STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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S.D. Warren Company
Somerset County
Skowhegan, Maine
A-19-77-5-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 40 CFR Part 51, 38 M.R.S.A, § 344, § 582, § 590 and § 603, the Department finds the following facts:

I. REGISTRATION

A. Introduction

FACILITY	S. D. Warren Company (SDW)
LICENSE TYPE	BART Determination
NAICS CODES	322121
NATURE OF BUSINESS	Pulp & Paper Mill
FACILITY LOCATION	Skowhegan, Maine
DETERMINATION ISSUANCE DATE	November 2, 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 from units that fall under criteria #2.

Per 38 MRSA §603-A, sub-§8; for those BART eligible units determined by the Department to require additional sulfur air pollution controls to improve visibility, the controls must:

1. Be installed and operational no later than January 1, 2013; and
2. Either:
    a. Require the use of oil having 1% or less of 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, Section 51, Appendix Y (2006).

To determine the appropriate BART for a given unit, the following five step process is used:

1. Identify all available retrofit control technologies

2. Eliminate technically infeasible options

3. Evaluate control effectiveness of remaining control technologies

4. Evaluate impacts and document results

5. Evaluate visibility impacts

40 CFR 51, Appendix Y states that if it is found that a BART source has controls already in place which are the most stringent available, that as long as these controls are made federally enforceable, the remainder of the analysis may be skipped, including the visibility analysis in step 5.

Appendix Y also allows States to streamline the BART analysis for VOC and PM sources subject to Maximum Achievable Control Technology (MACT) standards. Unless there are new technologies subsequent to the MACT standard which would lead to cost-effective increases in the level of control, States may rely on the MACT standards for purposes of BART.

SDW was issued an initial BART determination on November 20, 2008 (A-19-77-1-A) which will be replaced by this determination.

B. Emission Equipment

The following emission units are determined to be BART eligible under 40 CFR, Section 51:

CAA Source Specific Category	Emission Unit	Unit Capacity	Date of Start-up
#3, Kraft Mill	Recovery Boiler	5.5 MMlbs BLS/day	1976
	Smelt Tanks #1 & #2	N/A	1976
	Lime Kiln	92.1 MMBtu/hr	1976

II. EMISSION UNITS AND CONTROL EQUIPMENT DESCRIPTION

A. Recovery Boiler

The Recovery Boiler was installed in 1975-1976. It is used to recover chemicals from spent pulping liquors and to produce steam for mill operations. The Recovery Boiler is licensed to fire black liquor (spent pulping liquor), residual (#6) fuel oil, distillate (#2) fuel oil, and used oil. The Recovery Boiler is also licensed to combust low volume-high concentration (LVHC) and high volume-low concentration (HVLC) gases produced at various points in the pulping process.

The current black liquor firing rate is 5.1 million pounds per day of black liquor solids (BLS). The licensed maximum black liquor firing rate will become 5.5 million pounds per day of BLS after the boiler upgrade project is completed (scheduled for October 2010).

The Recovery Boiler is subject to MACT standards for Chemical Recovery Combustion Sources at Kraft Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (40 CFR 63, Subpart MM).

BART Analysis

1. PM

SDW currently operates a three-chamber electrostatic precipitator (ESP) on the Recovery Boiler.

SDW identified the following available retrofit technologies for control of PM from Kraft mill recovery boilers: electrostatic precipitators, wet scrubbers, and fabric filters.

Wet scrubbers were eliminated as a feasible control strategy because the ESP currently installed is capable of a greater degree of emissions control at a lower operating cost.

Fabric filters are generally considered to be equivalent to ESPs in regards to pollution control. However, fabric filters have not been applied to recovery boilers at Kraft mills and have been eliminated as a feasible control alternative.

Since the controls already in place are considered the most stringent available, and these controls are already required by a federally enforceable condition, SDW was not required to perform the remaining steps of the control analysis.

SDW's Part 70 license contains a PM limit of 0.038 gr/dscf established pursuant to MACT standards for Chemical Recovery Combustion Sources at Kraft Pulp Mills (40 CFR 63.862(a)(ii)). Per the Best Available Control Technology (BACT) analysis included in New Source Review air emission license A-19-77-2-A, upon completion of the Recovery Boiler upgrade project, PM emissions shall be limited to 0.030 gr/dscf when all three ESP chambers are online and 0.038 gr/dscf when less than three chambers are online.

Therefore, the Department has determined that BART for PM for the Recovery Boiler is the use of the ESP at the currently established license limits.

2. SO_2

SDW's Recovery Boiler is currently equipped with a three-level staged combustion air control system and, after the upgrade project, will be equipped with a four-level staged combustion air system.

SDW identified the following available retrofit technologies for control of SO_2 from Kraft mill recovery boilers: staged combustion systems and wet scrubbers.

SO_2 emissions from recovery boilers occur due to the volatilization and subsequent oxidation of sulfur compounds that are present in the black liquor. Proper operation of the recovery boiler maximizes the conversion of sulfur compounds in the liquor to the principal constituents of the pulping chemicals. This occurs through capture of these sulfur compounds in the combustion

zone of the boiler by sodium fume released from the smelt bed. Consequently, proper combustion control achieved through the use of staged combustion air systems results in effective control of SO_2 emissions.

The only available alternative for SO_2 emission control are wet scrubbers. However, recovery boilers with a properly operated staged air combustion system operate at much lower concentrations of SO_2 in the flue gas than emission units to which wet scrubbers are routinely applied.

Since the controls already in place are considered the most stringent available, and these controls are already required by a federally enforceable condition, SDW was not required to perform the remaining steps of the control analysis.

By January 1, 2013, SO_2 emissions shall be limited to 100 ppmdv at 8% O_2 and 1.92 lbs/MMBtu when firing black liquor on a 30 day average basis.

Therefore, the Department has determined that BART for SO_2 for the Recovery Boiler is the use of a staged combustion system at the existing Title V license limits and the above additional license limit for ppm.

3. NO_x

SDW's Recovery Boiler is currently equipped with a three-level staged combustion air control system and, after the upgrade project, will be equipped with a four-level staged combustion air system.

SDW identified the following available retrofit technologies for control of NO_x from Kraft mill recovery boilers: staged combustion systems, Selective Non-Catalytic Reduction (SNCR), Selective Catalytic Reduction (SCR), Low NO_x Burners, Flue Gas Recirculation, and Low-Temperature Oxidation.

Emission controls which have been demonstrated on conventional steam boilers, including SNCR, SCR, flue gas recirculation, and low NO_x burners, cannot be applied to, or have not been demonstrated to be feasible on, Kraft mill recovery boilers.

There has been some small-scale work done on "low-temperature oxidation" where pure oxygen is injected into the evaporation process to drive ammonia from the black liquor. However, one of the world's largest Recovery Boiler manufacturers has advised SDW that they are not aware of any commercial size case where this technology has been used. Therefore, this technology is not considered technically-feasible.

There are no technically-feasible alternatives for control of NO_x emissions from recovery boilers other than proper operation of the boiler and the staged combustion control system.

Since the controls already in place are considered the most stringent available, and these controls are already required by a federally enforceable condition, SDW was not required to perform the remaining steps of the control analysis.

SDW's Part 70 license contains a NO_x limit of 196 ppmdv at 8% O_2. Per the BACT analysis included in New Source Review air emission license A-19-77-2-A, upon completion of the Recovery Boiler upgrade project, NO_x emissions shall be limited to 120 ppmdv at 8% O_2 when firing only black liquor on a 30 day average basis.

Therefore, the Department has determined that BART for NO_x for the Recovery Boiler is the use of a staged combustion system at the currently established license limits.

B. Smelt Tanks #1 & #2

SDW operates two smelt tanks which were installed in 1975-1976. The smelt tanks operate in conjunction with the Recovery Boiler. Recovered sodium-based pulping chemicals, in the form of molten salts, are discharged from the bottom of the Recovery Boiler into the smelt tanks, where they are mixed with a water/caustic solution to form green liquor which is eventually used in the pulp mill digestion process.

The smelt tanks are subject to MACT standards for Chemical Recovery Combustion Sources at Kraft Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (40 CFR 63, Subpart MM).

BART Analysis

1. PM

SDW currently operates a wetted fan scrubber on each of the smelt tanks for control of particulate emissions. The scrubbing media for the scrubbers is either water or weak wash from the white liquor clarification system.

SDW identified the following available retrofit technologies for control of PM from smelt tanks: electrostatic precipitators, wet scrubbers, fabric filters, and mist eliminators.

The most common PM emission control system employed on smelt tanks is wet scrubbers. The use of wet scrubbers also provides a secondary environmental benefit by controlling reduced sulfur compound emissions.

The high moisture content of the smelt tank exhaust gases makes dry PM control systems, including fabric filters and dry ESPs, technically infeasible on this type of emission unit.

The only remaining control technology, mist eliminators, provide a lower degree of PM emission control than the use of wet scrubbers.

Since the controls already in place are considered the most stringent available, and these controls are already required by a federally enforceable condition, SDW was not required to perform the remaining steps of the control analysis.

SDW's Part 70 license contains a PM limit of 0.2 lb/ton BLS established pursuant to MACT standards for Chemical Recovery Combustion Sources at Kraft Pulp Mills (40 CFR 63.862(a)(1)(ii)).

Therefore, the Department has determined that BART for PM for Smelt Tanks #1 and #2 is the use of wet scrubbers at the currently established license limits.

2. SO_2 and NO_x

Since no combustion takes place within smelt tanks, SO_2 is not generated within the emission unit. Similarly, the operation of the smelt tanks themselves do not generate NO_x emissions.

SDW was not able to identify any retrofit control technologies applicable to the control of SO_2 or NO_x emissions from smelt tanks.

Therefore, the Department has determined that there are no applicable additional requirements due to the BART analysis for SO_2 and NO_x for Smelt Tanks #1 and #2.

C. Lime Kiln

The Lime Kiln was installed in 1975-1976. It is used to convert lime mud (principally calcium carbonate) to lime (calcium oxide). Fuel is fired in the Lime Kiln to generate the heat that is needed to convert lime mud to lime. The Lime Kiln is licensed to fire residual (#6) fuel oil, distillate (#2) fuel oil, used oil, and propane. The Lime Kiln is also licensed to combust LVHC gases and foul condensate streams.

The Lime Kiln is subject to MACT standards for Chemical Recovery Combustion Sources at Kraft Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills (40 CFR 63, Subpart MM).

BART Analysis

1. PM

   Particulate emissions from the Lime Kiln are currently controlled by a variable throat venturi scrubber system followed by a cyclone separator.

   SDW identified the following available retrofit technologies for control of PM from lime kilns: electrostatic precipitators, wet scrubbers, and fabric filters.

   Fabric filters have never been applied to Kraft pulp mill lime kilns. They are generally deemed to be technically infeasible on lime kilns.

   ESPs provide a greater degree of particulate matter control than venturi scrubbers. However, the possible annual reduction in emissions to be gained by replacing the existing scrubber with an ESP is relatively small (estimated at under 40 tons/year).

   Additionally, the scrubber also helps control emissions of SO_2 and reduced sulfur compounds. This beneficial removal of other pollutants is not available to lime kilns equipped with ESPs. Consequently, replacement of the existing scrubber with an ESP would be expected to result in higher TRS and SO_2 emissions from the Lime Kiln.

   With respect to any possible improvement in visibility impacts associated with retrofitting an ESP on the Lime Kiln, the modeling result for current PM emissions from the Lime Kiln was 0.0463 dv, well below the State's de minimis level of 0.1 dv. Therefore, any additional emission reductions that might be achieved by retrofitting the Lime Kiln with an ESP could only result in visibility impacts that would similarly be de minimus.

SDW's Part 70 license contains a PM limit of 0.10 gr/dscf established pursuant to MACT standards for Chemical Recovery Combustion Sources at Kraft Pulp Mills (40 CFR 63.862(a)(ii)).

Therefore, the Department has determined that BART for PM for the Lime Kiln is the use of the venturi scrubber at the currently established license limits.

2. SO_2

SO_2 forms in the Lime Kiln from either the combustion of sulfur in the fuel or combustion of TRS compounds in the LVHC gases. Currently emissions of SO_2 are controlled by using a combination of the inherent sulfur removal provided by operation of the kiln itself (i.e. extensive contact between burner exhaust gases and the calcium compounds in the kiln) enhanced through the use of a venturi wet scrubber (post-combustion).

SDW also uses a caustic scrubber (pre-combustion) on the LVHC gases fired in the boiler. Firing of LVHC gases in the Lime Kiln without pre-treatment with the caustic scrubber, causes formation of rings within the Lime Kiln leading to excessive down-time of the equipment.

Emissions of SO_2 from the Lime Kiln can vary significantly based on the amount of LVHC gases being fired and whether or not the caustic scrubber is in operation.

SDW identified the following available retrofit technologies for control of SO_2 from lime kilns: lime kiln operation and wet scrubbers.

Since the controls already in place are considered the most stringent available, and these controls are already required by a federally enforceable condition, SDW was not required to perform the remaining steps of the control analysis.

Therefore, the Department has determined that BART for SO_2 for the Lime Kiln is the use of the current operating practices in conjunction with the venturi wet scrubber with a federally enforceable license limit of 100 ton/year of SO_2.

3. NO_x

NO_x emissions from the Lime Kiln are currently controlled by good combustion controls and operation of the unit's combustion air system.

SDW identified the following available retrofit technologies for control of NO_x from lime kilns: Combustion Air Systems controls, SNCR, SCR, Low NO_x Burners, Flue Gas Recirculation.

There are no technically feasible alternatives for control of NO_x from lime kilns beyond the measures currently employed. Low NO_x burner systems, which seek to reduce thermal NO_x formation through either combustion air or fuel staging, are not possible on the lime kilns because such systems negatively impact the efficiency, energy use, and calcining capacity of a lime kiln.

Post combustion controls, such as SCR and SNCR, are not feasible for lime kilns. The temperature window necessary for the SNCR process (1500 – 2000 °F) is unavailable in a Kraft lime kiln. The high PM load at the exit of the kiln precludes the placement of the catalyst grid needed for the SCR process upstream of the PM control device, and the requisite temperature window required for this process (550 – 750 °F) is not available downstream of the PM control system.

Since the controls already in place are considered the most stringent available, and these controls are already required by a federally enforceable condition, SDW was not required to perform the remaining steps of the control analysis.

SDW's Part 70 license contains a NO_x limit of 120 ppmvw at 10% O_2.

Therefore, the Department has determined that BART for NO_x for the Lime Kiln is the use of a staged combustion system at the currently established license limits.

C. Implementation Dates

The BART control equipment determinations for the Recovery Boiler, the Smelt Tanks #1 & #2, and the Lime Kiln are currently required in existing Air Emission Licenses. Most of the emission limits are also included in the existing Air Emission Licenses issued to the facility except for the SO_2 ppm for the recovery boiler when firing black liquor and the tons per year limit on the lime kiln which are both included in the order section of this license determination.

ORDER

The Department hereby grants the BART Air Emission License Determination A-19-77-5-M subject to 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-19-77-1-A (issued November 20, 2008) is no longer applicable and shall be replaced with the BART requirements in this air emission license.

The following Federally Enforceable License Conditions shall take effect as of 1/1/2013:

(1) **Recovery Boiler**

Emissions from the Recovery Boiler shall not exceed the following when firing only black liquor:

Pollutant	ppmdv @ 8% O_2	Origin	Enforceability
SO_2	100 PPM on a 30 day rolling average	40 CFR 51, BART	Federally Enforceable

(2) **Lime Kiln**

SDW shall not exceed an SO_2 emission rate of 100 tons/year from the Lime Kiln, based on a 12-month rolling total. Compliance shall be based on site specific emission factors which have been approved by MEDEP. [40 CFR 51, BART]

(3) Per 40 CFR Part 51 §51.308(e)(1)(v), SDW 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. [Per 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 for
BETH NAGUSKY, ACTING COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date filed with the Board of Environmental Protection:

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