



STATE OF MAINE  
DEPARTMENT OF ENVIRONMENTAL PROTECTION



PAUL R. LEPAGE  
GOVERNOR

PATRICIA W. AHO  
COMMISSIONER

**Lincoln Paper and Tissue, LLC**  
**Penobscot County**  
**Lincoln, Maine**  
**A-177-77-7-A**

**Departmental**  
**Findings of Fact and Order**  
**New Source Review**  
**NSR #7**

**FINDINGS OF FACT**

After review of the air emissions license amendment 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., Section 344 and Section 590, the Maine Department of Environmental Protection (Department) finds the following facts:

**I. REGISTRATION**

**A. Introduction**

|                           |  |
|---------------------------|--|
| <b>FACILITY</b>           | <b>Lincoln Paper and Tissue, LLC (LPT)</b> |
| <b>LICENSE TYPE</b>       | 06-096 CMR 115, Minor Modification         |
| <b>NAICS CODES</b>        | 322121                                     |
| <b>NATURE OF BUSINESS</b> | Pulp & Paper                               |
| <b>FACILITY LOCATION</b>  | Katahdin Avenue Lincoln, ME                |

**B. Amendment Description**

LPT is proposing to repair Recovery Boiler #2, which is part of the Kraft chemical recovery process at their pulp, paper, and tissue manufacturing facility located at 50 Katahdin Avenue Lincoln, ME. Recovery Boiler #2 was substantially damaged during a water smelt explosion that occurred on November 2, 2013. After the boiler is repaired it will remain functionally and operationally equivalent to its former specifications.

AUGUSTA  
17 STATE HOUSE STATION  
AUGUSTA, MAINE 04333-0017  
(207) 287-7688 FAX: (207) 287-7826  
RAY BLDG., HOSPITAL ST.

BANGOR  
106 HOGAN ROAD, SUITE 6  
BANGOR, MAINE 04401  
(207) 941-4570 FAX: (207) 941-4584

PORTLAND  
312 CANCO ROAD  
PORTLAND, MAINE 04103  
(207) 822-6300 FAX: (207) 822-6303

PRESQUE ISLE  
1235 CENTRAL DRIVE, SKYWAY PARK  
PRESQUE ISLE, MAINE 04769  
(207) 764-0477 FAX: (207) 760-3143

C. Emission Equipment

The following equipment is addressed in this air emission license:

| Equipment          | Maximum Capacity (MMBtu/hr)  | Date of Manufacture | Fuel Type   | Control Device                        | Stack # |
|--------------------|--|---------------------|---|---------------------------------------|---------|
| Recovery Boiler #2 | 1.9 MMlb BLS/day Supports 650 ADTPD * (≈ oil heat input of 500 MMBtu/hr) | 1972                | Fuel Burning #6 oil, ≤2.0% sulfur content (S), on and off-spec waste oil, biofuel, black liquor | Wet Bottom Electrostatic Precipitator | 2       |

\* ADTPD - Air dried tons of pulp per day.

D. Application Classification

The application for LPT does not violate any applicable federal or state requirements and does not reduce monitoring, reporting, testing or record keeping. Due to the substantial repairs necessary to get Recovery Boiler #2 back on-line, LPT pursued a Best Available Control Technology (BACT) analysis. The applicability of BACT for units undergoing a rebuild (without an increase in actual or licensed allowed emissions) is unclear per New Source Review. However, to be conservative the Department and LPT determined a BACT analysis was appropriate.

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 (as amended). A "net emission increase", as defined by 06-096 CMR 100, is the increase in actual emissions from a particular physical change or change in the method of operation at a stationary source. "Actual emissions" are further defined in 06-096 CMR 100 as "the actual rate of emissions of a pollutant from an emissions unit. In general, actual emissions as of a particular date shall equal the average rate, in tons per year (tpy), at which the unit actually emitted the pollutant. Actual emissions shall be calculated using the unit's actual operating hours, production rates, and types of materials processed, stored, or combusted during the selected time period."

In order to compare the proposed repair against Maine's significant emissions increase thresholds, actual emissions from Recovery Boiler #2 were calculated using the most representative information available for this application including CEMS data when available, stack test results, and Annual Emission Inventory emission factors combined with actual operating hours, actual fuel use, and/or actual production rates. For this analysis, the consecutive 24-month period between July 2008 and June 2010 was selected as it is the most representative of potential historical mill operation.

Projected actual emissions from the repaired Recovery Boiler #2 are expected to be identical to the actual emissions from Recovery Boiler #2 because the repaired boiler's operation, capacity, and design will only differ minimally from the old boiler. Therefore, projected actual emissions for each pollutant were calculated assuming that the future projected actual emissions are equivalent to the baseline actual emissions.

The net emission increases are determined by subtracting the baseline actual emissions of any consecutive 24 month period in the ten year period preceding the modification (or representative 24 months) from the projected actual emissions. The results of this test are as follows:

| <b>Pollutant</b>  | <b>Baseline Actual<br/>(2008/2010)<br/>Emissions<br/>(TPY)</b> | <b>Projected<br/>Actual Emissions<br/>(TPY)</b> | <b>Net<br/>Emission<br/>Increase<br/>(TPY)</b> | <b>Sig.<br/>Emission<br/>Increase<br/>Level</b> |
|-------------------|--|---|--|---|
| PM                | 144.8  | 144.8   | 0  | 25  |
| PM <sub>10</sub>  | 90.5   | 90.5  | 0  | 15  |
| PM <sub>2.5</sub> | 66.8   | 66.8  |  |   |
| SO <sub>2</sub>   | 84.4   | 84.4  | 0  | 40  |
| NO <sub>x</sub>   | 121.4  | 121.4   | 0  | 40  |
| CO                | 410.8  | 410.8   | 0  | 100   |
| VOC               | 20.6   | 20.6  | 0  | 40  |
| CO <sub>2</sub> e | <75,000  | <75,000   | 0  | 75,000  |

Therefore, this amendment is determined to be a minor modification under *Minor and Major Source Air Emission License Regulations* 06-096 CMR 115 (as amended) since the changes being made are not addressed or prohibited in the Part 70 air emission license. The projected actual emissions from Recovery Boiler #2 are expected to be the same after the rebuild as compared to before the rebuild and will be less than 50% of significant emissions increase levels (this is explained in greater detail in Section II E). An application to incorporate the requirements of this amendment into the Part 70 air emission license shall be submitted no later than 12 months from commencement of the requested rebuild project.

## FIVE YEAR VERIFICATION OF COMPLIANCE

In accordance with 40 CFR 52.21(r)(6)(iii) LPT will maintain records of actual emissions in tons per year on a calendar year basis for a period of five years following the date the recovery boiler resumes operation after the rebuild project is complete. Records will document that emissions during this period do not exceed projected actual estimates plus the significant emission increase thresholds plus that which it was capable of accommodating prior to the repairs as defined in the following paragraphs.

Definition of Capable of Accommodating - In accordance with 40 CFR 52.21(b)(41)(ii)(c), LPT may opt to offset from its projected actual emission estimates any portion of the unit's emissions following the project that the existing unit could have accommodated during the consecutive two year period used to establish the baseline actual emissions and that are also unrelated to the particular project, including any increased utilization due to product demand growth. Conversely, LPT recognizes that if the operation of an emissions unit to meet a particular level of demand could have been accomplished during the baseline period, *but the increase is related to the changes made at the unit*, then the emissions increases resulting from the increased operation must be attributed to the project, and cannot offset the projection of the projected actual emissions.

In the event of qualifying demand growth, LPT will document that the demand growth exemption applies and will demonstrate that the unit could have achieved the necessary utilization prior to the rebuild project and that the increase in emissions is not related to this project. Projected actual emissions are predicted to be less than 50% of significant emissions increase levels and therefore submitting calculations of actual emissions is not required.

## 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 *Definitions Regulation*, 06-096 CMR 100 (as amended). Separate control requirement categories exist for new and existing equipment as well as for those sources located in designated non-attainment areas.

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. Project Description**

On November 2, 2013 the existing Recovery Boiler #2 experienced a water smelt explosion; the damage succumbed during the explosion rendered the recovery boiler inoperable. The recovery boiler is integral to the Kraft mill operation for the recovery of chemicals and energy from the residual black liquor and reformation of the recovered chemicals to form white liquor. Thus, it is LPT's intention to repair the existing recovery boiler when financing becomes available. While the damage succumbed during the explosion was substantial, many portions of the recovery boiler were salvageable including the mud and steam drums, the economizer tube section, the FD fan and motor, the ID fan motor, soot blowers, the black liquor tank, pumps, and piping system, and potentially the oil guns.

New components of the recovery boiler include a new furnace floor, wall tubes, the generating bank, the superheaters, and the screen tubes. A new four black liquor gun arrangement will be employed and additional boiler supports including additional buck-stays will be installed. In addition, the exterior insulation and siding on the boiler building will be replaced.

The repaired recovery boiler will operate identically post-explosion as it did pre-explosion; the repaired unit will be a straight fire black liquor unit with support from oil during start-up, shutdown, and to stabilize operation. While new components of the recovery boiler will provide increased safety and combustion stability, no increase in boiler capacity or operational capabilities will occur as part of this project. The recovery boiler will continue to exhaust through a wet bottom electrostatic precipitator (ESP) and the existing dual stack configuration of identical 175 foot stacks. LPT will continue to comply with a heat input capacity limit of 1.9 million pounds (MMlbs) of dry black liquor solids (BLS) per day and 500 MMBtu/hr of #6 fuel oil.

## **C. BACT for Recovery Boiler #2 rebuild**

### Nitrogen Oxide (NOx) control

The NOx emissions from Recovery Boiler #2 result from the combustion of fuel oil and black liquor. NOx is generated in one of three mechanisms; fuel NOx, thermal NOx, and prompt NOx. Fuel NOx is a result of the oxidation of fuel-bound nitrogen with oxygen present for combustion. Combustion of fuels with high nitrogen content produces greater amounts of fuel NOx than those with low nitrogen content; however the extent of conversion of fuel nitrogen to NOx is dependent upon the combustion characteristics. Thermal NOx is formed via the dissociation of nitrogen and the reaction with oxygen from combustion air at temperatures greater than 2900°F. Prompt NOx forms from the high-speed

oxidation of hydrocarbon radicals near the combustion flame and produces an insignificant amount of NO<sub>x</sub>.

The majority of NO<sub>x</sub> emissions from the recovery boiler are fuel NO<sub>x</sub> resulting from the partial oxidation of nitrogen contained in the black liquor and fuel oil. Due to the integral staged combustion with a reducing zone in the lower part of the furnace and an oxidizing zone further up in the liquor spray guns and secondary and tertiary air regions of the furnace, the recovery boilers naturally deter excessive NO<sub>x</sub> formation. In addition, black liquor, the primary fuel used in the recovery boiler, has a relatively low nitrogen content of 0.05-0.25%wt as compared to other fuels. Therefore, recovery boilers tend to have lower NO<sub>x</sub> emission as compared to other combustion systems. Potential control of NO<sub>x</sub> emissions could be achieved from add-on pollution control devices such Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR), as evaluated below. Demonstrated NO<sub>x</sub> control technologies include staged combustion and proper operation.

#### *Selective Non-Catalytic Reduction (SNCR)*

SNCR is based on the chemical reduction of NO<sub>x</sub> into molecular nitrogen (N<sub>2</sub>) and water vapor (H<sub>2</sub>O). A nitrogen based reducing agent such as ammonia or urea is injected into the post combustion flue gas. The following set of reduction reactions with NO<sub>x</sub> is favored over other chemical reaction processes at temperatures ranging between 870 to 1150 °C:

- $4\text{NO} + 4\text{NH}_3 + \text{O}_2 \rightarrow 4\text{N}_2 + 6\text{H}_2\text{O}$
- $2\text{NO}_2 + 4\text{NH}_3 + \text{O}_2 \rightarrow 3\text{N}_2 + 6\text{H}_2\text{O}$
- $\text{NO} + \text{NO}_2 + 2\text{NH}_3 \rightarrow 2\text{N}_2 + 3\text{H}_2\text{O}$

The addition of the reducing agent at the correct flue temperature window is essential as it ensures effectiveness and minimizes slip. Because recovery boilers are operated over a significant range of conditions, the addition of the reducing agent in the correct flue temperature window would be extremely difficult as the injection rate and injection location would have to change accordingly. In addition, there are substantial safety concerns associated with the injection of a reducing agent including the risk of a reducing agent reaching the furnace floor and causing a smelt-water explosion and the risk of degrading equipment due to the highly corrosive environment. Therefore, this option has been removed from consideration as it is not technically feasible for NO<sub>x</sub> control from a recovery boiler.

#### *Selective Catalytic Reduction (SCR)*

SCR also chemically reduces NO<sub>x</sub> into N<sub>2</sub> and H<sub>2</sub>O and utilizes a nitrogen based reducing agent, which is injected into the post combustion flue gas. The waste gas mixes with the reagent and diffuses through a catalyst bed. The reagent reacts

selectively with the NO<sub>x</sub> within a specific temperature range in the presence of the catalyst and oxygen. The optimum temperature range depends on the catalyst used and flue gas composition and could range from 250 °C to 430°C. The flue gases leaving the recovery boiler are laden with alkali dust, therefore, in order to potential catalyst poisoning, the SCR would have to be located after the electrostatic precipitator (ESP). This is not a feasible NO<sub>x</sub> emissions control option as it would require re-heating the flue gas after passing through the ESP and prior to entering the SCR, resulting in the substantial addition of operating costs and reduced system efficiency.

#### *Quaternary Staged Combustion*

Recovery Boiler #2 currently delivers primary, secondary, and tertiary combustion air into the boiler firebox. There is currently not enough room within the boiler between the tertiary air-port and the start of the boiler tubes to add a fourth stage of combustion due to the relatively short height of the boiler. The entire upper section of the boiler would have to be raised in order to contain a quaternary air system. This would require rebuilding the entire boiler building, which is not practical.

#### *Proper Operation*

Proper operation of recovery boilers is a demonstrated way to minimize NO<sub>x</sub> emissions. The addition of combustion air must be fine-tuned to balance the reducing conditions in the lower furnace and the oxidizing conditions required for complete combustion in the upper furnace. LPT will continue to properly operate and tune the recovery boiler to balance the emissions of NO<sub>x</sub> and CO which are inversely proportional.

#### **Selection of BACT for Nitrogen Oxides**

There are currently no NSPS or maximum achievable control technology (MACT) standards for NO<sub>x</sub> from Kraft recovery furnaces. NO<sub>x</sub> Reasonably Available Control Technology (RACT) for Recovery Boiler #2 was determined to be the installation of a NO<sub>x</sub> continuous emission monitoring system (CEMS) and compliance with the limits established in 06-096 CMR 138. LPT will continue to properly operate and tune Recovery Boiler #2 with the tertiary staged combustion air configuration. These NO<sub>x</sub> emission controls in addition to complying with a limit of 233 ppmv (dry basis) at 8% O<sub>2</sub> on a 24-hour block average basis and a mass limit of 210.6 lb/hr is considered BACT for NO<sub>x</sub>.

#### Particulate Matter (PM) emission control

The majority of particulate matter emissions generated in Recovery Boiler #2 are sodium sulfates, with minor amounts of sodium carbonate and sodium chloride. In addition, minimal potassium compounds and trace amounts of other metal

compounds may also be present. Recovery boilers are operated in such a way to ensure high levels of sodium fumes in order to capture the sulfur dioxide produced as a result of reduced sulfur compound oxidation. The particulate matter emissions are generally hygroscopic and comprised of roughly 66% PM<sub>10</sub> and less than 50% PM<sub>2.5</sub>. Potential PM emission control technologies include fabric filters, electrostatic precipitators (ESP), wet ESP, and wet scrubbers.

#### *Fabric Filters*

Fabric filters (baghouses) collect particulate matter on the surface of filter bags and are capable of collection efficiencies greater than 80%. Due to the high moisture content and hygroscopic nature characteristic of particulate matter emissions from recovery boilers, fabric filters would clog rapidly, rendering the control device inoperable. Therefore, fabric filters are an infeasible pollution control operation and have not been applied to recovery boilers at Kraft mills.

#### *Electrostatic Precipitators*

Electrostatic precipitators use high-voltage fields to apply an electrical charge to particles. The charged particles then move toward an oppositely charged collection surface where they accumulate. The accumulated dust is then dislodged from the collectors. LPT currently employs an ESP to control PM emissions from Recovery Boiler #2. The ESP is a wet bottom design with two chambers and four fields per chamber and is powered by Transformer Rectifier (TR) sets. LPT has made several improvements to the ESP since originally installed including improving the flue gas distribution baffles, adding a new microcomputer system for control of rapping, and new computer temperature and transistor rectifier controls.

#### *Wet Scrubber*

Wet scrubbers utilize particle inertia and pressure to transfer particles from the gas stream to a liquid stream. Wet scrubbers consume large quantities of water in liquid stream make-up, purged liquid, and sludge removed from the scrubber system. In addition, wet scrubbers generate a waste stream that must be treated and disposed of properly. Wet scrubbers have a control efficiency of roughly 75% and are therefore less effective than the existing ESP.

#### **Selection of BACT for Particulate Matter**

Recovery Boiler #2 is subject to a 40 CFR Part 63, Subpart MM NESHAP particulate matter limit of 0.044 grains per dry standard cubic foot (0.044 gr/dscf) corrected to 8% oxygen and a 06-096 CMR 105 limit of 4 lb/ADTP for a two-hour sampling period. LPT will continue the use of the ESP and compliance with the applicable emission limits as BACT for control of particulate matter from Recovery Boiler #2. In addition, LPT will comply with the mass emission limits of 38.8 lb/hr (filterable) of PM and 43.9 lb/hr (filterable + condensable) for PM<sub>10</sub> and PM<sub>2.5</sub>.

### Sulfur Dioxide (SO<sub>2</sub>) emission control

Black liquor has a significant sulfur content of roughly 3-5% by weight. While the majority of the sulfur exits the recovery boiler as smelt, about 1% exits the boiler as gaseous or particulate compound. The sulfur that is not collected as smelt is oxidized during the combustion of black liquor and fuel oil. The quantity of SO<sub>2</sub> emissions from recovery boilers depends on several factors, including liquor properties, combustion air and liquor firing patterns, furnace design, and operation parameters. Potential ways to control SO<sub>2</sub> emissions from recovery boilers include optimizing liquor and combustion air properties to yield maximum and uniform temperatures in the lower furnace; this can be achieved using staged combustion. Add-on control technologies include wet scrubbers.

#### *Wet Scrubbers*

Wet scrubbers utilize particle inertia and pressure to transfer particles from the gas stream to a liquid stream. Wet scrubbers consume large quantities of water in liquid stream make-up, purged liquid, and sludge removed from the scrubber system. In addition, wet scrubbers generate a waste stream that must be treated and disposed of properly. The installation of a wet scrubber would have to occur after the existing ESP.

#### *Quaternary Staged Combustion*

Recovery Boiler #2 currently delivers primary, secondary, and tertiary combustion air into the boiler firebox. There is currently not enough room within the boiler between the tertiary air-port and the start of the boiler tubes to add a fourth stage of combustion due to the relatively short height of the boiler. The entire upper section of the boiler would have to be raised in order to contain a quaternary air system. This would require rebuilding the entire boiler and boiler building, which is infeasible. The existing use of tertiary staged combustion can adequately minimize SO<sub>2</sub> emission to levels below those achievable by a wet scrubber.

#### **Selection of BACT for Sulfur Dioxide**

Recovery Boiler #2 is subject to 06-096 CMR 106 sulfur dioxide limit; however the existing BPT limit for sulfur dioxide is more stringent. Because the use of staged combustion is more efficient at minimizing SO<sub>2</sub> emissions from recovery boilers, LPT will continue the use of tertiary staged combustion. LPT was licensed to an SO<sub>2</sub> emission limit of 141 ppmvd corrected to 8% oxygen on a 24-hr block average basis, however, for consistency with SO<sub>2</sub> ppmvd limits from a similar facility in the state with a recovery boiler rebuild, LPT will comply with an SO<sub>2</sub> emissions limit of 100 ppmvd corrected to 8% oxygen on a 24-hour block average basis and the existing mass limit of 149.7 lb/hr as BACT.

Carbon Monoxide (CO) emission control

Carbon monoxide emissions from Recovery Boiler #2 are products of incomplete combustion of black liquor and fuel oil and results when there is insufficient residence time or oxygen available near the hydrocarbon molecule during combustion to complete the final step in hydrocarbon oxidation. Typically CO is emitted in relatively low quantities from fuel combustion and can be minimized using staged combustion and good combustion practices or with add-on pollution control devices such as an oxidation catalyst to control post-combustion CO.

*Good Combustion Practices and Staged Combustion*

CO formation can be limited by good combustion practices including ensuring complete and efficient combustion of fuel. This includes controlling combustion temperatures, proper maintenance including proper controls of the air/fuel ratio, and maintaining the atomizing air pressure at the correct levels. Good combustion practices are enhanced through the use of staged combustion. Good combustion practices are a proven technically feasible way of controlling CO emissions from boilers.

*Oxidation Catalysts*

Oxidation catalysts, which provide the most stringent level of control for CO, are technically feasible for control of CO from recovery boilers. However, the oxidation of CO proportionally results in increased carbon dioxide (CO<sub>2</sub>) emissions, which is a known greenhouse gas that contributes to climate change. In addition, while oxidation catalysts reduce CO emissions, a percentage of the SO<sub>2</sub> in the exhaust gas will oxidize to SO<sub>3</sub>. SO<sub>3</sub> reacts with moisture in the exhaust gas and in the atmosphere to form sulfuric acid mist (H<sub>2</sub>SO<sub>4</sub>) or acid rain, and would increase the particulate matter emissions. Finally, additional fuel consumption would be required in the application of a CO oxidation catalyst as the exhaust gas temperature after the ESP would not be high enough for a catalyst to be effective.

Due to subsequent environmental impacts from the installation of an oxidation catalyst and the additional fuel use that would be required, this control option is found to be infeasible.

**Selection of BACT for Carbon Monoxide**

LPT will use good combustion practices and staged combustion as BACT for Recovery Boiler #2. Both of these techniques are comprehensively acknowledged CO emission control techniques in recovery boiler applications. In addition, LPT will comply with a 500 ppmv wet basis corrected to 8% oxygen and a 320.4 lb/hr CO emission limit.

### Volatile Organic Compounds (VOC) emission control

Volatile organic compound emissions from Recovery Boiler #2 are, like CO, products of incomplete combustion of black liquor and fuel oil and results when there is insufficient residence time or oxygen available near the hydrocarbon molecule during combustion to complete the final step in hydrocarbon oxidation. Typically VOCs are emitted in relatively low quantities from fuel combustion and can be minimized using staged combustion and good combustion practices or with add-on pollution control devices such as an oxidation catalyst to control post-combustion VOC. Additional VOC emissions can result when the black liquor comes into contact with combustion gases, like in the wet bottom ESP.

#### *Good Combustion Practices and Staged Combustion*

VOC formation can be limited by good combustion practices including ensuring complete and efficient combustion of fuel. This includes controlling combustion temperatures, proper maintenance including proper controls of the air/fuel ratio, and maintaining the atomizing air pressure at the correct levels. Good combustion practices are enhanced through the use of staged combustion. Good combustion practices are a proven technically feasible way of controlling VOC emissions from boilers.

#### *Oxidation Catalysts*

Oxidation catalysts, which provide the most stringent level of control for VOC, are technically feasible for control of VOC from recovery boilers. However, due to the relatively low amount of VOC emissions from recovery boilers, the use of an oxidation catalyst to control VOC emissions has not been employed on other recovery boilers. Additionally, as mentioned above, there are significant environmental impacts, including the use of additional fuel to heat the exhaust gases prior to contact with the catalyst.

### **Selection of BACT for Volatile Organic Compounds**

LPT will use good combustion practices and staged combustion as BACT for control of VOCs from Recovery Boiler #2. Both of these techniques are comprehensively acknowledged VOC emission control techniques in recovery boiler applications. In addition, LPT will comply with a 200 ppmv wet basis corrected to 8% oxygen and a 73.3 lb/hr VOC emission limit.

### Total Reduced Sulfur (TRS) emission control

The total reduced sulfur emissions from recovery boilers result from sulfur contained in the black liquor that was not collected as smelt through the bottom of the furnace. The black liquor sulfur is released in the furnace as hydrogen sulfide

(H<sub>2</sub>S). The majority of H<sub>2</sub>S is oxidized to SO<sub>2</sub> in the secondary and tertiary combustion zones of the furnace. The H<sub>2</sub>S not oxidized in combustion will be oxidized in the cooling flue gases to form the majority of TRS emissions. Unnecessary TRS emissions can be minimized by avoiding overloading the furnace, when black liquor firing rates rise above the furnace design capacity, significant quantities of H<sub>2</sub>S are emitted. In addition, the TRS emissions from recovery boilers can be minimized by maintaining sufficient oxygen, residence time, and turbulence. For recovery boilers equipped with wet bottom ESPs, like Recovery Boiler #2, TRS emissions can also result from stripping of TRS from black liquor by the furnace flue gases passing through the ESP.

Proper boiler control and operation is the only proven control technology to minimize TRS emissions. Although TRS scrubbers are a potentially feasible add-on control technology, this has not yet been proven as no scrubbers are currently used to control TRS emissions from Recovery Boilers.

#### **Selection of BACT for Total Reduced Sulfur**

LPT will use good combustion practices to minimize TRS emissions from Recovery Boiler #2 as BACT. In addition, LPT shall continue to comply with TRS emission limits of 5 ppm corrected to 8% oxygen at the recovery boiler outlet and 15 ppm at 8% oxygen at the ESP outlet.

#### **BACT SUMMARY**

LPT will operate in a tertiary staged combustion configuration using good combustion practices and a wet bottom ESP as BACT for controlling emissions from Recovery Boiler #2. LPT shall continue to operate in compliance with all existing emission limits. However, recent changes to the PM<sub>10</sub> and PM<sub>2.5</sub> definitions, effective December 1, 2012, incorporate gaseous emissions which condense to form particulate matter at ambient temperature (condensable PM) to emission limitations in PSD permits. To comply with these definition amendments, LPT will maintain the existing filterable particulate limits while adding the expected condensable fraction of particulate. Thus, the proposed emission limits for PM<sub>10</sub> and PM<sub>2.5</sub> summarized below are total PM<sub>10</sub>/PM<sub>2.5</sub> limits, including the filterable and condensable particulate fractions.

#### **Recovery Boiler #2 Current and Proposed License Limits**

| <b>Pollutant</b> | <b>Current Emission Limits and Compliance Method</b>                | <b>Proposed Emission Limits and Compliance Method</b> |
|------------------|---|---|
| PM               | 0.044 gr/dscf @ 8% O <sub>2</sub><br>38.8 lb/hr<br>Stack Test Basis | No Change   |

|                   |  |  |
|-------------------|--|--|
| PM <sub>10</sub>  | 38.8 lb/hr (filterable only)<br>Stack Test Basis   | 43.9 lb/hr (filterable +<br>condensable) <sup>1</sup><br>Stack Test Basis                        |
| PM <sub>2.5</sub> | No existing limit  | 43.9 lb/hr (filterable +<br>condensable) <sup>1</sup><br>Stack Test Basis                        |
| SO <sub>2</sub>   | 100 ppmvd @ 8% O <sub>2</sub><br>(24-hr block avg basis) Stack Test Basis<br><br>149.7 lb/hr Stack Test Basis  | Decreased emission<br>limit from 141 ppmvd<br>@ 8% O <sub>2</sub><br><br>No Change (lb/hr limit) |
| NO <sub>x</sub>   | 233 ppmvd @ 8% O <sub>2</sub><br>(24-hr block avg basis) CEMS Basis<br>210.6 lb/hr Stack Test Basis  | No Change  |
| CO                | 500 ppmv wet @8% O <sub>2</sub> CEMS Basis<br><br>320.4 lb/hr Stack Test Basis   | No Change  |
| VOC               | 200 ppmv wet @ 8% O <sub>2</sub><br>73.3 lb/hr<br>Stack Test Basis   | No Change  |
| TRS               | 5 ppm @ 8% O <sub>2</sub> from boiler outlet<br>(12-hr block avg basis)<br>15 ppm @ 8% O <sub>2</sub> at ESP outlet<br>(12-hr block avg basis)<br>CEMS Basis | No Change  |

<sup>1</sup> Based on existing PM filterable limit plus expected condensable emissions based NCASI emission factors (See Appendix C of LPT's Dec 2013 application for complete calculations).

#### D. Federal Regulation Review

##### 1. New Source Performance Standards Applicability

Recovery Boiler #2 was not previously subject to the New Source Performance Standard (NSPS) 40 CFR Part 60 Subpart BB for Kraft Recovery Boilers since it was manufactured before September 24, 1976 or Subpart Db for Steam Generating Units since it was constructed after June 19, 1976.

NSPS regulations apply to all new emission units, emission units that are modified and result in increased emissions, and all reconstructed emission units. Under NSPS, a modification is defined as the following:

“...any physical change in, or change in the method of operation of, an existing facility which increases the amount of any air pollutant (to which a standard applies) emitted into the atmosphere by that facility or which results in the emission of any air pollutant (to which a standard applies) into the atmosphere not previously emitted.”

The repaired recovery boiler will remain in compliance with the existing license limits, therefore the modifications will not result in an increased emission rate and the project does not meet the NSPS definition of “modified.”

NSPS regulations also apply to emission units that are reconstructed. The NSPS regulations define reconstructed as the following:

“...as the replacement of components of an existing facility 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, and (2) It is technologically and economically feasible to meet the applicable standards set forth in Part 60/Part 63.”

40 CFR Part 60 further defines, fixed capital cost in §60.15 as the capital needed to provide all the depreciable components, including the costs of engineering, purchase and installation of major process equipment, contractor fees, instrumentation, and auxiliary facilities. Fixed capital costs exclude the cost of land, site preparation, demolition, contingency costs, and costs associated with any systems beyond the recovery boiler including replacement of building siding, fire suppression systems, and additional explosion safety measures, in accordance with § 60.15 and with guidance from the 2/28/08 letter from Michael S. Alushin, Director, Compliance Assessment and Media Programs Division Office of Compliance and 11/25/86 letter from John B. Rasnic, Acting Director Stationary Source Compliance Division Office of Air Quality Planning and Standards.

An independent engineering consulting firm has determined the proposed replacement components are approximately 40% of the fixed capital cost that would be required to construct a comparable entirely new recovery boiler, as calculated in accordance with §60.15 and the guidance documents referenced above. Because the capital cost of replacement components going into the modified recovery boiler will remain below the 50% reconstruction threshold, these changes do not satisfy the definition of reconstruction under NSPS. The details of this cost analysis can be found in LPT’s application dated December 2013.

Thus this project does not trigger new more restrictive NSPS standards for newly constructed, modified, or reconstructed sources. In addition, the modified recovery boiler will continue to operate in such a manner so as to remain below an annual capacity factor for fossil-fuel of 10%; therefore it will continue to be exempt from 40 CFR Part 60 Subpart D for Fossil Fuel Fired Steam Generators.

## 2. National Emissions Standards for Hazardous Air Pollutants Applicability

The recovery boiler will continue to be subject to the requirements of National Emission Standards for Hazardous Air Pollutants (NESHAP) 40 CFR Part 63,

Subpart MM for Chemical Recovery Sources at Kraft, Soda, Sulfite, and Stand-Alone Semi-chemical Pulp Mills. Because the criteria for a modified and reconstructed emission unit is not met, as described above, the recovery boiler will continue to be subject to Subpart MM as an existing Kraft recovery furnace and will continue to meet the applicable PM and TRS emission limits.

#### E. Projected Actual Emissions

The application submitted utilized the actual-to-projected-actual PSD applicability test. LPT submitted calculations which demonstrate that there is no “reasonable possibility” that the #2 Recovery Boiler rebuild project will result in a significant emissions increase in any regulated NSR pollutant. The calculations show that projected actual emission increases for all regulated NSR pollutant emissions from the rebuilt Recovery Boiler #2 will be less than 50% of significant emissions increase levels. Based on these calculations, LPT will not be required to track projected actual emissions for any of the NSR regulated pollutants as a result of this project.

#### F. Annual Emissions

LPT current total licensed allowed annual emissions for the facility (used to calculate the annual air license fee) will not change as a result of this amendment.

### III. AMBIENT AIR QUALITY ANALYSIS

LPT 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. An additional ambient air quality analysis is not required for this New Source Review minor modification.

### 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-177-77-7-A pursuant to the preconstruction licensing requirements of 06-096 CMR 115 and subject to the specific conditions below.

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.

### SPECIFIC CONDITIONS

- (1) LPT is licensed to rebuild Recovery Boiler #2. After the boiler is repaired it will remain functionally and operationally equivalent to its former specifications, with no increase in boiler capacity or operational capabilities as part of this project. Recovery Boiler #2 shall continue to exhaust through a wet bottom electrostatic precipitator (ESP) and the existing dual stack configuration of identical 175 foot stacks. LPT shall continue to comply with a heat input capacity limit of 1.9 million pounds (MMlbs) of dry black liquor solids (BLS) per day and 500 MMBtu/hr of #6 fuel oil for Recovery Boiler #2 as well as all other currently licensed requirements.
- (2) LPT shall meet the following BACT requirements for the #2 Recovery Boiler:

A. The emissions from the Recovery Boiler shall not exceed the following limits:  
[06-096 CMR 115, BACT]

|                 |  |
|-----------------|--|
| PM              | 0.044 gr/dscf @ 8% O <sub>2</sub>  |
| SO <sub>2</sub> | 100 ppmv (dry basis) @ 8% O <sub>2</sub> , 24-hr. block average basis                  |
| NO <sub>x</sub> | 233 ppmv (dry basis) @ 8% O <sub>2</sub> , 24-hr. block average basis                  |
| CO              | 500 ppmv (wet basis) @ 8% O <sub>2</sub>   |
| VOC             | 200 ppmv (wet basis) @ 8% O <sub>2</sub>   |
| TRS             | 5 ppm @ 8% O <sub>2</sub> , 12-hr. block average basis, at the recovery boiler outlet* |
|                 | 15 ppm @ 8% O <sub>2</sub> , 12-hr. block average basis, at the ESP outlet*            |

\* Limits do not apply during first 24 hours of start-up.

B. Mass emissions from the Recovery Boiler #2 shall not exceed the following:

| Pollutant         | lb/hour |
|-------------------|---------|
| PM                | 38.8    |
| PM <sub>10</sub>  | 43.9    |
| PM <sub>2.5</sub> | 43.9    |
| SO <sub>2</sub>   | 149.7   |
| NO <sub>x</sub>   | 210.6   |
| CO                | 320.4   |
| VOC               | 73.3    |

[06-096 CMR 115, BACT]

Lincoln Paper and Tissue, LLC  
Penobscot County  
Lincoln, Maine  
A-177-77-7-A

17

Departmental  
Findings of Fact and Order  
New Source Review  
NSR # 7

- (3) Approval to construct shall become invalid if the source has not commenced construction within eighteen (18) months after receipt of such approval or if construction is discontinued for a period of eighteen (18) months or more. The Department may extend this time period upon a satisfactory showing that an extension is justified, but may condition such extension upon a review of either the control technology analysis or the ambient air quality standards analysis, or both. [06-096 CMR 115]
- (4) LPT shall submit an application to incorporate this amendment into the Part 70 air emission license no later than 12 months from commencement of the requested rebuild. [06-096 CMR 140, Section 1(C)(8)]

DONE AND DATED IN AUGUSTA, MAINE THIS 9 DAY OF June , 2014.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

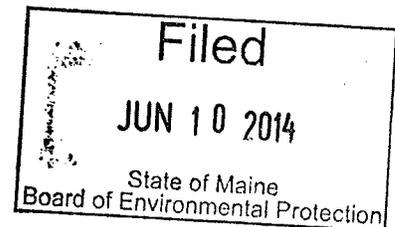
BY: Maureen Allen Robert Corne for  
PATRICIA W. AHO, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: December 23, 2013

Date of application acceptance: January 3, 2014

Date filed with the Board of Environmental Protection:



This Order prepared by Edwin Cousins, Bureau of Air Quality