



STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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**Red Shield Acquisition, LLC
Penobscot County
Old Town, Maine
A-180-77-4-A**

**Departmental
Findings of Fact and Order
New Source Review
NSR #2**

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 Department finds the following facts:

I. REGISTRATION

A. Introduction

FACILITY	Red Shield Acquisition, LLC (Red Shield)
LICENSE TYPE	06-096 CMR 115 Minor Modification, NSR
NAICS CODES	322110 Wood Pulp Manufacturing 221119 Electric Power Generation
NATURE OF BUSINESS	Pulp Manufacturing
FACILITY LOCATION	24 Portland Street, Old Town, Maine

Red Shield manufactures pulp in Old Town, Maine. In addition to operating the pulp mill process, Red Shield produces energy and process steam. The mill also operates support facilities including the wastewater treatment plant, labs, and shipping and receiving operations.

Red Shield is an existing stationary source currently operating under a Part 70 license (A-180-70-A-I) and amendments. Red Shield is considered a Part 70 major source as defined in *Definitions Regulations*, 06-096 CMR 100 (as amended).

B. Amendment Description

Red Shield has submitted an amendment proposing to increase the carbon monoxide (CO) limit from the Biomass Boiler from 0.35 lb/MMBtu to 0.9 lb/MMBtu. Reasons for this change include the firing of green wood (which has a higher moisture content than the construction and demolition wood fuel mix originally licensed for the facility), and the type, size, and age of the boiler.

Based on the Department’s review of Red Shield’s application submittal, information from other operating biomass boilers in the State, Red Shield’s historical data, the age of the unit, the moisture content and consistency of the

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fuel, startup/shutdown effects on CO emissions, the relationship between CO and NO_x emissions, and proposed federal regulations, the Department has concluded that prior to January 1, 2016, the Biomass Boiler will be licensed at a CO limit of 0.8 lb/MMBtu on a 30 day rolling average, including all operating times. Beginning January 1, 2016, the CO limit shall be 0.45 lb/MMBtu, excluding pre-defined startup and shutdown periods. The ambient air quality modeling analysis submitted by Red Shield at the slightly higher emission rate (0.9 lb/MMBtu) demonstrated compliance with ambient air quality standards; and therefore the lower rates set forth in this license will be further below the standards.

Red Shield has also requested an increase in the allowable incineration time of non-condensable gases (NCGs) in the Biomass Boiler from 20% of the total NCG incineration time to 23.8%.

C. Emission Equipment

This amendment addresses the following equipment:

EMISSION UNIT ID	UNIT CAPACITY	UNIT TYPE
Biomass Boiler	265.2 MMBtu/hr with 16 MW extraction condensing turbine generator	Fuel Burning - biomass, construction and demolition wood, NCGs, and supplemental natural gas

D. Application Classification

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).

The emission increases are determined by subtracting the average actual emissions of the 24 months preceding the modification (or representative 24 months) or current licensed allowed, whichever is more stringent, from the maximum future license allowed emissions. The result of this determination is the following:

Pollutant	Average Current Actual Emissions or Current License Allowed (tons/year)	Future License Allowed (ton/year)	Net Change (ton/year)	Significance Level (ton/year)
SO ₂	70.8 ^a	110.7	39.9	40
CO	406.6 ^b	929.3	522.7	100

^a Calculated using actual % incineration time in the Biomass Boiler of 12.2% and the licensed emission rates of 85 lb/hr with NCGs and 6.6 lb/hr without NCGs.

^b Calculated using current licensed 0.35 lb/MMBtu limit and 8760 hr/yr.

Note: The above numbers are for the Biomass Boiler only. No other equipment at the facility is affected by this amendment.

This amendment is determined to be a major modification for CO and a minor modification for SO₂. The amendment has been processed under *Minor and Major Source Air Emission License Regulations* 06-096 CMR 115 (as amended) and is simultaneously being processed under *Part 70 Emission License Regulations* 06-096 CMR 140 (as amended) as a Part 70 Significant Modification to revise the Part 70 license limits for CO emissions and NCG firing time in the Biomass Boiler.

Prior to submitting the major modification application, Red Shield had contact with the Department various times for pre-application meeting purposes, held a public informational meeting on October 4, 2011 at the Black Bear Inn & Conference Center in Orono, Maine, and the Public Notice of Intent to File was published in the Bangor Daily News on October 7, 14, and 21, 2011. A public meeting on the draft license was held on August 14, 2012 at the Black Bear Inn & Conference Center in Orono, Maine.

Federal Land Managers (FLMs) were notified of the project in January 2011. An FLM representative from each of the affected Class I areas (Acadia National Park, Moosehorn National Wildlife Refuge, Roosevelt Campobello International Park, and Presidential Range/Dry River/Great Gulf Wilderness Area) determined that Class I Air Quality Related Values (AQRV) analyses would not be required. The notification to the FLMs included a project summary, distances from the source to each of the Class I areas and the magnitude of proposed emissions increases on a pollutant-by-pollutant basis.

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 (as amended). BACT is a top-down approach to selecting air emission controls considering economic, environmental and energy impacts.

B. Biomass Boiler CO

The Biomass Boiler is a 265.2 MMBtu/hr Babcock & Wilcox boiler manufactured in 1986 and installed at the Red Shield facility in 2004/2005. The boiler is currently licensed with a CO limit of 0.35 lb/MMBtu. Due to the firing of green wood with high moisture content instead of construction and demolition wood waste, and the size and age of the boiler, Red Shield has submitted an amendment to increase the CO limit.

1. Background

The boiler was originally licensed under different ownership and a number of amendments were issued addressing CO from the unit. The boiler initially had operational difficulties meeting the carbon monoxide (CO) and nitrogen oxide (NO_x) license limits simultaneously. A temporary increase in the short term CO limit was given to the previous owners which allowed for operational changes to be made to the boiler to address CO while maintaining NO_x emissions from the unit. A temporary CO limit of 1.1 lb/MMBtu was in place while the boiler was adjusted. The facility was shutdown soon after and sold. The new owners requested the same temporary limit (1.1 lb/MMBtu) to allow for start-up and re-tuning. Then the facility was once again shutdown for a short time period and sold.

Under Red Shield Acquisition, Inc., two amendments addressing CO emissions were issued. Air emission license amendment A-180-71-AX-A, dated January 13, 2009, allowed for the extension of the 1.1 lb/MMBtu CO limit in order to take into account the firing of green wood only (without construction and demolition wood waste as part of the fuel mix). Firing green wood alone results in higher CO emissions than construction and demolition

wood waste due to the higher moisture content of the green wood. The temporary 1.1 lb/MMBtu limit was proposed until September 30, 2009 to allow for Red Shield to submit a major modification application for a permanent green wood CO limit. Air emission license amendment A-180-71-BA-A was subsequently issued on September 21, 2009 to allow for a temporary CO limit of 0.9 lb/MMBtu when firing green wood chips. At that time, Red Shield proposed to investigate using waste heat to dry the biomass fuel (or a portion of it) prior to feeding it into the boiler or using other methods to achieve the 0.35 lb/MMBtu limit. At the end of the preliminary design and economics review of the Biomass Boiler energy savings project and other projects, if it was determined that the projects were not feasible or could not be funded, Red Shield would revert back to submitting the full major modification process with air quality modeling to justify a permanent higher CO limit.

Red Shield's current Part 70 license (A-180-70-A-I) contains condition (15)(H) which requires a CO limit of 0.9 lb/MMBtu and 306.0 lb/hr valid until October 1, 2010 when firing green wood only and 0.35 lb/MMBtu and 119.3 lb/hr after October 1, 2010. This language was incorporated into the Part 70 license from air emission license amendment A-180-71-BA-A. In order to revise the CO limits, a full major modification amendment was submitted.

2. BACT

Red Shield submitted a BACT analysis, including information on CO formation, a review of similar sources, available CO control technology options (focusing on technical feasibility and economic, environmental and energy impacts for each), and a proposed CO emission limit. An ambient air quality dispersion modeling analysis was also submitted in support of the application to show compliance with Ambient Air Quality Standards.

The formation of CO from biomass boilers can be attributed to a number of factors, including the fuel fired in the unit, the type of unit (fluidized bed or spreader stokers) and the age and the size of the boiler. Red Shield's boiler is a spreader stoker type which initially burned a combination of green wood and construction and demolition wood waste for a short time. Construction and demolition wood waste fuel has a typical moisture content range of 25-35%. The facility now only fires green wood chips with a typical moisture content of 40-50%, which can be further affected by factors such as winter conditions (ice and snow) and periods of wet weather. Typically, the higher the moisture content, the higher the CO emissions. Also, the older and smaller the boiler, the more difficult it is to prevent the formation of CO emissions.

In addition to the stand-alone CO factors to consider, there is an inverse relationship between NO_x and CO emissions. When NO_x decreases, CO may increase and vice-versa. Red Shield has been meeting the NO_x emission limits from the Biomass Boiler while addressing CO.

Similar Source Comparisons

As part of the CO emission control technologies review, Red Shield identified similar sized boilers in EPA's RACT/BACT/LAER Clearinghouse (RBLC), as well as boiler licenses on state agency websites. The following sources were included in the review:

Biomass Boilers with CO Limits (from the RBLC)

Facility	State	Permit Date	Capacity MMBtu/hr	Primary Fuel	CO Control System	CO Limit lb/MMBtu
Berlin Biopower	NH	7/26/2010	1013	wood	BFB boiler design & FGR	0.075
Montville Power, LLC	CT	4/6/2010	600	clean wood	oxidation catalyst	0.10
Lindale Renewable Energy	TX	1/8/2010	213	biomass	good combustion practices	0.31
Lufkin Generating Plant	TX	10/26/2009	693	wood	good combustion practices, fluidized bed	0.075
Koda Energy	MN	8/23/2007	308	wood	good combustion practices	0.43
Northern Sun	ND	5/1/2006	280	biomass	good combustion practices	0.63
South Point Biomass Generation	OH	4/4/2006	318	wood	oxidation catalyst	0.10
Skagit County Lumber Mill	WA	1/25/2006	430	bark & wood waste	good combustion practices	0.43
Hibbing Public Utilities	MN	6/30/2005	230	wood	good combustion practices	0.30
Schiller Station	NH	10/25/2004	720	biomass	good combustion practices w/FBD	0.10
Inland Paperboard and Packaging, Inc.	GA	10/13/2004	856	bark	good combustion practices	0.29

Del-tin Fiber	LA	2/28/2003	291	wood waste	good combustion practices	0.78
Thermal Ventures	VA	2/15/2002	120	wood	good combustion practices	0.44
SD Warren Co – Skowhegan (SAPPI)	ME	11/27/2007	1300	wood waste	good boiler design and good combustion practices	0.40
Riegelwood Mill	NC	5/10/2001	600	wood	good combustion practices	0.50
New Plage, Wickliffe Mill	KY	2/12/2000	631	bark	N/A	None listed
Boralex-Sherman	ME	4/9/1999	315	wood	good combustion practices	0.45

A number of fluidized bed boilers are listed, whose design is different than the spreader stoker at Red Shield. Two entries have oxidation catalysts: Montville Power, LLC and South Point Biomass Generation. Construction on Montville Power has not yet started and the oxidation catalyst was proposed to avoid BACT. South Point Biomass Generation's control system is for the combined flue gas from five wood and coal fired boilers and the air quality region was designated as non-attainment for CO when the application was submitted, so a Lowest Achievable Emission Rate (LAER) analysis was performed.

Five facilities, shown as shaded in the table above, have biomass boilers sized close to Red Shield's unit (265 MMBtu/hr) and list good combustion practices as the primary control for CO. Hibbing Public Utilities is also licensed to burn low-moisture fuels, such as untreated residuals from manufacturing processes and construction and demolition wood. Koda Energy and Boralex-Sherman operate larger boilers. The two closest boilers in size are Northern Sun and Del-tin Fiber with CO limits of 0.63 lb/MMBtu and 0.78 lb/MMBtu, respectively.

A review of the currently licensed Part 70 sources in Maine resulted in the following information:

Comparison of Similar Licensed Biomass Boilers in Maine

Facility	Capacity MMBtu/hr	Date of Manufact.	NO _x Control	CO Limit lb/MMBtu	Averaging Time
Boralex - Ashland	585	1992	SNCR, ecotube	0.95	24 hour block, at all operating times
Boralex - Fort Fairfield	523	1987	ecotube w/SNCR capabilities	0.45 (235.4 lb/hr is license limit)	annual stack test
Boralex - Livermore Falls	586	1992	SNCR, ecotube	0.95	24 hour block, at all operating times
Boralex - Stratton	672	1988	R-SCR, ecotube	0.60	24 hour block
<i>Red Shield</i>	<i>265</i>	<i>1986</i>	<i>none</i>	<i>Being revised</i>	

Table Notes: These spreader stoker units fire wood and most are also able to fire construction and demolition debris and/or reprocessed wood fuel. SNCR = Selective Non-catalytic Reduction. R-SCR = Regenerative Selective Catalytic Reduction. SSM = startup, shutdown, malfunction.

The Red Shield boiler is the second oldest and the smallest of the units listed. The current limit for Red Shield (0.35 lb/MMBtu) and the proposed limit (0.90 lb/MMBtu) are on a 30-day rolling average, including all operating times. Red Shield does not currently combust low moisture fuel, such as construction and demolition wood waste or reprocessed wood fuel, as most of the other units do. The boiler size, boiler age, and fuel combusted can affect the formation of CO in biomass boilers. Red Shield also does not have add-on NO_x control. NO_x from the Red Shield Biomass Boiler is minimized through boiler operation. NO_x and CO emissions can have an inverse relationship as previously stated.

CO Control Technologies

Boiler CO emissions reductions can be attained through combustion modification techniques, post-combustion controls, good combustion practices, and boiler configuration retrofits.

Overfire Air

The primary combustion modification technique is the use of an overfire air system to ensure complete combustion takes place, often in the upper portion of the boiler's combustion chamber. Complete combustion reduces the level of CO in the exhaust. The amount of emission reductions achieved is dependent on the uncontrolled CO concentration,

the combustion chamber oxygen content, the air distribution between the burner and overfire air ports, and the type and method of fuel fired. CO reductions of up to 25% can be achieved in a boiler with an overfire air system versus a boiler without an overfire air system.

The Biomass Boiler at Red Shield is already equipped with an overfire air system.

Oxidation Catalyst

Post combustion controls for CO reduction is mainly the use of an add-on oxidation catalyst system which passes the boiler flue gas exhaust through a catalyst bed that converts the CO to carbon dioxide. CO reductions of between 65-95% can be achieved in a boiler with an oxidation catalyst. However, oxidation catalyst systems are most efficient in a specific exhaust temperature range (500-1100°F) and when used with clean fuels (natural gas, propane, #2 fuel oil). If the exhaust gases are lower than the optimal temperature range, then additional heat is needed to raise the temperature; and if the catalyst gets plugged by material in 'non-clean' fuel, including particulates and metal compounds from wood, then it loses its effectiveness. To rectify the possible plugging and fouling problems, the oxidation catalyst system can be located downstream of the particulate matter control device, but this location may result in additional blowers and a temperature increase for the system to work properly.

The oxidation catalyst is technically feasible for Red Shield's Biomass Boiler if the catalyst system is located downstream of the current electrostatic precipitator (ESP), the flue gas temperature is raised, and a soot blower is used. Putting the catalyst system in the boiler's HRSG (heat recovery steam generator) section would not be practical, so it would need to be located after the ESP. The temperature would need to be raised from 340°F to 700°F for optimum performance. A soot blower would be needed to keep the catalyst bed free of any build up of particulate or metals.

The cost of increasing the flue gas temperature would require a natural gas duct burner (assumed to be a unit which consumes 26.8 MMBtu natural gas per hour) at a cost of over \$1 million per year based on \$7.31/MMBtu. This burner would also add approximately 10.5 tons of CO that would need to be treated. The energy used by a duct burner is counter to the design of the boiler which recovers heat with an economizer. The overall operating cost associated with the installation of an oxidation catalyst based on a 95% reduction of CO (993.1 tons/yr) is \$1292 per ton of CO reduced. The use of an oxidation catalyst with the added annual expense

of a duct burner would compromise the financial operational viability of the Biomass Boiler.

An oxidation catalyst system has been installed as LAER on units, but would not be considered BACT for this situation.

Good Combustion Practices

Good combustion practices to reduce CO emissions from biomass boilers include good operator and maintenance practices; maintaining proper stoichiometric fuel-to-air ratios; monitoring of fuel quality, temperature, and combustion air distribution; and development and utilization of a startup and shutdown plan. There is no specific percent reduction given to good combustion practices, but without them, CO emissions could increase significantly.

The cost for maintaining good operating practices are the direct operating costs of the operating staff and supervisory staff to make sure the boiler is functioning at its optimal efficiency at all times.

Retrofit to fluidized bed boiler

The manufacturer Babcock & Wilcox has information on retrofitting the boiler from a stoker grate to a fluidized bed which could result in reducing CO emissions by approximately 10%. This is a feasible option; however, in the hierarchy of CO emission reduction options, converting the boiler to a fluidized bed design achieves the lowest incremental gain (an oxidation catalyst has a control efficiency of 65-96%, overfire air and good combustion practices have a control efficiency of greater than 25%). Based on the comparison ranking and the cost of boiler redesign, retrofitting the boiler to a fluidized bed was not considered BACT for the control of CO for Red Shield.

Red Shield's Proposed BACT

Red Shield proposed the continued use of an overfire air system and good combustion practices as BACT with a CO limit of 0.90 lb/MMBtu and 238.5 lb/hr based on the current emission limits for similar sources in Maine as well as sources listed in the RBLC. Red Shield proposed to continue efforts to optimize the Biomass Boiler to reduce the formation of CO. The proposed BACT limits were considered by the Department, with a final conclusion of a two phased approach as described in the *Department Findings – BACT Conclusion* section below.

Additional Federal Considerations

EPA has federal rules under review to which the Red Shield Biomass Boiler will be applicable (as the rule is currently drafted): 40 CFR Part 63, Subpart DDDDD, *National Emission Standards for Hazardous Air Pollutants (NESHAP) for Major Sources: Industrial, Commercial, and Institutional Boilers and Process Heaters*. The rule and the proposed rule revisions address particulate matter (PM), hydrogen chloride (HCl), mercury (Hg), and CO from boilers at major sources across the nation. Red Shield will need to meet the applicable final promulgated limits prior to the compliance deadline in the rule once it is finalized.

Department Findings – BACT Conclusion

Based on the Department's review of Red Shield's application submittal, information from other operating biomass boilers in the State, and Red Shield's historical data, it has been determined that the age of the unit, the moisture content and consistency of the fuel, and startup and shutdown events have a varying effect on CO emissions. However, the Department concludes that Red Shield can achieve additional minimization of CO emissions by focusing on tuning the boiler's overfire air system and the boiler's operating practices.

Historical data from Red Shield over the past 12 months showed large variations in CO emissions on a 24 hour basis from numerous startup and shutdown events, which has a significant bearing when calculating the 30 day rolling average. Red Shield was also focused on repairing the Biomass Boiler turbine generator. The turbine generator failed in March 2010 and was rebuilt as an extraction condensing turbine generator. The rebuild did not increase the steam demand on the Biomass Boiler or change the 16 MW capability of the generator. However, as the generator was being worked on, the Biomass Boiler CO emissions trended up during normal operating periods since the Biomass Boiler was operated at lower than normal loads during that time. The data shows that CO emissions since November of 2011 have been below 0.8 lb/MMBtu on a 30 day rolling average.

The Department concludes that prior to January 1, 2016 Red Shield shall meet a Biomass Boiler CO BACT limit of 0.8 lb/MMBtu on a 30 day rolling average for all operating times, including startup and shutdown, with the following calculation correction: for no more than four hours during startup, Red Shield may replace stack O₂ levels that exceed 14.0% with a value of 14.0 and recalculate the hourly lb/MMBtu actual average for CO using the 14.0 value. This calculation correction is used when O₂ levels skew the correction factor from realistic monitored data when excess air is at a

maximum during initial startup conditions and is consistent with monitoring requirements in 40 CFR Part 75. The CO lb/hr limit shall be 212.2 lb/hr, demonstrated to be in compliance with ambient air quality standards. This limit, effective through December 31, 2015, will allow boiler experts to be brought on-site, allow for staff to continue to fine tune the unit, as well as allow Red Shield to plan for the revised federal requirements in 40 CFR Part 63, Subpart DDDDD when promulgated.

Beginning January 1, 2016, the CO limit shall be 0.45 lb/MMBtu on a 30 day rolling average, excluding startups and shutdowns. Red Shield shall submit a Biomass Boiler startup and shutdown CO emissions minimization amendment application to the Department by January 1, 2015 clearly defining what constitutes startup and shutdown periods. The application shall be developed using appropriate internal and external expertise; and shall include information such as specific startup and shutdown timeframe ranges (including warm and cold startups), operating parameter measurements (ie. boiler temperature, definition of first fire, oxygen levels), and any additional information as necessary. Beginning January 1, 2016, the CO lb/hr limit shall be 119.3 lb/hr.

The exclusion of pre-defined startup and shutdown scenarios recognizes the operational difficulties of the Biomass Boiler during periods of ramping up or down, but will require very specific startup/shutdown conditions to be met for those emissions to be excluded from the 30 day rolling average calculations. Red Shield will be required to include the emissions from the startup/shutdown periods as part of the compliance documentation and reporting. The lb/hr limits on the Biomass Boiler shall be in effect at all times.

In order to document the facility's ongoing efforts to reduce CO emissions, Red Shield shall submit a Biomass Boiler CO emissions progress report to the Department by July 1, 2013. The report shall include progress-to-date on CO emission minimization and the expected plan moving forward to meet the future license requirement and EPA regulations.

C. Biomass Boiler NCG Firing

Red Shield has proposed a revision to the incineration time for firing Low Volume High Concentration (LVHC) gases, also known as Non-Condensable Gases (NCGs), in the Biomass Boiler. The Lime Kiln is the primary incinerator for the LVHC gases (NCGs) generated by the pulp mill, with #5 Power Boiler and the Biomass Boiler as back-up. Currently, primary is defined as greater than 80% of the total incineration time on an annual basis.

Red Shield has requested the Biomass Boiler NCG incineration percentage be increased from 20% to 23.8%. This will result in a 39.9 tons/year increase of SO₂, based on the licensed limit of 85 lb/hr when firing NCGs.

The Department approves the increase in NCG incineration time in the Biomass Boiler. Operationally, the Lime Kiln can build up 'rings' within the unit which need to be removed during shutdowns and allowing the slight increase in use of the Biomass Boiler may lessen this build up. Red Shield has also noted a slight decrease in CO when NCGs are fired in the Biomass Boiler. The Biomass Boiler SO₂ emissions were included in a previous ambient air quality analysis and showed compliance with ambient air quality standards. The short term SO₂ emissions are not increasing with this amendment.

III. AMBIENT AIR QUALITY ANALYSIS

A. Overview

A refined ambient air quality dispersion modeling analysis was performed to show that emissions from Red Shield, in conjunction with other sources, will not cause or contribute to violations of National Ambient Air Quality Standards (NAAQS) for CO. Since SO₂, PM₁₀ and NO₂ were addressed as part of a previous modeling analysis and because no emissions changes for these pollutants are proposed, no further modeling for these pollutants is required.

The current licensing action for Red Shield represents a major modification to an existing major source. Based upon the magnitude of proposed emissions increase and the distance from the source to any Class I area, the affected Federal Land Managers (FLMs) and MEDEP-BAQ have determined that an assessment of Class I Air Quality Related Values (AQRVs) is not required.

B. Model Inputs

The AERMOD-PRIME refined model was used to address standards and increments in all areas. If applicable, the modeling analysis accounted for the potential of building wake and cavity effects on emissions from all modeled stacks that are below their calculated formula GEP stack heights.

All modeling was performed in accordance with all applicable requirements of the Maine Department of Environmental Protection, Bureau of Air Quality (MEDEP-BAQ) and the United States Environmental Protection Agency (USEPA).

A valid 5-year hourly off-site meteorological database was used in the AERMOD-PRIME refined modeling analysis. Wind data was collected at two levels (10 and 76 meters) at Red Shield's meteorological monitoring site during

the 5-year period 1991-1995. Surface data collected at the Bangor National Weather Service (NWS) site were substituted for any missing data. All other missing data were interpolated or coded as missing, per USEPA guidance. In addition, hourly Bangor NWS data, from the same time period, were used to supplement the primary surface dataset for the required variables that were not explicitly collected at the monitoring site.

The surface meteorological data was combined with concurrent hourly cloud cover data collected at the Bangor NWS site and upper-air data collected from the Caribou NWS site. Missing cloud cover and/or upper-air data values were interpolated or coded as missing, per USEPA guidance.

All necessary representative micrometeorological surface variables for inclusion into AERMET (surface roughness, Bowen ratio and albedo) were calculated using AERSURFACE from procedures recommended by USEPA.

Point-source parameters, used in the modeling for are listed in Table III-1.

TABLE III-1 : Point Source Stack Parameters

Facility/Stack	Stack Base Elevation (m)	Stack Height (m)	GEP Stack Height (m)	Stack Diameter (m)	UTM Easting NAD83 (km)	UTM Northing NAD83 (km)
CURRENT/PROPOSED						
Red Shield						
• Biomass Boiler	26.95	41.15	94.01	1.98	528.774	4973.860
• #5 Boiler	27.68	54.86	97.61	2.29	528.763	4973.939
• Recovery Boiler	24.87	76.20	114.18	2.95	528.906	4973.901
• Lime Kiln	27.28	49.68	111.77	1.22	528.826	4974.053
• Smelt Dissolving Tank	24.93	76.20	114.12	1.50	528.904	4973.913
• Gas Turbine	27.64	24.38	40.50	2.44	528.749	4973.729

Emission parameters for CO NAAQS modeling are listed in Table III-2.

TABLE III-2 : Stack Emission Parameters

Facility/Stack	Averaging Periods	CO (g/s)	Stack Temp (K)	Stack Velocity (m/s)
MAXIMUM LICENSE ALLOWED				
Red Shield				
• Biomass Boiler	All	38.55	444.00	15.34
• #5 Boiler	All	3.45	455.40	9.50
• Recovery Boiler	All	39.40	505.40	17.65
• Lime Kiln	All	10.29	338.70	10.30
• Smelt Dissolving Tank	All	0.01	348.70	3.78
• Gas Turbine	All	1.22	735.90	78.22

C. Single Source Modeling Impacts

AERMOD-PRIME refined modeling results for Red Shield alone are shown in Table III-3. Any maximum predicted impacts that exceeded their respective significance level are indicated in boldface type.

TABLE III-3 : Maximum AERMOD-PRIME Impacts from Red Shield Alone

Pollutant	Averaging Period	Max Impact ($\mu\text{g}/\text{m}^3$)	Receptor UTM E (km)	Receptor UTM N (km)	Receptor Elevation (m)	Class II Significance Level ($\mu\text{g}/\text{m}^3$)
CO	1-hour	535.74	528.474	4973.560	29.75	2000
	8-hour	226.99	528.774	4973.160	30.68	500

D. Combined Source Modeling Impacts

Because all modeled impacts from Red Shield alone were less than significance levels for all CO averaging periods, no background data or other local sources need to be included in the analysis.

E. Class I Impacts

The current licensing action for Red Shield represents a major modification to an existing major source. Based upon the magnitude of proposed emissions increase and the distance from the source to any Class I area, the affected Federal Land Managers (FLMs) and MEDEP-BAQ have determined that an assessment of Class I Air Quality Related Values (AQRVs) is not required.

F. Summary

In summary, it has been demonstrated that emissions from Red Shield will not cause or contribute to violations of National Ambient Air Quality Standards (NAAQS) for CO.

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-180-77-4-A pursuant to the preconstruction licensing requirements of 06-096 CMR 115 and subject to the standard and special 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

[Note: The following requirements shall be included in air emissions license A-180-71-A-I through amendment A-180-70-D-A, being issued concurrently with this new source review amendment.]

(1) **Biomass Boiler CO**

A. CO emissions from the Biomass Boiler shall not exceed the following:

Pollutant	Ib/MMBtu	Averaging Time	Compliance Method
CO	0.8 (Prior to January 1, 2016)	30 day rolling ave, at all operating times	CEM
	0.45 (Beginning January 1, 2016)	30 day rolling ave, excluding startup and shutdown	CEM

Pollutant	Ib/hr*	Compliance Method
CO	212.2 (Prior to January 1, 2016)	40 CFR Part 60, Appendix A
	119.3 (Beginning January 1, 2016)	40 CFR Part 60, Appendix A

* Ib/hr limits shall apply at all times.

[06-096 CMR 115, BACT]

B. Calculations Corrections

1. For no more than four (4) hours during start-up, Red Shield may make the following calculation corrections for the Biomass Boiler: Stack O₂ levels that exceed 14.0% may be replaced with a value of 14.0.
2. Hourly lb/MMBtu averages for CO may be recalculated if the observed stack O₂ is greater than 14.0% for no more than four (4) hours during startup.
3. The recalculated hourly lb/MMBtu averages may be used for compliance purposes.

[06-096 CMR 115, BACT]

- C. By July 1, 2013, Red Shield shall submit a Biomass Boiler CO emissions progress report to the Department. The report shall include progress-to-date on CO emission minimization and the expected plan to meet the future license requirement and EPA regulations. [06-096 CMR 115, BACT]

- D. By January 1, 2015 Red Shield shall submit a Biomass Boiler startup and shutdown CO emissions minimization amendment which clearly defines startup and shutdown periods. If found acceptable, the plan shall be approved by the Department in the form of an issued air license amendment. The amendment application shall be developed using appropriate internal and external expertise; and shall include information such as specific startup and shutdown timeframe ranges (including warm and cold startups), operating parameter measurements (ie. boiler temperature, definition of first fire, oxygen levels), and any additional information as necessary. [06-096 CMR 115, BACT]

(2) NCG Incineration

The Lime Kiln shall be the primary incinerator for the LVHC gases (NCGs) generated by the pulp mill, with the Biomass Boiler as back-up, and #5 Power Boiler as the secondary back-up. Primary shall be defined as greater than 70.3% of the total incineration time on an annual basis. If a kiln failure occurs, Red Shield shall incinerate the LVHC gases in the Biomass Boiler or #5 Power Boiler. Records shall be maintained to document compliance with the 70.3% LVHC gas incineration time in the Lime Kiln, the use of the Biomass Boiler as back-up (no greater than 23.8% incineration time), and the use of the #5 Power Boiler as secondary back-up. [06-096 CMR 124, TRS, and 06-096 CMR 115, BACT]

(3) Boiler NESHAP

Red Shield shall meet all applicable requirements of 40 CFR Part 63, Subpart DDDDD, *National Emission Standards for Hazardous Air Pollutants for Major*

Red Shield Acquisition, LLC
Penobscot County
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Sources: *Industrial, Commercial, and Institutional Boilers and Process Heaters* for the Biomass Boiler. [40 CFR Part 63, Subpart DDDDD]

DONE AND DATED IN AUGUSTA, MAINE THIS 12th DAY OF October, 2012.

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BY: Melania B. B. B.
PATRICIA W. AHO, COMMISSIONER

PLEASE NOTE ATTACHED SHEET FOR GUIDANCE ON APPEAL PROCEDURES

Date of initial receipt of application: October 17, 2011

Date of application acceptance: October 21, 2011

Date filed with the Board of Environmental Protection:

This Order prepared by Kathleen E. Tarbuck, Bureau of Air Quality.

