TECHNICAL EVALUATION
&
PRELIMINARY DETERMINATION

APPLICANT

Buckeye Florida, Limited Partnership
One Buckeye Drive
Perry, FL 32348

Buckeye Foley Mill
Facility ID No. 1230001

PROJECT

Project No. 1230001-042-AC (PSD-FL-397B)
Application for Minor Source Air Construction Permit Revision
No. 3 Recovery Boiler Staged Air Improvements

COUNTY

Taylor County, Florida

PERMITTING AUTHORITY

Florida Department of Environmental Protection
Division of Air Resource Management
Office of Permitting and Compliance
Division of Air Resource Management
2600 Blair Stone Road, MS#5505
Tallahassee, Florida 32399-2400

November 30 2012

1. GENERAL PROJECT INFORMATION

1.1. Air Pollution Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters: 62-4 (Permits); 62-204 (Air Pollution Control – General Provisions); 62-210 (Stationary Sources – General Requirements); 62-212 (Stationary Sources – Preconstruction Review); 62-213 (Operation Permits for Major Sources of Air Pollution); 62-296 (Stationary Sources - Emission Standards); and 62-297 (Stationary Sources – Emissions Monitoring). Specifically, air construction permits are required pursuant to Chapters 62-4, 62-210 and 62-212, F.A.C.

In addition, the U. S. Environmental Protection Agency (EPA) establishes air quality regulations in Title 40 of the Code of Federal Regulations (CFR). Part 60 specifies New Source Performance Standards (NSPS) for numerous industrial categories. Part 61 specifies National Emission Standards for Hazardous Air Pollutants (NESHAP) based on specific pollutants. Part 63 specifies NESHAP based on the Maximum Achievable Control Technology (MACT) for numerous industrial categories. The Department adopts these federal regulations in Rule
62-204.800, F.A.C.

1.2. Facility Description and Location

The applicant operates an existing Pulp Mill (SIC No. 2611) at One Buckeye Drive, Perry, Taylor County, Florida 32348. This facility is located east of US 19, south of SR 30, southeast of Perry, Taylor County; UTM Coordinates: Zone 17, 256.7 km East and 3328.7 km North; Latitude: 30°03’59” North and Longitude: 83°33’12” West. This site is an area that is in attainment (or designated as unclassifiable) for all pollutants subject to a National Ambient Air Quality Standard (NAAQS).

1.3. Facility Regulatory Categories

- The facility is a major source of hazardous air pollutants (HAP).
- The facility does not operate units subject to the acid rain provisions of the Clean Air Act.
- The facility is a Title V major source of air pollution in accordance with Chapter 213, F.A.C.
- The facility is a major stationary source in accordance with Rule 62-212.400, F.A.C. for the Prevention of Significant Deterioration (PSD) of Air Quality.

1.4. Project Description

This permit will extend and revise Permit No. 1230001-023-AC for the Foley Energy Independence Project (EIP). Very briefly, the originally permitted Foley EIP included the following modifications:

- Conversion of the No. 2 Recovery Boiler from direct-contact evaporator units to low-odor non-direct contact units. This part of the project is complete.
- Addition of a condensing steam turbine-electrical generator. This part of the project is complete.
- Conversion of the No. 3 Recovery Boiler from direct-contact evaporator units to low-odor non-direct contact units including shutdown of the Black Liquor Oxidation System on Recovery Boiler No. 3 after conversion. This part of the project is complete.

Since the completion of the conversion of the No. 3 Recovery Boiler, the unit has experienced substantially increased shutdowns due to problems that the company wishes to rectify by physical changes to the staged air system. Following is the description provided by the company:

> *“Subsequent to the conversion of the No. 3 Recovery Boiler, the boiler has experienced an extreme rate of fouling of the upper furnace heat transfer surface. Due to the excessive fouling the No. 3 Recovery Boiler has been required to shut down for cleaning approximately every three weeks as compared to pre-conversion operation of 6 months between shut downs.*

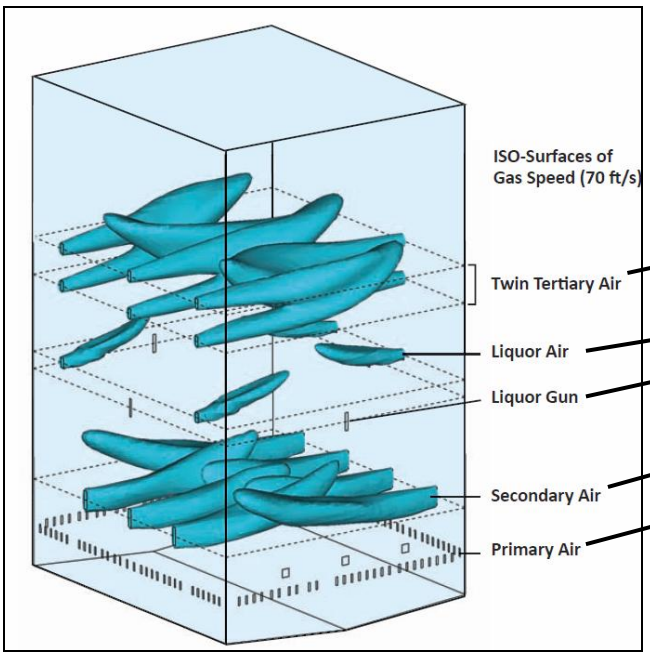
"The combination of the higher air demand and the greater black liquor droplets size leads to a higher rate of liquor droplets being entrained and combusted higher in the furnace than pre-conversion. As a result, much higher temperatures are occurring in the upper furnace and the boiler is plugging in 3 weeks rather than the historical 5 to 6 months. The higher flue gas temperatures in the upper furnace also give serious risk of higher corrosion rates of the screen tubes and superheaters. Boiler tube leaks and safety impacts are expected to occur if the process problems are not addressed.

"Buckeye proposes to implement additional physical changes to the No. 3 Recovery Boiler to allow the permitted black liquor rate to be achieved while ,maintaining compliance with all emission limits. To determine the physical changes which must be made, a computer modeling study of the No. 3 Recovery Boiler furnace has been initiated by the boiler manufacturer who performed the conversion to determine the modifications that will provide the best combustion improvements. There is a reasonably high probability that the boiler configuration found by the modeling study will include the following components:

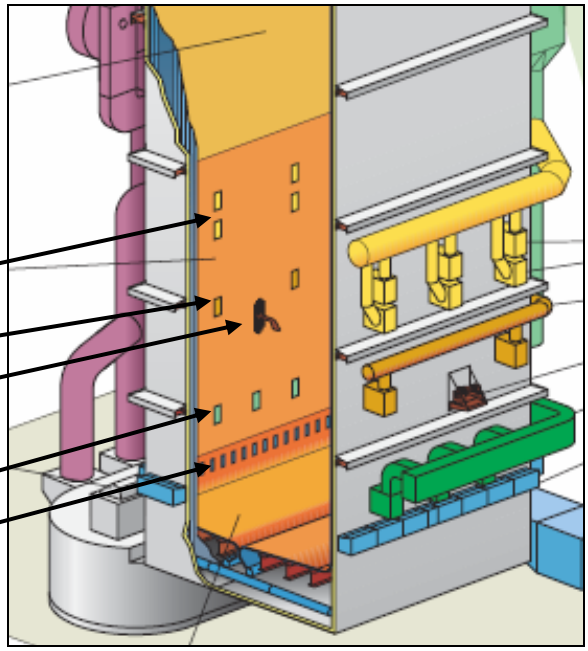
- *Additional primary air ports near the furnace corners may be added, or air port sizes could change, etc.*
- *A true secondary air zone (a few feet above the primary air zone) would likely be required. The configuration might be two-wall interlaced arrangement with air ports on just two walls.*
- *The existing secondary air zone (one level above the liquor guns) would require modification and become the tertiary air zone. These changes would likely eliminate the existing air ports, in favor of a two –wall interlaced arrangement with air ports on just two walls.*

"Since the new air system layout would introduce air more effectively in each combustion zone, and provide better mixing of oxygen and black liquor, the total air demand for the new system may be expected to be slightly lower at a given rate as compared to the existing system. The additional changes would also likely produce improved carbon monoxide (CO) control capability."

For reference, the Department downloaded the following two diagrams from one supplier's brochure that has experience in the design of modern black liquor boilers with advanced air staging features.



Fluid Dynamics Modeling of Staged Air System.



Physical features of Modern Staged Air System

Such innovations specifically improve furnace nitrogen oxides (NO_X), carbon monoxide (CO) and black liquor carryover characteristics. For example the system shown in the diagrams is described to achieve the following:

- Increased air staging reduces NO_X emissions;
- Reverse interlaced secondary air ports minimize gas plume along the furnace rear wall providing lower CO emissions and reduced maintenance;
- Single-level secondary air provides excellent control of char bed combustion for both low and high solids firing, which minimizes operational upsets and auxiliary natural gas fuel consumption;
- Liquor air level reduces fine particle carryover above the liquor guns; and
- Twin tertiary air level ports aligned with the liquor level ports further reduce particle carryover, improve mixing and reduce emissions, enabling extension of the run time between water washes.

1.5. Processing Schedule

October 23, 2012 Received the application to extend and revise Foley EIP PSD permit.

November 21, 2012 Request made to permittee for additional information.

November 28, 2012 Additional information provided by the applicant, application complete.

November 30, 2012 Issued draft permit package.

2. AIR POLLUTION REGULATIONS AND APPLICABILITY DETERMINATIONS

2.1. Department Regulations

Projects at stationary sources with the potential to emit air pollution are subject to the applicable environmental laws specified in Section 403 of the Florida Statutes (F.S.). The statutes authorize the Department of Environmental Protection (Department) to establish regulations regarding air quality as part of the Florida Administrative Code (F.A.C.), which includes the following applicable chapters:

Table 1. Applicable Air-Related Rules from the Florida Administrative Code

Chapter	Description
62-4	Permits
62-17	Power Plant Siting
62-204	Air Pollution Control – General Provisions
62-210	Stationary Sources of Air Pollution – General Requirements
62-212	Stationary Sources – Preconstruction Review
62-213	Operation Permits for Major Sources (Title V) of Air Pollution
62-296	Stationary Sources – Emission Standards
62-297	Stationary Sources – Emissions Monitoring

2.2. Federal Regulations

The U.S. Environmental Protection Agency (EPA) establishes air quality regulations in 40 CFR 60 that identify New Source Performance Standards (NSPS) for a variety of industrial activities. EPA also establishes the minimum emission guidelines and compliance schedules for existing facilities of certain industries in 40 CFR 60. 40 CFR 61 generally specifies National Emission Standards for Hazardous Air Pollutants (NESHAP). 40 CFR 63 generally specifies NESHAP provisions based on the Maximum Achievable Control Technology (MACT) for given source categories. Federal regulations adopted by reference are given in Rule 62-204.800, F.A.C. State regulations approved by EPA are given in 40 CFR 52, Subpart K – Florida; also known as the State Implementation Plan (SIP) for Florida. Link to 40 CFR 52, Subpart K

3. PSD APPLICABILITY

3.1. General PSD Applicability

The Department regulates major stationary sources in accordance with Florida's PSD program pursuant to Rule 62-212.400(PSD), F.A.C. PSD preconstruction review is required in areas that are currently in attainment with the state and federal ambient air quality standards (AAQS) or areas designated as "unclassifiable" for these regulated pollutants.

Commonly addressed PSD pollutants include: NO_X, carbon monoxide (CO), sulfur dioxide (SO_2), particulate matter (PM), PM smaller than 10 micrometers (µm) (PM_{10}), PM smaller than 2.5 µm ($PM_{2.5}$), volatile organic compounds (VOC), sulfuric acid mist (SAM), lead (Pb), fluorides (F), and mercury (Hg).

Additional PSD pollutants, including some that are specific to the pulp and paper industry are: hydrogen sulfide (H_2S), total reduced sulfur (TRS) including H_2S, reduced sulfur compounds (RSC) including H_2S, municipal waste combustor (MWC) organics measured as total tetra- through octa-chlorinated dibenzo-p-dioxins and dibenzofurans (dioxin/furan), MWC metals measured as PM; MWC acid gases measured as SO_2 and HCl, and municipal solid waste (MSW) landfill emissions as non-methane organic compounds (NMOC).

As defined in Rule 62-210.200(Definitions), F.A.C., a stationary source is a "major stationary source" (major PSD source) if it emits or has the potential to emit (PTE):

- 250 tons per year (tons/year) or more of any PSD pollutant; <u>or</u>
- 100 tons/year or more of any PSD pollutant <u>and</u> the facility belongs to one of the 28 listed PSD major facility categories.

The list given in the citation includes the category of "Kraft pulp mills". The given category applies to the Buckeye Foley Mill. The Buckeye Foley Mill is a major stationary source based on actual emissions of and potential to emit 100 tons/year or more of several individual PSD pollutants.

For major stationary sources such as the Buckeye Foley Mill, PSD applicability for modification projects is based on thresholds known as the significant emission rates (SER) as defined in Rule 62-210.200 (Definitions), F.A.C. Any "net emissions increase" as defined in Rule 62-210.200 (Definitions), F.A.C. of a PSD pollutant from the project that equals or exceeds the respective SER is considered "significant".

SER also means any emissions rate or any net emissions increase of a PSD pollutant associated with a major stationary source or major modification which would construct within 10 km of a Class I area and have an impact on such area equal to or greater than 1 gram per cubic meter, 24-hour average.

Although a facility may be "major" (i.e. emits or has the potential to emit 100 or 250 tons/year as applicable) for only one PSD pollutant, a project must include Best Available Control Technology (BACT) for any PSD pollutant increase in that equals or exceeds the corresponding significant emission rate given in Table 2.

Table 2. List of Significant Emission Rates by PSD-Pollutant Relevant to the Facility [2]

Pollutant	SER (tons/year)	Pollutant	SER (tons/year)
PM	25	PM_{10}	15
$PM_{2.5}$	10	$PM_{2.5}$ (NO_X) [1]	40
$PM_{2.5}$ (SO_2) [1]	40	CO	100
SO_2	40	NO_X	40
Ozone (NO_X) [1]	40	Ozone (VOC) [1]	40
Sulfuric acid mist (SAM)	7	fluoride	3
mercury	0.1	lead	0.6

1. $PM_{2.5}$ is also regulated through precursors (NO_X and SO_2); Ozone (O_3) is regulated through precursors (VOC and NO_X).
2. There is federal SER of 75,000 tons/year for Greenhouse Gases (GHG) as carbon dioxide equivalent (CO_2e) that has not been incorporated into Department rules.

According to 40 CFR 52.21, six greenhouse gases (GHG), are also subject to regulation at new stationary sources that will emit or have the potential to emit 100,000 tons/year (SER equal to 75,000 tons/year) expressed as the carbon dioxide equivalent emissions (CO_2e). This requirement has not been incorporated into Department rules but is a separate requirement of the EPA.

3.2. PSD Applicability for Project

Methodology for Calculations of Baseline Actual Emissions and Projected Actual Emissions

To determine whether the project causes net emissions increases equal to or greater than the respective SER (triggering PSD) requires a comparison of recent "baseline actual emissions" with future "projected actual emissions". According to Rule 62-210.200(Definitions), F.A.C., for an existing unit (other than an electric steam generating unit):

"Baseline Actual Emissions" means the rate of emissions, in tons/year of a PSD pollutant, at which the emissions unit actually emitted the pollutant during any consecutive 24-month period selected by the owner or operator within the 10-year period immediately preceding the date a complete permit application is received by the Department.

"Projected Actual Emissions" means the maximum annual rate, in tons/year, at which an existing emissions unit is projected to emit a PSD pollutant in ***any one*** *of the 5 years following the date the unit resumes regular operation after the project, or in* ***any one*** *of the 10 years following that date, if the project involves increasing the emissions unit's design capacity or its potential to emit that PSD pollutant and full utilization of the unit would result in a significant emissions increase or a significant net emissions increase at the major stationary source. One year is one 12-month period. In determining the projected actual emissions, the Department:*

(a) Shall consider all relevant information, including historical operational data, the company's own representations, the company's expected business activity and the company's highest projections of business activity, the company's filings with the State or Federal regulatory authorities, and compliance plans or orders, including consent orders; and
(b) Shall include fugitive emissions to the extent quantifiable and emissions associated with startups and shutdowns; and
(c) Shall exclude that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month 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; or
(d) In lieu of using the method set out in paragraphs (a) through (c) above, may be directed by the owner or operator to use the emissions unit's potential to emit, in tons per year.

Projected Actual Emissions

The conversion of the No. 3 Recovery Boiler from direct-contact evaporator units to low-odor non-direct contact units was part of the project permitted in August 2008. Permit No. 1230001-023-AC/PSD-FL-379 is accessible at the following link: Link to Foley Energy Independence Project Permit

A PSD applicability review was conducted for the original project. The PSD applicability analysis and determination of best available control technology (BACT) are included in the Technical Evaluation and Preliminary Determination document accessible at: Project Independence PSD/BACT

The following table from the original technical document summarizes the applicant's estimated emissions changes for the boilers due to the overall Foley Energy Independence Project (FEIP). PSD reviews and BACT determinations were conducted for the pollutants listed. Furthermore, in the permit for the FEIP, the Department requires the annual reporting of actual emissions in future years to determine whether emission increases of other PSD-pollutants exceed the respective SER's. The pollutants for which reporting is required are SAM, SO_2, TRS and VOC emissions for the No. 1 Power Boiler, No. 2 Power Boiler, No. 1 Bark Boiler, No. 2 Bark Boiler, No. 2 Recovery Boiler, No. 3 Recovery Boiler and the Pulping and Multi-effect Evaporator System.

Table 3. Baseline Actual and Future Actual Emissions Related to Foley Energy Independence Project

Pollutant	No. 2 Recovery Boiler (tons/year)			No. 3 Recovery Boiler (tons/year)		
	Baseline	Projected Actual	Change	Baseline	Projected Actual	Change
CO	243.6	879.8	+ 636.2	195.8	828.2	+ 632.4
NO_X	245.0	318.8	+ 73.8	207.4	310.0	+ 102.6
PM	73.6	129.4	+ 55.8	33.8	121.7	+ 87.9
PM_{10}	56.5	92.2	+ 35.7	26.0	86.7	+ 60.7

PSD Applicability for Revised Project

Work on the No. 3 Recovery Boiler under the FEIP was completed in March 2012. The No. 3 Recovery Boiler is in compliance with the BACT emission limits specified in the permit but is unable to achieve the targeted production rate as described above.

For the purposes of PSD applicability review for the additional work, the Department does not consider the No. 3 Recovery Boiler to have achieved normal operation following the FEIP. In accordance with Rule 62-210.200(11), F.A.C. (Definition of actual emissions):

(b) The Department may presume that unit-specific allowable emissions for an emissions unit are equivalent to the actual emissions of the emissions unit provided that such unit-specific allowable emissions limits are federally enforceable.

(c) For any emissions unit that has not begun normal operations on a particular date, actual emissions shall equal the potential emissions of the emissions unit on that date.

The additional work to increase air staging on the No. 3 Recovery Boiler will not increase emissions from a practical or definitional point of view. Also there has not been and will not be a discontinuation of work for a period of 18 months in the FEIP which might otherwise make the permit no longer valid. Finally, it is not necessary for the Department to conduct a new BACT review on the No. 3 Recovery Boiler for the following reason:

The applicant originally identified and rejected catalytic oxidation system as the top control option for CO. The Department agrees with the applicant on this conclusion, though not necessarily with the rationale. The applicant identified the next available top control option for CO as combustion control. The discussion made reference to an over-fire air (OFA) system that stages combustion air to promote efficient combustion while reducing emissions. It stated *"proper mixing is accomplished by manually adjusting air flow to the oxygen-deficient zone (primary, secondary or* ***tertiary zone****)"*.

The Department accepted the applicant's proposal to minimize CO emissions by "boiler design and combustion control", and described *"a tertiary OFA system to complete combustion"*. However the permit did not specifically require the tertiary air (that will be added by the present project).

Basically, the staged air project will actually install the BACT envisioned but not specifically required by the permit. Modifying the permit to require implementation of the additional air staging would satisfy a review of the project to reassess the BACT.

4. PRELIMINARY DETERMINATION

The air staging project will be added to the scope of work of the FEIP. The permit will be extended through 2014 to allow time to complete the air staging project. The Department makes a preliminary determination that the proposed project will comply with all applicable state and federal air pollution regulations as conditioned by the draft permit. Leigh Ann Pell is the project engineer responsible for reviewing the application and drafting the permit. Additional details of this analysis may be obtained by contacting Ms. Pell at 850-717-9033 or at leigh.pell@dep.state.fl.us or at the Department's Office of Permitting and Compliance at Mail Station #5505, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400.