AIR DISPERSION MODELING
PROTOCOL FOR BART
RAYONIER PERFORMANCE FIBERS, LLC
JESUP, GEORGIA

Submitted For:

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SECTION 1. INTRODUCTION

Under regional haze regulations, the Environmental Protection Agency (EPA) has issued final guidelines dated July 6, 2005 for Best Available Retrofit Technology (BART) determinations. The regional haze rule includes a requirement for BART for certain large stationary sources. Sources are BART-eligible if they have potential emissions of at least 250 tons per year of a visibility-impairing pollutant, were put in place between August 7, 1962 and August 7, 1977, and fall within one of the 26 listed source categories in the guidance. A BART engineering evaluation using five statutory factors – 1) existing controls; 2) cost; 3) energy and non-air environmental impacts; 4) remaining useful life of the source; 5) degree of visibility improvement expected from the application of controls – is required for any BART-eligible source that can be reasonably expected to cause or contribute to impairment of visibility in Class I areas.

States must develop their implementation plans by December 2007. States will first identify the facilities that will have to reduce emissions under BART and then set BART emissions limits for those facilities.

As part of this process, the Visible Improvement State and Tribal Association of the Southeast (VISTAS) members agreed to develop a common BART Modeling Protocol[1] for use by the states and facilities subject to BART. The VISTA recommended process for evaluating the BART-eligible sources are:

- Identify the BART eligible sources based on source category, when it was put in service, and the magnitude of emissions of one or more "visibility-impairing pollutants".

- Determine whether the BART eligible source can be excluded from BART controls by demonstrating that the source cannot be reasonably expected to cause or contribute to visibility impairment in a Class I area.

- Determine BART controls for the source by considering various control options and selecting the "best" alternative.

- Incorporate the BART determination into the State Implementation Plan (SIP).

The objective of this VISTAS' BART Modeling Protocol is to describe common procedures for air quality modeling to support BART determinations that are consistent with the EPA guidelines. The protocol will serve as the basis for establishing a common understanding among the organizations who will be performing the BART analyses or reviewing the BART modeling results, including VISTAS, State and Local air regulatory agencies, Environmental Protection Agency (EPA,) Federal Land Managers (FLMs), source operators, and contractors for the sources.

A BART-eligible source will be required to submit a site-specific modeling protocol to the State for review and approval prior to performing CALPUFF modeling. States will consult with FLMs and the EPA when evaluating the site-specific BART protocols. The site-specific protocol will include the source-specific data on source location, stack parameters, and

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[1] "Protocol for the Application of the CALPUFF Modeling for Analyses of Best Available Retrofit Technology (BART)", Visibility Improvement State and Tribal Association of the Southeast, March 2006.

emissions. The methods of the VISTAS common modeling protocol will be followed in the site-specific protocol unless the source proposes to the State alternative methods or assumptions.

The Rayonier Performance Fibers, LLC (Rayonier) Mill located in Jesup, Georgia has several BART eligible sources. These are the No. 5 Recovery Furnace, the No. 5 Smelt Dissolving Tank, wastewater treatment system, C-mill (digesters, brownstock washers and bleach plant), D-evaporators and the No. 3 Power Boiler. However, only the No. 5 Recovery Furnace, the No. 5 Smelt Tank and the No. 3 Power Boiler emit visibility impairing pollutants. This protocol outlines the approach to be taken to conduct the CALPUFF modeling for Rayonier.

SECTION 2. MILL LOCATION

The Rayonier mill is located northeast of downtown Jesup in Wayne County at approximate Universal Transverse Mercator (UTM) coordinates 420,019 meters Easting and 3,502,929 meters Northing, NAD83, Zone 17.   Modeling for BART–eligible sources must be evaluated for Class I areas located within 300 km of the facility. Table 2-1 lists the Class I areas within 300 km of the Jesup mill. The distances given in Table 2-1 are the approximate distance from the mill to the nearest boundary of the Class I Area.

Table 2-1
Class I Areas within 300 Kilometers
Rayonier, Jesup, Georgia

Class I Area	State	Distance (kilometers)	Direction From Plant
Okefenokee Wilderness Area	Georgia	76	Southwest
Wolf Island Wilderness Area	Georgia	58	Southeast
Cape Romain	South Carolina	246	Northeast
St. Marks	Florida	264	Southwest
Bradwell Bay	Florida	302	Southwest

SECTION 3. MODELING APROACH

According to 40 CFR Part 51, Appendix Y, dispersion modeling can be used to determine that an individual BART-eligible source can reasonably be anticipated to cause or contribute to visibility impairment in a Class I area and thus not be subject to BART requirements. A BART-eligible source that is responsible for a 1.0 deciview (dv) change or more at a Class I area is considered to "cause" visibility impairment. A BART-eligible source that is responsible for a 0.5 dv change or more at a Class I area is considered to "contribute" to visibility impairment in a Class I area. Sources determined to cause or contribute to visibility impairment in a Class I area are subject to BART requirements.

Since the distance to each of these Class I areas is greater than 50 km, the use of CALPUFF to determine visibility impacts is acceptable. The CALMET/CALPUFF (as provided by VISTAS) modeling system will be used. The analysis will follow guidance provided in the VISTAS guidance document. Features of the CALPUFF modeling system include:

- A Gaussian puff dispersion formulation: Plumes are treated as a series of Gaussian puffs that move and disperse according to local meteorological conditions that vary in time and space.

- Three-dimensional meteorology: Wind and other meteorological variables are allowed to vary three-dimensionally.

- Wet and dry deposition: Deposition processes are included for both particles and gaseous pollutants that depend on the characteristics of the pollutant, local surface roughness and meteorology. The model accounts for the mass removed from the plume when deposition occurs. Post-processing will be performed using CALPOST (Version 5.4) to predict annual deposition of nitrogen (N) and sulfur (S).

- Aerosol chemistry: Secondary aerosol formation is treated according to a first-order mechanism that depends on the time of day, relative humidity, meteorology, background ozone concentration, and background ammonia concentration.

- Post-processing by CALPOST specifically to assess regional haze: Visibility is characterized using extinction coefficients that vary with the concentrations of the aerosol species present, extinction characteristics of each aerosol species, and relative humidity.

Based on the VISTAS guidance, if the BART eligible potential emissions of SO_2 in tons per year (Q, based on the actual emissions for 2002) divided by the distance to each Class I boundary (d, in kilometers) is greater than 10, the source is subject to BART and no further exemption modeling will be performed by VISTAS. The source either can proceed with using CALPUFF to evaluate BART control options or the source can conduct its own modeling to determine impacts on the Class I area. If Q/d is less than 10, then VISTAS will conduct further modeling of the facility.

For Rayonier the 2002 actual emissions of SO_2 from the BART-eligible sources is 1,715 tons per year (based on information received from EPD). Table 3-1 shows the calculation for the five Class I areas located within 300 km of Rayonier. Based on this calculation, modeling will be conducted for Okefenokee and Wolf Island Class I.

Table 3-1
Class I Modeling

Class I Area	Distance from Rayonier (km)	Q/d	BART Modeling Required?
Okefenokee	76	23	Yes
Wolf Island	58	30	Yes
Cape Romain	246	7.0	No
St. Marks	264	6.5	No
Bradwell Bay	302	5.7	No

To further determine if a BART-eligible source is subject to BART, a two tier approach is recommended by VISTAS. The first step is to model the facility (sources) with CALPUFF using a 12-km grid CALMET file (this is available from EPD). If the facility modeling shows twenty-four hour impacts less than 0.5 dv, then no further modeling is required. If the facility modeling impacts are greater than 0.5 dv, then further modeling can be conducted using a more refined 4 km CALMET input file. If the impacts using the 4 km CALMET input file are less than 0.5 dv, then the source is exempted from further BART evaluation. If the impacts exceed 0.5 dv, then the Rayonier sources are required to implement BART. This would require further modeling.

For the 12-km initial modeling exemption test, the highest single 24-hour average value across the receptors in the Class I area will be compared to the threshold value of 0.5 dv. If using the single highest 24-hr average value proves to be too conservative f a screening level, VISTAS may allow some exceedances of the threshold value for exemption purposes, up to no more than the 98th percentile value. The 12-km modeling results can be used to focus finer grid modeling for exemption purposes on only those Class I areas where impacts greater than 0.5 dv were projected in the 12-km modeling. For the grid (4 km or less) analyses, the 98th percentile impact value for the 24-hr average will be used. Either the 8th highest day in each year or the 22nd highest day in the 3-year period, whichever is more conservative, will be used for comparison to the exemption threshold.

3.1 MODEL CONFIGURATION AND SETTINGS

The 12 km and/or 4 km CALPUFF modeling will be conducted using the settings specified in Section 4 of the VISTAS protocol document.

3.1.1 EMISSIONS AND STACK PARAMETERS

Currently, Rayonier is developing the emission rate information to be used in the modeling. Once this is complete, Rayonier will supply EPD with this information. This will include the maximum 24-hour actual emissions of SO_2, H_2SO_4, NO_x, and PM_{10}. PM_{10} emissions will be broken down further into the appropriate filterable and condensable portions and further into elemental carbon (soot), soil, coarse particulate and organics. The VISTAS Protocol specifies a priority ranking of how to obtain the emission rates for use with the BART exclusion modeling as follows:

- 24-hour maximum value emissions for the period 2001-2003 based on continuous emission monitoring data.

- 24-hour maximum value from continuous emission monitoring data.

- Facility stack tests.

- Potential to emit.

- Permit allowable rates.

- Emission factors from AP-42.

PM speciation will be obtained from AP-42, stack testing and the VISTAS website http://www.vistas-sesarm.org/BART/calpuff.asp

Table 3-2 shows the stack parameters to be used for the BART-eligible Rayonier sources. As specified in the VISTAS protocol, building downwash will not be considered.

Table 3-2
Stack Parameters[a]

Source	UTM East (m)	UTM North (m)	Height (m)	Diameter (m)	Temperature (^{o}K)	Exit Velocity (m/s)
No. 3 Power Boiler[b]	C	c	57	2.58	521	27.69
No. 5 Recovery Furnace	420,163	3,502,648	78.8	3.81	475	15.5
No. 5 Smelt Dissolving Tank	420,156	3,502,671	78.8	1.38	339	19.2

a Visibility impairing pollutants (PM, SO_2, NO_x and H_2SO_4) are not emitted from the BART-eligible wastewater treatment plant, C-mill, and D-evaporators and will not be included in the BART modeling analysis.

b A new scrubber is currently be installed on the No. 3 Boiler. The initial modeling will be conducted based on the configuration of the stack when it was originally installed. However, subsequent modeling may incorporate the emission reductions associated with the installation oft his scrubber.

c To be determined.

3.1.2   RECEPTORS

Receptor location and elevations information for each of the five Class I areas to be modeled will be obtained from the Federal Land Manager (FLM) website http://www2.nature.nps.gov/air/Maps/Receptors/index.cfm .

3.1.3   BACKGROUND

Background information for ammonia will be set to 0.5 ppb. For ozone, background will be developed from the existing CASNET and AIRS station data. The data to be used will be

submitted to EPD for review prior to modeling. Background concentrations of TNO_3 and SO_4 will be obtained from the CMAQ modeling currently being conducted.