

U.S. EPA Region 4 Comments on the Georgia BART Exemption Modeling Protocols

Date: June 1, 2006

The following are comments on the CALPUFF-based modeling protocols which are developed to address source-specific dispersion modeling to demonstrate whether a source should be exempt from Best Available Retrofit Technology (BART) controls in compliance with the Regional Haze Rule.

General Comments for all Georgia BART Exemption Modeling Protocols

1. Rayleigh Scattering and Sea Salt: This comment applies to the protocols for the Georgia Power and Savannah Electric and Power Company power plants (i.e., Branch, McIntosh, McDonough, Wansley, Yates, Bowen and Mitchell), International Paper (Augusta Mill) and the Tronox Pigments Incorporated facility. Some protocols indicate that the Rayleigh Scattering term will be modified from the default value of 10 Mm⁻¹ to account for elevation of the specific Class I area receptors. Some protocols propose the use of sea salt for coastal areas. The use of a site-specific Rayleigh scattering value or sea salt is part of the revised-IMPROVE extinction equation for calculating light extinction from particle concentrations. The revised equation is based on recommendations by the IMPROVE Steering. The revised-IMPROVE extinction equation has not been peer reviewed, nor has the Environmental Protection Agency (EPA) made a decision regarding its use. Also, there does not appear to be consensus among the participants on the national RPO data workgroup on how or when this new equation should be implemented. It is also unclear if selectively choosing to use only a portion of the new IMPROVE equation (e.g., site-specific Raleigh scattering value or sea salt) is a valid use of the equation. Therefore, it is not clear how or if the new IMPROVE extinction equation, which considers geographical variation in PM_{2.5} species, should be used at the present time. There does not appear to be consensus among the participants on the national Regional Planning Organization (RPO) data workgroup on how or when this new equation should be implemented. It is also unclear if selectively choosing to use only a portion of the new IMPROVE equation (e.g., site-specific Raleigh scattering values) is a valid use of the equation. Until a decision is made on the use of the new IMPROVE extinction equation, the existing approved equation should be used in the compliance demonstration for the Regional Haze Rule.

However, if a state chooses to develop an alternative approach to estimating natural conditions or background data for a Class I Area, a technical rationale that discusses the assumptions and methodology for the deviation from the EPA recommended extinction equation should be developed per the "*Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule.*" We recommend that the new IMPROVE extinction equation be used in its entirety, not in pieces. Merely referencing the IMPROVE Steering Committee recommendation would not be adequate. The rationale would need to be specific to a Class I Area or show how it is applicable to all Class I areas being modeled and submitted to the reviewing agencies and EPA on a case-by-case basis. It should demonstrate how the alternative methodology is consistent: across applications (e.g., BART and Reasonable Progress), across time (e.g., baseline and future calculation for natural conditions), and among the stakeholders involved and who need to consult on the development of a long term strategy for the Class I Area (i.e., Federal Land Managers (FLMs), states, industry).

2. **GEP Stack Heights:** It is unclear if the stack heights presented in the protocols represented the good engineering practice (GEP). Modeling with GEP stack heights is required under 6.2.2 of 40CFR Part 51, Appendix W: Guideline on Air Quality Models. Using stack heights greater than the GEP derived stack height in 40 CFR Part 51.100 (hh)(1)(v) is a prohibitive dispersion technique for regulatory modeling applications. The modeling protocols do not contain any discussion on how the GEP stack heights were determined for modeling those sources with stack heights greater than the de minimis GEP height of 65 meters. These sources must provide justifications that emission units modeled with stack heights above 65 m represent GEP according to 40 CFR Part 51.100 (hh)(1)(v) or they must redo the modeling. This documentation should be included in the BART exemption modeling reports. The sources with stacks heights potentially greater than the GEP de minimis height in the NC BART modeling protocols are listed in the following table.

Stacks with Heights Potentially Greater than GEP Height in the GA BART Modeling Protocols

Facility	Emissions Units / permit ID/Stack ID	Stack height
Plant Mitchel	Unit 3	152.4 m
Plant Branch	Units 1, 2, 3, 4	304.8 m
Plant McIntosh	Unit 1	121.9 m
Plant Bowen	Units 1,2,3,4	304.8 m
Plant McDonough	Units 1,2	254.8 m
Plant Wansley	Units 1,2	304.8 m
Plant Kraft	Units 3,4	83.8 m
Plant Yates	Units 6,7	254.4 m
PCS Nitrogen Fertilizer	ST06	216 ft
	ST11	272 ft
	ST33	272 ft
	ST15	285 ft
	ST27	285 ft
	ST28	285 ft
	ST29	272 ft
	ST30	285 ft
	ST13	285 ft
DSM Chemicals North America, Inc.	S016	280 ft
	S014	220
Rayonier Performance Fibers, LLC	No. 5 Recovery Furnace	78.8 m
	No. 5 Smelt Dissolving Tank	78.8 m
Georgia-Pacific Corporation Cedar Springs Mill	Recovery boiler No.3	246 ft
	Smelt Tank No.3	248 ft
	Power Boiler No. 1	350 ft
	Power Boiler No. 2	350 ft

Georgia-Pacific Corporation Brunswick Mill	No. 5 Recovery Furnace –R401	82.9 m
	No. 5 Recovery Furnace –R401	82.9 m
	No. 5 Smelt Dissolver Tank	80.5 m

3. Documentation:

a. The BART exemption modeling protocols did not, in some cases, detail the specific input choices that will be used to run the various programs for the CALPUFF modeling system (i.e., CALMET, CALPUFF, POSTUTIL, CALPOST, etc.). The BART exemption modeling reports should include a table that shows the inputs used in running each module in CALPUFF. Even though the CALMAT program was run by the Visibility Improvement - State and Tribal Association of the Southeast (VISTAS), that information should be obtained for the modeling report. A table similar to the one included in the March 16, 2006 EPA Model Clearinghouse memo, “Dispersion Coefficients for Regulatory Air Quality Modeling in CALPUFF,” from Tyler Fox to Kay Prince is recommended. This table provides a list of the regulatory default modeling options for use in the CALPUFF modeling system. The memo is located on the EPA website at

<http://www.epa.gov/ttn/scram/guidance/mch/cfym109.pdf>. The BART CALPUFF input table would indicate the regulatory defaults and the inputs that the modeler chooses to use for all of the CALPUFF processors. A rationale for why a non-regulatory default was chosen would be included in a revised modeling protocol or in the modeling report that documents the BART modeling.

b. A table that lists all of the emission units that were considered prior to determining the BART-eligible sources in the facility should be included in the modeling report. The table would include the appropriate date(s) that show why that emission unit was or was not BART –eligible and any other rationale used to exclude an emission unit. If this information is not included in the modeling report, it should be included in the RH SIP documentation. EPA Region 4 is willing to assist the state in reviewing the assumptions and decisions that the state used to determine a BART-eligible unit and source prior to the submittal of the Regional Haze SIPs.

c. The protocol should not merely state that the approach recommended by the Visibility Improvement – State and Tribal Association of the Southeast (VISTAS) or the VISTAS protocol will be followed. The source-specific protocol should indicate how with specifics the VISTAS protocol and EPA guidance will be followed.

Georgia Power and Savannah Electric Power Plants

1. Rayleigh Scattering: See the above general comments for EPA concerns on alternative Rayleigh scattering.

2. Emission Rates for Plant Bowen and Wansley: The protocols for Plants Bowen and Wansley propose to use seasonal emission rates for the visibility impairment pollutants (VIPs). Maximum 24-hour emission rates for non-seasonal and seasonal rates are proposed. The 24-hr emission rate from the highest emitting day of the meteorological period modeled must be used.

International Paper (IP) Augusta Mill

In addition to the following comments on the International Paper Augusta Mill BART exemption modeling protocol, we agree with all of the comments on the this protocol as presented in the May 18, 2006 letter from Bill Jackson (US Department of Agriculture's Forest Service) to Peter Courtney (GA EPD). In some cases a brief portion of those comments are repeated in this document.

1. Use of 98th percentile for visibility threshold comparison: The VISTAS 12-km screening approach has been discussed among the EPA Regional Offices, the FLMs and the VISTAS states. The VISTAS states have agreed with this approach and to its incorporation in the VISTAS protocol. We are in agreement that if the no-observation (NO-OBS) non-regulatory option is used in CALMET, the screening would be acceptable if the peak values are used with the visibility threshold. In comments on the draft versions of the VISTAS BART protocol, EPA Region 4 expressed concerns on how the visibility threshold comparison should be performed for the screening methodology if the 98th percentile is used as opposed to the peak value. The highest visibility impact over three years is used in the screening modeling because of the uncertainty in using CALMET without observations; this a departure from how the CALPUFF model was evaluated. It is unclear how the processing of the meteorological data (i.e., specifically the 36-km MM5 data) with the NO-OBS input would affect the performance of the CALPUFF modeling system, especially in areas of complex winds, and still provide a conservative model while using the 98th percentile for the impact test. Finally, the use of the 98th percentile is not a regulation that must be applied for the BART assessment.

2. AERMOD Turbulence-based dispersion: The protocol does states that the appropriate model codes for the dispersion scheme will be used (section 4.3). This is stated after mentioning that CALPUFF can use either AERMOD-turbulence or Pasquill-Gifford (P-G) dispersion coefficients. Section 4.3.5 states that P-G curves will be used. However, the regulatory default (i.e., option 3) representing the P-G dispersion option for the MDISP and MDISP2 CALPUFF inputs are not proposed for use, but should be, in the modeling. In the CALPUFF Model Input Group2: Technical Options in Appendix A, option 2 for turbulence based-dispersion is indicated. It is unclear which approach will be used in the BART modeling, but the P-G dispersion coefficients should be used.

EPA continues to recommend the use of the P-G dispersion parameters with CALPUFF. The March 16, 2006 EPA Model Clearinghouse memo, "Dispersion Coefficients for Regulatory Air Quality Modeling in CALPUFF," from Tyler Fox to Kay Prince, discusses the Agency's position on dispersion coefficients for CALPUFF. The memo also provides a list of the regulatory default modeling options for use in the CALPUFF modeling system. The memo is located on the EPA website at <http://www.epa.gov/ttn/scram/guidance/mch/cfym109.pdf>. The International Paper (Augusta) BART modeling protocol should be revised to clearly indicate that P-G dispersion parameters will be used in the BART modeling.

3. Ammonia-Limiting Method: The Ammonia-limiting method is proposed to be used. It appears that hourly ammonia data from the CMAQ model will be used. The protocol should state that monthly-averaged CMAQ data that is unmodified will be used.

4. Alternative methodologies when VISTAS BART Protocol methods fail: Chapter 7 discusses several alternative modeling methodologies that will be used should the facility's BART sources fail to indicate a need for determining BART controls. These alternative approaches include the use of line-of-sight, Method 7, actual relative humidity and the EPA f(RH) curve to determine a new delta deciview (dv)

value, limiting CALPOST to only those periods with higher EPA $f(RH)$ values, adjustment for Rayleigh scattering, addition of sea salt, and the new EPRI coefficients for calculating extinction.

a. Sea Salt and Rayleigh Scattering Adjustments: See the above general comments on this topic for revising the protocol.

b. Line-of-Sight (LOS): EPA Region 4 reiterates the comments that were submitted to the North and South Carolina on the BART exemption modeling protocols proposing to use this methodology. EPA Region 4 does not recommend the use of LOS for evaluating compliance with the BART rule. The use of a LOS calculation is an alternative methodology departure from the VISTAS protocol. We do not recommend or support this proposed alternative modeling methodology. The preamble of the regional haze rule, 64 Federal Register 35726-35727 (July 1, 1999), provides some direction on this issue. "...The EPA also acknowledges the technical point made by some commenters that for other types of scenes with other site-specific conditions, {for example, where the sight path to a scenic feature is less than the maximum visual range} a change of more than 1 deciview might be required in order for the change to be perceptible. However, EPA wishes to emphasize that the overall goal of the regional haze program is not to track changes in visibility for only certain vistas at a specific Class I area. Rather, the program is designed to track changes in regional visibility for the range of possible views of sky and terrain found in any Class I area, and to assure progress toward the national goal." While the LOS concept is technically valid for evaluating visibility impacts on an instantaneous basis from a specific observer's viewpoint, it is not appropriate for evaluating regional visibility impacts. Therefore, the use of LOS does not ensure that the goals of the Regional Haze Rule (RHR) will be met.

The VISTAS BART modeling protocol has been discussed and has obtained general consensus from the EPA, FLM and state reviewers to not use LOS for the BART modeling. Also a LOS calculation was not used by EPA in developing the threshold value. The goal of the BART assessment is not to determine visibility improvement along a specific line of sight but rather improvement in regional haze. If this and other options are used to fine tune the model or significantly change the model as EPA used it to develop the threshold criteria, then maybe the criterion might also change. One could choose a host of options to adjust the model to predict what may or may not be a better approach in using the CALPUFF modeling system. EPA Region 4 is supporting and recommending the use of the regulatory defaults for the BART modeling (with the exception agreed upon for the screening modeling).

c. Method 7: EPA disagrees with the use of Method 7 as an alternative method for the BART exemption or determination modeling. This is one of many alternative methods that has been previously discussed in the development of the VISTAS protocol. As previously stated by Bill Jackson of the Forest Service in comments on the VISTAS BART protocol, Method 7 attempts "to address the issue of "natural obscuration" solely by modifying the background visibility conditions in the CALPOST calculations. This approach addresses only one of the CALPUFF modeling problems that occur when "natural obscurations" such as clouds and precipitation are present. As stated in the VISTAS protocol, sulfate and nitrate formation rates may increase greatly in the presence of liquid water vapor. However, the increased sulfate/nitrate formation in the presence of liquid water is not simulated by CALPUFF. Method 7 and Method 7 Prime modify the visibility extinction calculations such that the effects are generally lowered (with respect to change in dv), without accounting for the

compensating effect of the increased sulfate/nitrate formation that occurs in the presence of liquid water. Also, during periods of “natural obscuration”, the primary FLM interest would be in the visibility impacts that might occur during the non-obscured hours. The application of Method 7 has the effect of double counting the perceived importance of “natural obscurations” in the BART modeling.” Method 7 should not be used in the BART CALPUFF modeling.

d. Other alternative methodologies: Deviations for the BART modeling should be presented with a technical rationale that discusses the assumptions and methodology for the deviation from the VISTAS BART protocol and any EPA recommendations. The rationale would need to be specific to a Class I Area or show how it is applicable to all Class I areas being modeled and submitted to the reviewing agencies and EPA on a case-by-case basis. It should demonstrate how the alternative methodology is consistent: across applications (e.g., BART and Reasonable Progress), across time (e.g., baseline and future calculation for natural conditions), and among the stakeholders involved and who need to consult on the development of a LTS for the Class I Area (i.e., FLMs, states, industry).

PCS Nitrogen Fertilizer

1. PCS Nitrogen Fertilizer was identified in the VISTAS ammonia (NH₃) modeling to be one of the large sources that should be specifically modeled for NH₃. The protocol states that the facilities NH₃ emissions will be modeled. It does not, but should also, address modeling particulate matter emissions.
2. The protocol did not clearly state that 12 km screening modeling will be performed using the maximum 24-hour results to compare with the 0.5 deciview (dv) threshold; and that finer grid modeling (i.e., 4 km) will be developed using the 98th percentile results. EPA assumes this is what was implied. If this is incorrect, please submit a revised section 1.3 for review.
3. The protocol is vague in many areas in describing the CALPUFF modeling system inputs. It was difficult to determine the input choices that will be used in the modeling. Please see the documentation comment under the general comments presented above for more information on this topic.
4. There are several versions of the CALPUFF model on the website maintained by the model developer. The protocol should state the version number of the models (CALMET and CALPUFF) that will be used in the BART modeling and the website location for obtaining the model.
5. A map of the modeling domain should be included in the protocol and/or the modeling report.

Interstate Paper, LLC

1. Section 2.2. - BART-eligible source: Based on the data presented, we agree the bubbling fluidized bed boiler does not pass the Step 2 “date test” for BART eligibility. (See Section II.A. of 40 CFR Part 51, Appendix Y, “Guidelines for BART Determinations under the Regional Haze Rule,” for a detailed description of the Step 2 test.) However, we disagree with the conclusion in subsection 2.2.1 that the lime kiln is not BART-eligible for the following reason.

The BART-eligibility assessment in Section 2.2 is not performed correctly and needs to be revised. It appears that the potential emissions from each BART-eligible unit were incorrectly compared on a unit by unit basis to the 250 tons per year (tpy) or more threshold. The correct procedure is to sum the potential emissions for each visibility-impairing pollutant listed in Table 2-1 across all the potentially BART-eligible emission units that pass Steps 1 and 2 for BART eligibility, i.e., the lime kiln, power boiler, and recovery boiler. (For further details on the Steps, please see Section II.A. of Appendix Y.) Thus, potential emissions of NO_x would sum to 149+409+350 = 908 tpy NO_x. Similarly, potential emissions across all three units would sum to 128 tpy PM₁₀ and 311 tpy SO₂.

Since the lime kiln, power boiler, and recovery boiler passed Steps 1, 2, and 3 for BART eligibility, these three emission units are considered BART eligible. Some confusion may have resulted from portraying the order of the steps to determine BART-eligibility in reverse order from what is presented in Appendix Y. We recommend clarifying the step by step analysis in Section 2.2 to reflect the order in Appendix Y.

2. The facility is within 50 km of the Wolf Island Class I Area. For facilities within 50 km of Class I areas, the 12-km screening approach should not be used. At a minimum, the 4-km CALMET data should be used and a refinement to 1-km may be necessary. Building downwash should be used.
3. The version numbers of the CALMET and CALPUFF models that will be used in the modeling should be included in the protocol. The location (i.e., website) that the models were obtained should be included in the protocol.
4. Please see the documentation comment under the general comments presented above for more information on this topic.

Tronox Pigments Incorporated

1. Please see the documentation comment under the general comments presented above for more information on this topic
2. The third paragraph on page 2-1 states that additional emission limits are being considered that could exempt sources based on emission levels and distance to Class I areas. It is not entirely clear what this means. It appears that the facility is considering implementing controls to reduce emission and develop a Q/d number that could exempt sources from BART. The Q/d approach cannot be used to exempt a BART-source or a Class I area from BART modeling. VISTAS is using Q/d was to determine those facilities that the VISTAS contractor would perform 12 km screening modeling for the BART exemption assessment. This appears to be a circumvention of the BART rule. If this interpretation of the Tronox protocol is correct, then the state could pursue the following.
 - a. Assume that the source is subject to BART and proceed to the BART determination modeling and engineering assessment for the controls. This would assist the facility in developing BART controls.
 - b. The source could take an enforceable permit limit to avoid BART-eligibility so long as the source takes the limit before the BART determination is made by the state. The enforceable

permit limit would have to maintain emissions below 250 tpy of each VIP. Permit limits cannot be based on modeling results; they must be based on maintaining emissions below 250 tpy.

3. The protocol does not, but should list or discuss the pollutants that will be modeled.
4. Section 3.2 on page 3-1 states that hourly CMAQ ammonia data will be used as provided by VISTAS. VISTAS has agreed to provide monthly CMAQ ammonia data. Hourly CMAQ data is not recommended for the BART modeling.
5. Tronox proposes to adjust the f(RH) values for the 20% best day's humidity conditions because the monthly f(RH) values in Table A-3 of Appendix A of the EPA "*Guidance for Tracking Progress Under the Regional Haze Rule*," correspond to annual average background conditions which do not capture the drier conditions of the 20% best conditions. Consultation with the FLMs is suggested in adjusting the humidity factors. It may be that there are other parameter, distributions, scattering efficiencies that should be considered in making this adjustment.
6. The version numbers for the CALMET and CALPUFF models that will be used should also be included in the protocol.
7. Rayleigh Scattering: See the above general comments for EPA concerns on alternative Rayleigh scattering choices.
8. A more detailed protocol is recommended.

Packaging Corporation of America (PCA) – Valdosta Mill

1. Bradwell Bay Wilderness is not a mandatory Class I area. It should not be modeled for the BART requirement.
2. The potential VIP BART emissions by individual emission units for the VIPs should be included in the protocol.
3. The protocol should discuss how integrated puff sampling methodology will be used in the BART modeling.
4. The protocol does not, but should list or discuss the pollutants that will be modeled.

DSM Chemicals North America, Inc.

1. Rayleigh Scattering: See the above general comments for EPA concerns on alternative Rayleigh scattering choices.
2. GEP: See General Comment number 3 for concerns in this topic.

3. The protocol does not, but should list or discuss the pollutants that will be modeled. A table is provided that lists information about potential BART sources for all VIPS at DSM but this does not indicate which VIPS will be modeled.

Rayonier Performance Fibers, LLC

1. Use of Q/d to exempt from BART modeling: The Cape Romain and St. Marks Class I areas were proposed to be exempt from modeling because the Q/d number for the facility was less than 10. The Q/d approach cannot be used to exempt a BART-source or a Class I area from BART modeling. The VISTAS use of Q/d was to merely determine those facilities that the VISTAS contractor would perform the 12 km screening modeling for the BART exemption assessment. The Rayonier facility must perform BART modeling for all BART-eligible sources and those Class I areas that are within 300 km of the facility.

2. The protocol states that if the highest 24-hr average screening visibility impact is greater than 0.5 dv then some exceedances are allowed for exemption purposes. No exemptions are allowed under the screening modeling. Refined modeling using a finer grid is the only other option allowed if screening indicates that a BART determination is required.

3. The protocol should indicate how the VISTAS protocol will be applied, not merely reference that is will be used. The VISTAS protocol did not provide the input choices that could be used in setting up each CALPUF modeling system module for execution.

4. GEP: See General Comment number 3 for concerns in this topic.

Prayton, Inc.

1. It is unclear if the 24-hr emission rates in Table 2-1 represent the maximum 24-hr emission rate during the 2000-2004 time period. The protocol should discuss how the emission rates that comply with the BART rule were developed.

2. The protocol should indicate how the VISTAS protocol will be applied, not merely reference that is will be used. The VISTAS protocol did not provide the input choices that could be used in setting up each CALPUF modeling system module for execution.

3. The protocol states that only particulate emissions will be modeled. The protocol should list the VIPS for all BART-eligible units at the facility.

4. Rayleigh Scattering: See the above general comments for EPA concerns on alternative Rayleigh scattering choices.

Georgia-Pacific Corporation Mills in Cedar Springs and Brunswick

1. GEP: See the GEP comment in the General Comment section above.