identified and evaluated selective catalytic reduction (SCR), low NO_x burners (LNBs), selective non-catalytic reduction (SNCR), and combustion control methods (including an overfire air (OFA) system and a flue gas recirculation (FGR) system) as potential control technologies in the reduction of NO_x emissions from Power Boilers #1 and #2. SCR and SNCR control technologies were found to be technically feasible and so were evaluated further. LNBs are currently installed and used on Power Boilers #1 and #2 and are estimated to provide a 15% reduction in NO_x emissions, so were not evaluated further. Combustion control methods were evaluated, however none were found to be viable control options for Power Boilers #1 and #2. Verso Androscoggin found that the size and design of Power Boilers #1 and #2 would provide little room for the installation of an overfire air system and that the application of a flue gas recirculation system would result in minimal reductions (7% to 15%) in NO_x emissions. A summary of Verso Androscoggin's evaluation of the remaining viable NO_x control technologies (SCR and SNCR) is provided in the table below.

Control Technology	Control Effectiveness	Cost Effectiveness ($/ton removed)	Energy and Other Impacts	Greatest Visibility Improvement
SCR	90%	$5,271	Minor Impacts	1.7
SNCR	35%	$5,973	Minor Impacts	1.4

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. Although the use of SCR or SNCR has the potential to reduce visibility impacts by a perceptible amount, Verso Androscoggin proposes that the cost effectiveness levels whether based on actual emissions from the 2000 to 2008 period or on the lower actual emissions typical of more recent operating years (2008 to 2009) are not economically justifiable. Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that the current use of LNBs represents BART for control of NO_x emissions from Power Boilers #1 and #2 and that no additional level of control is justifiable as BART.

2. SO_2

Verso Androscoggin identified and evaluated low sulfur fuels, wet scrubbing, dry scrubbing, and semi-dry scrubbing as potential control technologies in the reduction of SO_2 emissions from Power Boilers #1 and #2. Low sulfur fuels and wet scrubbing control technologies were found to be technically feasible by Verso Androscoggin and so were evaluated further. Dry and semi-dry scrubbing control technologies were evaluated, however Verso Androscoggin found that control effectiveness levels would be low (<25%), downstream particulate matter control devices such as an ESP and/or fabric filter would need to be installed to collect and re-circulate the scrubbing material, and no applications of these technologies on fuel oil fired boilers like Power Boilers #1 and #2 were identified during Verso Androscoggin's research of potential control technologies. A summary of Verso Androscoggin's evaluation of the remaining viable SO_2 control technologies (low sulfur fuels and wet scrubbing) is provided in the table below.

Control Technology	Control Effectiveness	Cost Effectiveness ($/ton removed)	Energy and Other Impacts	Greatest Visibility Improvement
Natural Gas	99%	$3,334	Negligible	1.5
#2 Fuel Oil	97%	$3,341	Negligible	1.5
0.7% Sulfur #6 Fuel Oil	60%	$631	Negligible	0.9
Wet Scrubbing	99%	$2,278	Disposal Impacts	1.5

The cost effectiveness numbers in the table above are based on controlling SO_2 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 between $4,920 and $7,133 per ton of SO_2 removed with the installation of a wet scrubber. The use of low sulfur fuels or a wet scrubber has the potential to reduce visibility impacts from Power Boilers #1 and #2 by a perceptible amount; however there are significant cost differences among the three low sulfur containing fuels evaluated by Verso Androscoggin and the wet scrubber. Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that the use of 0.7% sulfur #6 fuel oil is a feasible and justifiable cost at $631 per ton of SO_2 reduced, but that the other low sulfur fuel options and the wet scrubbing option are not economically justifiable and do not represent BART. Therefore, Verso Androscoggin proposes that the use of lower sulfur (0.7%) #6 fuel oil in place of the higher sulfur (1.8%) #6 fuel oil that they currently fire, represents BART for control of SO_2 emissions from Power Boilers #1 and #2. In accordance with Maine's *Low Sulfur Fuel* statute, 38 M.R.S.A. § 603-A, Verso Androscoggin will be required to use fuel oil containing no more than 0.5% sulfur beginning January 1, 2018.

3. PM_{10}

Verso Androscoggin did not identify or evaluate potential control technologies for the reduction of PM_{10} emissions from Power Boilers #1 and #2. Verso Androscoggin cited language in 40 CFR Part 51, Appendix Y that identifies an exception to the BART analysis for PM and VOC sources subject to maximum achievable control technology (MACT) standards under Section 112 of the CAA. Specifically, Appendix Y states: "*We believe that, in many cases, it will be unlikely that States will identify emission controls more stringent than the MACT standards without identifying control options that* *would cost many thousands of dollars per ton. Unless there are new technologies subsequent to the MACT standards which would lead to cost-effective increases in the level of control, you may rely on the MACT standards for the purposes of BART.*". In addition, Verso Androscoggin states in their application that PM_{10} emissions are low based on the firing of fuel oil and that PM_{10} emissions from Power Boilers #1 and #2 have a minimal impact on visibility and a reduction in these emissions would have no impact on the contribution of either boiler to overall visibility impacts. Based on this information, Verso Androscoggin proposed in its BART analysis that it was not necessary to expand the BART analysis for PM and therefore did not identify or evaluate potential control technologies for the reduction of PM_{10} or VOC emissions from Power Boilers #1 and #2. Verso Androscoggin proposes that the final "Boiler MACT" standards (40 CFR Part 63, Subpart DDDDD) that the boilers will be subject to will also represent BART for Power Boilers #1 and #2.

BART Determination

Based on the information supplied in the case-by-case BART analysis submitted by Verso Androscoggin, the Department finds that BART for Power Boilers #1 and #2 includes continued use of the existing LNBs for control of NO_x emissions, use of #6 fuel oil with a sulfur content not to exceed 0.7%, by weight for control of SO_2 emissions by January 1, 2013, and meeting the final "Boiler MACT" standards for the control of PM_{10} emissions. Verso Androscoggin will be required by statute to further reduce SO_2 emissions from Power Boilers #1 and #2 beginning no later than January 1, 2018, by firing fuel oil that contains no more than 0.5% sulfur, by weight.

B. Waste Fuel Incinerator (WFI)

The WFI is rated at 480 MMBtu/hr on biomass and 240 MMBtu/hr on oil and began operation in 1976. While the WFI primarily fires biomass, fuel oils (#6 and #2 fuel oils, waste oil, and oily rags) can also be fired in the boiler. Sulfur dioxide and particulate matter emissions are controlled using a variable throat venturi scrubber and demister arrangement. When #6 fuel oil is fired in significant amounts, caustic is used in the wet scrubber to meet the applicable SO_2 emission limit. In addition, the WFI is equipped with a combustion system designed to ensure the optimal balance between control of NO_x and limitation of CO and VOC. NO_x, SO_2, and PM_{10} are the VIPs emitted by the WFI that require a BART analysis.

BART Evaluation

1. NO_x

Verso Androscoggin identified and evaluated selective catalytic reduction (SCR), low NO_x burners (LNB), selective non-catalytic reduction (SNCR), and combustion control methods (including an overfire air system and a flue gas recirculation system) as potential control technologies in the reduction of NO_x emissions from the WFI. SCR and SNCR control technologies were found to be technically feasible and so were evaluated further. Since the WFI primarily fires biomass on the grate, LNBs would not be effective for the majority of the time that the WFI operates, thus Verso Androscoggin felt LNBs did not warrant further evaluation. Combustion control methods were evaluated, however none were found to be viable control options for the WFI due to the limited NO_x removal potential (<15%), potential impacts to other pollutants and boiler equipment, and the limited amount of room available for the installation of control equipment. A summary of Verso Androscoggin's evaluation of technically feasible NO_x control technologies (SCR, SNCR, and FGR) is provided in the table below.

Control Technology	Control Effectiveness	Cost Effectiveness ($/ton removed)	Energy and Other Impacts	Greatest Visibility Improvement
SCR	90%	$4,676	Minor Impacts	0.3
SNCR	30%	$5,944	Minor Impacts	0.1
FGR	15%	$17,010	Minor Energy Impacts	<0.1

Although the use of SCR has the potential to reduce visibility impacts by a perceptible amount, Verso Androscoggin proposes that the cost effectiveness levels are not economically justifiable for any of the control technologies evaluated, including SCR. Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that additional control of NO_x emissions from the WFI cannot be justified as BART due to the capital costs ($3 million to more than $7.6 million) and cost effectiveness levels ($4,700 to more than $17,000 per ton of NO_x removed).

2. SO_2

Verso Androscoggin identified and evaluated low sulfur fuels, wet scrubbing, dry scrubbing, and semi-dry scrubbing as potential control technologies in the reduction of SO_2 emissions from the WFI. While using low sulfur fuels is technically feasible, Verso Androscoggin believes that it is not a practically feasible option for the WFI based on the limited amount of fuel oil typically used in the boiler (less than 10% of the annual fuel oil heat input capacity). The WFI currently uses a water based wet scrubbing system for PM control with the addition of caustic to meet SO_2 emission limits when firing #6 fuel oil in significant amounts. Dry and semi-dry scrubbing control technologies were not considered by Verso Androscoggin to be either practical or technically feasible for the WFI due to the fact that they could not find any applications of these technologies on any other biomass-fired grate type boilers like the WFI. Verso Androscoggin also believes that the cost of removing the existing wet scrubber and replacing it with a dry or semi-dry scrubbing system and a new ESP and/or fabric filter would be costly. A summary of Verso Androscoggin's evaluation of the only remaining viable SO_2 control technology (adding caustic to the existing wet scrubbing system) is provided in the table below.

Control Technology	Control Effectiveness	Cost Effectiveness ($/ton removed)	Energy and Other Impacts	Greatest Visibility Improvement
Addition of Caustic to Existing Wet Scrubber	50%	$21,800	Disposal Impacts	<0.1

The WFI has very low baseline SO_2 emissions (~50 tons per year) due to the inherent low sulfur content and alkalinity of the primary fuel (biomass) and the small amount of fuel oil used in the WFI. In addition, during the limited amount of time that #6 fuel oil is used to provide a significant portion of the heat input to the WFI, caustic is added to the wet scrubber to control SO_2 emissions. Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that additional control of SO_2 emissions from the WFI cannot be justified as BART due to the imperceptible effect it would have on visibility.

3. PM_{10}

Verso Androscoggin did not identify or evaluate potential control technologies for the reduction of PM_{10} emissions from the WFI. Verso Androscoggin cited language in 40 CFR Part 51, Appendix Y that identifies an exception to the BART analysis for PM and VOC sources subject to maximum achievable control technology (MACT) standards under Section 112 of the CAA. Specifically, Appendix Y states: "*We believe that, in many* *cases, it will be unlikely that States will identify emission controls more stringent than the MACT standards without identifying control options that would cost many thousands of dollars per ton. Unless there are new technologies subsequent to the MACT standards which would lead to cost-effective increases in the level of control, you may rely on the MACT standards for the purposes of BART.*". Based on this information, Verso Androscoggin proposed in its BART analysis that it was not necessary to expand the BART analysis for PM_{10} and therefore did not identify or evaluate potential control technologies for the additional reduction of PM_{10} emissions from the WFI. Verso Androscoggin proposes that the final "Boiler MACT" standards (40 CFR Part 63, Subpart DDDDD) that the boiler will be subject to will also represent BART for the WFI.

BART Determination

Based on the information supplied in the case-by-case BART analysis submitted by Verso Androscoggin, the Department finds that BART for the WFI includes continued operation of the boiler's combustion control systems for the control of NO_x emissions, continued use of the existing wet scrubber system for the control of SO_2 emissions, and meeting the final "Boiler MACT" standards for the control of PM_{10} emissions.

C. Recovery Boilers #1 & #2

Recovery Boilers #1 and #2 generate steam while regenerating chemicals used in the wood pulping process and began operation in 1965 and 1976, respectively. The Recovery Boilers (#1 and #2) have rated processing capacities of 2.50 and 3.44 million pounds per day of dry black liquor solids (MMlb/day of BLS), respectively. Inorganic material (smelt) from the bottoms of the recovery boilers is used to produce green liquor, which is a solution of sodium sulfide and sodium carbonate salts, when it is dissolved in water or weak wash in the Smelt Dissolving Tanks (#1 and #2). Although the recovery boilers primarily fire black liquor, they also fire small quantities of #2 and #6 fuel oils during startup, shutdown, and load stabilization conditions. The license currently limits the sulfur content of the fuel oils to no more than 0.5%, by weight. Particulate matter emissions from both recovery boilers are currently controlled using an electrostatic precipitator (ESP). NO_x, SO_2, and PM_{10} are the VIPs emitted by Recovery Boilers #1 and #2 that require a BART analysis.

BART Evaluation

1. NO_x

   Kraft recovery boilers are a unique type of combustion source that inherently produce low levels of NO_x emissions. Both Recovery Boilers (#1 and #2) operate with a reducing zone in the lower part of the boiler and an oxidizing zone in the region of the liquor spray guns designed to provide secondary and tertiary staged combustion zones to complete combustion of the black liquor and minimize NO_x emissions.

   Verso Androscoggin identified and evaluated selective catalytic reduction (SCR), low NO_x burners (LNB), selective non-catalytic reduction (SNCR), and combustion control methods (including the addition of a fourth level or quaternary air system and a flue gas recirculation system) as potential control technologies in the reduction of NO_x emissions from Recovery Boilers #1 and #2. SCR has not been applied or demonstrated successfully on any recovery boilers according to Verso Androscoggin and they do not know how the unique characteristics of recovery boiler exhaust gas constituents would react with a SCR catalyst, so they did not further evaluate this control technology. Verso Androscoggin's evaluation of LNB technology is that it is not feasible to use this technology in the firing of black liquor given its tar-like qualities and the method by which it is injected into the boiler and that it would have minimal results in the firing of fuel oils given the small amounts of fuel oils that are fired in the recovery boilers. Verso Androscoggin's evaluation of SNCR control technologies resulted in a finding that there have been no applications of this technology on recovery boilers in the United States for a variety of reasons, including safety concerns associated with the risk of a smelt/water explosion should boiler tube walls corrode and leak near urea injection points and risks associated with an ammonia handling system for the SNCR. Operational concerns associated with SNCR were found to include the potential formation of acidic sulfates that could result in corrosion and a catastrophic boiler tube failure. As a result of Verso Androscoggin's initial evaluation of SNCR, no further evaluation was conducted. Recovery Boilers #1 and #2 are currently designed and operated using low excess air combined with three levels of staged combustion to minimize NO_x emissions. Additional combustion control methods were evaluated by Verso Androscoggin, however none were not found to be viable control options for Recovery Boilers #1 and #2 due to the limited amount of space in the boilers to install a fourth or quaternary air system and due to the technical challenges re-circulating recovery boiler exhaust gases in a FGR system due to the unique characteristics of the exhaust gases.

Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that the existing combustion control methods represent BART and that additional control of NO_x emissions from Recovery Boilers #1 and #2 are not technically feasible and warrant no further evaluation.

2. SO_2

Verso Androscoggin has found that sulfur dioxide (SO_2) emissions from Recovery Boilers #1 and #2 are variable due to several factors including black liquor properties (e.g., sulfidity, sulfur to sodium ratio, heat value, and solids content), combustion air, liquor firing patterns, furnace design features, and type of startup fuel used. Both recovery boilers are low-odor design. Although each recovery boiler has the ability to utilize #2 fuel oil, #6 fuel oil, and used/waste oil for startup, shutdown, and load stabilizing conditions, fuel oil firing is not a typical operating scenario for the recovery boilers. SO_2 emission levels during fuel oil firing conditions are directly related to the sulfur content of the fuel oils. Black liquor solids (BLS) firing produces sodium fume, which effectively scrubs SO_2 emissions. Verso Androscoggin identified and evaluated wet scrubbing, dry scrubbing, and semi-dry scrubbing as potential control technologies in the reduction of SO_2 emissions from Recovery Boilers #1 and #2, however none of these technologies were found to have been applied to recovery boilers and Verso Androscoggin believes that operation of these technologies could negatively affect the operation of Recovery Boilers #1 and #2.

Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that each of the control technologies evaluated are not technically feasible and therefore were not evaluated further. Verso Androscoggin proposes that existing combustion controls represent BART for the control of SO_2 emissions from Recovery Boilers #1 and #2.

3. PM_{10}

Particulate matter (PM) emissions from Recovery Boilers #1 and #2 are currently controlled by an existing shared/common electrostatic precipitator (ESP). Verso Androscoggin did not identify or evaluate potential control technologies for the reduction of PM_{10} emissions from Recovery Boilers #1 and #2. Verso Androscoggin cited language in 40 CFR Part 51, Appendix Y that identifies an exception to the BART analysis for PM and VOC sources subject to maximum achievable control technology (MACT) standards under Section 112 of the CAA. Specifically, Appendix Y states: "*We believe that, in* *many cases, it will be unlikely that States will identify emission controls more stringent than the MACT standards without identifying control options that would cost many thousands of dollars per ton. Unless there are new technologies subsequent to the MACT standards which would lead to cost-effective increases in the level of control, you may rely on the MACT standards for the purposes of BART.*". Recovery Boilers #1 and #2 are subject to MACT standards under 40 CFR Part 63, Subpart MM (MACT II). Verso Androscoggin reviewed the RACT/BACT/LAER Clearinghouse (RBLC) and believes that the current control configuration is the most current control technology in use on recovery boilers and that there are no new technologies subsequent to the MACT standard that should be considered. Based on this information, Verso Androscoggin proposed in its BART analysis that it was not necessary to expand the BART analysis for PM_{10} and therefore did not identify or evaluate potential control technologies for the additional reduction of PM_{10} emissions from Recovery Boilers #1 and #2. Verso Androscoggin proposes that "MACT II" standards (40 CFR Part 63, Subpart MM) that the boilers are currently subject to represent BART for PM_{10} emissions from Recovery Boilers #1 and #2.

<u>BART Determination</u>
Based on the information supplied in the case-by-case BART analysis submitted by Verso Androscoggin, the Department finds that BART for Recovery Boilers #1 and #2 includes continued operation of the boiler's combustion control systems for the control of NO_x emissions, continued operation of Recovery Boiler #1 to control and minimize SO_2 emissions to comply with current SO_2 emission limits, operation of Recovery Boiler #2 to control and minimize SO_2 emissions to a new SO_2 emission limit of 150 ppmdv on a 30-day rolling average basis, and utilizing the existing ESP in meeting "MACT II" standards for the control of PM_{10} emissions.

D. <u>Smelt Dissolving Tanks #1 and #2</u>
Smelt Dissolving Tank #1 is rated at 2.50 MMlb/day of dry BLS and began operation in 1965. Smelt Dissolving Tank #2 is rated at 3.44 MMlb/day of dry BLS and began operation in 1975. Inorganic materials from the recovery boiler floors drain into Smelt Dissolving Tanks #1 and #2 as molten smelt. In the smelt dissolving tanks, the smelt is mixed with weak wash to form green liquor which is pumped to the causticizing area. Sulfur dioxide (SO_2) and particulate matter (PM_{10}) emissions from Smelt Dissolving Tank #1 are controlled with a dual-nozzle wet cyclonic scrubber which utilizes an alkaline scrubbing solution and was installed in 1983. Sulfur dioxide (SO_2) and particulate matter (PM_{10}) emissions from Smelt Dissolving Tank #2 are controlled with a dual-nozzle wet

cyclonic scrubber which utilizes an alkaline scrubbing solution and was installed in 1976. SO_2 and PM_{10} are the VIPs emitted by Smelt Dissolving Tanks #1 and #2 that require a BART analysis.

BART Evaluation

1. SO_2

   Verso Androscoggin has found that sulfur dioxide (SO_2) emissions from Smelt Dissolving Tanks #1 and #2 are dependent on how much sulfur carries over from the respective recovery boilers with the smelt. Controlled smelt-water explosions in the smelt dissolving tanks can create SO_2 as a result of the oxidation of the sulfur in the smelt. SO_2 emissions from both smelt dissolving tanks combined are very low at approximately 5 tons per year.

   Verso Androscoggin proposes that BART for SO_2 emissions from Smelt Dissolving Tanks #1 and #2 is no additional control based on the following:

   - SO_2 emissions from the smelt dissolving tanks during the BART baseline period were and are expected to continue to be extremely low (~5 TPY, combined);
   - The smelt dissolving tanks and associated scrubbers are designed and operated to minimize SO_2 emissions;
   - SO_2 emissions from the smelt dissolving tanks have a minimal impact on visibility (<0.1 deciviews); and
   - Additional control of SO_2 emissions from the smelt dissolving tanks would have a minimal impact on overall visibility.

2. PM_{10}

   Particulate matter (PM) emissions from Smelt Dissolving Tanks #1 and #2 are currently controlled by existing wet cyclonic scrubbers. Verso Androscoggin did not identify or evaluate other potential control technologies for the reduction of PM_{10} emissions from Smelt Dissolving Tanks #1 and #2. Verso Androscoggin cited language in 40 CFR Part 51, Appendix Y that identifies an exception to the BART analysis for PM sources subject to maximum achievable control technology (MACT) standards under Section 112 of the CAA. Specifically, Appendix Y states: "*We believe that, in many cases, it will be unlikely that States will identify emission controls more stringent than* *the MACT standards without identifying control options that would cost many thousands of dollars per ton. Unless there are new technologies subsequent to the MACT standards which would lead to cost-effective increases in the level of control, you may rely on the MACT standards for the purposes of BART.*". Smelt Dissolving Tanks #1 and #2 are subject to MACT standards under 40 CFR Part 63, Subpart MM (MACT II). Verso Androscoggin reviewed the RACT/BACT/LAER Clearinghouse (RBLC) and believes that the current control configuration is the most current control technology in use on smelt dissolving tanks and that there are no new technologies subsequent to the MACT standard that should be considered. Based on this information, Verso Androscoggin proposed in its BART analysis that it was not necessary to expand the BART analysis for PM_{10} and therefore did not identify or evaluate potential control technologies for the additional reduction of PM_{10} emissions from Smelt Dissolving Tanks #1 and #2. Verso Androscoggin proposes that "MACT II" standards (40 CFR Part 63, Subpart MM) that the smelt dissolving tanks are currently subject to represent BART for PM_{10} emissions from Smelt Dissolving Tanks #1 and #2.

<u>BART Determination</u>
Based on the information supplied in the case-by-case BART analysis submitted by Verso Androscoggin, the Department finds that BART for Smelt Dissolving Tanks #1 and #2 includes continued operation of the smelt dissolving tanks and associated wet cyclonic scrubber systems to control and minimize SO_2 and PM_{10} emissions and meeting "MACT II" standards for PM_{10} emissions.

E. <u>"A" & "B" Lime Kilns</u>
The "A" and "B" Lime Kilns process lime mud (calcium carbonate) from the causticizing area to regenerate calcium oxide (CaO). Inside the lime kilns, the lime mud is dried and heated to a high temperature where the lime mud is converted to lime (calcium oxide (CaO)). "A" and "B" Lime Kilns are each rated at an operating rate of 248 tons of calcium oxide (CaO) per day and a heat input of 72 MMBtu/hr and began operation in 1965 and 1975, respectively. The lime kilns are licensed to fire #6 fuel oil, #2 fuel oil, propane, and used/waste oil. The license currently limits the sulfur content of the fuel oil to no more than 1.8%, by weight. The A and B Lime Kilns also serve as an incineration device (control device) for select sources of low volume high concentration (LVHC) non-condensable gases (NCG) from pulping operations at the mill. Particulate matter (PM_{10}) emissions are controlled from the "A" and "B" Lime Kilns using a fixed throat venturi scrubber. NO_x, SO_2, and PM_{10} are the VIPs emitted by the "A" and "B" Lime Kilns that require a BART analysis.

BART Evaluation

1. NO_x

Verso Androscoggin identified and evaluated selective catalytic reduction (SCR), low NO_x burners (LNB), and selective non-catalytic reduction (SNCR) as potential control technologies in the reduction of NO_x emissions from the "A" and "B" Lime Kilns. Verso Androscoggin's evaluation of SCR and SNCR as potential NO_x control technologies revealed that they have not been installed on any lime kilns in the pulp and paper industry and were also found to be technically infeasible and so were not evaluated further. Verso Androscoggin's research with respect to lime kilns and LNB technology revealed that the technology is actually a combination of passive combustion control measures used to minimize NO_x formation from primarily thermal NO_x and to a lesser extent fuel NO_x. These combustion control measures include careful design of the fuel feed system in order to ensure proper mixing of the fuel with air and burner "tuning" or optimization which impacts fuel burning efficiency and overall flame length. Verso Androscoggin already incorporates burner "tuning" in the operation and maintenance of the "A" and "B" Lime Kilns to optimize the relationship between NO_x emissions and operating efficiency.

Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that the current use of LNB (referred to as combustion control measures on lime kilns) represents BART for control of NO_x emissions from "A" and "B" Lime Kilns and that no additional level of control is technically feasible. Verso Androscoggin also notes in their BART analysis that existing NO_x emissions from the "A" and "B" Lime Kilns have a minimal impact on visibility (<0.1 deciviews) and that additional control of NO_x emissions would have a minimal impact on the overall improvement to visibility.

2. SO_2

Verso Androscoggin has found that a significant portion of the sulfur dioxide (SO_2) formed during the combustion process in the lime kilns is removed as the regenerated quicklime in the kilns functions as a scrubbing agent. In addition, the NCG collection system is equipped with a scrubber that uses white liquor (sodium hydroxide (NaOH)) and thus the sulfur loading from the NCGs is minimized. SO_2 emissions from both lime kilns combined are very low at less than 4 tons per year primarily due to the alkalinity of the lime.

Verso Androscoggin proposes that BART for SO_2 emissions from the "A" and "B" Lime Kilns is no additional control based on the following:

- SO_2 emissions from the lime kilns during the BART baseline period were and are expected to continue to be extremely low (<4 TPY, combined);
- There are no control technologies available for lime kilns that are more cost effective than the inherent scrubbing that occurs for SO_2 due to the alkalinity of the lime in the process;
- SO_2 emissions from the smelt dissolving tanks have a minimal impact on visibility (<0.1 deciviews); and
- Additional control of SO_2 emissions from the lime kilns would have a minimal impact on overall visibility.

3. PM_{10}

Particulate matter (PM_{10}) emissions from the "A" and "B" Lime Kilns consist primarily of dust entrained from the combustion section of the kilns. This dust consists of sodium salts, calcium carbonate, and calcium oxide. The sodium salts result primarily from sodium compounds that are retained in the lime mud due to inefficient washing, while the calcium particulates result principally from entrainment. Thus, the PM_{10} emissions are affected by the efficiency of the mud washing system and the gas velocity and turbulence in the kilns. PM_{10} emissions are currently controlled by existing venturi scrubbers. Verso Androscoggin cited language in 40 CFR Part 51, Appendix Y that identifies an exception to the BART analysis for PM sources subject to maximum achievable control technology (MACT) standards under Section 112 of the CAA. Specifically, Appendix Y states: "*We believe that, in many cases, it will be unlikely that States will identify emission controls more stringent than the MACT standards without identifying control options that would cost many thousands of dollars per ton. Unless there are new technologies subsequent to the MACT standards which would lead to cost-effective increases in the level of control, you may rely on the MACT standards for the purposes of BART.*". "A" and "B" Lime Kilns are subject to MACT standards under 40 CFR Part 63, Subpart MM (MACT II). Verso Androscoggin reviewed the RACT/BACT/LAER Clearinghouse (RBLC) and believes that there are two control technologies that represent the most stringent PM control (ESPs and venturi scrubbers). Both ESPs and venturi scrubbers have been used to control PM emissions from lime kilns and both are capable of a high level of control. Verso Androscoggin proposes that use of the existing venturi scrubbers to control PM_{10} emissions from the "A" and "B" represents BART for the following reasons:

- The existing venturi scrubbers maintain compliance with the MACT II PM emission limits;
- The replacement of the existing venturi scrubbers with dry ESPs could increase SO_2 emissions from the lime kilns when compared to use of the venturi scrubbers;
- The replacement of the existing venturi scrubbers with wet ESPs would result in high capital costs ($1.5 million per kiln); and
- Visibility impacts from the lime kilns are minimal and installation of additional control would result in inconsequential improvement in visibility.

BART Determination

Based on the information supplied in the case-by-case BART analysis submitted by Verso Androscoggin, the Department finds that BART for the "A" and "B" Lime Kilns includes continued use of combustion control measures including burner "tuning" to control NO_x emissions, continued operation of the lime kilns and associated venturi scrubber systems to control and minimize SO_2 and PM_{10} emissions, and continued compliance with the "MACT II" standards for PM_{10} emissions.

F. Flash Dryer

The Flash Dryer is used to dry pulp for resale or for storage and future use on one of Verso Androscoggin's paper machines. The Flash Dryer has a rated heat input capacity of 84 MMBtu/hr and began operation in 1964. The flash dryer is licensed to fire #2 fuel oil, which contains a maximum sulfur content of 0.5% as defined by ASTM D396 standards. Particulate matter emissions are controlled using a wet shower system and SO_2 emissions are limited through the firing of #2 fuel oil. NO_x, SO_2, and PM_{10} are the VIPs emitted by the Flash Dryer that require a BART analysis. Verso Androscoggin noted in its BART analysis that the Flash Dryer has not operated since 2006 and so has not contributed to any visibility impacts in several years.

BART Evaluation

1. NO_x
   The Flash Dryer is not equipped with any NO_x control equipment. NO_x emissions from the Flash Dryer are primarily generated from the nitrogen component in the fuel oil. Verso Androscoggin currently uses good maintenance practices to minimize NO_x emissions from the Flash Dryer. Verso Androscoggin's investigation of conventional NO_x combustion controls (e.g., LNB, OFA, and FGR) lead to findings that they are either unavailable for installation on the Flash Dryer or are not feasible for a combustion source as small as the Flash Dryer.

   Based on Verso Androscoggin's identification and evaluation of control technology options, they propose that no additional level of control is technically feasible as BART.

2. SO_2
   The Flash Dryer is limited to firing #2 fuel oil with a maximum sulfur content of 0.5%, by weight and so has relatively low SO_2 emissions. Although Verso Androscoggin could replace the use of #2 fuel oil with lower sulfur containing fuels such as low sulfur (0.05%) diesel fuel or natural gas, the Flash Dryer is predicted to have peak visibility impacts of 0.1 deciviews or less.

   Based on Verso Androscoggin's identification and evaluation of SO_2 control technology options for the Flash Dryer, they propose that no additional level of control is representative of BART.

3. PM_{10}
   Particulate matter (PM_{10}) emissions from the Flash Dryer are currently controlled by the use of a wet shower system. Verso Androscoggin proposes that the application of add-on controls and the use of cleaner fuels are not practical considerations for controlling PM emissions from the Flash Dryers and that with potential visibility impacts from the Flash Dryer being extremely low, any emission reductions would have an inconsequential impact on visibility improvement.

BART Determination

Based on the information supplied in the case-by-case BART analysis submitted by Verso Androscoggin, the Department finds that BART for the Flash Dryer includes continued use of operating and maintenance measures including "tuning" of burners to control NO_x emissions, continued use of #2 fuel oil in the dryer to control and minimize SO_2 emissions, and continued operation and maintenance of the wet shower system to control and minimize PM_{10} emissions.

G. Implementation Dates

The BART determinations for all pollutants from all of the BART eligible emission units except for SO_2 emissions from Power Boilers #1 and #2 are currently required by Verso Androscoggin's existing Air Emission License A-203-70-A-I. No further implementation is required for these determinations.

The BART implementation date for Recovery Boiler No. 2's new SO2 ppm limit is January 1, 2013.

The BART determination option selected by Verso Androscoggin to reduce SO_2 emissions from Power Boilers #1 and #2 shall be implemented no later than January 1, 2013.

ORDER

The Department hereby grants Air Emission License A-203-77-11-M subject to the conditions found in Verso Androscoggin's existing Air Emission License A-203-70-A-I except where superseded by any subsequent amendments and the following conditions:

Severability. The invalidity or unenforceability of any provision, or part thereof, of this License shall not affect the remainder of the provision or any other provisions. This License shall be construed and enforced in all respects as if such invalid or unenforceable provision or part thereof had been omitted.

Air emission license A-203-77-3-A (issued October 31, 2008) is no longer applicable and shall be replaced with the BART requirements in this air emission license.

BART SPECIFIC CONDITIONS

(1) **Power Boilers #1 and #2**

Verso Androscoggin shall reduce SO_2 emissions from Power Boilers #1 and #2 beginning no later than January 1, 2013 by firing fuel oil that contains no more

than 0.7% sulfur, by weight and beginning no later than January 1, 2018, by firing fuel oil that contains no more than 0.5% sulfur, by weight.
[06-096 CMR 140, BART and 38 M.R.S.A § 603-A]

(2) **Recovery Boiler #2**
Verso Androscoggin shall comply with a SO_2 emission limit of 150 ppmdv, corrected to 8% oxygen, on a 30-day rolling average basis from Recovery Boiler #2 beginning no later than January 1, 2013.
[06-096 CMR 140, BART]

(3) **Equipment Operating & Maintenance Requirement**
Per 40 CFR Part 51 §51.308(e)(1)(v), the facility shall maintain the control equipment required by BART and establish procedures to ensure such equipment is properly operated and maintained. This condition shall go into effect 5 years from the date of EPA's approval of Maine's Regional Haze SIP submittal.
[40 CFR Part 51 §51.308(e)(1)(v)]

DONE AND DATED IN AUGUSTA, MAINE THIS 2nd DAY OF November 2010.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: James P. Brooks
BETH NAGUSKY, ACTING COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date filed with the Board of Environmental Protection: ______________________

This Order prepared by Eric Kennedy, Bureau of Air Quality.

FILED
NOV - 3 2010
BOARD OF ENVIRONMENTAL PROT.
STATE OF MAINE