Verso Androscoggin LLC **Franklin County** **Jay, Maine** **A-203-77-4-A**	**Departmental** **Findings of Fact and Order** **New Source Review** **License**

After review of the air emissions license application, 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 and § 590, the Department finds the following facts:

I. REGISTRATION

A. Introduction

FACILITY	Verso Androscoggin LLC
LICENSE TYPE	06-096 CMR 115, Minor Modification
NAICS CODES	322121
NATURE OF BUSINESS	Pulp and Paper Mill
FACILITY LOCATION	Jay, Maine
NSR LICENSE ISSUANCE DATE	April 22, 2008

B. Amendment Description

Verso Androscoggin LLC (Verso Androscoggin) of Jay, Maine has applied for a New Source Review (NSR) Air Emission License under *Major and Minor Source Air Emission License Regulations*, 06-096 CMR 115. This license addresses two proposed projects both involving changes to Recovery Boiler #1 (RB#1) planned to be completed during this year's annual outage scheduled for May of 2008. The two projects are described in more detail below.

1. One project encompasses repair and replacement work to be performed in the upper furnace area of RB#1. The proposed work includes:
   - Replacing the upper furnace walls with a new membrane design in an effort to reduce the accumulation of corrosive elements behind the boiler tube structure;
   - Replacing an estimated 145 boiler tubes in the front wall area of the upper furnace;

- Replacing an estimated 145 boiler tubes in the rear wall area of the upper furnace; and
- Replacing an estimated 137 boiler tubes in the side wall areas of the upper furnace.

The purpose of this project is to improve the physical and operational safety of the boiler by reducing steam/water intrusion, to minimize the impact and risk associated with escalating boiler tube failures, and to reduce the amount of downtime currently experienced on the unit due to boiler tube leaks and failures.

These proposed changes have been determined to be a physical change to RB#1 and will be treated as a modification to RB#1. The changes will result in no change in the maximum design capacity of RB#1, will result in no change in either actual or license allowed short term emissions, and will result in no change in license allowed annual emissions for either RB#1 or the facility. The changes are projected to result in six (6) days per year of additional operating time for RB#1 due to the reduction in unit downtime experienced over recent years as a direct result of boiler tube leaks and failures.

2. The second project involves replacement of the oil burner igniters and flame sensor system on RB#1. This proposed work includes:

   - Removing the existing flame proving sensors, igniters, light oil piping, field devices, and related cable and conduit from the burner fronts of all eight (8) burners;
   - Overhauling and relocating the fuel safety shut-off valves (SSVs) to a location on the outer edge of the burner catwalk (a much cooler location);
   - Installing new retracting high energy spark igniters at each burner;
   - Installing new flame proving sensors at each burner to provide reliable flame proving capability;
   - Installing new burner control enclosures for each of the eight (8) burners;
   - Replacing the conduit and cabling from the burner control enclosures to the new igniters, extend/retract controls, flame sensors, the overhauled SSVs, and field devices; and
   - Reconnecting the burner controls to the burner management PLC and completing any programming changes required for the new burner igniters and flame sensor system.

This work will replace outdated burner ignition and flame scanner technology. The existing ignition/flame scanner cards are not rated for the temperatures that are being experienced on the boiler's burner deck, resulting in a very high rate of failure. In addition, the scanner cards are obsolete and no longer produced. The new ignition system will remove the light oil pre-ignition system, and therefore, reduce the complexity of lighting the burners. These changes are expected to improve the overall reliability of RB#1.

These proposed changes have been determined to be a physical change to RB#1 and will be treated as a modification to RB#1. The changes will result in no change in the maximum design capacity of RB#1, will result in no change in either actual or license allowed short term emissions, and will result in no change in license allowed annual emissions for either RB#1 or the facility. The changes are projected to result in the elimination of an estimated 32 hours per year of unit downtime currently experienced as a result of poor reliability from the existing oil burner igniter equipment and associated flame scanning system.

Under federal New Source Performance Standards (NSPS) provisions found in 40 CFR Part 60 and Maximum Achievable Control Technology (MACT) provisions found in 40 CFR Part 63, reconstruction means "the replacement of components of an existing facility or affected source to such an extent that: (1) The fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable, entirely new facility or a comparable new source; and (2) it is technologically and economically feasible to meet the applicable standards set forth in this part."
The estimated cost of the two projects combined is $15.4 million dollars. The cost of an entirely new recovery boiler is estimated to be $130 million dollars, thus the proposed project cost is less than 12 percent of the cost of a new comparable recovery boiler. Because the fixed capital cost of these projects does not exceed 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, this project does not meet the definition of "reconstruction" as defined either in 40 CFR Part 60.15 (NSPS provisions) or in 40 CFR Part 63.2 (MACT provisions).

C. Emission Unit Description

The following emission unit is addressed in this air emission license amendment:

Process Equipment

Emission Unit	Maximum Capacity (MMBtu/hr)	Maximum Processing Rate (MMlb of BLS/day)	Fuel Type, % sulfur	Stack #
RB#1	315	2.5	Black liquor & fuel oils; 0.5% for fuel oils	RB#1 & RB#2 stack

Recovery Boiler #1 (RB#1) Background Information

RB#1 was manufactured by Combustion Engineering with a maximum process rate of 2.50 MMlb dry Black Liquor Solids (BLS) per day. It was installed at the facility in 1965 and converted to a low-odor design in 1985. The conversion of RB#1 in 1985 did not result in an emission increase on a lb/hr basis nor did the total cost of the project exceeded 50% of the fixed capital projected cost for a comparable new recovery boiler.

RB#1 is licensed to fire black liquor and fuel oil (including #6 fuel oil, specification waste oil, and off-specification waste oil). The fuel oil fired is allowed to contain a maximum sulfur content of 0.5%, by weight and may be used as startup/supplemental fuel. RB#1 has a maximum design heat input capacity of 315 MMBtu/hr. Flue gas emissions from RB#1 are controlled by the operation of an electrostatic precipitator (ESP). The ESP is a rigid frame, dry bottom design precipitator powered by transformer rectifier (TR) sets. The ESP has the design capacity to control emissions from both recovery boilers (RB#1 and RB#2) located at the facility. Compliance with emission limits has been demonstrated while operating with one chamber, while the other chamber is down for repairs. Both recovery boilers exhaust through a common 240 foot above ground level (AGL) stack.

Emissions of total reduced sulfur compounds (TRS) from RB#1 are controlled in accordance with *Total Reduced Sulfur Control from Kraft Pulp Mills*, 06-096 CMR 124. Compliance with the TRS emission limit is demonstrated through the operation of a continuous emission monitoring system (CEMS) positioned downstream of the control devices to measure TRS concentration and percent O_2 in the emission stream.

RB#1 is not an electric utility steam generating unit and therefore is not subject to 40 CFR Part 60, Subpart Da *Standards of Performance for Electric Utility Steam Generating Units for Which Construction is Commenced After September 18,*

1978. RB#1 is also not subject to 40 CFR Part 60, Subpart D *Standards of Performance for Fossil-Fuel-Fired Steam Generators for Which Construction Is Commenced After August 17, 1971* because RB#1's annual capacity factor for oil is less than 10 percent.

RB#1 is subject to 40 CFR Part 63, Subpart MM *National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills* and the *General Provisions* contained in 40 CFR Part 63, Subpart A.

RB#1 is not subject to 40 CFR Part 63, Subpart DDDDD *National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters* (Boiler MACT standards) because units covered by 40 CFR Part 63 Subpart MM *National Emission Standards for Hazardous Air Pollutants for Chemical Recovery Combustion Sources at Kraft, Soda, Sulfite, and Stand-Alone Semichemical Pulp Mills* are not subject to the Boiler MACT standards.

Verso Androscoggin operates a continuous opacity monitoring system (COMS) on the recovery boilers combined stack (RB#1 & RB#2 stack). This COMS is required per the continuous monitoring system (CMS) requirements of 40 CFR Part 63, Subpart MM.

D. Application Classification

The application does not violate any applicable federal or state requirements and does not request a relaxation in monitoring, reporting, testing or record keeping requirements, therefore this application is not considered an amendment to Verso Androscoggin's Part 70 License, however, any license conditions contained in this license amendment that either alter or are in addition to existing Part 70 license conditions will be incorporated into Verso Androscoggin's Part 70 License.

This application is being processed under the New Source Review (NSR) licensing provisions contained in *Major and Minor Source Air Emission License Regulations*, 06-096 CMR 115. The application includes a Best Available Control Technology (BACT) analysis performed per New Source Review requirements.

Additionally, the modification of a major source is considered a major modification based on whether or not expected emissions increases exceed the "Significant Emission Increase Levels" as given in *Definitions Regulation*, 06-096 CMR 100 (last amended December 1, 2005).

The emission increases are determined by subtracting the average actual emissions of the 24 months preceding the modification (or representative 24 months) from the projected future actual emissions. The results of this analysis for the two proposed projects combined are as follows:

Pollutant	Average Past Actual Emissions 2005/2006 (ton/year)	Future Actual Emissions (avg. past actual emissions plus 6 days and 32 hours/year of additional operation) (ton/year)	**Net Change (ton/year)**	Significant Emissions Increase Levels (ton/year)
PM	48	49.6	**1.6**	25
PM_{10}	48	49.6	**1.6**	15
SO_2	91	92.6	**1.6**	40
NO_x	178	182.5	**4.5**	40
CO	168	171	**3**	100
VOC	26	26.7	**0.7**	40

The projected increases in emissions are well below significant emissions increase levels associated with a major modification, therefore the modification is determined to represent a minor modification.

Based on the above information, this license amendment is determined to be a minor modification under *Major and Minor Source Air Emission License Regulations*, 06-096 CMR 115 (last amended December 1, 2005) and has been processed as such.

II. BEST PRACTICAL TREATMENT (BPT)

A. Introduction

In order to receive a license the applicant must control emissions from each unit to a level considered by the Department to represent Best Practical Treatment (BPT), as defined in 06-096 CMR 100. Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

Verso Androscoggin in not located in a designated non-attainment area. BPT for new sources and modifications requires a demonstration that emissions are receiving Best Available Control Technology (BACT), as defined in 06-096 CMR 100. BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

B. BACT Determination

A summary of the BACT determination for RB#1 is the following:

1. Particulate Matter (PM & PM_{10})

Particulate matter emissions from kraft recovery boilers mainly consist of sodium salts that are generated mostly by carryover of solids and sublimation and condensation of the inorganic chemicals. Particulate matter control can be provided on recovery boilers in a variety of ways. At Verso Androscoggin, an electrostatic precipitator (ESP) is employed after the non-direct-contact evaporator (NDCE) that achieves a particulate matter control efficiency of 85 to more than 99 percent. The ESP controlling PM emissions from RB#1 consists of two parallel sides with four banks each. PM emissions from RB#1 are currently limited to 0.035 gr/dscf which is below the MACT, 40 CFR Part 63, Subpart MM applicable emission standard for PM of 0.044 gr/dscf.

According to the RACT/BACT/LAER Clearinghouse (RBLC) database, the top 15 facilities with the lowest achievable emission rates for PM utilize an ESP for control and meet PM emission limits ranging from 0.02 gr/dscf to 0.044 gr/dscf. The current PM emission limit for RB#1 of 0.035 gr/dscf is well within the range of the top PM emission performing facilities. Verso is already utilizing an ESP to control PM emissions. The incremental cost associated with constructing and operating additional ESP banks or of installing and operating an auxiliary scrubber to remove PM from a flue gas stream is not economically justifiable, especially given the minor nature of the proposed modification.

The Department finds that the use of an ESP to meet the current PM emission limit of 0.035 gr/dscf, corrected to 8% O_2, represents BACT for PM emissions from RB#1.

2. Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) is formed from reduced sulfur compounds generated by the combustion of black liquor. Pollution control options to reduce the emissions of SO_2 include flue gas desulfurization by means of wet scrubbing whereby scrubbing liquid is used to remove sulfur from the flue gas, or the use of low-odor design and proper process operation.

Examination of the control strategies used at similar facilities to attain BACT control for recovery boilers indicates that low-odor design and the use of proper process operation appears to be the best control method for SO_2 emissions from recovery boilers. The BACT limit for SO_2 has ranged from 10 ppm to 500 ppm for previously permitted recovery boilers. The SO_2 limit currently required for RB#1 is 180 ppm which is within the range of limits similar recovery boilers are meeting. The recover boiler with the proposed 10

ppm limit is the Apple Grove Mill in West Virginia, but this mill has not yet been built. Weyerhauser's Red River Mill located in Louisiana achieves a 20 ppm SO_2 limit on Boiler #3 through proper boiler design and operation, however this recovery boiler was built new in 2006.

The Meadwestvaco Mill in Kentucky is the only facility in the RBLC database that utilizes a wet scrubber. The wet scrubber is used primarily to comply with TRS regulations. The costs of a wet scrubbing system for RB#1, including the associated annual operating cost for scrubbing liquid, energy, operation and maintenance does not make this option economically feasible.

Several factors influence SO_2 emission rates from recovery boilers, including black liquor sulfidity (or sulfur-to-sodium ratio), liquor solids content, stack oxygen content, furnace load, auxiliary fuel use, furnace design, combustion air and liquor firing patterns, and other furnace operational parameters. Prior to the stacked air project completed on RB#1 in 2007, which improved combustion air firing patterns in the boiler, the daily average SO_2 concentrations ranged from 13 ppm to 70 ppm. Upon completion of the stacked air project the daily average SO_2 concentrations ranged from less than 1 ppm to 45 ppm. Although SO_2 concentrations have been found to range from nearly 0 ppm to as high as 500 ppm, our review of the information submitted by Verso Androscoggin as well as our knowledge regarding SO_2 concentrations from similar recovery boilers operating in the State of Maine, leads the Department to conclude that RB#1 can and should be able to be operated such that a lower SO_2 concentration limit than the current 180 ppm limit is met over the 30-day rolling average time period.

The Department finds that the employment of good operating practices in combination with the low-odor, NDCE design of RB #1 to meet a reduced SO_2 emission limit of 120 ppmdv, corrected to 8% O_2, represents BACT for SO_2 emissions from RB#1 when it is operating at a black liquor firing rate of 50% or higher and that a SO_2 emission limit of 140 ppmdv, corrected to 8% O_2, represents BACT for SO_2 emissions from RB#1 when it is operating at a black liquor firing rate of less than 50%.

3. Nitrogen Oxides (NO_x)

NO_x emissions from fuel burning equipment is generated through any of three mechanisms; fuel NO_x, thermal NO_x, and prompt NO_x. Fuel NO_x is produced by oxidation of nitrogen contained in the fuel source. Combustion of fuels with high nitrogen content produces greater amounts of NO_x than those with low nitrogen content such as distillate oil and natural gas. Thermal NO_x is formed by the fixation of nitrogen (N_2) and oxygen (O_2) at temperatures greater than 3,600 °F. Prompt NO_x forms from the oxidation of hydrocarbon radicals near the combustion flame and produces an insignificant amount of NO_x.

Potential control technologies for reducing NO_x emissions from recovery boilers include add-on controls such as selective non-catalytic reduction (SNCR) and selective catalytic reduction (SCR), and proper boiler combustion control and air combustion optimization. Only one facility in the RBLC database proposed add-on control technology as BACT. This mill was the Apple Grove Mill in West Virginia which proposed a BACT limit of 40 ppm attained through the use of SNCR technology. This mill has not yet been built. The range of NO_x limits proposed as BACT in the database was from 40 ppm to 250 ppm. RB#1 is currently limited to a NO_x emission concentration of 206 ppm. Weyerhauser's Red River Mill located in Louisiana achieves an 80 ppm NOx limit on Boiler #3 through proper boiler design and operation, however this recovery boiler was built new in 2006.

The results of studies performed on recovery boilers in Sweden and Japan have demonstrated that NO_x reduction using SNCR technology may only be effective for short-term periods. Studies on these boilers show that long-term SNCR operation on kraft recovery boilers may lead to an increase in nitrogen and chlorine concentrations in the liquor, thus increasing NO_x emissions and causing fouling and plugging in the boiler due to high levels of chloride deposits.

SCR is currently not a practical option for recovery boilers because of the high temperature window (450 ºF to 750 ºF) needed for proper SCR operation. Temperatures in this range are only found in the economizer section of the recovery boiler, however, because the flue stream is still loaded with particulate at this time (pre-ESP) the catalyst would not remain effective. Utilizing SCR after the ESP would require re-heating the flue gas to the required temperature range which is impractical and would generate additional emissions of other criteria pollutants.

The Department's review of the information submitted by Verso Androscoggin as well as our knowledge regarding NO_x concentrations from similar recovery boilers operating in the State of Maine, leads the Department to conclude that RB#1 should be able to be operated such that a lower NO_x concentration limit than the current 206 ppm limit is met over the 24-hour block average time period.

The Department finds that the employment of good combustion practices to meet a reduced NO_x emission limit of 150 ppmdv, corrected to 8% O_2 or 12% CO_2, represents BACT for NO_x emissions from RB#1.

4. Carbon Monoxide (CO)

Catalytic oxidation is a post combustion alternative that has been used with gas turbines and internal combustion engines firing liquid or gaseous fuels that have relatively clean exhaust gases. This technology has not, however,

been demonstrated on a recovery boiler. It is expected that fouling of the catalyst would occur due to the heavy concentration of PM in the exhaust stream physically blocking the pores of the catalyst bed. While the combustion temperatures needed for catalytic oxidation are lower than the temperatures needed for thermal oxidation (due to the presence of the catalyst) the typical range of combustion temperatures is 700 ºF to 900 ºF. Thus placing the catalyst bed after the ESP would require re-heating the flue gas to the required temperature range which is impractical and would generate additional emissions of other criteria pollutants.

The Department finds that the employment of good combustion practices to meet the current prorated CO emission limit of 112.2 lb/hr represents BACT for CO emissions from RB#1.

5. Volatile Organic Compounds (VOC)

Control of VOC emissions from boilers can include the application of add-on control devices. Relevant add-on control options include carbon adsorption, absorbers (scrubbers), condensers, biofilters, and thermal oxidation. Different air pollution control technologies can be applied to sources, once they are covered, enclosed, or vented in order to capture and then recover or destroy the VOC emissions. The application of a particular control technology depends on the gas stream under consideration. A control technology is selected based on stream-specific characteristics (flow rate, hydrocarbon concentration, temperature, moisture content, etc.) and the desired control efficiency. The concentration of organics in the gas stream is a key characteristic that affects the applicability of a particular control technology. Add-on control technologies to reduce VOC emissions are not employed on kraft recover boilers because the VOC content of the flue stream is too low for efficient and cost effective pollutant removal. A review of the RBLC database concluded that there are no facilities that are utilizing add-on control technology as BACT for VOC emission. RB#1's current prorated VOC limit of 9.4 lb/hr is consistent with units of similar size and age and is well within the range of limits in the RBLC database: 3.7 lb/hr to 43 lb/hr.

The Department finds that the employment of good combustion practices to meet the current prorated VOC emission limit of 9.4 lb/hr represents BACT for VOC emissions from RB#1.

6. Total Reduced Sulfur Compounds (TRS)

Total reduced sulfur compounds (TRS), the most common of which are hydrogen sulfide (H_2S), methyl mercaptan, dimethyl sulfide, and dimethyl disulfide are emitted from recover boilers. In a recovery boiler, the sodium fumes (gaseous Na and NaOH), carbon monoxide, hydrogen sulfide and other volatile organics are oxidized as they rise through the furnace and react with

secondary and tertiary air. Secondary air provides oxygen for burning the organics and to raise the lower furnace temperature. Tertiary air supplies oxygen to more fully combust all the volatile organics and reduced sulfur gases. As a result, in passing through the secondary and tertiary zones, H_2S is oxidized to sulfur dioxide. Any H_2S not oxidized at this point will not be oxidized later on in the cooling flue gases and will form the main component of TRS emissions from the furnace. The use of a non-direct contact evaporator (NDCE) minimizes TRS emissions from recovery boilers.

Efficient operation of the recovery furnace, by avoiding overloading and by maintaining sufficient oxygen supply, residence time, and turbulence, significantly reduces emissions of TRS. RB#1 is currently subject to a TRS emission limit of 5 ppm. Other facilities with BACT limits on TRS emissions from recovery boilers were compared to the limit currently applicable to RB#1. Only the Apple Grove Mill in West Virginia (which has not yet been built) and Weyerhauser's Red River Mill Recover Boiler #3 (constructed in 2006) had lower BACT limits for TRS emissions.

The Meadwestvaco Mill in Kentucky utilizes a wet scrubber to reduce TRS emissions to a BACT limit of 8 ppm. RB#1 is already meeting a lower TRS limit without the use of add-on control technology.

The Department finds that efficiently operating the recovery boiler to meet the current TRS emission limit of 5 ppmdv, corrected to 8% O_2 (measured as H_2S), represents BACT for TRS emissions from RB#1.

C. Annual Emissions

The proposed minor modification will not result in the need to change any of the annual emission limits currently existing in Verso Androscoggin's Air Emission Licenses, including any amendments. License allowed annual emission limits remain unchanged.

III. AMBIENT AIR QUALITY ANALYSIS

Verso Androscoggin previously submitted an ambient air quality analysis demonstrating that emissions from the facility, in conjunction with all other sources, do not violate ambient air quality standards. Neither short term nor long term emission limits will increase as a result of the minor modification being approved in this license amendment, therefore no additional ambient air quality analysis is required for this license amendment.

ORDER

Based on the above Findings and subject to conditions listed below, the Department concludes that the emissions from this source:

- will receive Best Practical Treatment,
- will not violate applicable emission standards,
- will not violate applicable ambient air quality standards in conjunction with emissions from other sources.

The Department hereby grants Air Emission License A-203-77-4-A pursuant to the preconstruction licensing requirements of 06-096 CMR 115, which allows Verso Androscoggin to complete the repair and replacement work on RB#1 described in its application and in the findings of fact of this license amendment, and subject to any special conditions below. Verso Androscoggin shall continue to be subject to the standard and special conditions listed in their initial Part 70 License, A-203-70-A-I, and in any subsequent Part 70 or New Source Review license amendments.

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.

(1) **Recovery Boiler #1 (RB#1)**
Following completion of the repair and replacement work described in this license, SO_2 emissions from RB#1 shall not exceed 120 ppmdv, corrected to 8% O_2, on a 30-day rolling average basis when RB#1 is operating at a black liquor firing rate of 50%, or higher. When RB#1 is operating at a black liquor firing rate of less than 50%, SO_2 emissions shall not exceed 140 ppmdv, corrected to 8% O_2, on a 30-day rolling average basis. [06-096 CMR 115, BACT]
Enforceable by State-only

(2) **Recovery Boiler #1 (RB#1)**
Following completion of the repair and replacement work described in this license, NO_x emissions from RB#1 shall not exceed 150 ppmdv, corrected to 8% O_2 or 12% CO_2, on a 24-hour block average basis. [06-096 CMR 115, BACT]
Enforceable by State-only

DONE AND DATED IN AUGUSTA, MAINE THIS DAY OF 2008.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY:_____
DAVID P. LITTELL, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: January 9, 2008
Date of application acceptance: January 14, 2008

Date filed with the Board of Environmental Protection: _____

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