BART EXEMPTION MODELING ANALYSIS
FOR
SMURFIT-STONE CONTAINER ENTERPRISES, INC.
PANAMA CITY MILL

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1.0 INTRODUCTION

1.1 Objectives

Pursuant to Section 403.061(35), Florida Statutes, the federal Clean Air Act, and the regional haze regulations contained in Title 40, Part 51 of the Code of Federal Regulations (40 CFR 51), Subpart P – Protection of Visibility, the Florida Department of Environmental Protection (FDEP) is required to ensure that certain sources of visibility impairing pollutants in Florida use Best Available Retrofit Technology (BART) to reduce the impact of their emissions on regional haze in Federal Class I areas. Requirements for individual source BART control technology determinations and for BART exemptions are proposed in Rule 62-296.340 of the Florida Administrative Code (F.A.C.).

Proposed Rule 62-296.340(5)(c), F.A.C., states that a BART-eligible source may demonstrate that it is exempt from the requirement for BART determination for all pollutants by performing an individual source attribution analysis in accordance with the procedures contained in 40 CFR 51, Appendix Y. A BART-eligible source is exempt from BART determination requirements if its contribution to visibility impairment, as determined below, does not exceed 0.5 deciview (dv) above natural conditions in any Class I area.

Based on FDEP guidance, the 98th percentile, i.e., the 8th highest 24-hour average visibility impairment value in any year or the 22nd highest 24-hour average visibility impairment value over 3 years combined, whichever is higher, is compared to 0.5 dv in the source attribution analysis.

Based on the proposed Rule 62-296.340(5)(c), F.A.C., if the owner or operator of a BART-eligible source requests exemption from the requirement for BART determination for all pollutants by submitting its source attribution analysis to the FDEP by January 31, 2007, and the FDEP ultimately grants such exemption, the requirement for submission of an air construction permit application pursuant to 62-296.340(3)(b)1., F.A.C., shall not apply.

This report is submitted to the FDEP to present the source attribution analysis for the Smurfit-Stone Container Enterprises (SSCE) Panama City Mill (Mill), which is a BART-eligible source with multiple BART-eligible emissions units. These units include:

- Nos. 1 and 2 Recovery Boilers (EUs 001 and 019),
- No. 4 Combination Boiler (EU 016),
- Nos. 1 and 2 Smelt Dissolving Tanks (EUs 021 and 020),

- Lime Kiln (EU 004), and
- Lime Slaker (EU 005).

The objective of the analysis is to demonstrate that the Mill is exempt from BART determination.

This report contains a brief source description, visibility modeling methodology, and visibility modeling analysis results for the facility. The source information and methodologies used for the BART exemption analysis are the same as those presented in the document entitled "Revised Air Modeling Protocol to Evaluate BART Options for Smurfit-Stone Container Enterprises, Inc., Panama City Mill". A copy of this document has been included for reference in Appendix A.

1.2 Source Description

SSCE operates two combination boilers, two recovery boilers, two smelt dissolving tanks, a lime kiln, a lime slaker, evaporator systems, a non-condensable gas handling system, a woodyard, a bleach plant, a pulping system, and ancillary equipment at the Panama City Mill to make kraft linerboard. The Mill is located in Panama City, Bay County, Florida. The BART-eligible emissions units are listed in Section 1.1. An area map showing the facility location and PSD Class I areas located within 300 kilometers (km) of the facility is presented in Figure 1-1 in the Protocol. The Universal Transverse Mercator (UTM) coordinates of the Mill are approximately 632.8 km East and 3,335.1 km North in UTM Zone 16.

There are two Prevention of Significant Deterioration (PSD) Class I area within 300 km of the Mill. The St. Marks National Wildlife Area (NWA) is located at a distance of 112 km from the Mill. The Bradwell Bay NWA is within 300 km of the Mill, but visibility impairment is not an air quality-related value (AQRV) at this PSD Class I area.

The stack, operating, and sulfur dioxide (SO_2), particulate matter (PM), and nitrogen oxides (NO_x) emission data, including PM speciation, for the BART-eligible units are presented in detail in the Protocol. As presented in the Protocol, the maximum 24-hour average emission rates for these units used in the modeling are based on two scenarios:

1. Normal operations, which is the basis of evaluating visibility impairment of an emission unit under the BART regulations, and
2. Periodic maintenance operations for Nos. 1 and 2 Recovery Boilers.

SSCE is proposing a new, lower 24-hour average SO_2 emission limit for the No. 4 Combination Boiler. The current limit is 1,183 lb/hr, while the proposed lower limit is 710 lb/hr. This new limit will be demonstrated by use of a continuous emission monitoring system (CEMS) for SO_2, that is currently installed on the No. 4 Combination Boiler. Air construction permit application forms for this change are attached in Appendix B.

As stated in the Protocol, the Nos. 1 and 2 Recovery Boilers undergo maintenance on the cascade evaporators approximately once every 6 weeks. Maintenance operations are discussed in detail in the Protocol.

Based on the U.S. Environmental Protection Agency (EPA) BART guidelines (see Federal Register, Vol. 70, No. 128, pg. 39162), SSCE does not believe that the recovery boiler maintenance operation is a condition that should be modeled for visibility impacts. The maintenance operation is not reflective of "steady-state operating conditions during periods of high-capacity utilization". In addition, the recovery boilers are not processing any black liquor, which is their function. These aspects of the maintenance operation, in addition to their very infrequent nature (i.e., once every 6 weeks), make this operation inappropriate for modeling. Nevertheless, at FDEP's request, modeling for this operation was performed.

Building downwash effects were not considered in the modeling analysis for the facility, since the distance of the nearest PSD Class I area is more than 50 km from the plant; therefore, these effects are considered to be minimal in assessing the visibility impacts.

2.0 AIR QUALITY MODELING METHODOLOGY

The California Puff (CALPUFF) model, Version 5.756, was used to predict the maximum visibility impairment at the PSD Class I areas located within 300 km of the Mill. Recent technical enhancements, including changes to the over-water boundary layer formulation and coastal effects modules (sponsored by the Minerals Management Service), are included in this version. The methods and assumptions used in the CALPUFF model are presented in the Protocol. The 4-km spacing Florida domain was used for the BART exemption. The refined CALMET domain used for this modeling analysis has been provided by the FDEP. The major features used in preparing these CALMET data have also been described in Section 4.0 of the Protocol.

Currently, the atmospheric light extinction is estimated by an algorithm developed by the Interagency Monitoring of Protected Visual Environments (IMPROVE) committee, which was adopted by the EPA under the 1999 Regional Haze Rule (RHR) and is referred to in this report as the "1999 IMPROVE algorithm". The 1999 IMPROVE algorithm tends to underestimate light extinction for the highest haze conditions and overestimate it for the lowest haze conditions and does not include light extinction due to sea salt, which is important at sites near the sea coasts. As a result of these limitations, the IMPROVE Steering Committee recently developed a new algorithm (the "new IMPROVE algorithm") for estimating light extinction from PM component concentrations, which provides a better correspondence between measured visibility and that calculated from PM component concentrations. A detailed description of the new IMPROVE algorithm and its implementation is presented in Section 3.4 of the Protocol.

The new IMPROVE algorithm will be used if the visibility impairment value predicted with the 1999 IMPROVE algorithm is greater than 0.5 dv. If the new IMPROVE algorithm is used, the maximum predicted visibility impairment values will be lower than those predicted with the 1999 IMPROVE algorithm.

Visibility impacts were predicted at the PSD Class I area of St. Marks NWA using receptors provided by the National Park Service and are presented in Figure 4-1 of the Protocol.

3.0 AIR MODELING ANALYSIS RESULTS

Summaries of the maximum visibility impairment values for the BART-eligible emissions units at the Mill, estimated using the 1999 IMPROVE algorithm, are presented in Tables 3-1 and 3-2 for normal operations and compared to the BART exemption criteria of 0.5 dv. These model results include the proposed lower SO_2 emission limit on the No. 4 Combination Boiler. The 98th percentile 24-hour average visibility impairment values (i.e., 8th highest) for the years 2001, 2002, and 2003, and the 22nd highest 24-hour average visibility impairment value over the 3 years, are presented in Table 3-1. The number of days and receptors for which the visibility impairment was predicted to be greater than 0.5 dv is also presented in Table 3-1. The eight highest visibility impairment values predicted at the PSD Class I area are presented in Table 3-2.

As shown in these tables, the 8th highest visibility impairment values for normal operations are predicted to be greater than 0.5 dv for each year at the PSD Class I area using the 1999 IMPROVE algorithm. The 22nd highest visibility impairment value predicted over the 3-year period at the PSD Class I area is also greater than 0.5 dv.

As a result, the visibility impacts were evaluated at the St. Marks NWA with the new IMPROVE algorithm. Similar to the results presented using the 1999 IMPROVE algorithm, summaries of the maximum visibility impairment values estimated using the new IMPROVE algorithm are presented in Tables 3-3 and 3-4. As shown in these tables, the highest, 8th highest visibility impairment value predicted at the St. Marks NWA with the new IMPROVE algorithm is 0.499 dv. The 22nd highest visibility impairment value predicted at this PSD Class I area over the 3-year period is 0.475 dv.

Based on these results, which demonstrate that the maximum visibility impairment values for the BART-eligible emission units are predicted to be less than the FDEP's BART exemption criteria of 0.5 dv, an exemption from BART determination is requested for the Panama City Mill.

Summaries of the maximum visibility impairment values predicted for the BART-eligible emission units at the Mill for periodic maintenance operations are presented in Tables 3-5 and 3-6 using the 1999 IMPROVE algorithm and in Tables 3-7 and 3-8 using the new IMPROVE algorithm. As discussed previously, SSCE does not believe that the recovery boiler maintenance operation is a condition that should be modeled for visibility impacts. These results for periodic maintenance are presented for informational purposes at the request of the FDEP.

The input and output files (excluding CALMET) used for the exemption modeling are provided on a CD submitted with this report. Quality assurance procedures were followed, as described in the Protocol, to ensure that the setup and execution of the CALPUFF model and processing of the modeling results satisfy the regulatory objectives of the BART program.

TABLE 3-1
SUMMARY OF BART EXEMPTION MODELING RESULTS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
NORMAL OPERATIONS
1999 IMPROVE ALGORITHM

Class I Area	Distance (km) of Source to Nearest Class I Area Boundary	Number of Days and Receptors with Impacts >0.5 dv									22nd Highest Impact (dv) Over 3-Yr Period
		2001			2002			2003			
		No. of Days	No. of Receptors	8th Highest Impact (dv)	No. of Days	No. of Receptors	8th Highest Impact (dv)	No. of Days	No. of Receptors	8th Highest Impact (dv)	
St. Marks NWA	112	14	101	0.573	10	101	0.594	13	101	0.567	0.574

TABLE 3-2
VISIBILITY IMPACT RANKINGS AT PSD CLASS I AREAS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
NORMAL OPERATIONS
1999 IMPROVE ALGORITHM

Class I Area	Rank	Predicted Impact (dv) 2001	2002	2003
St. Marks NWA	1	1.524	1.132	1.217
	2	1.151	0.828	0.916
	3	0.902	0.804	0.780
	4	0.764	0.680	0.665
	5	0.683	0.679	0.640
	6	0.597	0.630	0.574
	7	0.577	0.600	0.567
	8	0.573	0.594	0.567

TABLE 3-3
SUMMARY OF BART EXEMPTION MODELING RESULTS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
NORMAL OPERATIONS
NEW IMPROVE ALGORITHM

Class I Area	Distance (km) of Source to Nearest Class I Area Boundary	Number of Days and Receptors with Impacts >0.5 dv [a] 2001 No. of Days	2001 No. of Receptors	2001 8th Highest Impact (dv)	2002 No. of Days	2002 No. of Receptors	2002 8th Highest Impact (dv)	2003 No. of Days	2003 No. of Receptors	2003 8th Highest Impact (dv)	22nd Highest Impact (dv) Over 3-Yr Period
St. Marks NWA	112	NA	NA	0.474	NA	NA	0.499	NA	NA	0.462	0.475

Note: NA= not available.

[a] No. of days and receptors are not readily available from the spreadsheet developed by VISTAS to estimate visbility impairment with the new IMPROVE equation.

TABLE 3-4
VISIBILITY IMPACT RANKINGS AT PSD CLASS I AREAS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
NORMAL OPERATIONS
NEW IMPROVE ALGORITHM

Class I Area	Rank	Predicted Impact (dv)		
		2001	2002	2003
St. Marks NWA	1	1.226	0.940	0.988
	2	0.938	0.671	0.735
	3	0.731	0.670	0.655
	4	0.622	0.571	0.545
	5	0.556	0.552	0.519
	6	0.497	0.527	0.481
	7	0.475	0.501	0.472
	8	0.474	0.499	0.462

TABLE 3-5
SUMMARY OF BART EXEMPTION MODELING RESULTS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
PERIODIC MAINTENANCE OPERATIONS
1999 IMPROVE ALGORITHM

Class I Area	Distance (km) of Source to Nearest Class I Area Boundary	Number of Days and Receptors with Impacts >0.5 dv									22nd Highest Impact (dv) Over 3-Yr Period
		2001			2002			2003			
		No. of Days	No. of Receptors	8th Highest Impact (dv)	No. of Days	No. of Receptors	8th Highest Impact (dv)	No. of Days	No. of Receptors	8th Highest Impact (dv)	
St. Marks NWA	112	15	101	0.624	13	101	0.650	15	101	0.623	0.626

TABLE 3-6
VISIBILITY IMPACT RANKINGS AT PSD CLASS I AREAS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
PERIODIC MAINTENANCE OPERATIONS
1999 IMPROVE ALGORITHM

Class I Area	Rank	Predicted Impact (dv)		
		2001	2002	2003
St. Marks NWA	1	1.706	1.257	1.349
	2	1.267	0.913	1.025
	3	0.997	0.890	0.864
	4	0.836	0.750	0.731
	5	0.749	0.749	0.699
	6	0.633	0.697	0.627
	7	0.626	0.650	0.626
	8	0.624	0.650	0.623

TABLE 3-7
SUMMARY OF BART EXEMPTION MODELING RESULTS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
PERIODIC MAINTENANCE OPERATIONS
NEW IMPROVE ALGORITHM

Class I Area	Distance (km) of Source to Nearest Class I Area Boundary	Number of Days and Receptors with Impacts >0.5 dv [a]									22nd Highest Impact (dv) Over 3-Yr Period
		2001			2002			2003			
		No. of Days	No. of Receptors	8th Highest Impact (dv)	No. of Days	No. of Receptors	8th Highest Impact (dv)	No. of Days	No. of Receptors	8th Highest Impact (dv)	
St. Marks NWA	112	8	NA	0.508	10	NA	0.541	9	NA	0.507	0.518

NA= not available

[a] No. of days and receptors are not readily available from the spreadsheet developed by VISTAS to estimate visbility impairment with the new IMPROVE equation.

TABLE 3-8
VISIBILITY IMPACT RANKINGS AT PSD CLASS I AREAS
SMURFIT-STONE CONTAINER ENTERPRISES, INC., PANAMA CITY MILL
PERIODIC MAINTENANCE OPERATIONS
NEW IMPROVE ALGORITHM

Class I Area	Rank	Predicted Impact (dv)		
		2001	2002	2003
St. Marks NWA	1	1.374	1.043	1.095
	2	1.030	0.738	0.822
	3	0.807	0.741	0.724
	4	0.678	0.630	0.597
	5	0.608	0.606	0.565
	6	0.526	0.582	0.521
	7	0.503	0.545	0.508
	8	0.512	0.541	0.507

APPENDIX A

REVISED
AIR MODELING PROTOCOL
TO EVALUATE BART OPTIONS
FOR
SMURFIT-STONE CONTAINER ENTERPRISES, INC.
PANAMA CITY MILL

REVISED
AIR MODELING PROTOCOL
TO EVALUATE
BART OPTIONS
SMURFIT-STONE CONTAINER ENTERPRISES, INC.
PANAMA CITY MILL

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1.0 INTRODUCTION

1.1 Objectives

Under the regional haze regulations, contained in Title 40, Part 51 of the Code of Federal Regulations (40 CFR 51), Subpart P – Protection of Visibility, the U.S. Environmental Protection Agency (EPA) has issued final rules and guidelines, dated July 6, 2005, for Best Available Retrofit Technology (BART) determinations [Federal Register (FR), Volume 70, pages 39104-39172]. BART applies to certain large stationary sources known as BART-eligible sources. Sources are BART-eligible if they meet the following three criteria:

- Contains emissions units that are one of the 26 listed source categories in the guidance;
- Contains emissions units that were put in place between August 7, 1962 and August 7, 1977; and
- Potential emissions from the emissions units of at least 250 tons per year (TPY) of a visibility-impairing pollutant [sulfur dioxide (SO_2), nitrogen oxides (NO_x), and direct particulate matter of equal to or less than 10 microns (PM_{10})].

Smurfit-Stone Container Enterprises, Inc.'s (SSCE) Panama City Mill facility has been identified as a BART-eligible source with multiple BART-eligible emissions units.

The Florida Department of Environmental Protection (FDEP) has proposed to adopt EPA's visibility protection rules and guidelines contained in 40 CFR 51, Subpart P. Final adoption of these rules is expected by the end of this year.

The basic tenet of the regional haze program is the achievement of natural visibility conditions in Prevention of Significant Deterioration (PSD) Class I areas by the year 2064. Florida has four PSD Class I areas while Georgia has two PSD Class I areas that can be affected by Florida sources (i.e., located in Florida or within 300 kilometers (km) of Florida).

BART is required for any BART-eligible source that FDEP determines emits any air pollutant that may "reasonably be anticipated to cause or contribute to any impairment of visibility in any Class I area." The BART guidelines establish a threshold value of 0.5 deciview (dv) for any single source for determining whether the source contributes to visibility impairment.

Throughout this protocol the terms "source" and "facility" have the same meanings. The term "BART-eligible emissions unit" is defined as any single emissions unit that meets the criteria described above, except for the 250 TPY criterion, which applies to the entire BART-eligible source. A "BART-eligible source" is defined as the collection of all BART-eligible emissions units at a single facility. If a source has several emissions units, only those that meet the BART-eligible criteria are included in the definition of "BART-eligible source."

FDEP requires that the California Puff (CALPUFF) modeling system be used to determine visibility impacts from BART-eligible sources at the PSD Class I areas. A source-specific modeling protocol is required to be submitted by the affected sources to FDEP for review and approval. Protocols are due to FDEP no later than September 30, 2006. The source-specific modeling must be included in the BART application, due to FDEP no later than January 31, 2007.

This protocol describes the modeling procedures to be followed for performing the air modeling and includes site-specific data for SSCE's Panama City Mill BART-eligible emissions units. The site-specific data includes emissions unit locations, stack parameters, emission rates, and PM_{10} speciation information.

For guidance in preparing the air modeling protocol, the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) has developed a "common" modeling protocol outline that describes the recommended procedures for performing a visibility impairment analysis under the BART regulations [see *Protocol for the Application of the CALPUFF Model for Analyses of Best Available Retrofit Technology (BART)*, December 22, 2005 (Revision 3.2 – August 31, 2006)]. The proposed modeling protocol for the SSCE Panama City Mill facility follows the general procedures recommended by VISTAS.

1.2 Location of Source

The Panama City Mill is located in Panama City, Bay County, Florida. An area map showing the facility location and PSD Class I areas located within 300 km of the facility is presented in Figure 1-1. The only PSD Class I area within 300 km of the Panama City Mill is the St. Marks National Wildlife Area (NWA), located at a distance of 112 km from the Mill. Bradwell Bay PSD Class I area is within 300 km of the Panama City Mill, but visibility impairment is not an air quality-related value (AQRV) at Bradwell Bay.

The Universal Transverse Mercator (UTM) coordinates of the Panama City Mill are approximately 632.8 km East and 3,335.1 km North in UTM Zone 16.

1.3 Source Impact Evaluation Criteria

The common BART modeling protocol describes the application of the CALPUFF modeling system for two purposes:

- Air quality modeling to determine whether a BART-eligible source is "subject to BART" – to evaluate whether a BART-eligible source is exempt from BART controls because it is not reasonably expected to cause or contribute to impairment of visibility in Class I areas and
- Air quality modeling of emissions from sources that have been found to be subject to BART – to evaluate regional haze benefits of alternative control options and to document the benefits of the preferred option.

The common BART protocol identifies the first activity as the "BART exemption analysis" and the second activity as the "BART control analysis."

The final BART rule (70 FR 39118) states that the proposed threshold at which a source may "contribute" to visibility impairment should not be higher than 0.5 dv. FDEP is also recommending the criterion of 0.5 dv.

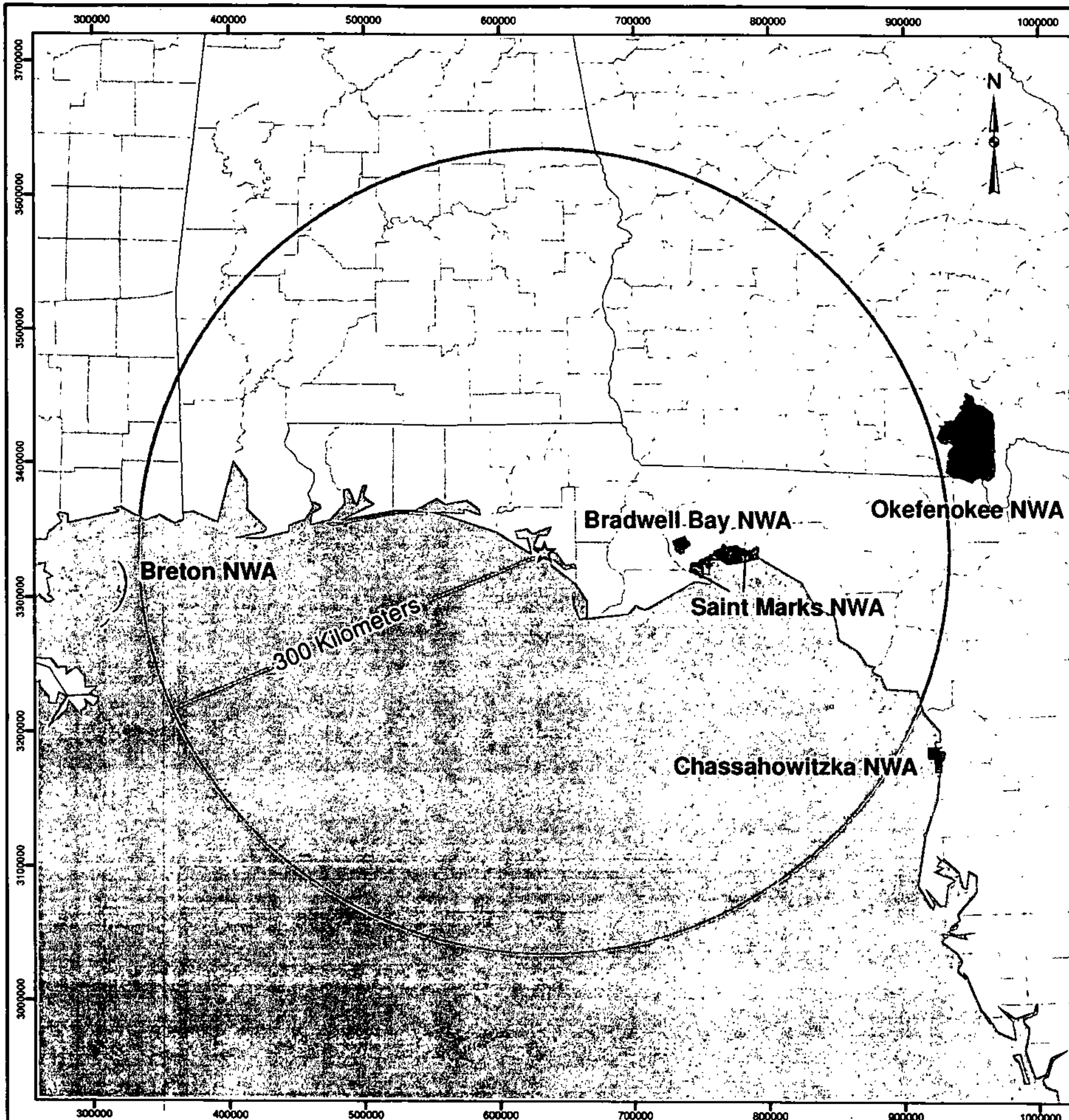
Based on VISTAS recommendations regarding BART exemption analysis, "initial screening" and "refined" analyses can be performed to determine whether a BART-eligible source is subject to or exempt from BART. The initial screening analysis, which is based on a coarse scale 12-km regional VISTAS California Meteorological Model (CALMET) domain, is optional and answers two questions – whether (a) a particular source may be exempted from further BART analyses and (b) if refined (finer grid) CALPUFF analyses were to be undertaken, which Class I areas should be included.

For the screening analysis, the highest predicted 24-hour impairment value is compared to the 0.5 dv criteria. If the highest predicted impacts are found to be less than 0.5 dv, no further analysis is required. But if the highest impact is predicted to be greater than 0.5 dv, then a refined, finer grid, analysis may be performed.

The refined analysis, which is based on a finer grid subregional CALMET domain, is the definitive test for whether a source is subject to BART. In the refined analysis, the 98th percentile (i.e., the 8th highest 24-hour average visibility impairment value in 1 year) or the 22nd highest 24-hour average visibility impairment value over 3 years combined, whichever is higher, is compared to 0.5 dv.

The screening analysis is optional for large sources that will clearly exceed the initial screening thresholds or sources that are very close to the Class I areas, which will be better analyzed by a finer grid resolution. For the SSCE Panama City BART analyses, only the refined analysis will be performed to determine whether the source is exempt from BART. Modeling results will be presented for the St. Marks NWA, which is the only Class I area within 300 km of the Panama City Mill.

If the BART exemption analysis reveals that the BART-eligible source is subject to the BART control analysis, part of the BART review process involves evaluating the visibility benefits of different BART control measures. These benefits will be determined by the refined analysis, where CALPUFF will be executed with the baseline emission rates and again with emission rates reflective of BART control options.



LEGEND

☆ Facility Location

Class I Areas

REFERENCE

Projection: Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 16

100,000 0 100,000 Meters

PROJECT

SSCE PANAMA CITY MILL
BART MODELING PROTOCOL

TITLE

Facility Location and PSD Class I Areas Within 300 km

Golder Associates
Gainesville, Florida

PROJECT No			SCALE AS SHOWN	REV 0
DESIGN	AB	25 Apr 2006		
GIS	AB	25 Apr 2006		
CHECK	AB	25 Apr 2006		
REVIEW	AB	25 Apr 2006		

FIGURE 1-1

2.0 SOURCE DESCRIPTION

2.1 Source Applicability

SSCE operates two combination boilers, two recovery boilers, two smelt dissolving tanks, a lime kiln, a lime slaker, evaporator systems, a non-condensable gas handling system, a wood yard, a bleach plant, a pulping system, and ancillary equipment at the Panama City Mill to make kraft linerboard. The FDEP has published a list of potential BART-eligible sources (updated September 12, 2006), which is based on a survey questionnaire sent by FDEP to selected facilities in Florida on November 4, 2002 and April 18, 2003. The FDEP's list contains nine potential BART-eligible emissions units located at the Panama City Mill. SSCE's Panama City Mill is on the FDEP list since it is one of the 26 major source categories identified in the BART regulation (kraft pulp mills) and has potential emissions of visibility impairment pollutants (i.e., SO_2, NO_x, and PM_{10}) from it, BART-eligible emission units that are greater than 250 TPY.

From detailed information obtained from SSCE, a BART-eligibility analysis was performed to verify the applicability of the BART rule to the facility as well as the list of BART-eligible units at the facility. This analysis consisted of a three-step procedure.

First, the facility is a BART-eligible source since it is classified under the source category of "kraft pulp mills."

Second, each emissions unit at the facility was reviewed to determine which units met the date requirements for a BART-eligible unit. For each emissions unit, it was determined which units began operation after August 7, 1962, and also were in existence on August 7, 1977.

Third, if an emissions unit met the date requirements for BART eligibility, the potential emissions of visibility impairing pollutants from each unit were identified. At present, the visibility impairing pollutants include SO_2, NO_x, and PM_{10}. Other potential visibility impairing pollutants, such as volatile organic compounds (VOCs) and ammonia, have been determined by FDEP to have no significant effect on regional haze in Florida.

The results of this analysis are summarized in Table 2-1. As shown in Table 2-1, there are a total of 12 emission units comprising the BART-eligible facility. The potential annual SO_2, NO_x, and PM_{10} emissions from the BART-eligible emissions units total more than 250 TPY for each pollutant. Because the emissions of one or more pollutants are greater than the 250 TPY threshold, all of these pollutants will be included in the visibility impairment assessment for the facility. Since PM_{10} emissions from the non-fugitive emissions units are greater than 250 TPY, it is not necessary to quantity fugitive particulate matter (PM) emissions from the BART-eligible emissions units for facility applicability under the BART regulation.

Only the visibility impairing pollutants (SO_2, NO_x, and PM_{10}) are required to be included in the visibility modeling analyses. Therefore, BART-eligible emission units that do not emit these pollutants will not be included in the modeling analysis. In addition, FDEP is not requiring fugitive emissions to be included in the modeling unless the source is relatively close to a PSD Class I area (i.e., 50 km). The final list of BART-eligible, non-fugitive emissions units which will be included in the modeling for SSCE are as follows:

- No. 4 Combination Boiler (EU 016),
- Nos. 1 and 2 Recovery Boilers (EUs 001 and 019),
- Nos. 1 and 2 Smelt Dissolving Tanks (EUs 021 and 020),
- Lime Kiln (EU 004), and
- Lime Slaker (EU 005).

Based on discussions with FDEP, if a BART-eligible emission unit does not emit SO_2, NO_x, or PM_{10}, the emission unit is not required to undergo a BART determination analysis. Also, if a facility is more than 50 km from the nearest PSD Class I area, fugitive PM emissions from BART-eligible emissions units are not required to undergo BART control evaluation.

2.2 Stack Parameters

The stack height above ground, stack diameter, exit velocity, and exit temperature for the BART-eligible emissions units at the Panama City Mill are presented in Table 2-2. For the modeling analysis, all the emissions units will be collocated in the VISTAS domain Lambert Conformal Conic (LCC) coordinate system at (X, Y) = (1,097.775, -1,025.138) km.

2.3 Emission Rates for Visibility Impairment Analyses

The EPA BART guidelines indicate that the emission rate to be used for BART modeling is the highest 24-hour actual emission rate representative of normal operations for the modeling period.

Depending on the availability of the source data, the source emissions information should be based on the following, in order of priority based on the BART common protocol:

- 24-hour maximum emissions based on continuous emission monitoring (CEM) data for the period 2001-2003,
- Facility stack test emissions,
- Potential to emit,
- Allowable permit limits, and
- AP-42 emission factors.

The maximum 24-hour average emission rates for the BART-eligible units at the Panama City Mill that will be used in the modeling to represent normal operations are presented in Table 2-3. PM_{10} emission rates from the recovery boilers, smelt dissolving tanks, lime kiln, and lime slaker are all from stack test data. For the No. 4 Combination Boiler, the PM emission rate is based on an emission limit of 0.07 pounds per million British thermal units (lb/MMBtu), which will become effective on September 13, 2007 based on the 40 CFR 63, Subpart DDDDD allowable emission rate.

NO_x and SO_2 emission rates from the recovery boilers are based on National Council for Stream Improvement, Inc. (NCASI) and AP-42 emission factors. In using the NCASI data (see Appendices A and B), the "median" values were selected as most representative. The 24-hour average SO_2 and NO_x emission rates for the No. 4 Combination Boiler at the Panama City Mill are based on continuous emission monitoring system (CEMS) data and stack test data , respectively. The lime kiln SO_2 and NO_x emission rates are from stack test data. The smelt dissolving tank SO_2 and NO_x emission rates are calculated based on NCASI emission factors (median values; see Appendices A and B).

It is noted that the Nos. 1 and 2 Recovery Boilers undergo maintenance on the cascade evaporators approximately once every six weeks. Normally only one recovery boiler undergoes this maintenance activity on any given day. During these periods, No. 6 fuel oil only is burned in the recovery boilers (i.e., no black liquor is processed) to continue to generate steam for the pulp making process at the mill. The fuel oil burning can last up to about 8 hours, with an average fuel oil burning rate of 1,500 gal/hr. Normal operation of the recovery boilers occur for the remaining hours of the day. Also caustic is used in washing the cascade evaporators. The flue gases from the recovery boilers press through the cascade evaporators prior to exiting the stack. Therefore, significant SO_2 reduction in the flue gases is believed to occur during this process. The emission rates for this scenario, based on 8 hours of No. 6 fuel oil firing and 16 hours of BLS firing, are shown in Table 2-4. Derivation of the 24-hour average recovery boiler emissions are shown in Appendix A, Table A-1. These calculations assume no removal of SO_2 due to fuel oil burning when washing the cascades.

The EPA BART guidelines state:

> The emission estimates used in the models are intended to reflect steady-state operating conditions during periods of high capacity utilization. We do not generally recommend that emissions reflecting periods of start-up, shutdown, and malfunction be used, as such emission rates could produce higher than normal effects than would be typical of most facilities. We recommend that the States use the 24-hour average actual emission rate from the highest emitting day of the meteorological period modeled, unless this rate reflects periods of start-up, shutdown, or malfunction." (FR, Vol. 70, No. 128, Pg. 39162)

Based on the guideline, SSCE does not believe that the recovery boiler maintenance operation is a condition that should be modeled for visibility impacts. The maintenance operation is not reflective of "steady-state operating conditions during periods of high capacity utilization". In addition, the recovery boilers are not processing any black liquor, which is their function. These aspects of the maintenance operation, in addition to their very infrequent nature (i.e., once every 6 weeks), make this operation inappropriate for modeling. Nevertheless, at FDEP's request, modeling for this operation will be performed.

Detailed calculations of the emission rates, a summary of the stack test data, and a summary of the recent SO_2 CEMS data for the No. 4 Combination Boiler, are presented in Appendix A.

2.4 PM Speciation

Based on the latest regulatory guidance, PM emissions by size category are required to be considered in the appropriate species for the visibility analysis. The effect that each species has on visibility impairment is related to a parameter called the extinction coefficient. The higher the extinction coefficient, the greater the species' affect on visibility. Filterable PM is speciated into coarse (PMC), fine (PMF), and elemental carbon (EC), with default extinction efficiencies of 0.6, 1.0, and 10.0, respectively. PMC is PM with aerodynamic diameter between 10 microns and 2.5 microns. Both EC and PMF have aerodynamic diameters equal to or less than 2.5 microns. Condensable PM is comprised of inorganic PM such as sulfate (SO_4) and organic PM such as secondary organic aerosols

(SOA). The extinction efficiencies for these species are 3*f(RH) and 4, respectively, where f(RH) is the relative humidity factor.

The PM emissions from the BART-eligible units at the Panama City Mill were speciated into the recommended size and species categories using the latest EPA Publication AP-42 emission factors for wood and oil-fired boilers, and NCASI particulate emissions data for pulp and paper industry-specific sources (dated August 25, 2006) (see Appendix B). The PM emissions from the stack test data were considered as total filterable PM. Using the AP-42 and NCASI factors, emission factors for all the species categories were first developed as a fraction of the total filterable PM and then using the fraction, the emission rates of the different species were estimated. Speciation among the different size categories were also developed based on the NCASI's data on particle size ranges for kraft recovery sources. Detailed PM speciation summaries are presented in Tables 2-5 and 2-6.

2.5 Building Dimensions

Based on discussions with FDEP, building downwash effects will not be considered in the modeling because these effects are considered to be minimal in assessing impacts at the distance of the nearest PSD Class I area, which is more than 50 km from the Panama City Mill.

TABLE 2-1
BART ELIGIBILITY ANALYSIS FOR SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL
(FACILITY ID 0050009)

EU ID	Emission Unit	BART Category[a]	Dates: Start-Up	Dates: Initial Construction	In Existence on 8/7/1977 ? (Yes/No)	Began Operation After 8/7/1962 ? (Yes/No)	Meets BART Date Criteria ? (Yes/No)	SO_2, NO_x, or PM Source ? (Yes/No)	BART Eligible ? (Yes/No)	Potential Emissions: SO_2 (TPY)	Potential Emissions: NO_x (TPY)	Potential Emissions: PM_{10} (TPY)	Comments
001	No. 1 Recovery Boiler	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	1,263.0 [b]	295.3 [c]	337.3 [b]	
019	No. 2 Recovery Boiler	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	1,263.0 [b]	295.3 [c]	329.8 [b]	
015	No. 3 Combination Boiler	3	--	Before 8/7/62	Yes	No	No	--	No	--	--	--	Began operation before 8/7/62
016	No. 4 Combination Boiler	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	5,181.5 [b]	902.0 [d]	151.9 [e]	
021	No. 1 Smelt Dissolving Tank	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	1.4 [f]	5.4 [f]	54.2 [b]	
020	No. 2 Smelt Dissolving Tank	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	1.4 [f]	5.4 [f]	54.2 [b]	
004	Lime Kiln	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	53.1 [b]	155.9 [g]	130.7 [b]	
026	Multiple Effect Evaporator System[h]	3	--	After 8/7/62	Yes	Yes	Yes	No	Yes	--	--	--	Not a SO_2, NO_x, or PM source
027	Digester System, NCG Handling System[h]	3	--	After 8/7/62	Yes	Yes	Yes	No	Yes	--	--	--	Not a SO_2, NO_x, or PM source
005	Lime Slaker	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	--	--	61.3 [b]	
030	Woodyard	3	--	After 8/7/62	Yes	Yes	Yes	Yes	Yes	--	--	--	Fugitive emission only
033	Bleach Plant with Wet Scrubber[h]	3	--	After 8/7/62	Yes	Yes	Yes	No	Yes	--	--	--	Not a SO_2, NO_x, or PM source
034	Pulping System[h]	3	--	After 8/7/62	Yes	Yes	Yes	No	Yes	--	--	--	Not a SO_2, NO_x, or PM source
									Total TPY =	7,763.3	1,659.4	1,119.4	

[a] BART category 3 is Kraft Pulp Mills.
[b] Title V Permit Application Dated December, 2004.
[c] Table 4.11, NCASI Technical Bulletin No. 884, August, 2004. See Appendix A.
[d] Attachment SCC-EU4-F1.8(f), Title V permit application dated December, 2004. Adjusted for 300,000 lb/hr maximum allowed steam rate when all boilers operating.
[e] Permit No. 0050009-022-AC, PM emissions limitation of 0.07 lb/MMBtu and heat input rate of 545 MMBtu/hr. Adjusted for 300,000 lb/hr maximum allowed steam rate when all boilers operating.
[f] Table 4.15, NCASI Technical Bulletin No. 884, August, 2004. See Appendix A.
[g] Table 4.13, NCASI Technical Bulletin No. 884, August, 2004. See Appendix A.
[h] Not a SO_2, NO_x, or PM_{10} source and therefore, will not be included in any modeling and a BART determination will not be required.

TABLE 2-2
SUMMARY OF STACK AND OPERATING PARAMETERS AND LOCATIONS FOR THE BART-ELIGIBLE EMISSIONS UNITS
SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

		Stack Parameters				Operating Parameters				
		Height		Diameter		Flow Rate	Exit Temperature		Velocity	
Emission Unit	Model ID	ft	m	ft	m	(acfm)	°F	K	ft/s	m/s
No. 1 Recovery Boiler[a]	RB1	233	71.02	6.5	1.98	192,634	310	427.6	96.8	29.49
No. 2 Recovery Boiler[a]	RB2	233	71.02	6.5	1.98	186,824	336	442.0	93.8	28.60
No. 4 Combination Boiler [b]	CB4	213	64.92	7.9	2.40	261,000	141	333.8	89.3	27.22
No. 1 Smelt Dissolving Tank	SDT1	233	71.02	6.0	1.83	45,900	163	345.9	27.1	8.25
No. 2 Smelt Dissolving Tank	SDT2	233	71.02	6.0	1.83	43,800	153	340.4	25.8	7.87
Lime Kiln [c]	LKILN	60.5	18.44	6.3	1.91	89,526	160	344.3	48.4	14.75
Lime Slaker [d]	LSLAK	56	17.07	3.0	0.93	9,482	179	354.8	21.7	6.63

Source: Title V Permit Application dated December, 2004, unless otherwise noted.

[a] No. 1 and No. 2 Recovery Boilers each have two identical stacks. Stack parameters are for each stack.

[b] No. 4 Combination Boiler stack parameters are from stack test dated 10/12/05.

[c] Lime Kiln stack parameters are from stack test dated 2/7/06.

[d] Lime Slaker stack parameters are from stack test dated 10/13/05.

Note: All emissions units will be collocated for the purpose of modeling. The facility coordinates are as follows:

UTM Zone 16: 632.8 km East, 3,335.1 km North.

Lambert Conformal Conic (LCC) coordinate, VISTAS Domain: 1,097.775 km, -1,025.138 km

TABLE 2-3
SUMMARY OF MAXIMUM 24-HOUR AVERAGE EMISSION RATES FOR THE BART-ELIGIBLE EMISSIONS UNITS
NORMAL OPERATIONS - SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

Source	EU ID	Model ID	PM_{10} lb/hr	PM_{10} Reference	NO_x lb/hr	NO_x Reference	SO_2 lb/hr	SO_2 Reference
No. 1 Recovery Boiler	001	RB1	7.2	Stack Test 10/10/05	67.4	Appendix A	141.6	Appendix A
No. 2 Recovery Boiler	019	RB2	27.1	Stack Test 10/6/04	67.4	Appendix A	141.6	Appendix A
No. 4 Combination Boiler	016	CB4	38.2	Permit 0050009-022-AC[a]	334.0	Stack Test 2/6/06	803.5	CEM Data 8/24/06
No. 1 Smelt Dissolving Ta	021	SDT1	9.46	Stack Test 10/10/05	1.24	Appendix A	0.31	Appendix A
No. 2 Smelt Dissolving Ta	020	SDT2	11.0	Stack Test 10/5/04	1.24	Appendix A	0.31	Appendix A
Lime Kiln	004	LKILN	13.0	Stack Test 10/13/05	35.6	Stack Test 2/7/06	0.50	Stack Test 2/7/06
Lime Slaker	005	LSLAK	3.2	Stack Test 10/13/05	--		--	
Total Emissions			**109.1**		**506.9**		**1,087.9**	

[a]Permit No. 0050009-022-AC, PM emission limitation of 0.07 lb/MMBtu and heat input rate of 545 MMBtu/hr.

Note: See Appendix A for a summary of the stack test data at SSCE Panama City Mill.

TABLE 2-4
SUMMARY OF MAXIMUM 24-HOUR AVERAGE EMISSION RATES FOR THE BART-ELIGIBLE EMISSIONS UNITS
PERIODIC MAINTENANCE SCENARIO - SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

Source	EU ID	Model ID	PM_{10} lb/hr	PM_{10} Reference	NO_x lb/hr	NO_x Reference	SO_2 lb/hr	SO_2 Reference
No. 1 Recovery Boiler (maintenance)	001	RB1	6.7	Appendix A	68.4	Appendix A	290.7	Appendix A
No. 1 Recovery Boiler (normal operation)	019	RB2	27.1	Stack test 10/6/04	67.4	Appendix A	141.6	Appendix A
No. 4 Combination Boiler	016	CB4	38.2	Permit 0050009-022-AC[a]	334.0	Stack Test 2/6/06	803.5	CEM Data 8/24/06
No. 1 Smelt Dissolving Tank	021	SDT1	9.46	Stack Test 10/10/05	1.24	Appendix A	0.31	Appendix A
No. 2 Smelt Dissolving Tank	020	SDT2	11.0	Stack Test 10/5/04	1.24	Appendix A	0.31	Appendix A
Lime Kiln	004	LKILN	13.0	Stack Test 10/13/05	35.6	Stack Test 2/7/06	0.50	Stack Test 2/7/06
Lime Slaker	005	LSLAK	3.2	Stack Test 10/13/05	--		--	
Total Emissions			**108.6**		**507.9**		**1,236.9**	

[a]Permit No. 0050009-022-AC, PM emission limitation of 0.07 lb/MMBtu and heat input rate of 545 MMBtu/hr.

Note: Nos. 1 and 2 Recovery Boilers undergo maintenance on the cascade evaporators approximately once every six weeks. Maintenance work is performed normally on one boiler on any given day. See Appendix A for a summary of the stack test data at SSCE Panama City Mill. Derivation of the 24-hour average recovery boiler emissions during maintenance are presented in Table A-1.

TABLE 2-5
PM SPECIATION FOR THE BART-ELIGIBLE EMISSIONS UNITS - SPECIES CATEGORIES
NORMAL OPERATIONS - SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

Source	EU ID	Model ID	Filterable PM (lb/hr)	Filterable PM_{10}[a] Coarse PM_{10} (lb/hr)	Filterable PM_{10}[a] Fine PM_{10} (Soil) (lb/hr)	Filterable PM_{10}[a] Carbon (EC) (lb/hr)	Condensable PM (CPM)[a] CPM (SO4) (lb/hr)	Condensable PM (CPM)[a] Organic CPM (SOA) (lb/hr)	Total Filterable PM_{10} (lb/hr)	Total Condensable PM (lb/hr)	Model PM (Filterable PM_{10} + SOA) (lb/hr)	Contribution to Model PM (%) Coarse PM_{10} (%)	Contribution to Model PM (%) Fine PM_{10} (Soil) (%)	Contribution to Model PM (%) Carbon (EC) (%)	Contribution to Model PM (%) Inorganic CPM (SO4) (%)	Contribution to Model PM (%) CPM (SOA) (%)
No. 1 Recovery Boiler	001	RB1	7.2	1.2	2.8	0.1	3.4	0.3	4.1	3.7	4.3	27.3%	63.8%	2.7%	[b]	6.3%
No. 2 Recovery Boiler	019	RB2	27.1	4.5	10.5	0.4	12.9	1.0	15.4	13.9	16.4	27.3%	63.8%	2.7%	[b]	6.3%
No. 4 Combination Boiler	016	CB4	38.2	0.0	34.1	3.5	4.9	4.9	37.6	9.8	42.5	0.0%	80.2%	8.2%	[b]	11.6%
No. 1 Smelt Dissolving Tank	021	SDT1	9.5	0.9	6.6	0.3	0.3	0.1	7.7	0.5	7.9	11.2%	83.7%	3.5%	[b]	1.7%
No. 2 Smelt Dissolving Tank	020	SDT2	11.0	1.0	7.6	0.3	0.4	0.2	9.0	0.5	9.1	11.2%	83.7%	3.5%	[b]	1.7%
Lime Kiln	004	LKILN	13.0	1.0	9.6	0.4	1.2	0.1	11.0	1.3	11.1	9.2%	86.2%	3.6%	[b]	0.9%
Lime Slaker	005	LSLAK	3.2	--	3.2	--	--	--	3.2	--	3.2	--	100.0%	--	--	--

[a] Calculated using the percentages of the total filterable PM provided in the table below.

[b] Inorganic CPM (SO4) is modeled in CALPUFF as a separate category other than PM.

Source	Emission Factors: Emission Factors and Basis (lb/ton BLS for NCASI and lb/MMBtu for EPA) Filterable PM	Filterable PM_{10}	Filterable $PM_{2.5}$	Condensable PM (CPM)	CPM Organic	CPM Inorganic Sulfate	CPM Inorganic Non-Sulfate	Reference	Estimated Emission Factors: Coarse PM_{10}[c]	Fine PM_{10} (Soil)[d]	Elemental Carbon (EC)[e]	Emission Factor Contribution to Filterable PM (%): Coarse PM_{10}	Fine PM_{10} (Soil)	Elemental Carbon (EC)	Inorganic CPM (SO4)[f]	Organic CPM (SOA)
No. 1 Recovery Boiler	0.74	0.42	0.297	0.38	0.028	0.137	0.215	NCASI[g]	0.122	0.286	0.012	16.5%	38.6%	1.6%	47.6%	3.8%
No. 2 Recovery Boiler	0.74	0.42	0.297	0.38	0.028	0.137	0.215	NCASI[g]	0.122	0.286	0.012	16.5%	38.6%	1.6%	47.6%	3.8%
No. 4 Combination Boiler	0.066	0.065	0.065	0.017	--	--	--	EPA[h]	0	0.059	0.006	0.0%	89.3%	9.2%	12.9%	12.9%
No. 1 Smelt Dissolving Tank	0.148	0.12	0.107	0.0074	0.002	0.002	0.003	NCASI[i]	0.0138	0.103	0.004	9.3%	69.7%	2.9%	3.6%	1.4%
No. 2 Smelt Dissolving Tank	0.148	0.12	0.107	0.0074	0.002	0.002	0.003	NCASI[i]	0.0138	0.103	0.004	9.3%	69.7%	2.9%	3.6%	1.4%
Lime Kiln	1.59	1.35	1.221	0.155	0.013	0.090	0.052	NCASI[j]	0.1256	1.172	0.049	7.9%	73.7%	3.1%	5.9%	0.5%

[c] Coarse PM_{10} = Filterable PM_{10} - Filterable $PM_{2.5}$

[d] Fine PM_{10} = Filterable $PM_{2.5}$ - Elemental Carbon (EC).

[e] Elemental carbon (EC) fraction is as follows:

Recovery Boiler, SDT, and Lime Kiln - 4.0 % of $PM_{2.5}$ (Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006).

Combination Boiler - 9.3 % of $PM_{2.5}$ (EPA's Catalog of Global Emissions Inventories, Table 6, Draft Report, January 2002).

[f] Sum of inorganic sulfate and inorganic non-sulfate CPMs. Inorganic non-sulfate CPMs conservatively assumed as inorganic sulfate CPMs for the purpose of modeling.

[g] Table 2, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006

[h] Table 1.6-1 Emission Factors for PM From Wood Residue Combustion, AP-42, EPA 2003. Total condensable PM equally divided between inorganic and organic PM.

[i] Table 1, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006.

[j] Table 3, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006.

TABLE 2-6
PM SPECIATION FOR THE BART-ELIGIBLE EMISSIONS UNITS - SIZE CATEGORIES
NORMAL OPERATIONS - SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

					Size Distribution of Filterable PM_{10}[b]						Size Distribution of Organic CPM (SOA)[c]		Particle Matter Emissions by Size Category						Model PM
Source	EU ID	Model ID	Total Filterable PM[a] (lb/hr)	CPM (SOA)[a] (lb/hr)	PM0063 (<0.625 μm) (%)	PM0100 (.625-1 μm) (%)	PM0125 (1-1.25 μm) (%)	PM0250 (1.25-2.5 μm) (%)	PM0600 (2.5-6 μm) (%)	PM1000 (6-10 μm) (%)	PM0063 (<0.625 μm) (%)	PM0100 (.625-1 μm) (%)	PM0063 (<0.625 μm) (lb/hr)	PM0100 (.625-1 μm) (lb/hr)	PM0125 (1-1.25 μm) (lb/hr)	PM0250 (1.25-2.5 μm) (lb/hr)	PM0600 (2.5-6 μm) (lb/hr)	PM1000 (6-10 μm) (lb/hr)	PM_{10} + SOA) (lb/hr)
No. 1 Recovery Boiler	001	RB1	7.2	0.3	16.6%	9.0%	4.7%	9.9%	13.8%	2.7%	50.0%	50.0%	1.3	0.8	0.3	0.7	1.0	0.2	4.3
No. 2 Recovery Boiler	019	RB2	27.1	1.0	16.6%	9.0%	4.7%	9.9%	13.8%	2.7%	50.0%	50.0%	5.0	3.0	1.3	2.7	3.7	0.7	16.4
No. 4 Combination Boiler[d]	016	CB4	38.2	4.9	47.5%	47.5%	1.0%	2.0%	0.0%	0.0%	50.0%	50.0%	20.6	20.6	0.4	0.5	0.0	0.0	42.4
No. 1 Smelt Dissolving Tank	021	SDT1	9.5	0.1	34.6%	14.3%	7.9%	15.9%	8.1%	1.2%	50.0%	50.0%	3.3	1.4	0.7	1.5	0.8	0.1	7.9
No. 2 Smelt Dissolving Tank	020	SDT2	11.0	0.2	34.6%	14.3%	7.9%	15.9%	8.1%	1.2%	50.0%	50.0%	3.9	1.6	0.9	1.7	0.9	0.1	9.1
Lime Kiln	004	LKILN	13.0	0.1	43.4%	19.7%	4.9%	8.8%	7.6%	0.3%	50.0%	50.0%	5.7	2.6	0.6	1.1	1.0	0.04	11.1
Lime Slaker[e]	005	LSLAK	3.2	0.0	25.0%	25.0%	25.0%	25.0%	0.0%	0.0%	50.0%	50.0%	0.8	0.8	0.8	0.8	0.0	0.0	3.2

[a] From Table 2-5.

[b] Table 4, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006.

[c] Condensable PM is of less than 1 μm in size, which is equally divided into PM0063 and PM0100.

[d] Particle size distribution for PM emissions from No. 2 Bark Boiler is based on Table 1.6-5, AP-42, EPA 2003.

[e] Lime slaker PM emissions, which have been considered as fine filterable PM_{10}, are equally divided among the 4 size categories below 2.5 μm.

TABLE 2-7
PM SPECIATION FOR THE BART-ELIGIBLE EMISSIONS UNITS - SPECIES CATEGORIES
RECOVERY BOILER CASCADE EVAPORATOR MAINTENANCE - SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

Source	EU ID	Model ID	Filterable PM (lb/hr)	Filterable PM_{10}[a]: Coarse PM_{10} (lb/hr)	Filterable PM_{10}[a]: Fine PM_{10} (Soil) (lb/hr)	Filterable PM_{10}[a]: Carbon (EC) (lb/hr)	Condensable PM (CPM)[a]: CPM (SO4) (lb/hr)	Condensable PM (CPM)[a]: Organic CPM (SOA) (lb/hr)	Total Filterable PM_{10} (lb/hr)	Total Condensable PM (lb/hr)	Model PM (Filterable PM_{10} + SOA) (lb/hr)	Contribution to Model PM (%): Coarse PM_{10} (%)	Contribution to Model PM (%): Fine PM_{10} (Soil) (%)	Contribution to Model PM (%): Carbon (EC) (%)	Contribution to Model PM (%): Inorganic CPM (SO4) (%)	Contribution to Model PM (%): CPM (SOA) (%)
No. 1 Recovery Boiler	001	RB1	6.7	1.1	2.6	0.1	3.2	0.3	3.8	3.4	4.0	27.3%	63.8%	2.7%	b	6.3%
No. 2 Recovery Boiler	019	RB2	27.1	4.5	10.5	0.4	12.9	1.0	15.4	13.9	16.4	27.3%	63.8%	2.7%	b	6.3%
No. 4 Combination Boiler	016	CB4	38.2	0.0	34.1	3.5	4.9	4.9	37.6	9.8	42.5	0.0%	80.2%	8.2%	b	11.6%
No. 1 Smelt Dissolving Tank	021	SDT1	9.5	0.9	6.6	0.3	0.3	0.1	7.7	0.5	7.9	11.2%	83.7%	3.5%	b	1.7%
No. 2 Smelt Dissolving Tank	020	SDT2	11.0	1.0	7.6	0.3	0.4	0.2	9.0	0.5	9.1	11.2%	83.7%	3.5%	b	1.7%
Lime Kiln	004	LKILN	13.0	1.0	9.6	0.4	1.2	0.1	11.0	1.3	11.1	9.2%	86.2%	3.6%	b	0.9%
Lime Slaker	005	LSLAK	3.2	--	3.2	--	--	--	3.2	--	3.2	--	100.0%	--	--	--

[a] Calculated using the percentages of the total filterable PM provided in the table below.
[b] Inorganic CPM (SO4) is modeled in CALPUFF as a separate category other than PM.

Source	Emission Factors and Basis (lb/ton BLS for NCASI and lb/MMBtu for EPA): Filterable PM	Filterable PM_{10}	Filterable $PM_{2.5}$	Condensable PM (CPM)	CPM Organic	CPM Inorganic Sulfate	CPM Inorganic Non-Sulfate	Reference	Estimated Emission Factors: Coarse PM_{10}[c]	Fine PM_{10} (Soil)[d]	Elemental Carbon (EC)[e]	Emission Factor Contribution to Filterable PM (%): Coarse PM_{10}	Fine PM_{10} (Soil)	Elemental Carbon (EC)	Inorganic CPM (SO4)[f]	Organic CPM (SOA)
No. 1 Recovery Boiler	0.74	0.42	0.297	0.38	0.028	0.137	0.215	NCASI[g]	0.122	0.286	0.012	16.5%	38.6%	1.6%	47.6%	3.8%
No. 2 Recovery Boiler	0.74	0.42	0.297	0.38	0.028	0.137	0.215	NCASI[g]	0.122	0.286	0.012	16.5%	38.6%	1.6%	47.6%	3.8%
No. 4 Combination Boiler	0.066	0.065	0.065	0.017	--	--	--	EPA[h]	0	0.059	0.006	0.0%	89.3%	9.2%	12.9%	12.9%
No. 1 Smelt Dissolving Tank	0.148	0.12	0.107	0.0074	0.002	0.002	0.003	NCASI[i]	0.0138	0.103	0.004	9.3%	69.7%	2.9%	3.6%	1.4%
No. 2 Smelt Dissolving Tank	0.148	0.12	0.107	0.0074	0.002	0.002	0.003	NCASI[i]	0.0138	0.103	0.004	9.3%	69.7%	2.9%	3.6%	1.4%
Lime Kiln	1.59	1.35	1.221	0.155	0.013	0.090	0.052	NCASI[j]	0.1256	1.172	0.049	7.9%	73.7%	3.1%	5.9%	0.8%

[c] Coarse PM_{10} = Filterable PM_{10} - Filterable $PM_{2.5}$.
[d] Fine PM_{10} = Filterable $PM_{2.5}$ - Elemental Carbon (EC)
[e] Elemental carbon (EC) fraction is as follows:
Recovery Boiler, SDT, and Lime Kiln - 4.0 % of $PM_{2.5}$ (Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006).
Combination Boiler - 9.3 % of $PM_{2.5}$ (EPA's Catalog of Global Emissions Inventories, Table 6, Draft Report, January 2002).
[f] Sum of inorganic sulfate and inorganic non-sulfate CPMs. Inorganic non-sulfate CPMs conservatively assumed as inorganic sulfate CPMs for the purpose of modeling.
[g] Table 2, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006
[h] Table 1.6-1 Emission Factors for PM From Wood Residue Combustion, AP-42, EPA 2003. Total condenseble PM equally divided between inorganic and organic PM.
[i] Table 1, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006.
[j] Table 3, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006.

TABLE 2-8
PM SPECIATION FOR THE BART-ELIGIBLE EMISSIONS UNITS - SIZE CATEGORIES
RECOVERY BOILER CASCADE EVAPORATOR MAINTENANCE - SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

			Total		Size Distribution of Filterable PM_{10} [b]						Size Distribution of Organic CPM (SOA) [c]		Particle Matter Emissions by Size Category						Model PM
Source	EU ID	Model ID	Filterable PM [a] (lb/hr)	CPM (SOA) [a] (lb/hr)	PM0063 (<0.625 µm) (%)	PM0100 (.625-1 µm) (%)	PM0125 (1-1.25 µm) (%)	PM0250 (1.25-2.5 µm) (%)	PM0600 (2.5-6 µm) (%)	PM1000 (6-10 µm) (%)	PM0063 (<0.625 µm) (%)	PM0100 (.625-1 µm) (%)	PM0063 (<0.625 µm) (lb/hr)	PM0100 (.625-1 µm) (lb/hr)	PM0125 (1-1.25 µm) (lb/hr)	PM0250 (1.25-2.5 µm) (lb/hr)	PM0600 (2.5-6 µm) (lb/hr)	PM1000 (6-10 µm) (lb/hr)	(Filt PM_{10} + SOA) (lb/hr)
No. 1 Recovery Boiler	001	RB1	6.7	0.3	16.6%	9.0%	4.7%	9.9%	13.8%	2.7%	50.0%	50.0%	1.2	0.7	0.3	0.7	0.9	0.2	4.1
No. 2 Recovery Boiler	019	RB2	27.1	1.0	16.6%	9.0%	4.7%	9.9%	13.8%	2.7%	50.0%	50.0%	5.0	3.0	1.3	2.7	3.7	0.7	16.4
No. 4 Combination Boiler [d]	016	CB4	38.2	4.9	47.5%	47.5%	1.0%	2.0%	0.0%	0.0%	50.0%	50.0%	20.6	20.6	0.4	0.8	0.0	0.0	42.4
No. 1 Smelt Dissolving Tank	021	SDT1	9.5	0.1	34.6%	14.3%	7.9%	15.9%	8.1%	1.2%	50.0%	50.0%	3.3	1.4	0.7	1.5	0.8	0.1	7.9
No. 2 Smelt Dissolving Tank	020	SDT2	11.0	0.2	34.6%	14.3%	7.9%	15.9%	8.1%	1.2%	50.0%	50.0%	3.9	1.6	0.9	1.7	0.9	0.1	9.1
Lime Kiln	004	LKILN	13.0	0.1	43.4%	19.7%	4.9%	8.8%	7.6%	0.3%	50.0%	50.0%	5.7	2.6	0.6	1.1	1.0	0.04	11.1
Lime Slaker [e]	005	LSLAK	3.2	0.0	25.0%	25.0%	25.0%	25.0%	0.0%	0.0%	50.0%	50.0%	0.8	0.8	0.8	0.8	0.0	0.0	3.2

[a] From Table 2-7.

[b] Table 4, Particulate Emissions Data for Pulp and Paper Industry-Specific Sources, NCASI, August 2006.

[c] Condensable PM is of less than 1 µm in size, which is equally divided into PM0063 and PM0100.

[d] Particle size distribution for PM emissions from No. 2 Bark Boiler is based on Table 1.6-5, AP-42, EPA 2003.

[e] Lime slaker PM emissions, which have been considered as fine filterable PM_{10}, are equally divided among the 4 size categories below 2.5 µm.

3.0 GEOPHYSICAL AND METEOROLOGICAL DATA

3.1 Modeling Domain and Terrain

CALMET data sets have been developed by EarthTech, Inc. that are based on the following 3 years of Fifth Generation Mesoscale Model (MM5) meteorological data assembled by VISTAS:

- 2001 MM5 data set at 12- km grid (developed by EPA),
- 2002 MM5 data set at 12-km grid (developed by VISTAS), and
- 2003 MM5 data set at 36-km grid (developed by Midwest Regional Planning Organization).

For the finer grid modeling analysis (refined analysis), the 4-km spacing Florida CALMET domain will be used. VISTAS has prepared a total of five sub-regional 4-km spacing CALMET domains. Domain 2 covers all Florida sources and Class I areas that can be potentially affected by the Florida sources.

Golder Associates Inc. (Golder) obtained these data sets from FDEP. As indicated in Section 1.3, of this protocol, the exemption modeling will be based on the finer grid modeling since the Panama City Mill is a large source that is likely to exceed the initial screening thresholds.

3.2 Land Use and Meteorological Database

The CALMET meteorological domains to be used in the exemption modeling have been supplied by VISTAS. The CALMET data sets contain meteorological data and land use parameters for the three-dimensional modeling domain.

3.3 Air Quality Database

3.3.1 Ozone Concentrations

For these analyses, observed ozone data for 2001-2003 from CASTNet and Aerometric Information Retrieval System (AIRS) stations will be used. These data sets have been obtained from EarthTech's website as recommended by FDEP.

3.3.2 Ammonia Concentrations

A fixed monthly background ammonia concentration of 0.5 parts per billion (ppb) will be used based on FDEP's recommendation.

3.4 Natural Conditions at Class I Area

Based on VISTAS' recommendation, Visibility Method 6 will be used in all BART-related modeling, which will compute extinction coefficients for hygroscopic species (modeled and background) using a monthly f(RH) in lieu of calculating hourly RH factors. Monthly RH values from Table A-3 of EPA's *Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule* (Haze Guideline) will be used. Monthly RH factors for the St. Marks Class I area are as follows:

- January – 3.7
- February – 3.4
- March – 3.4
- April – 3.4
- May – 3.5
- June – 4.0
- July – 4.1
- August – 4.4
- September – 4.2
- October – 3.8
- November – 3.7
- December – 3.8

Method 6 requires input of natural background (BK) concentrations of ammonium sulfate ($BKSO_4$), ammonium nitrate ($BKNO_3$), coarse particulates (BKPMC), organic carbon (BKOC), soil (BKSOIL), and elemental carbon (BKEC) in micrograms per cubic meter ($\mu g/m^3$). The model then calculates the natural background light extinction and haze index based on these values.

According to FDEP recommendations, the natural background light extinction may be based on haze index (HI) values (in dv) for either the annual average or the 20-percent best visibility days provided by EPA in Appendix B of the Haze Guideline document (using the 10^{th} percentile HI value). For SSCE's BART analysis, the annual average HI values will be used to determine natural background light extinction of the Class I areas. The light extinction coefficient in inverse megameters (Mm^{-1}) is based on the concentration of the visibility impairing components and the extinction efficiency, in square meters per gram (m^2/g), for each component.

Per VISTAS and FDEP recommendations, the natural background light extinction that is equivalent to EPA-provided background HI values for each Class I area, based on the annual average, will be estimated using the following background values:

- Rayleigh scattering = 10 Mm^{-1};
- Concentrations of $BKSO_4$, $BKNO_3$, BKPMC, BKEC, and BKEC = 0.0; and
- BKSOIL concentration, which is estimated from the extinction coefficient that corresponds to EPA's HI value (corresponding to 20 percent best visibility days) and then subtracting the Rayleigh scattering of 10 Mm-1 (assumes that the extinction efficiency of soil is 1 m^2/g).

According to Appendix B of the Haze Guideline document, the annual average background light extinction coefficient for the St. Marks Class I area is 21.53 Mm^{-1}(equivalent to 7.67 dv) and the corresponding calculated BKSOIL concentration to be used in the modeling is 11.53 $\mu g/m^3$.

Currently, the atmospheric light extinction is estimated by an algorithm developed by the Interagency Monitoring of Protected Visual Environments (IMPROVE) committee, which was adopted by the EPA under the 1999 Regional Haze Rule (RHR). This algorithm for estimating light extinction from particle speciation data tends to underestimate light extinction for the highest haze conditions and overestimate it for the lowest haze conditions and does not include light extinction due to sea salt, which is important at sites near the sea coasts. As a result of these limitations, the IMPROVE Steering Committee recently developed a new algorithm (the "new IMPROVE algorithm") for estimating light extinction from particulate matter component concentrations, which provides a better correspondence between measured visibility and that calculated from particulate matter component concentrations.

The new algorithm splits the total sulfate, nitrate, and organic carbon compound concentrations into two fractions, representing small and large size distributions of those compounds. New terms added to the algorithm are light absorption by NO_2 gas and light scattering due to fine sea salt accompanied by its own hygroscopic scattering enhancement factor and Class I area specific Rayleigh scattering values rounded off to the nearest whole number. The EPA and the Federal Land Managers (FLMs) from the National Park Service and the U.S. Fish and Wildlife Service have determined that adding site-specific data (e.g., sea salt and site-specific Rayleigh scattering) to the old IMPROVE algorithm, for a hybrid approach, is not recommended and is allowing the optional use of the new IMPROVE algorithm.

Because the St. Marks NWA, which is the only Class I area within 300 km of the SSCE's Panama City Mill facility, is located near the sea coast, the new IMPROVE algorithm may additionally be used to calculate the natural background at this Class I area. The new IMPROVE algorithm accounts for the background sea salt concentrations and site-specific Rayleigh scattering. Since the new IMPROVE equation cannot be directly implemented using the existing version of the CALPUFF model without additional post-processing or model revision, VISTAS has developed a methodology for implementing the new IMPROVE equation using existing CALPUFF/CALPOST output in a spreadsheet. This spreadsheet, known as the CALPOST-IMPROVE Processor, will be used to re-calculate visibility impacts due to SSCE's BART-eligible units in addition to the visibility impacts determined using the old IMPROVE equation.

It is assumed that ambient NO_2 concentrations due to SSCE's BART eligible units would be very small as to cause negligible light absorption, so light absorption by NO_2 gas, which is a new term added to the new IMPROVE algorithm, will not be considered for SSCE's BART modeling analysis. The following values will be used to evaluate the visibility impacts at the St. Marks Class I area using the new CALPOST-IMPROVE Processor:

- Rayleigh Scattering – 11 Mm^{-1}
- Sea salt concentration – 0.03 $\mu g/m^3$

4.0 AIR QUALITY MODELING METHODOLOGY

For predicting maximum visibility impairment at the Class I areas, the CALPUFF modeling system will be used. For BART-related visibility impact assessments, the CALPUFF model, Version 5.756 (060725), is recommended for use by EPA and VISTAS. Recent technical enhancements, including changes to the over-water boundary layer formulation and coastal effects modules (sponsored by the Minerals Management Service), are included in this version. The CALPUFF model is a non-steady-state long-range transport Lagrangian puff dispersion model applicable for estimating visibility impacts. The methods and assumptions used in the CALPUFF model will be based on the latest recommendations for CALPUFF analysis as presented in the VISTAS modeling protocol, Interagency Workgroup on Air Quality Models (IWAQM) Phase 2 Summary Report and the FLM's Air Quality Related Values Work Group (FLAG) document. This model is also maintained by EPA on the Support Center for Regulatory Air Models (SCRAM) website.

4.1 Modeling Domain Configuration

The 4-km spacing Florida domain will be used for the BART exemption modeling and if required, modeling to evaluate visibility benefits of different BART control measures. VISTAS has prepared five sub-regional 4-km spacing CALMET domains. Domain 2 covers sources in Florida and Class I areas that are affected by the sources in Florida.

4.2 CALMET Meteorological Domain

The refined CALMET domain, to be used for SSCE's BART modeling, has been provided by FDEP. The major features used in preparing these CALMET data have been described in Section 4.0 of the VISTAS BART modeling protocol.

4.3 CALPUFF Computational Domain and Receptors

The computational domain to be used for the refined modeling will be equal to the full extent of the meteorological domain. Visibility impacts will be predicted at the St. Marks Class I area using receptor locations provided by the FLM. The receptors to be used are presented in Figure 4-1.

4.4 CALPUFF Modeling Options

The major CALPUFF modeling options recommended in the IWAQM guidance (EPA, 1988; Pages B-1 through B-8), in addition to the recommendations in Section 4.3.3 of the VISTAS BART modeling protocol, will be used. An example CALPUFF input file showing the default modeling options and modeling options to be used for SSCE's BART analysis is presented in Appendix C.

4.5 Light Extinction and Haze Impact Calculations

The CALPOST program will be used to calculate the light extinction and the haze impact. The Method 6 technique, which is recommended by the BART guideline document, will be used to compute change in light extinction.

4.6 Quality Assurance and Quality Control (QA/QC)

Quality assurance procedures will be established to ensure that the setup and execution of the CALPUFF model and processing of the modeling results satisfy the regulatory objectives of the BART program. The meteorological datasets to be used in the modeling were developed and provided by VISTAS and therefore, no further QA will be required for these.

The CALPUFF modeling options are described in Section 4.4. The site-specific source data will be independently confirmed by an independent modeler not involved in the initial setup of the modeling files. The verification will address the following:

- Units of measure;
- Verification of the correct source and receptor locations, including datum and projection;
- Confirmation of the switch selections relative to modeling guidance;
- Checks of the program switches and file names of the various processing steps; and
- Confirmation of the use of the proper version and level of each model program.

In addition, all the data and program files needed to reproduce the modeling results will be supplied with the modeling report.

The source and emission data will be independently verified by Golder and SSCE. The source coordinates and related projection/datum parameters will be checked using the CALPUFF GUI's COORDS software and other comparable coordinate translation software such as CORPSCON and National Park Services Conversion Utilities software.

The POSTUTIL and CALPOST post-processor input files will be carefully checked to make sure of the following:

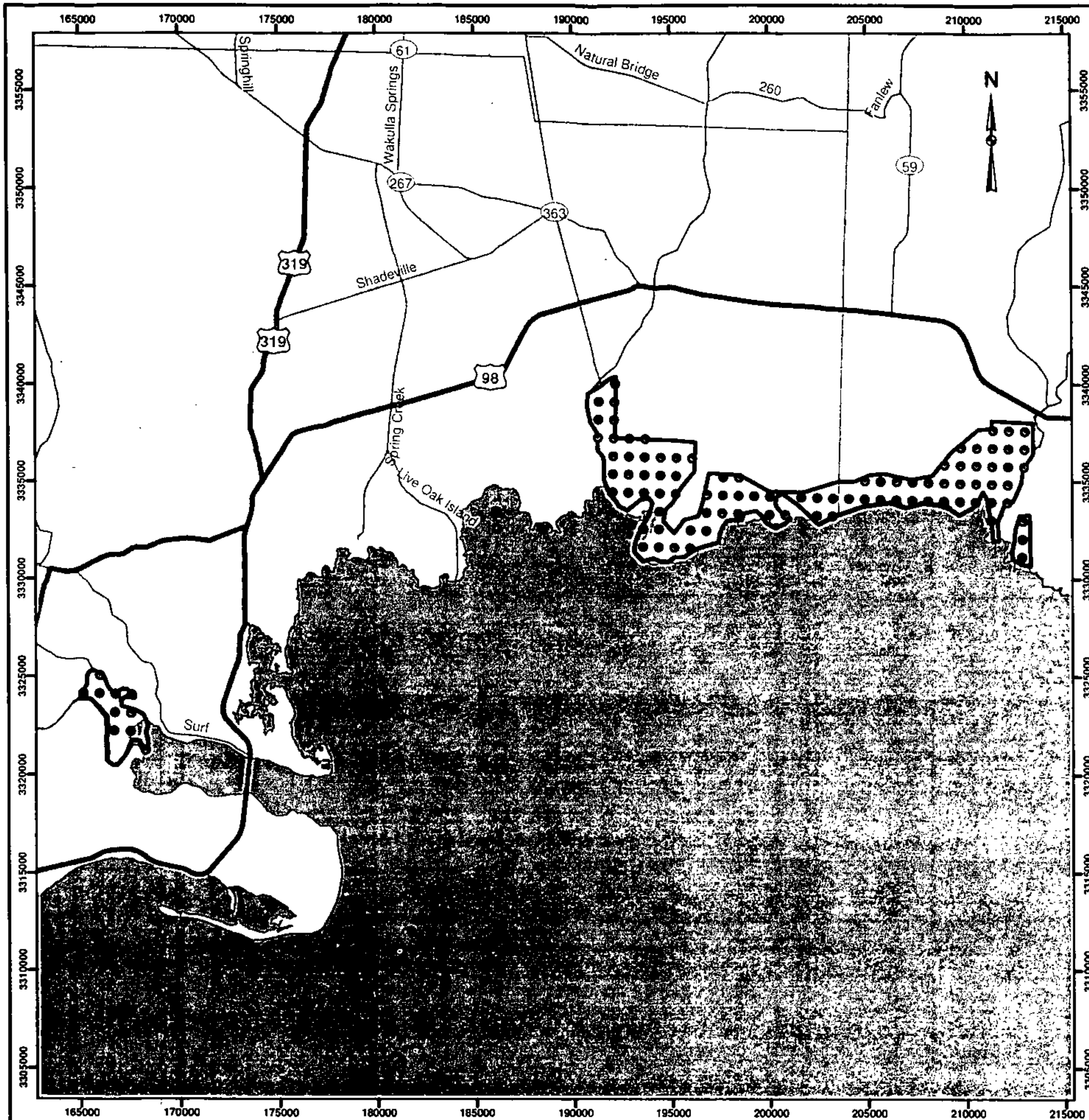
- Appropriate CALPUFF concentrations files are used in the POSTUTIL run;
- The PM species categories are computed using the appropriate fractions;
- Background light extinction computation method selected as Method 6;
- Correct monthly relative humidity adjustment factors used for the appropriate Class I area;
- Background light extinction values as described in Section 3.4 of this protocol;
- Appropriate species names for coarse and fine PM;
- Appropriate Rayleigh scattering term used; and
- Appropriate Class I receptors selected for each Class I area-specific CALPOST run.

4.7 Modeling Report

A modeling report will be submitted containing the following information:

- Map of source location and Class I areas within 300 km of the source;
- Table showing visibility impacts at each Class I area within 300 km of the source; and
- For the refined modeling analysis, a table showing the eight highest visibility impairment values ranked in a descending order for the prime Class I area(s) of interest.

The predicted visibility impairment results for the base emission case and all evaluated BART emission scenarios will be included in the report to show the affect on visibility for each proposed control technology. Final recommendations for BART will also be presented, based on the analysis results of the five evaluation criteria presented in the BART regulation.



LEGEND

Saint Marks NWA

- 100 Receptor Grid
- Class I Boundary

REFERENCE

Projection: Transverse Mercator Datum: NAD 27 Coordinate System: UTM Zone 17

6,000 0 6,000 Meters

PROJECT

SSCE PANAMA CITY MILL
BART MODELING PROTOCOL

TITLE

Saint Marks NWA Receptor Grid

Golder Associates
Gainesville, Florida

PROJECT No			SCALE AS SHOWN	REV 0
DESIGN	AB	25 Apr 2006		
GIS	AB	25 Apr 2006		

FIGURE 4-1

APPENDIX A

DETAILED EMISSION CALCULATIONS, STACK TESTS, AND CEM DATA

TABLE A-1
EMISSION RATE CALCULATION FOR THE BART-ELIGIBLE EMISSIONS UNITS
SMURFIT-STONE CONTAINER ENTERPRISES - PANAMA CITY MILL

EU ID	Source	Fuel	Emission Factor	Emission Factor Reference	Activity Factor	Emission Rate Daily (lb/day)	Annual (TPY)	Daily Average (lb/hr)
Normal Operation								
NO_x								
001	No. 1 Recovery Boiler	BLS	1.09 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	1,618.0	295.3	67.4
019	No. 2 Recovery Boiler	BLS	1.09 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	1,618.0	295.3	67.4
021	No. 1 Smelt Dissolving Tan	BLS	0.020 lb/ton	Ref. 1, Table 4.15	123,700 lb/hr	29.7	5.4	1.24
020	No. 2 Smelt Dissolving Tan	BLS	0.020 lb/ton	Ref. 1, Table 4.15	123,700 lb/hr	29.7	5.4	1.24
004	Lime Kiln	No. 6 Oil	35.6 lb/hr	Stack test 2/7/06	--	854.4	155.9	35.6
SO_2								
001	No. 1 Recovery Boiler	BLS	2.29 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	3,399.3	620.4	141.6
019	No. 2 Recovery Boiler	BLS	2.29 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	3,399.3	620.4	141.6
021	No. 1 Smelt Dissolving Tan	BLS	0.005 lb/ton	Ref. 1, Table 4.15	123,700 lb/hr	7.4	1.4	0.31
020	No. 2 Smelt Dissolving Tan	BLS	0.005 lb/ton	Ref. 1, Table 4.15	123,700 lb/hr	7.4	1.4	0.31
004	Lime Kiln	No. 6 Oil	0.5 lb/hr	Stack test 2/7/06	--	12.0	2.2	0.50
Recovery Boiler Cascade Evaporator Maintenance [a]								
NO_x								
001	No. 1 Recovery Boiler	BLS	1.09 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	1,078.7	--	44.9
		No. 6 Oil	47 lb/10^3 gal	AP-42 Table 1.3-1	1,500 gal/hr	564.0	--	23.5
							Total =	68.4
019	No. 2 Recovery Boiler	BLS	1.09 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	1,078.7	--	44.9
		No. 6 Oil	47 lb/10^3 gal	AP-42 Table 1.3-1	1,500 gal/hr	564.0	--	23.5
							Total =	68.4
SO_2								
001	No. 1 Recovery Boiler	BLS	2.29 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	2,266.2	--	94.4
		No. 6 Oil	157 *S lb/10^3 gal	AP-42 Table 1.3-1	1,500 gal/hr	4,710.0	--	196.3
							Total =	290.7
019	No. 2 Recovery Boiler	BLS	2.29 lb/ton	Ref. 1, Table 4.11	123,700 lb/hr	2,266.2	--	94.4
		No. 6 Oil	157 *S lb/10^3 gal	AP-42 Table 1.3-1	1,500 gal/hr	4,710.0	--	196.3
							Total =	290.7
PM_{10}								
001	No. 1 Recovery Boiler	BLS	7.2 lb/hr	Stack Test of 10/10/05	-- --	115.2	--	4.8
		No. 6 Oil	0.212 lb/10^3 gal[c]	AP-42 Table 1.3-4[b]	1,500 gal/hr	45.0	--	1.9
							Total =	6.7
019	No. 2 Recovery Boiler	BLS	27.1 lb/hr	Stack Test of 10/6/04	-- --	433.6	--	18.1
		No. 6 Oil	0.212 lb/10^3 gal[c]	AP-42 Table 1.3-4[b]	1,500 gal/hr	45.0	--	1.9
							Total =	19.9

Footnotes:

[a] No 6 fuel oil is burned in the recovery boilers only during maintenance on the cascade evaporators approximately once every six weeks. Fuel burn 8 hours, with an average fuel oil burning rate of 1,500 gal/hr. Daily average emission rate calculated based on 8 hours of oil firing and 16 hours of Maximum sulfur content of 2.5% used in calculation.

[b] Based on ESP control, since the ESP is operating during the maintenance operations

[c] Based on formula of $0.067 * (1.12(S)+0.37)$ lb/10^3 gal.

References:

1. From *Compilation of Criteria Air Pollutant Emissions Data For Sources At Pulp And Paper Mills Including Boiler s*. National Council For Air Improvement (NCASI), August 2004. Median value used

TABLE A-2
SUMMARY OF RECENT EMISSION TESTS AT THE SMURFIT STONE PANAMA CITY MILL

Test Date	Unit	PM avg lb/hr	SO_2 avg lb/hr	NO_x avg lb/hr
#4 CB				
10/11/2006	CB4	31.6	--	--
4/25/2006	CB4	28.6	--	--
10/10/2006	CB4	64.5	--	--
2/6/2006	CB4	53.5	--	334.0
10/12/2005	CB4	37.2	453.5	--
Lime Kiln				
10/12/2006	LKILN	11.52	--	--
2/7/2006	LKILN	--	0.50	35.6
10/13/2005	LKILN	12.98	--	--
10/5/2004	LKILN	12.39	--	--
Lime Slaker				
10/12/2006	LSLAKER	2.53	--	--
10/13/2005	LSLAKER	3.18	--	--
10/5/2004	LSLAKER	1.28	--	--
Smelt Dissolving Tank 1				
10/10/2006	SDTV1	8.86	--	--
10/10/2005	SDTV1	9.46	--	--
10/5/2004	SDTV1	8.08	--	--
Smelt Dissolving Tank 2				
10/10/2006	SDTV2	8.43	--	--
10/10/2005	SDTV2	8.58	--	--
10/5/2004	SDTV2	10.96	--	--
Recovery Boiler 1A				
10/10/2006	RB1A	2.22	--	--
10/10/2005	RB1A	3.24	--	--
10/7/2004	RB1A	2.65	--	--
Recovery Boiler 1B				
10/10/2006	RB1B	3.13	--	--
10/10/2005	RB1B	3.91	--	--
10/7/2004	RB1B	3.29	--	--
Recovery Boiler 2A				
10/11/2006	RB2A	4.19	--	--
10/11/2005	RB2A	6.11	--	--
10/6/2004	RB2A	12.33	--	--
Recovery Boiler 2B				
10/11/2006	RB2B	4.22	--	--
10/10/2005	RB2B	9.46	--	--
10/6/2004	RB2B	14.81	--	--

TABLE A-3

CEM DATA SUMMARY FOR STONE CONTAINER PANAMA CITY MILL - NO. 4 COMBINATION BOILER

Date	SO_2 24hr Avg. (ppm)	SO_2 24hr Avg. (lb/hr)	Date	SO_2 24hr Avg. (ppm)	SO_2 24hr Avg. (lb/hr)	Date	SO_2 24hr Avg. (ppm)	SO_2 24hr Avg. (lb/hr)
4/26/2006	38.2	23.3	6/10/2006	378.7	441.2	7/25/2006	222.8	247.9
4/27/2006	78.8	73.5	6/11/2006	235.6	272.6	7/26/2006	395.1	450.9
4/28/2006	43.0	49.5	6/12/2006	301.3	349.3	7/27/2006	284.6	320.2
4/29/2006	62.9	74.9	6/13/2006	284.4	321.4	7/28/2006	288.2	325.9
4/30/2006	66.6	78.1	6/14/2006	233.3	256.0	7/29/2006	215.0	249.4
5/1/2006	97.9	111.0	6/15/2006	266.9	295.5	7/30/2006	324.8	380.7
5/2/2006	140.7	153.1	6/16/2006	376.4	436.9	7/31/2006	340.9	389.7
5/3/2006	85.8	100.7	6/17/2006	324.6	366.6	8/1/2006	429.3	516.4
5/4/2006	114.1	117.6	6/18/2006	384.7	437.8	8/2/2006	436.2	497.9
5/5/2006	115.5	133.6	6/19/2006	398.9	461.7	8/3/2006	242.1	277.7
5/6/2006	119.2	141	6/20/2006	336.4	391.8	8/4/2006	314.3	360.5
5/7/2006	139.3	152.6	6/21/2006	374.8	438.6	8/5/2006	315.4	355.4
5/8/2006			6/22/2006	244.4	273.4	8/6/2006		
5/9/2006	30.6	54.2	6/23/2006	282.4	327.4	8/7/2006	184.7	206.5
5/10/2006	64.7	62.2	6/24/2006	312.6	361.2	8/8/2006	243.4	273.4
5/11/2006	89.2	92.0	6/25/2006	433.6	500.1	8/9/2006	256.5	284.2
5/12/2006	89.1	102.8	6/26/2006	414.1	470.3	8/10/2006	229.6	266.2
5/13/2006	109.5	127.7	6/27/2006	308.0	333.1	8/11/2006	182.9	210.4
5/14/2006	68.7	77.9	6/28/2006	280.1	312.6	8/12/2006	154.0	166.5
5/15/2006	166.0	187.4	6/29/2006	315.6	360.9	8/13/2006	314.0	310.7
5/16/2006	289.1	369.7	6/30/2006	267.8	306.5	8/14/2006	413.6	426.5
5/17/2006	288.3	325.0	7/1/2006	234.3	264.5	8/15/2006	419.1	415.9
5/18/2006	212.1	234.0	7/2/2006	246.2	287.8	8/16/2006	454.3	472.0
5/19/2006	280.8	311.6	7/3/2006	887.3	408.7	8/17/2006	441.0	470.0
5/20/2006	328.4	362.1	7/4/2006	401.3	463.8	8/18/2006	425.5	463.2
5/21/2006	300.9	338.0	7/5/2006	394.5	459.9	8/19/2006	426.1	489.9
5/22/2006	308.1	335.1	7/6/2006	346.6	397.7	8/20/2006	325.6	356.5
5/23/2006	345.8	388.2	7/7/2006	323.6	360.0	8/21/2006	331.5	370.2
5/24/2006	367.3	385.4	7/8/2006	275.2	314.4	8/22/2006	302.6	332.8
5/25/2006	381.0	428.8	7/9/2006	235.5	270.3	8/23/2006	662.6	756.9
5/26/2006	308.3	352.9	7/10/2006	255.3	291.1	8/24/2006	685.9	803.5
5/27/2006	352.8	405.6	7/11/2006	309.3	346.8	8/25/2006	434.0	459.6
5/28/2006	314.0	360.3	7/12/2006	290.0	323.8	8/26/2006	300.6	311.5
5/29/2006	426.4	488.8	7/13/2006	306.7	352.2	8/27/2006	371.8	404.6
5/30/2006	388.8	451.1	7/14/2006	314.6	358.2	8/28/2006	263.2	306.0
5/31/2006	401.9	462.9	7/15/2006	279.0	319.3	8/29/2006	326.6	369.9
6/1/2006	325.4	374.6	7/16/2006	191.6	220.2	8/30/2006	298.3	343.5
6/2/2006	333.4	380.1	7/17/2006	214.6	240.2	8/31/2006	309.2	354.9
6/3/2006	347.1	401.1	7/18/2006	362.1	414.6	9/1/2006	261.1	299.2
6/4/2006	294.7	342.8	7/19/2006	289.7	318.6	9/2/2006	277.4	318.6
6/5/2006	268.2	310.3	7/20/2006	281.6	322.5	9/3/2006	273.2	311.9
6/6/2006	303.7	350.8	7/21/2006	240.0	278.4	9/4/2006	288.8	322.3
6/7/2006	162.7	186.0	7/22/2006	333.1	382.5	9/5/2006	352.2	391.4
6/8/2006	264.9	313.4	7/23/2006	232.5	262.3	9/6/2006	98.7	110.3
6/9/2006	289.2	341.5	7/24/2006	303.9	345.4	9/7/2006	347.9	373.8

TABLE A-3
CEM DATA SUMMARY FOR STONE CONTAINER PANAMA CITY MILL - NO. 4 COMBINATION BOILER

Date	SO_2 24hr Avg. (ppm)	SO_2 24hr Avg. (lb/hr)	Date	SO_2 24hr Avg. (ppm)	SO_2 24hr Avg. (lb/hr)	Date	SO_2 24hr Avg. (ppm)	SO_2 24hr Avg. (lb/hr)
9/8/2006	397.5	434.5	10/23/2006	252.4	310.7	12/7/2006	80	88.6
9/9/2006	416.8	461.8	10/24/2006	408.5	557.1	12/8/2006	152.6	163.9
9/10/2006	305.0	337.2	10/25/2006	334.9	413.9	12/9/2006	136.4	148.6
9/11/2006	311.1	339.8	10/26/2006	297.1	358	12/10/2006	90.6	97.1
9/12/2006	352.6	374.5	10/27/2006	274.5	345.8	12/11/2006		
9/13/2006	205.6	215.4	10/28/2006	285.5	359.7	12/12/2006		
9/14/2006	231.9	253.5	10/29/2006	348.1	421.2	12/13/2006		
9/15/2006	102.8	112	10/30/2006	348.9	423.1	12/14/2006		
9/16/2006	179.8	205.4	10/31/2006	295.8	367.1	12/15/2006		
9/17/2006	38.9	39.4	11/1/2006	228.3	287.6	12/16/2006		
9/18/2006			11/2/2006	309.6	391.5	12/17/2006		
9/19/2006	102.8	123.6	11/3/2006	335.5	430.9	12/18/2006		
9/20/2006	236.1	281.1	11/4/2006	326.5	420.8	12/19/2006		
9/21/2006	279.6	334.6	11/5/2006	323.1	403.6	12/20/2006		
9/22/2006	279.2	332.1	11/6/2006	257.5	322.9	12/21/2006		
9/23/2006	240.3	280.0	11/7/2006	282.8	335.4	12/22/2006		
9/24/2006	233	274.4	11/8/2006	280.5	338.4	12/23/2006		
9/25/2006	250.8	299.1	11/9/2006	323.5	391.2	12/24/2006		
9/26/2006	200.9	242.5	11/10/2006	224.3	276.8	12/25/2006		
9/27/2006	194.7	236.7	11/11/2006	304	370.2	12/26/2006		
9/28/2006	176.2	212.1	11/12/2006	287.5	356	12/27/2006		
9/29/2006	242.8	298.7	11/13/2006	320.4	399.4	12/28/2006		
9/30/2006	237.7	295.2	11/14/2006	341.8	417.6	12/29/2006		
10/1/2006	218.9	270.1	11/15/2006	270.3	343.8	12/30/2006		
10/2/2006	258.7	315.6	11/16/2006	144.8	184.4	12/31/2006		
10/3/2006	116.2	143.6	11/17/2006	220.1	273		Max:	803.5
10/4/2006	147.3	181.6	11/18/2006	339.6	420			
10/5/2006	185.5	262.4	11/19/2006	238.1	297.8			
10/6/2006	207	263.5	11/20/2006	324	397.9			
10/7/2006	237.4	298.4	11/21/2006	329.5	409			
10/8/2006	227.6	285.3	11/22/2006	300.6	383.1			
10/9/2006	266.7	328.8	11/23/2006	285.3	361.2			
10/10/2006	284.0	337.6	11/24/2006	296.6	371.3			
10/11/2006	267.7	323.1	11/25/2006	326	398.4			
10/12/2006	247	306.5	11/26/2006	363.7	446.8			
10/13/2006	136	169.9	11/27/2006	253.7	307.7			
10/14/2006	355.8	432.5	11/28/2006	74	92.6			
10/15/2006	318.1	387.3	11/29/2006					
10/16/2006	352.7	417.9	11/30/2006					
10/17/2006	230.6	269.7	12/1/2006					
10/18/2006	341	402.6	12/2/2006					
10/19/2006	457.8	552	12/3/2006					
10/20/2006	397	472.7	12/4/2006					
10/21/2006	385.3	454.5	12/5/2006					
10/22/2006	351.6	428.1	12/6/2006					

APPENDIX B

NCASI EMISSION FACTORS

ncasi

NATIONAL COUNCIL FOR AIR AND STREAM IMPROVEMENT, INC.
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Ronald A. Yeske, Ph.D.
President
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August 25, 2006

TO: Corporate Correspondents -- CC 06-021
Regional Managers

FROM: Ronald A. Yeske

SUBJECT: Information on Kraft Pulp Mill Particulate Emissions for Visibility Modeling

This memorandum will be of interest to kraft pulp mills conducting modeling of visibility impacts in response to regional haze regulatory programs.

Numerous kraft pulp mills have "BART-eligible" power boilers, recovery furnaces, smelt dissolving tanks, and lime kilns. Generally speaking, "BART-eligible" sources were built between 1962 and 1977, as discussed in NCASI Corporate Correspondent Memorandum No. 05-17, and emit SO_2, NO_x, and particulate matter. As required by EPA's regional haze program, states are now in the process of evaluating whether or not emission reductions should be imposed on these "BART-eligible" sources. The key factor in these evaluations is the impact that the source emissions have on visibility in Class I areas. If the impact is minimal, it is unlikely that emission reductions would be imposed as a result of a BART (Best Available Retrofit Technology) analysis.

As recommended by EPA, visibility impacts are being assessed with the CALPUFF model. CALPUFF is a long-range transport and dispersion model that also simulates the formation of fine particulate matter from gaseous emissions. In visibility assessments, CALPUFF is used to predict concentrations of ammonium sulfate, ammonium nitrate, organic aerosols, fine particulates, coarse particulates, and elemental carbon. These concentrations are then used to calculate a total light extinction coefficient based on the light scattering and absorption properties of each of the components. The amount of light extinction can then related to the deciview change in a Class I area attributable to emissions from a point source. EPA suggests BART-eligible sources with less than a 0.5 deciview impact in any Class I area could reasonably be exempted from further BART analysis.

To run the CALPUFF model for "BART-eligible" sources, emission rates of SO_2, NO_x, and particulate matter are required. However, CALPUFF inputs needed for particulate matter are rather detailed. A breakdown of PM_{10} emissions into the following components and aerodynamic diameters is necessary:

Filterable PM_{10}:
- <0.625 µm
- 0.625 – 1.0 µm
- 1.0 – 1.25 µm
- 1.25 – 2.5 µm
- 2.5 - 6 µm
- 6 – 10 µm
- Elemental carbon percentage

Condensible PM_{10}:
- organic portion
- inorganic sulfate, nitrate and soils portions

Most mills have total particulate emission test results from EPA Method 5, but very few have PM_{10} or $PM_{2.5}$ results and virtually none have detailed particle size distribution information. In response to company requests for this information, NCASI has compiled available data for kraft recovery furnaces, smelt dissolving tanks, and lime kilns that may used to estimate the required inputs for CALPUFF. The data are described and summarized in the attachment. For power boilers, similar information can be found in Chapter 1 of EPA's AP-42 publication for coal, oil, gas, and wood fuels.

The attached summary was prepared by Arun Someshwar (asomeshwar@ncasi.org; ext. 226) and Ashok Jain (ajain@ncasi.org; ext. 0) at the Southern Regional Center (352-331-1745). Please contact either one if you need further details or assistance.

Attachment

Particulate Emissions Data for Pulp and Paper Industry-Specific Sources

August 25, 2006

This material has been prepared to assist mills which are using the CALPUFF model to assess the visibility impacts of their kraft pulp mill sources. It contains data on particulate emissions from the major sources at kraft pulp mills, including smelt dissolving tanks, lime kilns, and recovery furnaces. Boilers are not addressed since EPA AP-42 emission factors are considered the best source for these sources. The EPA AP-42 particulate emission factors for coal-fired, oil-fired, gas-fired and wood-fired boilers are also presented in NCASI Technical Bulletin No. 884 (NCASI 2004).

The CALPUFF model requires as input emission rates of filterable and condensable particles in different size distribution ranges. Over the years, NCASI has conducted studies at a number of kraft mill sources to characterize their PM and CPM (condensible particulate matter) emissions. These and other industry generated data have been compiled in NCASI Technical Bulletin No. 884 (NCASI 2004). The CALPUFF model, however, requires input of emission rates of particles in size ranges which are more detailed than what is generally measured. Consequently, in this document, the industry and NCASI data have been combined with the detailed size distribution data in AP-42 to provide data suitable for CALPUFF modeling for kraft recovery furnaces, lime kilns, and smelt dissolving tanks. The elemental carbon content data from EPA's CMAQ (Community Multi-Scale Air Quality) data base have also been included in this document.

In reviewing and using these data it should be noted that CPM emissions comprise an organic and an inorganic fraction. The inorganic fraction of CPM may consist of sulfates, nitrates, and soil (inert material presumably from passing of otherwise filterable PM material through the filter). It has been suggested that as a worst case visibility impact analysis, the non-sulfate fraction of inorganic CPM may be treated as nitrate, which has the same extinction coefficient of 3 as sulfate. However, there is little evidence that nitric acid or hygroscopic ammonium nitrate is present in CPM. Thus, caution should be exercised in assuming that all the non-sulfate inorganic CPM is nitrate.

To assist mills in using their own data for input into CALPUFF, NCASI has developed a companion spreadsheet, which has been posted on the NCASI website at http://www.ncasi.org/support/downloads/Detail.aspx?id=37. (A user name and password are required for access.) The spreadsheet allows facilities to input their site-specific PM and, if available, PM_{10}, $PM_{2.5}$ and CPM data to the different size fractions for input into CALPUFF.

Smelt Dissolving Tanks

The emission data for smelt dissolving tanks were obtained from NCASI Technical Bulletin Nos. 884 (NCASI 2004) and 898 (NCASI 2005). These data are summarized in Table 1. All smelt dissolving tanks (SDTs) in this data set had wet particulate control devices, and thus "wet" stacks. Wet stacks are not amenable to be tested for PM_{10}, $PM_{2.5}$ and condensible PM (CPM) by the traditional EPA Methods 201A (PM_{10}), modified 201A ($PM_{2.5}$), CTM 039 (PM_{10}, $PM_{2.5}$) and CTM 040 (PM_{10}, $PM_{2.5}$), which are designed for stacks following dry PM control devices. Thus far, the only PM_{10}, $PM_{2.5}$ and CPM emission data for SDTs with wet stacks have been obtained by O'Connor and Geneste (2003) using a modified dilution tunnel method. O'Connor and Geneste quantified total PM_{10} and $PM_{2.5}$ emissions from seven Canadian smelt dissolving tanks with wet stacks. They determined the filterable and condensible fractions of total PM_{10} and $PM_{2.5}$ emissions by heating the filters to 120°C and determining weight loss. The portion remaining after heating was assumed to be the filterable material and the portion lost was assumed to equal the condensible portion of the samples

Table 1 is a summary of the PM data for smelt dissolving tanks. The detailed data are presented in Table A1 of Appendix A. The filterable PM data in Table 1 were obtained from combining the data set of 36 sources listed in NCASI Technical Bulletin No. 884 (NCASI 2004), Table A15c, and the data set of 6 sources listed in NCASI Technical Bulletin No. 898 (NCASI 2005). The data for PM_{10} and $PM_{2.5}$ emissions, which are presented as a percentage of the filterable PM, correspond to the eight Canadian SDTs reported by O'Connor and Geneste (2003) after subtracting 19% attributed to CPM (see NCASI Technical Bulletin No. 884, Table A15d).

The total CPM data in Table 1 were obtained from NCASI tests (3 units) and mill tests (3 units), both of which are summarized in NCASI Technical Bulletin No. 898 (NCASI 2005). Organic and inorganic (water soluble) CPM fractions were also determined in emissions from these six units. Sulfate CPM fractions were determined in three of the six units. Total CPM data for two other units were available in NCASI files. CPM emissions for eight Canadian mill SDTs were also estimated by O'Connor and Geneste (2003) using the modified dilution tunnel method. However, these emissions were found to be consistently much higher than the corresponding emissions from U.S. SDT vents by as much as one to two orders of magnitude. Use of foul or dirty condensates to make weak wash used as scrubbing solution on the SDTs which in turn may have contained elevated levels of organics and ammonia is suspected to be the cause of this large difference. Consequently, the Canadian data were not used for estimating averages of total SDT CPM emissions in Table 1.

Table 1. Smelt Tank Data Summary

Parameter	Measurement Method	No. of Sources	Range (lb/ton BLS)	Mean (lb/ton BLS)	Mean Percent of PM or CPM
PM	EPA Method 5	42	0.03 - 0.64	0.148	
PM_{10}	Dilution Tunnel	7			81.9[1]
$PM_{2.5}$	Dilution Tunnel	7			72.6[1]
CPM – Total	EPA Method 202	8	0.002 - 0.015	0.0074	
CPM – Organic		6			27.8[2]
CPM Inorganic - Sulfate (as H_2SO_4)		3			27.3[2]
CPM Inorganic – non-sulfate[3]		6			44.9[2]

[1]filterable PM_{10} and $PM_{2.5}$ values expressed as percent of filterable PM values; [2]organic and inorganic (sulfate and non-sulfate) CPM values expressed as percent of total CPM values; [3]Nitrate may comprise some or all of the non-sulfate inorganic CPM fractions. As a conservative measure, the non-sulfate portion of inorganic CPM may be assumed to be sulfate. Sulfate and nitrate have the same extinction efficiency (3.0) and the same dependence on relative humidity, and thus in terms of modeling for visibility using the CALPUFF model, they will behave the same way. This assumption is conservative since in reality some of the nitrate may become nitric acid in the atmosphere, depending on temperature, relative humidity and availability of ammonia. However, as a first step, the assumption of all inorganic condensable PM as sulfate should be sufficient. Primary NO_3 should not be categorized as soil, because soil is non-hygroscopic with lower extinction efficiency (1.0). If the assumption of all inorganic CPM as sulfate proves to be too conservative, it may be possible to conduct tests with the model to explore whether the NO_3^- can be properly entered as a primary (emitted) pollutant.

Recovery Furnaces

The recovery furnace data were obtained from NCASI Technical Bulletins Nos. 852 (NCASI 2002) and 884 (NCASI 2004). These are summarized in Table 2. All of the recovery furnaces in this data set use electrostatic precipitators (ESP) for particulate matter emissions control. In NCASI Technical Bulletins No. 852 and 884, the total PM data for the data sets where PM_{10} and $PM_{2.5}$ were also measured were obtained by using an in-stack filter. The total PM values in these tests, thus, are similar to what would be obtained if an EPA Method 17 train was used. However, in Subpart BB, kraft mills subject to NSPS are required to add 0.004 gr/dscf to the results of in-stack Method 17 when the latter is used as an alternative to EPA Method 5. Thus, in order to estimate PM_{10} and $PM_{2.5}$ fractions of Method 5-derived PM values, 0.004 gr/dscf was added to the total PM values obtained with the EPA CTM-40 train. For example, if a run gave 0.020, 0.025 and 0.036 gr/dscf for $PM_{2.5}$, PM_{10} and total PM, respectively, the total PM value was adjusted upwards to 0.036 + 0.004 or 0.040 gr/dscf. The $PM_{2.5}$ would then be 0.020/0.040 x 100 = 50 percent of PM Method 5 and PM_{10} would be 0.0250/0.040 x 100 = 62 percent of PM Method 5. If such adjustments to total PM values were not made, the values of $PM_{2.5}$ and PM_{10} as percent of total PM would have been higher and these are shown in the table footnote.

The PM data for DCE recovery furnaces shown in Table 2 are from the 23 sources listed in NCASI Technical Bulletin No. 884 (NCASI 2004), Table A11c. Detailed data are presented in Table A2 of Appendix A. The PM_{10} and $PM_{2.5}$ data for the DCE recovery furnaces are from the 4 DCE sources listed in Technical Bulletin No. 884 (NCASI 2004), Table A11d. Total CPM, organic CPM, inorganic CPM (water soluble) and sulfate CPM data were available from two sources listed in Technical Bulletin No. 852 (NCASI 2002). Data for total CPM, organic CPM, and inorganic CPM emissions from two DCE recovery furnaces and sulfate emissions from one DCE furnace generated in an ongoing unpublished NCASI study are also included in Table 2.

The PM data for the NDCE recovery furnaces shown in Table 2 are from the 20 sources listed in NCASI Technical Bulletin No. 884 (NCASI 2004), Table A12b. Detailed data are presented in Table A3 of Appendix A. The PM_{10} and $PM_{2.5}$ data are from the 10 NDCE sources listed in Technical Bulletin No. 884 (NCASI 2004), Table A12c for which both PM_{10} and $PM_{2.5}$ data were available. The NDCE furnace CPM data are from 6 sources listed in Technical Bulletin No.884 (NCASI 2004). The organic CPM, inorganic CPM (water soluble) and sulfate CPM data are from two sources listed in Technical Bulletin No. 852 (NCASI 2002). Data for total CPM, organic CPM, and inorganic CPM emissions from one NDCE recovery furnace generated in an ongoing unpublished NCASI study are also included in Table 2.

Table 2. Recovery Furnace Data Summary

Kraft DCE Recovery Furnace

Parameter	Measurement Method	No. of Sources	Range (lb/ton BLS)	Mean (lb/ton BLS)	Mean Percent of PM or CPM
PM	EPA Method 5	23	0.07 - 2.58	0.74	–
PM_{10}	EPA CTM-040	4			56.7[1]
$PM_{2.5}$	EPA CTM-040	4			40.2[1]
CPM – Total	EPA Method 202	4	0.208 – 0.678	0.38	
CPM - Organic		4			7.4[2]
CPM Inorganic - Sulfate (as H_2SO_4)		3			36.0[2]
CPM Inorganic – non-sulfate[3]		3			56.6[2]

Kraft NDCE Recovery Furnace

Parameter	Measurement Method	No. of Sources	Range (lb/ton BLS)	Mean (lb/ton BLS)	Mean Percent of PM or CPM
PM	EPA Method 5	20	0.02 - 3.50	0.65	
PM_{10}	EPA CTM-040	10			50.2[1]
$PM_{2.5}$	EPA CTM-040	10			37.2[1]
CPM – Total	EPA Method 202	7	0.05 - 0.15	0.09	
CPM – Organic		3			16.5[2]
CPM Inorganic - Sulfate (as H_2SO_4)		3			35.2[2]
CPM Inorganic – non-sulfate[3]		1			48.3[2]

[1]filterable PM_{10} and $PM_{2.5}$ values expressed as percent of filterable PM values – note that PM_{10} and $PM_{2.5}$ were calculated as percent of total PM by adding 0.004 gr/dscf to total PM values; average PM_{10} and $PM_{2.5}$ values without such adjustment would be higher (75.0% and 52.9%, respectively, for DCE furnaces and 67.8% and 51.0%, respectively, for NDCE furnaces); [2]organic and inorganic (sulfate and non-sulfate) CPM values expressed as percent of total CPM values; [3]see footnote 3 in Table 1

Lime Kilns

The lime kiln data were obtained from NCASI Technical Bulletins Nos. 852 (NCASI 2002), 884 (NCASI 2004), and 898 (NCASI 2005) and are summarized in Table 3. Detailed data are presented in Table A4 of Appendix A. The emissions data are separated by control device type. The majority of lime kilns in this data set used wet control devices for particulate control. Two of the lime kilns used an ESP for particulate control, followed by a wet scrubber for SO_2 control. The remainder used an ESP for particulate control. Once again, as for SDTs, wet stacks are not amenable to be tested for PM_{10}, $PM_{2.5}$ and CPM by the traditional EPA Methods 201A (PM_{10}), modified 201A ($PM_{2.5}$), CTM 039 (PM_{10}, $PM_{2.5}$) and CTM 040 (PM_{10}, $PM_{2.5}$), which are designed for stacks following dry PM control devices. O'Connor and Geneste (2003) used a modified dilution tunnel method to quantify total PM_{10} and $PM_{2.5}$ emissions from six Canadian kraft lime kilns with wet scrubbers.

The filterable PM data for lime kilns using wet control devices are from 31 sources listed in NCASI Technical Bulletin No. 884 (NCASI 2004), Table A13c. The data for PM_{10} and $PM_{2.5}$ emissions for lime kilns using wet control devices are presented as a percentage fraction of the total PM corresponding to the six Canadian lime kilns tested by O'Connor and Geneste (2003) (see NCASI Technical Bulletin No. 884, Table A13d) for which both PM_{10} and $PM_{2.5}$ data were obtained . In the O'Connor and Geneste (2003) study, lime kiln total PM_{10} and $PM_{2.5}$ emissions were measured using a dilution tunnel followed by size-specific cyclones and quartz filters. To determine the filterable and condensible fractions of total PM_{10} and $PM_{2.5}$ emissions, the filters were heated at 120°C to determine weight loss. The portion remaining after heating was assumed to be the filterable fraction and the portion lost was assumed to equal the condensible fraction of the samples.

The CPM data for lime kilns with wet scrubbers in Table 3 were obtained from NCASI tests (4 units) reported in NCASI Technical Bulletin No. 898 (NCASI 2005) and from the Canadian study (seven kilns) summarized in Technical Bulletin No. 884 (NCASI 2004). The organic CPM, inorganic CPM and sulfate CPM data are from two to three sources listed in Technical Bulletin No. 898 (NCASI 2005).

All of the PM and CPM data for lime kilns using an ESP followed by a wet control device are from two sources listed in NCASI Technical Bulletin No. 898 (NCASI 2005). Unfortunately, no PM_{10} and $PM_{2.5}$ data are available for such sources. However, if one assumes that the wet scrubber played no role in removing or contributing to PM emissions from such sources, which is not an unreasonable assumption, one could use the results for lime kilns using ESPs to estimate the PM_{10} and $PM_{2.5}$ fractions of PM. Total CPM emissions data for two kilns, and organic CPM, inorganic CPM and sulfate CPM emissions for one kiln are obtained from Technical Bulletin No. 898 (NCASI 2005).

The filterable PM data for lime kilns using an ESP alone are from the 7 sources listed in NCASI Technical Bulletin No. 884 (NCASI 2004), Table A13c. The PM_{10} and $PM_{2.5}$ data are from the 6 sources listed in Technical Bulletin No. 884 (NCASI 2004), Table A13d. These data are also presented as a percentage fraction of the filterable PM corresponding to the six lime kilns tested. As discussed earlier for the recovery furnaces, the in-stack total PM data for kilns with ESPs were adjusted by 0.004 gr/dscf to obtain estimated total Method 5 PM values. These adjusted PM values were used to estimate $PM_{2.5}$ and PM_{10} values at percents of EPA Method 5 values. Table 3 also shows the estimated percentages if the total PM value was not adjusted. The CPM data are from 4 sources that are summarized in NCASI Technical Bulletin No. 852 (NCASI 2002). The organic CPM, organic CPM (water soluble) and sulfate CPM data are from two to three sources listed in Technical Bulletins No. 852 (NCASI 2002).

Table 3. Lime Kiln Data Summary

Lime Kilns with Wet Particulate Control Devices

Parameter	Measurement Method	No. of Sources	Range (lb/ton CaO)	Mean (lb/ton CaO)	Mean Percent of PM or CPM
PM	EPA Method 5	31	0.35 – 5.34	1.59	
PM_{10}	Dilution Tunnel	6			84.7[1]
$PM_{2.5}$	Dilution Tunnel	6			76.8[1]
CPM – Total	EPA Method 202	11	0.020 - 0.453	0.155	
CPM - Organic		3			8.3[2]
CPM Inorganic - Sulfate (as H_2SO_4)		2			58.2[2]
CPM Inorganic – non-sulfate[4]		3			33.5[2]

Lime Kilns with a Dry ESP for Particulate Control Followed by a Wet Scrubber

Parameter	Measurement Method	No. of Sources	Range (lb/ton CaO)	Mean (lb/ton CaO)	Mean Percent of PM or CPM
PM	EPA Method 5	2	0.043 - 0.053	0.048	
PM_{10}					No Data[3]
$PM_{2.5}$					No Data[3]
CPM – Total	EPA Method 202	2	0.070 - 0.161	0.116	
CPM - Organic		1			54.9[2]
CPM Inorganic - Sulfate (as H_2SO_4)		1			45.1[2]
CPM Inorganic – non-sulfate[4]		1			0.0[2]

Lime Kilns with a Dry ESP for Particulate Control

Parameter	Measurement Method	No. of Sources	Range (lb/ton CaO)	Mean (lb/ton CaO)	Mean Percent of PM
PM	EPA Method 5	7	0.024 - 0.525	0.175	
PM_{10}	EPA CTM-040	6			30.2[1]
$PM_{2.5}$	EPA CTM-040	6			11.0[1]
CPM – Total	EPA Method 202	4	0.057 - 0.198	0.152	
CPM - Organic		3			31.5[2]
CPM Inorganic - Sulfate (as H_2SO_4)		2			20.8[2]
CPM Inorganic – non-sulfate[4]		3			47.7[2]

[1]filterable PM_{10} and $PM_{2.5}$ values expressed as percent of filterable PM values – note that for lime kilns with ESPs, PM_{10} and $PM_{2.5}$ were calculated as percent of total PM by adding 0.004 gr/dscf to total PM values; average PM_{10} and $PM_{2.5}$ values without such adjustment would be higher (64.2% and 23.6%, respectively); [2]organic and inorganic (sulfate and non-sulfate) CPM values expressed as percent of total CPM values; [3]may be estimated using the fractions for lime kilns with dry ESPs in Table 3; [4]see footnote 3 in Table 1

Estimating PM Emissions in Particle Size Ranges

Table 4 reproduces the representative particle size distributions for PM emissions from various kraft recovery sources (smelt tanks, lime kilns and recovery furnaces) as provided in Chapter 10.2 (Chemical Wood Pulping) of EPA's AP-42 document. Using these distributions and the mean emissions for PM_{10} and $PM_{2.5}$ as percent of total PM shown in Table 1(smelt dissolving tanks), Table 2 (kraft recovery furnaces) and Table 3 (lime kilns), further breakdowns of PM_{10} and $PM_{2.5}$ emissions can be developed for the particle size ranges 0 to 0.625 µm, 0.625 to 1.0 µm, 1.0 to 1.25 µm, 1.25 to 2.5 µm, 2.5 to 6.0 µm, and 6.0 to 10.0 µm and these are also shown in Table 4. Note that if mill-specific measurements for PM_{10} and/or $PM_{2.5}$ were used instead, this would result in slightly different estimates for the breakdowns (as explained later). Finally; in EPA's CMAQ (Community Multi-scale Air Quality) database, filterable $PM_{2.5}$ has been split into elemental carbon and non-elemental carbon portions for kraft mill sources (recovery furnace, smelt dissolving tank, lime kiln). For these sources, the elemental carbon fraction of total $PM_{2.5}$ (filterable $PM_{2.5}$ + CPM) was reported as 0.0153, and the filterable, non-elemental carbon fraction of total $PM_{2.5}$ was reported as 0.3699. Thus, the elemental C fraction of filterable $PM_{2.5}$ for kraft mill sources is 0.0397 (0.0153 / {0.0153 + 0.3699}), or about 4%.

Table 4. Breakdown of PM Emissions from Kraft Recovery Sources – from Chapter 10.2 of AP-42

	Smelt Tank[1a]	Smelt Tank[1b]	Lime Kiln[2]	Lime Kiln[3]	DCE Furnace[4]	NDCE Furnace[4]
PM size, µm	Cumulative Mass % ≤ stated size					
15	89.9	95.3	98.9	91.2	no data	78.8
10	89.5	95.3	98.3	88.5	no data	74.8
6	88.4	94.3	98.2	86.5	68.2	71.9
2.5	81.3	85.2	96.0	83.0	53.8	67.3
1.25	63.5	63.8	85.0	70.2	40.5	51.3
1	54.7	54.2	78.9	62.9	34.2	42.4
0.625	38.7	34.2	54.3	46.9	22.2	29.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
$PM_{6.0-10.0}$, as % of PM[6]	1.2%	0.9%	0.3%	7.0%	2.7%[5]	5.0%
$PM_{2.5-6.0}$, as % of PM[6]	8.1%	8.4%	7.6%	12.2%	13.8%	8.0%
$PM_{1.25-2.5}$, as % of PM[6]	15.9%	18.2%	8.8%	1.7%	9.9%	8.8%
$PM_{1.0-1.25}$, as % of PM[6]	7.9%	8.2%	4.9%	1.0%	4.7%	4.9%
$PM_{0.625-1.0}$, as % of PM[6]	14.3%	17.0%	19.7%	2.1%	9.0%	7.1%
$PM_{0.625}$, as % of PM[6]	34.6%	29.1%	43.4%	6.2%	16.6%	16.4%

[1a]smelt dissolving tank vent with venturi scrubber; [1b]smelt dissolving tank vent with packed tower; [2]lime kiln with venturi scrubber; [3]lime kiln with ESP; [4]kraft recovery furnace with ESP; [5]cumulative mass % for PM_{10} not available; assumed same ratio of PM_{10} to $PM_{6.0}$ as for NDCE furnaces; [6]these PM distributions (expressed as percent of total PM) are estimated based on the mean PM_{10} and $PM_{2.5}$ emissions shown in Tables 1, 2 and 3 (as % of total PM); note that they would be different if mill-specific PM_{10} and $PM_{2.5}$ measurements were used instead – see section on Excel Spreadsheet for further explanation

Sample Calculation – The following calculations show how a mill which has Method 5 PM data may use the information contained in this document to estimate the emission rates needed for BART modeling. Known: The total PM emissions from a DCE kraft recovery furnace are 1.0 lb/ton BLS.

From Table 2, the filterable PM_{10} emissions from this furnace = 0.567 x 1.0 = 0.567 lb/tbls

and the filterable $PM_{2.5}$ emissions = 0.402 x 1.0 = 0.402 lb/tbls

Thus, the PM_{coarse} emissions = $PM_{10} - PM_{2.5}$ = 0.567 – 0.402 = 0.165 lb/tbls

From Table 4, PM_{coarse} emissions that are $PM_{2.5\text{-}6.0}$ = 0.138 x 1.0 = 0.138 lb/tbls,

and PM_{coarse} emissions that are $PM_{6.0\text{-}10.0}$ =0.027 x 1.0 = 0.027 lb/tbls

The filterable $PM_{2.5}$ emissions comprise both elemental carbon and non-elemental carbon emissions. The elemental carbon $PM_{2.5}$ emissions = 4% of total filterable $PM_{2.5}$ emissions = 0.04 x 0.402 or 0.016 lb/tbls

The non-elemental carbon filterable $PM_{2.5}$ emissions = remaining 96% of filterable $PM_{2.5}$ emissions = 0.96 x 0.402 = 0.386 lb/tbls

From Table 4, further fractions of the non-carbon filterable $PM_{2.5}$ emissions are estimated as follows:

$PM_{0.625}$ emissions = 0.96 x 0.166 x 1.0 = 0.159 lb/tbls

$PM_{0.625\text{-}1.0}$ emissions = 0.96 x 0.09 x 1.0 = 0.086 lb/tbls

$PM_{1.0\text{-}1.25}$ emissions = 0.96 x 0.047 x 1.0= 0.045 lb/tbls

$PM_{1.25\text{-}2.5}$ emissions = 0.96 x 0.099 x 1.0= 0.095 lb/tbls

and further fractions of the elemental carbon $PM_{2.5}$ emissions are estimated as follows (note- the non-carbon and elemental carbon filterable $PM_{2.5}$ emissions are assumed to have similar breakdowns):

$PM_{0.625}$ emissions = 0.04 x 0.166 x 1.0= 0.0066 lb/tbls

$PM_{0.625\text{-}1.0}$ emissions = 0.04 x 0.09 x 1.0 = 0.0036 lb/tbls

$PM_{1.0\text{-}1.25}$ emissions = 0.04 x 0.047 x 1.0= 0.0019 lb/tbls

$PM_{1.25\text{-}2.5}$ emissions = 0.04 x 0.099 x 1.0= 0.0040 lb/tbls

From Table 2, the total CPM emissions = 0.38 lb/tbls (note - CPM emissions are independent of PM emissions)

Also from Table 2, the organic CPM emissions = 0.074 x 0.38 = 0.028 lb/tbls

the sulfate as H_2SO_4 component of inorganic CPM emissions= 0.36 x 0.38 = 0.137 lb/tbls

and the rest of the inorganic CPM (non-sulfate)emissions = 0.38 – 0.028 – 0.137 = 0.215 lb/tbls

The calculated emission rates can be input into the CALPUFF model for determining visibility impacts.

Excel Spreadsheet Example Calculations

NCASI has prepared an excel spreadsheet that carries out the above calculations for all six categories of unit operations shown in Table 4. For a mill that has only PM data for a given unit operation, the spread-sheet estimates all the distributions as shown above using the mean PM_{10}, $PM_{2.5}$, and CPM values shown in Tables 1, 2 and 3 combined with the PM distributions shown in Table 4. The spreadsheet also allows a mill to input its own PM_{10} and $PM_{2.5}$ values, as also its own CPM, organic CPM and inorganic CPM as sulfate (H_2SO_4) values. The spreadsheet can be accessed at the NCASI website at http://www.ncasi.org/support/downloads/Detail.aspx?id=37. (A user name and password are required for access.)

References

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Appendix A

The following tables provide detailed data for the PM emissions from smelt dissolving tanks, lime kilns and kraft recovery furnaces.

Table A1. Smelt Dissolving Tank Particulate Matter Emissions

Mill Code	Total In-Stack PM gr/dscf	PM_{10}	$PM_{2.5}$	Total CPM lb/t BLS	Organic CPM lb/t BLS	Organic CPM % of total	Inorganic CPM Total lb/t BLS	Inorganic CPM Total % of total	Inorganic CPM SO_4 as H_2SO_4 lb/t BLS	Inorganic CPM SO_4 as H_2SO_4 % of total
		As % of PM								
SDTA	0.0529	99.4%	86.7%	0.0401[2]						
SDTB	0.1632	96.6%	87.3%	0.1224[2]						
SDTC	0.1077	68.3%	64.6%	0.0584[2]						
SDTD	0.0540	62.0%	58.7%	0.0266[2]						
SDTE	0.0760			0.0306[2]						
SDTF	0.0160	91.0%	84.3%	0.0114[2]						
SDTG1	0.4237	70.7%	54.0%	0.2153[2]						
SDTG2	0.0758	85.2%	72.4%	0.0487[2]						
Mill A	0.0500			0.0020	0.0005	25.6%	0.0015	74.4%	0.0015	74.9%
Mill B	0.0400			0.0070	0.0018	26.0%	0.0052	74.0%	*0.0018*	*25.5%*
Mill C	0.0200			0.0080	0.0018	22.4%	0.0062	77.6%	*0.0014*	*17.0%*
Mill F1	0.0200			0.0060	0.0004	6.3%	0.0056	93.7%		
Mill F2	0.0200			0.0060	0.0002	2.9%	0.0058	97.1%		
Mill G	0.0400			0.0150	0.0076	50.4%	0.0074	49.6%		
SDTAD	0.72 lb/hr			0.0140						
SDTAE	0.0387			0.0010						
Mean	0.0799	81.9%	72.6%	0.0074	0.0020	27.8%[1]	0.0053	72.2%[1]	0.0015	27.3%[1]
Number	7	7	7	8[2]	6		6		3	

[1]The mean % for organic CPM is obtained by dividing the mean organic CPM in lb/t BLS by the mean of the corresponding set of total CPM in lb/t BLS - same for inorganic CPM (total and SO_4 as H_2SO_4).
[2]These Canadian mill CPM data were not developed using EPA Method 202; thus only the CPM data generated using M202 for the U.S. mill SDTs (Mills A, B, C, F1, F2, G, AD and AE) were included when estimating the mean. CPM emissions estimated using the modified dilution tunnel method in the Canadian SDT vents appear to be consistently higher than their U.S. counterparts by one to two orders of magnitude. Use of foul or dirty condensates in the Canadian mill SDT scrubbers with high levels of organics and ammonia is suspected.
Note – italicized entries denote non-detects shown at ½ detection limit

Table A2. DCE Kraft Recovery Furnace Particulate Matter Emissions

Mill Code	Total In-Stack PM gr/dscf	PM_{10}[1]	$PM_{2.5}$[1]	Total CPM lb/t BLS	Organic CPM		Inorganic CPM			
							Total		SO_4 as H_2SO_4	
		As % of PM			lb/t BLS	% of total	lb/t BLS	% of total	lb/t BLS	% of total
B2RF	0.0118	51.3%	34.8%	0.6778	0.0404	6.0%	0.6373	94.0%	0.2428	35.8%
G1RF	0.0034	35.1%	24.3%	0.2080	0.0347	16.7%	0.1733	83.3%	0.0865	41.6%
C1	0.0250	67.2%	46.6%							
C8	0.0800	73.3%	55.1%							
A3RF	0.0061			0.2800	0.0112	4.0%	0.2688	96.0%	0.0860	30.7%
B1RF	0.0254			0.3731	0.0277	7.4%	0.3454	92.6%		
Mean	0.0253	56.7%	40.2%	0.3847	0.0285	7.4%[2]	0.3562	92.6%[2]	0.1384	36.0%[2]
Number	4	4	4	4	4		4		3	

[1]PM_{10} and $PM_{2.5}$ calculated as percent of total PM by adding 0.004 gr/dscf to total PM value; average PM_{10} and $PM_{2.5}$ values without such adjustment would be higher (75.0% and 52.9%, respecitively); [2]The mean % for organic CPM is obtained by dividing the mean organic CPM in lb/t BLS by the mean of the corresponding set of total CPM in lb/t BLS - same for inorganic CPM (total and SO_4 as H_2SO_4).

Table A3. NDCE Kraft Recovery Furnace Particulate Matter Emissions

Mill Code	Total In-Stack PM gr/dscf	PM_{10}[1]	$PM_{2.5}$[1]	Total CPM lb/t BLS	Organic CPM		Inorganic CPM			
							Total		SO_4 as H_2SO_4	
		As % of PM			lb/t BLS	% of total	lb/t BLS	% of total	lb/t BLS	% of total
B3RF	0.0053	28.0%	19.4%	0.0579	0.0062	10.7%	0.0517	89.3%		
E1RF	0.0076	36.2%	29.3%						0.0970	
F1RF	0.0072	37.5%	30.4%	0.0684	0.0189	27.6%	0.0495	72.4%	0.0241	35.2%
RFAB	0.0074			0.0880						
RFAE	0.0023			0.1340						
RFAF	0.0030									
RFAH	0.0130			0.0470						
C1	0.0160	64.1%	34.7%							
C4	0.0634	69.1%	49.3%							
C6a	0.0468	83.0%	53.0%							
C6b	0.0118	70.3%	52.3%							
C11	0.0106	69.6%	59.1%							
C12	0.0033	27.5%	25.1%	0.0780						
C21	0.0162	17.3%	19.7%							
A4RF	0.0203			0.1538	0.0212	13.8%	0.1326	86.2%		
Mean	0.0156	50.2%	37.2%	0.0896	0.0154	16.5%[2]	0.0779	83.5%[2]	0.0605	35.2%[2]
Number	10	10	10	7	3		3		1	

[1]PM_{10} and $PM_{2.5}$ calculated as percent of total PM by adding 0.004 gr/dscf to total PM value; average PM_{10} and $PM_{2.5}$ values without such adjustment would be higher (67.8% and 51.0%, respectively); [2]The mean % for organic CPM is obtained by dividing the mean organic CPM in lb/t BLS by the mean of the corresponding set of total CPM in lb/t BLS - same for inorganic CPM (total and SO_4 as H_2SO_4).
Note – italicized entries denote non-detects shown at ½ detection limit

Table A4. Kraft Lime Kiln Particulate Matter Emissions

Mill Code	Total In-Stack PM gr/dscf	PM_{10}[1]	$PM_{2.5}$[1]	Total CPM lb/t CaO	Organic CPM lb/t CaO	Organic CPM % of total	Inorganic CPM Total lb/t CaO	Inorganic CPM Total % of total	Inorganic CPM SO_4 as H_2SO_4 lb/t CaO	Inorganic CPM SO_4 as H_2SO_4 % of total
		As % of PM								
Lime Kilns with ESPs										
A	0.0044	27.4%	9.5%	0.1748	0.0357	20.4%	0.1391	79.6%	0.0576	32.9%
E	0.0035	36.0%	16.0%	0.1979	0.0940	47.5%	0.1038	52.5%	*0.0200*	*10.1%*
G	0.0020	28.3%	23.3%	0.0565	0.0057	10.0%	0.0509	90.0%		
LKC1a	0.0014	8.4%	0.0%							
LKC1b	0.0015	18.7%	0.0%							
LKC6	0.0334	62.4%	17.0%							
LKC12				0.1789						
Mean	0.0077	30.2%	11.0%	0.1520	0.0451	31.5%[2]	0.0979	68.5%[2]	0.0388	20.8%[2]
Number	6	6	6	4	3		3		2	
Lime Kilns with Wet Scrubbers										
LKA1	0.0581	79.9%	78.0%	0.1494						
LKA2	0.0837	93.0%	91.0%	0.2507						
LKAB	0.0588	102.4%	95.9%	0.1897						
LKAC1	0.0476	92.1%	85.5%	0.1378						
LKAC2	0.1127	70.7%	50.1%	0.2217						
LKAE	0.0719			0.0663						
LKAH	0.0531	70.2%	60.5%	0.1130						
Mill C	0.0430			0.0700	0.0024	3.4%	0.0676	96.6%	0.0429	61.3%
Mill E	0.1640			0.0300	0.0044	14.6%	0.0256	85.4%	*0.0153*	*51.0%*
Mill F	0.0678			0.0200	0.0033	16.3%	0.0167	83.7%		
Mill H	0.0413			0.4532						
Mean	0.0729	84.7%	76.8%	0.1547	0.0033	8.3%[2]	0.0367	91.7%[2]	0.0291	58.2%[2]
Number	11	6	6	11		3		3		2
Lime Kilns with Wet Scrubber and ESP										
Mill D	0.0030			0.0700					0.0370	51.0%
Mill G	0.0033			0.1614	0.0887	54.9%	0.0728	45.1%		
Mean	0.0032			0.1157	0.0887	54.9%[2]	0.0728	45.1%[2]	0.0370	51.0%[2]
Number	2			2	1		1		1	

[1]For lime kilns with ESPs, PM_{10} and $PM_{2.5}$ is calculated as percent of total PM by adding 0.004 gr/dscf to total PM value; average PM_{10} and $PM_{2.5}$ values without such adjustment would be higher (64.2% for mean and 23.6% for median); [2]The mean % for organic CPM is obtained by dividing the mean organic CPM in lb/t CaO by the mean of the corresponding set of total CPM in lb/t CaO - same for inorganic CPM (total and SO_4 as H_2SO_4).
Note – italicized entries denote non-detects shown at ½ detection limit

APPENDIX C

EXAMPLE CALPUFF INPUT FILE

```
EXAMPLE FACILITY XYZ - CALPUFF
IMPACTS AT SOURCE-SPECIFIC CLASS I AREAS
4-km FLORIDA DOMAIN (VISTAS REFINED DOMAIN 2), 2001
--------------- Run title (3 lines) ------------------------------------------

                     CALPUFF MODEL CONTROL FILE
                     --------------------------

-------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input     * METDAT =                  *
    or
ISCMET.DAT    input     * ISCDAT =                  *
    or
PLMMET.DAT    input     * PLMDAT =                  *
    or
PROFILE.DAT   input     * PRFDAT =                  *
SURFACE.DAT   input     * SFCDAT =                  *
RESTARTB.DAT  input     * RSTARTB=                  *
--------------------------------------------------------------------------------
CALPUFF.LST   output    ! PUFLST = PUFFEXP.LST !
CONC.DAT      output    ! CONDAT = PUFFEXP.CON !
DFLX.DAT      output    * DFDAT  =                  *
WFLX.DAT      output    * WFDAT  =                  *

VISB.DAT      output    * VISDAT =                  *
TK2D.DAT      output    * T2DDAT =                  *
RHO2D.DAT     output    * RHODAT =                  *
RESTARTE.DAT  output    * RSTARTE=                  *
--------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input     * PTDAT  =                  *
VOLEMARB.DAT  input     * VOLDAT =                  *
BAEMARB.DAT   input     * ARDAT  =                  *
LNEMARB.DAT   input     * LNDAT  =                  *
--------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input     ! OZDAT  =C:\BARTHRO3\2001FLOz.DAT !
VD.DAT        input     * VDDAT  =                  *
CHEM.DAT      input     * CHEMDAT=                  *
H2O2.DAT      input     * H2O2DAT=                  *
HILL.DAT      input     * HILDAT=                 *
HILLRCT.DAT   input     * RCTDAT=                 *
COASTLN.DAT   input     * CSTDAT=                 *
FLUXBDY.DAT   input     * BDYDAT=                 *
BCON.DAT      input     * BCNDAT=                 *
DEBUG.DAT     output    * DEBUG =                 *
MASSFLX.DAT   output    * FLXDAT=                 *
MASSBAL.DAT   output    * BALDAT=                 *
FOG.DAT       output    * FOGDAT=                 *
--------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case       ! LCFILES = T !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 70 characters in length


Provision for multiple input files
----------------------------------

     Number of CALMET.DAT files for run (NMETDAT)
                                    Default: 1       ! NMETDAT =   36  !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                    Default: 0       ! NPTDAT =  0  !

     Number of BAEMARB.DAT files for run (NARDAT)
```

```
                                          Default: 0       ! NARDAT =   0  !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                          Default: 0       ! NVOLDAT =   0  !

!END!

-------------
Subgroup (0a)
-------------

  The following CALMET.DAT filenames are processed in sequence if NMETDAT>1

Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-01A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-01B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-01C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-02A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-02B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-02C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-03A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-03B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-03C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-04A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-04B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-04C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-05A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-05B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-05C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-06A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-06B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-06C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-07A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-07B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-07C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-08A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-08B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-08C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-09A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-09B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-09C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-10A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-10B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-10C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-11A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-11B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-11C.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-12A.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-12B.DAT !  !END!
CALMET.DAT    input    ! METDAT =E:\FLA4KM\2001\MET2001-DOM2-12C.DAT !  !END!
--------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   0  !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in met. file

      Starting date:    Year (IBYR) -- No default       ! IBYR =  2001  !
      (used only if   Month (IBMO) -- No default       ! IBMO =  1  !
       METRUN = 0)        Day (IBDY) -- No default       ! IBDY =  1  !
                         Hour (IBHR) -- No default       ! IBHR =  1  !

      Base time zone         (XBTZ) -- No default       ! XBTZ = 5.0  !
         PST = 8., MST = 7.
         CST = 6., EST = 5.

      Length of run (hours) (IRLG) -- No default       ! IRLG = 8760 !

      Number of chemical species (NSPEC)
                                          Default: 5       ! NSPEC = 11   !
```

```
     Number of chemical species
     to be emitted  (NSE)            Default: 3        ! NSE = 9   !

     Flag to stop run after
     SETUP phase (ITEST)             Default: 2        ! ITEST =  2   !
     (Used to allow checking
     of the model inputs, files, etc.)
           ITEST = 1 - STOPS program after SETUP phase
           ITEST = 2 - Continues with execution of program
                       after SETUP

     Restart Configuration:

        Control flag (MRESTART)      Default: 0        ! MRESTART =  0   !

           0 = Do not read or write a restart file
           1 = Read a restart file at the beginning of
               the run
           2 = Write a restart file during run
           3 = Read a restart file at beginning of run
               and write a restart file during run

        Number of periods in Restart
        output cycle (NRESPD)        Default: 0        ! NRESPD =  0   !

           0 = File written only at last period
          >0 = File updated every NRESPD periods

     Meteorological Data Format (METFM)
                                     Default: 1        ! METFM =  1   !

           METFM = 1 - CALMET binary file (CALMET.MET)
           METFM = 2 - ISC ASCII file (ISCMET.MET)
           METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
           METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                       surface parameters file (SURFACE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                     Default: 60.0     ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                     Default: 60.0     ! PGTIME = 60. !


!END!


-------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                   Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                              Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                          Default: 0     ! MCTSG =  0   !
        0 = not modeled
        1 = modeled

     Near-field puffs modeled as
     elongated 0 (MSLUG)                   Default: 0     ! MSLUG =  0   !
        0 = no
```

```
   1 = yes (slug model used)

Transitional plume rise modeled ?
(MTRANS)                            Default: 1      ! MTRANS =  1    !
   0 = no  (i.e., final rise only)
   1 = yes (i.e., transitional rise computed)

Stack tip downwash? (MTIP)          Default: 1      ! MTIP =  1  !
   0 = no  (i.e., no stack tip downwash)
   1 = yes (i.e., use stack tip downwash)

Vertical wind shear modeled above
stack top? (MSHEAR)                 Default: 0      ! MSHEAR =  0  !
   0 = no  (i.e., vertical wind shear not modeled)
   1 = yes (i.e., vertical wind shear modeled)

Puff splitting allowed? (MSPLIT)    Default: 0      ! MSPLIT =  0  !
   0 = no (i.e., puffs not split)
   1 = yes (i.e., puffs are split)

Chemical mechanism flag (MCHEM)     Default: 1      ! MCHEM =  1    !
   0 = chemical transformation not
       modeled
   1 = transformation rates computed
       internally (MESOPUFF II scheme)
   2 = user-specified transformation
       rates used
   3 = transformation rates computed
       internally (RIVAD/ARM3 scheme)
   4 = secondary organic aerosol formation
       computed (MESOPUFF II scheme for OH)

Aqueous phase transformation flag (MAQCHEM)
(Used only if MCHEM = 1, or 3)      Default: 0      ! MAQCHEM =  0    !
   0 = aqueous phase transformation
       not modeled
   1 = transformation rates adjusted
       for aqueous phase reactions

Wet removal modeled ? (MWET)        Default: 1      ! MWET =  1    !
   0 = no
   1 = yes

Dry deposition modeled ? (MDRY)     Default: 1      ! MDRY =  1    !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)

Method used to compute dispersion
coefficients (MDISP)                Default: 3      ! MDISP =  3    !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)       Default: 3      ! MTURBVW =  3  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4)
```

```
      3 = use both sigma-(v/theta) and sigma-w
          from PROFILE.DAT to compute sigma-y and sigma-z
          (valid for METFM = 1, 2, 3, 4)
      4 = use sigma-theta measurements
          from PLMMET.DAT to compute sigma-y
          (valid only if METFM = 3)

   Back-up method used to compute dispersion
   when measured turbulence data are
   missing (MDISP2)                      Default: 3     ! MDISP2 =   3  !
   (used only if MDISP = 1 or 5)
      2 = dispersion coefficients from internally calculated
          sigma v, sigma w using micrometeorological variables
          (u*, w*, L, etc.)
      3 = PG dispersion coefficients for RURAL areas (computed using
          the ISCST multi-segment approximation) and MP coefficients in
          urban areas
      4 = same as 3 except PG coefficients computed using
          the MESOPUFF II eqns.

   PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
   (MROUGH)
      0 = no
      1 = yes

   Partial plume penetration of          Default: 1     ! MPARTL =  1  !
   elevated inversion?
   (MPARTL)
      0 = no
      1 = yes

   Strength of temperature inversion     Default: 0     ! MTINV =  0  !
   provided in PROFILE.DAT extended records?
   (MTINV)
      0 = no (computed from measured/default gradients)
      1 = yes

   PDF used for dispersion under convective conditions?
                                         Default: 0     ! MPDF =  0  !
   (MPDF)
      0 = no
      1 = yes

   Sub-Grid TIBL module used for shore line?
                                         Default: 0     ! MSGTIBL = 0  !
   (MSGTIBL)
      0 = no
      1 = yes

   Boundary conditions (concentration) modeled?
                                         Default: 0     ! MBCON = 0  !
   (MBCON)
      0 = no
      1 = yes


   Analyses of fogging and icing impacts due to emissions from
   arrays of mechanically-forced cooling towers can be performed
   using CALPUFF in conjunction with a cooling tower emissions
   processor (CTEMISS) and its associated postprocessors.  Hourly
   emissions of water vapor and temperature from each cooling tower
   cell are computed for the current cell configuration and ambient
   conditions by CTEMISS. CALPUFF models the dispersion of these
   emissions and provides cloud information in a specialized format
   for further analysis. Output to FOG.DAT is provided in either
   'plume mode' or 'receptor mode' format.

   Configure for FOG Model output?
                                         Default: 0     ! MFOG =  0  !
   (MFOG)
      0 = no
      1 = yes  - report results in PLUME Mode format
      2 = yes  - report results in RECEPTOR Mode format
```

```
     Test options specified to see if
     they conform to regulatory
     values? (MREG)                              Default: 1      ! MREG =   1    !

        0 = NO checks are made
        1 = Technical options must conform to USEPA
            Long Range Transport (LRT) guidance
                       METFM     1 or 2
                       AVET      60. (min)
                       PGTIME    60. (min)
                       MGAUSS    1
                       MCTADJ    3
                       MTRANS    1
                       MTIP      1
                       MCHEM     1 or 3 (if modeling SOx, NOx)
                       MWET      1
                       MDRY      1
                       MDISP     2 or 3
                       MPDF      0 if MDISP=3
                                 1 if MDISP=2
                       MROUGH    0
                       MPARTL    1
                       SYTDEP    550. (m)
                       MHFTSZ    0

!END!


-------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =          SO2  !          !END!
! CSPEC =          SO4  !          !END!
! CSPEC =          NOX  !          !END!
! CSPEC =         HNO3  !          !END!
! CSPEC =          NO3  !          !END!
! CSPEC =       PM0063  !          !END!
! CSPEC =       PM0100  !          !END!
! CSPEC =       PM0125  !          !END!
! CSPEC =       PM0250  !          !END!
! CSPEC =       PM0600  !          !END!
! CSPEC =       PM1000  !          !END!

                                                         Dry                OUTPUT GROUP
    SPECIES          MODELED            EMITTED       DEPOSITED               NUMBER
     NAME          (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,                (0=NONE,
   (Limit: 12                                         1=COMPUTED-GAS       1=1st CGRUP,
    Characters                                        2=COMPUTED-PARTICLE  2=2nd CGRUP,
    in length)                                        3=USER-SPECIFIED)    3= etc.)

!            SO2  =         1,               1,            1,             0   !
!            SO4  =         1,               1,            2,             0   !
!            NOX  =         1,               1,            1,             0   !
!           HNO3  =         1,               0,            1,             0   !
!            NO3  =         1,               0,            2,             0   !
!         PM0063  =         1,               1,            2,             1   !
!         PM0100  =         1,               1,            2,             1   !
!         PM0125  =         1,               1,            2,             1   !
!         PM0250  =         1,               1,            2,             1   !
!         PM0600  =         1,               1,            2,             1   !
!         PM1000  =         1,               1,            2,             1   !

!END!

-------------
Subgroup (3b)
```

```
-------------
 The following names are used for Species-Groups in which results
 for certain species are combined (added) prior to output.  The
 CGRUP name will be used as the species name in output files.
 Use this feature to model specific particle-size distributions
 by treating each size-range as a separate species.
 Order must be consistent with 3(a) above.

! CGRUP =           PM10 !     !END!

INPUT GROUP: 4 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                    Default: UTM     ! PMAP = LCC  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                   Default=0.0      ! FEAST  = 0.000  !
     (FNORTH)                  Default=0.0      ! FNORTH = 0.000  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                  No Default       ! IUTMZN =  0 !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                  Default: N       ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection

     Latitude and Longitude (decimal degrees) of projection origin
     (Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
     (RLAT0)                   No Default       ! RLAT0 =  40N !
     (RLON0)                   No Default       ! RLON0 =  97W !

         TTM :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         LCC :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         PS  :  RLON0 identifies central (grid N/S) meridian of projection
                RLAT0 selected for convenience
         EM  :  RLON0 identifies central meridian of projection
                RLAT0 is REPLACED by 0.0N (Equator)
         LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
                RLAT0 identifies latitude of tangent-point of mapping plane

     Matching parallel(s) of latitude (decimal degrees) for projection
     (Used only if PMAP= LCC or PS)
     (XLAT1)                   No Default       ! XLAT1 = 33N  !
     (XLAT2)                   No Default       ! XLAT2 = 45N  !

         LCC :  Projection cone slices through Earth's surface at XLAT1 and XLAT2
         PS  :  Projection plane slices through Earth at XLAT1
               (XLAT2 is not used)

     ----------
     Note:  Latitudes and longitudes should be positive, and include a
            letter N,S,E, or W indicating north or south latitude, and
            east or west longitude.  For example,
            35.9  N Latitude  =  35.9N
            118.7 E Longitude = 118.7E


     Datum-region
```

```
     ------------

     The Datum-Region for the coordinates is identified by a character
     string.  Many mapping products currently available use the model of the
     Earth known as the World Geodetic System 1984 (WGS-84).  Other local
     models may be in use, and their selection in CALMET will make its output
     consistent with local mapping products.  The list of Datum-Regions with
     official transformation parameters is provided by the National Imagery and
     Mapping Agency (NIMA).

     NIMA Datum - Regions(Examples)
     ------------------------------------------------------------------------------
     WGS-84    WGS-84 Reference Ellipsoid and Geoid, Global coverage (WGS84)
     NAS-C     NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS (NAD27)
     NAR-C     NORTH AMERICAN 1983 GRS 80 Spheroid, MEAN FOR CONUS (NAD83)
     NWS-84    NWS 6370KM Radius, Sphere
     ESR-S     ESRI REFERENCE 6371KM Radius, Sphere

     Datum-region for output coordinates
     (DATUM)                    Default: WGS-G     ! DATUM = NWS-84 !


METEOROLOGICAL Grid:

     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX = 263   !
            No. Y grid cells (NY)      No default     ! NY = 206    !
         No. vertical layers (NZ)      No default     ! NZ =  10   !

           Grid spacing (DGRIDKM)      No default     ! DGRIDKM = 4. !
                                       Units: km

                Cell face heights
                    (ZFACE(nz+1))      No defaults
                                       Units: m
        ! ZFACE = 0.,20.,40.,80.,160.,320.,640.,1200.,2000.,3000.,4000. !

            Reference Coordinates
           of SOUTHWEST corner of
                 grid cell(1, 1):

            X coordinate (XORIGKM)     No default     ! XORIGKM =  721.995 !
            Y coordinate (YORIGKM)     No default     ! YORIGKM = -1598.000 !
                                      Units: km


COMPUTATIONAL Grid:

     The computational grid is identical to or a subset of the MET. grid.
     The lower left (LL) corner of the computational grid is at grid point
     (IBCOMP, JBCOMP) of the MET. grid.  The upper right (UR) corner of the
     computational grid is at grid point (IECOMP, JECOMP) of the MET. grid.
     The grid spacing of the computational grid is the same as the MET. grid.

        X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1  !
                  (1 <= IBCOMP <= NX)

        Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1  !
                  (1 <= JBCOMP <= NY)


        X index of UR corner (IECOMP)      No default     ! IECOMP = 263 !
                  (1 <= IECOMP <= NX)

        Y index of UR corner (JECOMP)      No default     ! JECOMP = 206 !
                  (1 <= JECOMP <= NY)



SAMPLING Grid (GRIDDED RECEPTORS):

     The lower left (LL) corner of the sampling grid is at grid point
     (IBSAMP, JBSAMP) of the MET. grid.  The upper right (UR) corner of the
```

```
       sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid.
       The sampling grid must be identical to or a subset of the computational
       grid.  It may be a nested grid inside the computational grid.
       The grid spacing of the sampling grid is DGRIDKM/MESHDN.

          Logical flag indicating if gridded
          receptors are used (LSAMP)        Default: T      ! LSAMP = F !
          (T=yes, F=no)

          X index of LL corner (IBSAMP)     No default      ! IBSAMP =  1    !
           (IBCOMP <= IBSAMP <= IECOMP)

          Y index of LL corner (JBSAMP)     No default      ! JBSAMP =  1    !
           (JBCOMP <= JBSAMP <= JECOMP)


          X index of UR corner (IESAMP)     No default      ! IESAMP =  263 !
           (IBCOMP <= IESAMP <= IECOMP)

          Y index of UR corner (JESAMP)     No default      ! JESAMP =  206  !
           (JBCOMP <= JESAMP <= JECOMP)


         Nesting factor of the sampling
          grid (MESHDN)                     Default: 1      ! MESHDN =  1  !
          (MESHDN is an integer >= 1)

!END!

-------------------------------------------------------------------------------

INPUT GROUP: 5 -- Output Options
--------------

     FILE                         DEFAULT VALUE            VALUE THIS RUN
     ----                         -------------            --------------

   Concentrations (ICON)                 1                 !  ICON =  1    !
   Dry Fluxes (IDRY)                     1                 !  IDRY =  0    !
   Wet Fluxes (IWET)                     1                 !  IWET =  0    !
   Relative Humidity (IVIS)              1                 !  IVIS =  0    !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                          Default: T           ! LCOMPRS = T !

    0 = Do not create file, 1 = create file


    DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

       Mass flux across specified boundaries
       for selected species reported hourly?
       (IMFLX)                        Default: 0           ! IMFLX =  0  !
         0 = no
         1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
                  are specified in Input Group 0)

       Mass balance for each species
       reported hourly?
       (IMBAL)                        Default: 0           ! IMBAL =  0  !
         0 = no
         1 = yes (MASSBAL.DAT filename is
              specified in Input Group 0)


    LINE PRINTER OUTPUT OPTIONS:

       Print concentrations (ICPRT)   Default: 0           ! ICPRT =  0   !
       Print dry fluxes (IDPRT)       Default: 0           ! IDPRT =  0   !
       Print wet fluxes (IWPRT)       Default: 0           ! IWPRT =  0   !
```

```
        (0 = Do not print, 1 = Print)

        Concentration print interval
        (ICFRQ) in hours               Default: 1          ! ICFRQ =  24   !
        Dry flux print interval
        (IDFRQ) in hours               Default: 1          ! IDFRQ =  1    !
        Wet flux print interval
        (IWFRQ) in hours               Default: 1          ! IWFRQ =  1    !

        Units for Line Printer Output
        (IPRTU)                        Default: 1          ! IPRTU =  3    !
                       for             for
                  Concentration    Deposition
             1 =     g/m**3         g/m**2/s
             2 =    mg/m**3        mg/m**2/s
             3 =    ug/m**3        ug/m**2/s
             4 =    ng/m**3        ng/m**2/s
             5 =    Odour Units

        Messages tracking progress of run
        written to the screen ?
        (IMESG)                        Default: 2          ! IMESG =  2    !
          0 = no
          1 = yes (advection step, puff ID)
          2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


      SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                  ---- CONCENTRATIONS ----    ------ DRY FLUXES ------    ------ WET FLUXES ------    --
MASS FLUX --
   SPECIES
   /GROUP         PRINTED?  SAVED ON DISK?    PRINTED?  SAVED ON DISK?    PRINTED?  SAVED ON DISK?    SAVED
ON DISK?
   -------        ------------------------    ------------------------    ------------------------    ------
---------
!        SO2 =      0,           1,              0,          1,              0,          1,             0   !
!        SO4 =      0,           1,              0,          1,              0,          1,             0   !
!        NOX =      0,           1,              0,          1,              0,          1,             0   !
!       HNO3 =      0,           1,              0,          1,              0,          1,             0   !
!        NO3 =      0,           1,              0,          1,              0,          1,             0   !
!       PM10 =      0,           1,              0,          1,              0,          1,             0   !

      OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

        Logical for debug output
        (LDEBUG)                                 Default: F     ! LDEBUG = F !

        First puff to track
        (IPFDEB)                                 Default: 1     ! IPFDEB =  1  !

        Number of puffs to track
        (NPFDEB)                                 Default: 1     ! NPFDEB =  1  !

        Met. period to start output
        (NN1)                                    Default: 1     ! NN1 =  1   !

        Met. period to end output
        (NN2)                                    Default: 10    ! NN2 =  10  !

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
------------------------


---------------
Subgroup (6a)
---------------
        Number of terrain features (NHILL)       Default: 0     ! NHILL =  0   !

        Number of special complex terrain
```

```
        receptors   (NCTREC)                         Default: 0      ! NCTREC =   0    !

        Terrain and CTSG Receptor data for
        CTSG hills input in CTDM format ?
        (MHILL)                                      No Default      ! MHILL =  2    !
        1 = Hill and Receptor data created
            by CTDM processors & read from
            HILL.DAT and HILLRCT.DAT files
        2 = Hill data created by OPTHILL &
            input below in Subgroup (6b);
            Receptor data in Subgroup (6c)

        Factor to convert horizontal dimensions  Default: 1.0    ! XHILL2M = 1. !
        to meters (MHILL=1)

        Factor to convert vertical dimensions    Default: 1.0    ! ZHILL2M = 1. !
        to meters (MHILL=1)

        X-origin of CTDM system relative to      No Default      ! XCTDMKM = 0.0E00 !
        CALPUFF coordinate system, in Kilometers (MHILL=1)

        Y-origin of CTDM system relative to      No Default      ! YCTDMKM = 0.0E00 !
        CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

---------------
Subgroup (6b)
---------------

                      1 **
     HILL information

HILL        XC        YC      THETAH  ZGRID  RELIEF   EXPO 1   EXPO 2   SCALE 1   SCALE 2
AMAX1     AMAX2
 NO.        (km)      (km)    (deg.)   (m)     (m)      (m)      (m)      (m)       (m)      (m)
(m)
----        ----      ----    ------  -----  ------   ------   ------   -------   -------   ----
-      -----

---------------
Subgroup (6c)
---------------

    COMPLEX TERRAIN RECEPTOR INFORMATION

                       XRCT          YRCT          ZRCT           XHH
                       (km)          (km)           (m)
                      ------         -----         ------         ----


-------------------
1
     Description of Complex Terrain Variables:
          XC, YC   = Coordinates of center of hill
          THETAH   = Orientation of major axis of hill (clockwise from
                     North)
          ZGRID    = Height of the  0  of the grid above mean sea
                     level
          RELIEF   = Height of the crest of the hill above the grid elevation
          EXPO 1   = Hill-shape exponent for the major axis
          EXPO 2   = Hill-shape exponent for the major axis
          SCALE 1  = Horizontal length scale along the major axis
          SCALE 2  = Horizontal length scale along the minor axis
          AMAX     = Maximum allowed axis length for the major axis
          BMAX     = Maximum allowed axis length for the major axis

          XRCT, YRCT = Coordinates of the complex terrain receptors
          ZRCT     = Height of the ground (MSL) at the complex terrain
                     Receptor
          XHH      = Hill number associated with each complex terrain receptor
                     (NOTE: MUST BE ENTERED AS A REAL NUMBER)

   **
```

NOTE: DATA for each hill and CTSG receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases

SPECIES NAME	DIFFUSIVITY (cm**2/s)	ALPHA STAR	REACTIVITY	MESOPHYLL RESISTANCE (s/cm)	HENRY'S LAW COEFFICIENT (dimensionless)
! SO2 =	0.1509,	1000,	8,	0,	0.04 !
! NOX =	0.1656,	1,	8,	5,	3.5 !
! HNO3 =	0.1628,	1,	18,	0,	0.00000008 !

!END!

INPUT GROUP: 8 -- Size parameters for dry deposition of particles

For SINGLE SPECIES, the mean and standard deviation are used to compute a deposition velocity for NINT (see group 9) size-ranges, and these are then averaged to obtain a mean deposition velocity.

For GROUPED SPECIES, the size distribution should be explicitly specified (by the 'species' in the group), and the standard deviation for each should be entered as 0. The model will then use the deposition velocity for the stated mean diameter.

SPECIES NAME	GEOMETRIC MASS MEAN DIAMETER (microns)	GEOMETRIC STANDARD DEVIATION (microns)
! SO4 =	0.48,	2. !
! NO3 =	0.48,	2. !
! PM0063 =	0.63,	0. !
! PM0100 =	1.00,	0. !
! PM0125 =	1.25,	0. !
! PM0250 =	2.50,	0. !
! PM0600 =	6.00,	0. !
! PM1000 =	10.00,	0. !

!END!

INPUT GROUP: 9 -- Miscellaneous dry deposition parameters

```
Reference cuticle resistance (s/cm)
(RCUTR)                            Default: 30     !  RCUTR = 30.0 !
Reference ground resistance  (s/cm)
(RGR)                              Default: 10     !    RGR = 10.0 !
Reference pollutant reactivity
(REACTR)                           Default: 8      ! REACTR = 8.0 !

Number of particle-size intervals used to
evaluate effective particle deposition velocity
(NINT)                             Default: 9      !   NINT =  9   !

Vegetation state in unirrigated areas
(IVEG)                             Default: 1      !   IVEG =  1    !
   IVEG=1 for active and unstressed vegetation
   IVEG=2 for active and stressed vegetation
```

```
        IVEG=3 for inactive vegetation

!END!

-------------------------------------------------------------------------------

INPUT GROUP: 10 -- Wet Deposition Parameters
---------------

                     Scavenging Coefficient -- Units: (sec)**(-1)

        Pollutant      Liquid Precip.       Frozen Precip.
        ---------      --------------       --------------
!          SO2 =          3.0E-05,             0.0E00 !
!          SO4 =          1.0E-04,             3.0E-05 !
!         HNO3 =          6.0E-05,             0.0E00 !
!          NO3 =          1.0E-04,             3.0E-05 !
!       PM0063 =          1.0E-04,             3.0E-05 !
!       PM0100 =          1.0E-04,             3.0E-05 !
!       PM0125 =          1.0E-04,             3.0E-05 !
!       PM0250 =          1.0E-04,             3.0E-05 !
!       PM0600 =          1.0E-04,             3.0E-05 !
!       PM1000 =          1.0E-04,             3.0E-05 !

!END!

-------------------------------------------------------------------------------

INPUT GROUP: 11 -- Chemistry Parameters
---------------

     Ozone data input option (MOZ)     Default: 1            ! MOZ =  1   !
     (Used only if MCHEM = 1, 3, or 4)
        0 = use a monthly background ozone value
        1 = read hourly ozone concentrations from
            the OZONE.DAT data file

     Monthly ozone concentrations
     (Used only if MCHEM = 1, 3, or 4 and
      MOZ = 0 or MOZ = 1 and all hourly O3 data missing)
     (BCKO3) in ppb                    Default: 12*80.
     !  BCKO3 = 12*50. !

     Monthly ammonia concentrations
     (Used only if MCHEM = 1, or 3)
     (BCKNH3) in ppb                   Default: 12*10.
     !  BCKNH3 = 12*0.5 !

     Nighttime SO2 loss rate (RNITE1)
     in percent/hour                   Default: 0.2          ! RNITE1 = .2 !

     Nighttime NOx loss rate (RNITE2)
     in percent/hour                   Default: 2.0          ! RNITE2 = 2.0 !

     Nighttime HNO3 formation rate (RNITE3)
     in percent/hour                   Default: 2.0          ! RNITE3 = 2.0 !

     H2O2 data input option (MH2O2)    Default: 1            ! MH2O2 =  1   !
     (Used only if MAQCHEM = 1)
        0 = use a monthly background H2O2 value
        1 = read hourly H2O2 concentrations from
            the H2O2.DAT data file

     Monthly H2O2 concentrations
     (Used only if MQACHEM = 1 and
      MH2O2 = 0 or MH2O2 = 1 and all hourly H2O2 data missing)
     (BCKH2O2) in ppb                  Default: 12*1.
     !  BCKH2O2 = 12*1 !
```

--- Data for SECONDARY ORGANIC AEROSOL (SOA) Option
(used only if MCHEM = 4)

The SOA module uses monthly values of:
- Fine particulate concentration in ug/m^3 (BCKPMF)
- Organic fraction of fine particulate (OFRAC)
- VOC / NOX ratio (after reaction) (VCNX)

to characterize the air mass when computing
the formation of SOA from VOC emissions.
Typical values for several distinct air mass types are:

Month	1 Jan	2 Feb	3 Mar	4 Apr	5 May	6 Jun	7 Jul	8 Aug	9 Sep	10 Oct	11 Nov	12 Dec
Clean Continental												
BCKPMF	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
OFRAC	.15	.15	.20	.20	.20	.20	.20	.20	.20	.20	.20	.15
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Clean Marine (surface)												
BCKPMF	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5	.5
OFRAC	.25	.25	.30	.30	.30	.30	.30	.30	.30	.30	.30	.25
VCNX	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.	50.
Urban - low biogenic (controls present)												
BCKPMF	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.	30.
OFRAC	.20	.20	.25	.25	.25	.25	.25	.25	.20	.20	.20	.20
VCNX	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.	4.
Urban - high biogenic (controls present)												
BCKPMF	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.	60.
OFRAC	.25	.25	.30	.30	.30	.55	.55	.55	.35	.35	.35	.25
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Regional Plume												
BCKPMF	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.	20.
OFRAC	.20	.20	.25	.35	.25	.40	.40	.40	.30	.30	.30	.20
VCNX	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.	15.
Urban - no controls present												
BCKPMF	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.	100.
OFRAC	.30	.30	.35	.35	.35	.55	.55	.55	.35	.35	.35	.30
VCNX	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.	2.

Default: Clean Continental

```
! BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
! OFRAC  = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
! VCNX   = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00 !
```

!END!

INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
----

```
     Horizontal size of puff (m) beyond which
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                           Default: 550.   ! SYTDEP = 5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                   Default: 0      ! MHFTSZ =  0   !

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                               Default: 5      ! JSUP =  5   !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)     Default: 0.01   ! CONK1 = .01 !
```

```
Vertical dispersion constant for neutral/
unstable conditions (k2 in Eqn. 2.7-4)
(CONK2)                                        Default: 0.1     ! CONK2 = .1 !

Factor for determining Transition-point from
Schulman-Scire to Huber-Snyder Building Downwash
scheme (SS used for Hs < Hb + TBD * HL)
(TBD)                                          Default: 0.5     ! TBD = .5 !
   TBD < 0    ==> always use Huber-Snyder
   TBD = 1.5 ==> always use Schulman-Scire
   TBD = 0.5 ==> ISC Transition-point

Range of land use categories for which
urban dispersion is assumed
(IURB1, IURB2)                                 Default: 10      ! IURB1 =  10  !
                                                        19      ! IURB2 =  19  !

Site characterization parameters for single-point Met data files ---------
(needed for METFM = 2,3,4)

   Land use category for modeling domain
   (ILANDUIN)                                  Default: 20      ! ILANDUIN =  20  !

   Roughness length (m) for modeling domain
   (Z0IN)                                      Default: 0.25    ! Z0IN = .25 !

   Leaf area index for modeling domain
   (XLAIIN)                                    Default: 3.0     ! XLAIIN = 3.0 !

   Elevation above sea level (m)
   (ELEVIN)                                    Default: 0.0     ! ELEVIN = .0 !

   Latitude (degrees) for met location
   (XLATIN)                                    Default: -999.   ! XLATIN = -999.0 !

   Longitude (degrees) for met location
   (XLONIN)                                    Default: -999.   ! XLONIN = -999.0 !

Specialized information for interpreting single-point Met data files -----

   Anemometer height (m) (Used only if METFM = 2,3)
   (ANEMHT)                                    Default: 10.     ! ANEMHT = 10.0 !

   Form of lateral turbulance data in PROFILE.DAT file
   (Used only if METFM = 4 or MTURBVW = 1 or 3)
   (ISIGMAV)                                   Default: 1       ! ISIGMAV =  1  !
       0 = read sigma-theta
       1 = read sigma-v

   Choice of mixing heights (Used only if METFM = 4)
   (IMIXCTDM)                                  Default: 0       ! IMIXCTDM =  0  !
       0 = read PREDICTED mixing heights
       1 = read OBSERVED mixing heights

Maximum length of a slug (met. grid units)
(XMXLEN)                                       Default: 1.0     ! XMXLEN = 1.0 !

Maximum travel distance of a puff/slug (in
grid units) during one sampling step
(XSAMLEN)                                      Default: 1.0     ! XSAMLEN = 1.0 !

Maximum Number of slugs/puffs release from
one source during one time step
(MXNEW)                                        Default: 99      ! MXNEW =  99   !

Maximum Number of sampling steps for
one puff/slug during one time step
(MXSAM)                                        Default: 99      ! MXSAM =  99   !

Number of iterations used when computing
the transport wind for a sampling step
that includes gradual rise (for CALMET
and PROFILE winds)
(NCOUNT)                                       Default: 2       ! NCOUNT =  2   !
```

```
Minimum sigma y for a new puff/slug (m)
(SYMIN)                                         Default: 1.0     ! SYMIN = 1.0  !

Minimum sigma z for a new puff/slug (m)
(SZMIN)                                         Default: 1.0     ! SZMIN = 1.0  !

Default minimum turbulence velocities sigma-v and sigma-w
for each stability class over land and over water (m/s)
(SVMIN(12) and SWMIN(12))

                   ----------- LAND ----------      --------- WATER ----------
   Stab Class :  A    B    C    D    E    F         A    B    C    D    E    F
                ---  ---  ---  ---  ---  ---       ---  ---  ---  ---  ---  ---
Default SVMIN : .50, .50, .50, .50, .50, .50,      .37, .37, .37, .37, .37, .37
Default SWMIN : .20, .12, .08, .06, .03, .016,     .20, .12, .08, .06, .03, .016

     ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500, 0.370, 0.370, 0.370, 0.370, 0.370, 0.370!
     ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016, 0.200, 0.120, 0.080, 0.060, 0.030, 0.016!

Divergence criterion for dw/dz across puff
used to initiate adjustment for horizontal
convergence (1/s)
Partial adjustment starts at CDIV(1), and
full adjustment is reached at CDIV(2)
(CDIV(2))                                       Default: 0.0,0.0  ! CDIV = .0, .0 !

Minimum wind speed (m/s) allowed for
non-calm conditions. Also used as minimum
speed returned when using power-law
extrapolation toward surface
(WSCALM)                                        Default: 0.5     ! WSCALM = .5 !

Maximum mixing height (m)
(XMAXZI)                                        Default: 3000.   ! XMAXZI = 3000.0 !

Minimum mixing height (m)
(XMINZI)                                        Default: 50.     ! XMINZI = 50.0 !

Default wind speed classes --
5 upper bounds (m/s) are entered;
the 6th class has no upper limit
(WSCAT(5))                          Default    :
                                    ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8 (10.8+)

                       Wind Speed Class :  1     2     3     4     5
                                          ---   ---   ---   ---   ---
                                ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

Default wind speed profile power-law
exponents for stabilities 1-6
(PLXO(6))                           Default    : ISC RURAL values
                                    ISC RURAL : .07, .07, .10, .15, .35, .55
                                    ISC URBAN : .15, .15, .20, .25, .30, .30

                        Stability Class :  A     B     C     D     E     F
                                          ---   ---   ---   ---   ---   ---
                                 ! PLXO = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55 !

Default potential temperature gradient
for stable classes E, F (degK/m)
(PTGO(2))                           Default: 0.020, 0.035
                                     ! PTGO = 0.020,  0.035 !

Default plume path coefficients for
each stability class (used when option
for partial plume height terrain adjustment
is selected -- MCTADJ=3)
(PPC(6))                Stability Class :  A     B     C     D     E     F
                            Default PPC : .50,  .50,  .50,  .50,  .35,  .35
                                          ---   ---   ---   ---   ---   ---
                                 !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35, 0.35 !

Slug-to-puff transition criterion factor
equal to sigma-y/length of slug
(SL2PF)                                   Default: 10.      ! SL2PF = 10.0 !
```

```
    Puff-splitting control variables ------------------------

      VERTICAL SPLIT
      --------------

      Number of puffs that result every time a puff
      is split - nsplit=2 means that 1 puff splits
      into 2
      (NSPLIT)                          Default:    3        ! NSPLIT =  3  !

      Time(s) of a day when split puffs are eligible to
      be split once again; this is typically set once
      per day, around sunset before nocturnal shear develops.
      24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
      0=do not re-split    1=eligible for re-split
      (IRESPLIT(24))                    Default:  Hour 17 = 1
      !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

      Split is allowed only if last hour's mixing
      height (m) exceeds a minimum value
      (ZISPLIT)                         Default: 100.        ! ZISPLIT = 100.0 !

      Split is allowed only if ratio of last hour's
      mixing ht to the maximum mixing ht experienced
      by the puff is less than a maximum value (this
      postpones a split until a nocturnal layer develops)
      (ROLDMAX)                         Default: 0.25        ! ROLDMAX = 0.25 !


      HORIZONTAL SPLIT
      ----------------

      Number of puffs that result every time a puff
      is split - nsplith=5 means that 1 puff splits
      into 5
      (NSPLITH)                         Default:    5        ! NSPLITH =  5  !

      Minimum sigma-y (Grid Cells Units) of puff
      before it may be split
      (SYSPLITH)                        Default:  1.0        ! SYSPLITH = 1.0 !

      Minimum puff elongation rate (SYSPLITH/hr) due to
      wind shear, before it may be split
      (SHSPLITH)                        Default:  2.         ! SHSPLITH = 2.0 !

      Minimum concentration (g/m^3) of each
      species in puff before it may be split
      Enter array of NSPEC values; if a single value is
      entered, it will be used for ALL species
      (CNSPLITH)                        Default:  1.0E-07    ! CNSPLITH = 1.0E-07 !

    Integration control variables ------------------------

      Fractional convergence criterion for numerical SLUG
      sampling integration
      (EPSSLUG)                         Default:   1.0e-04   ! EPSSLUG = 1.0E-04 !

      Fractional convergence criterion for numerical AREA
      source integration
      (EPSAREA)                         Default:   1.0e-06   ! EPSAREA = 1.0E-06 !

      Trajectory step-length (m) used for numerical rise
      integration
      (DSRISE)                          Default:   1.0       ! DSRISE = 1.0 !

!END!


-------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
--------------------------------
```

```
---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  1 !

     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   3  !
           1 =        g/s
           2 =       kg/hr
           3 =        lb/hr
           4 =      tons/yr
           5 =      Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =      Odour Unit * m**3/min
           7 =      metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 = 0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                                   a
          POINT SOURCE: CONSTANT DATA
          -----------------------------
                                                                                   b         c
  Source       X           Y        Stack    Base      Stack    Exit  Exit    Bldg.  Emission
   No.     Coordinate  Coordinate  Height  Elevation Diameter  Vel.  Temp.   Dwash   Rates
              (km)        (km)       (m)      (m)        (m)   (m/s) (deg. K)
  ------   ----------  ----------  ------  ------    --------  ----- --------  -----  --------
***************    EMISSION RATES ARE IN LB/HR    ****************SO2****SO4***NOX****HNO3**NO3**PM10

Project-Specific Source Input
--------

    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

     SRCNAM  is a 12-character name for a source
             (No default)
     X       is an array holding the source data listed by the column headings
             (No default)
     SIGYZI  is an array holding the initial sigma-y and sigma-z (m)
             (Default: 0.,0.)
     FMFAC   is a vertical momentum flux factor (0. or 1.0) used to represent
             the effect of rain-caps or other physical configurations that
             reduce momentum rise associated with the actual exit velocity.
             (Default: 1.0  -- full momentum used)

    b
     0. = No building downwash modeled, 1. = downwash modeled
     NOTE: must be entered as a REAL number (i.e., with decimal point)

    c
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IPTU
     (e.g. 1 for g/s).

---------------
Subgroup (13c)
```

```
--------------

          BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH
          -------------------------------------------------------
Source                                                                        a
 No.      Effective building width and height (in meters) every 10 degrees
------    ------------------------------------------------------------------

--------
    a
     Each pair of width and height values is treated as a separate input
     subgroup and therefore must end with an input group terminator.

--------------
Subgroup (13d)
--------------
                                                  a
         POINT SOURCE: VARIABLE EMISSIONS DATA
         ---------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 13b.  Factors entered multiply the rates in 13b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                              Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)

--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.

--------------------------------------------------------------------------------

INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters
--------------------------------

--------------
Subgroup (14a)
--------------

     Number of polygon area sources with
     parameters specified below (NAR1)       No default  !  NAR1 =  0   !

     Units used for area source
     emissions below          (IARU)         Default: 1  !  IARU =   1  !
           1 =          g/m**2/s
           2 =         kg/m**2/hr
           3 =         lb/m**2/hr
           4 =       tons/m**2/yr
           5 =       Odour Unit * m/s  (vol. flux/m**2 of odour compound)
           6 =       Odour Unit * m/min
           7 =       metric tons/m**2/yr

     Number of source-species
```

```
      combinations with variable
      emissions scaling factors
      provided below in (14d)        (NSAR1) Default: 0   !  NSAR1 =  0  !

      Number of buoyant polygon area sources
      with variable location and emission
      parameters (NAR2)                   No default   !  NAR2 =  0   !
      (If NAR2 > 0, ALL parameter data for
      these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                         a
          AREA SOURCE: CONSTANT DATA
          ----------------------------
                                                           b
Source           Effect.    Base      Initial     Emission
 No.             Height   Elevation   Sigma z      Rates
                   (m)       (m)        (m)
-------          ------   ------    --------    ---------

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IARU
     (e.g. 1 for g/m**2/s).

---------------
Subgroup (14c)
---------------

          COORDINATES (UTM-km) FOR EACH VERTEX(4) OF EACH POLYGON
          --------------------------------------------------------
Source                                                               a
 No.      Ordered list of X followed by list of Y, grouped by source
------    -----------------------------------------------------------

--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

---------------
Subgroup (14d)
---------------
                                                    a
          AREA SOURCE: VARIABLE EMISSIONS DATA
          --------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 14b.  Factors entered multiply the rates in 14b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                              Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
```

```
         5 =        Temperature    (12 scaling factors, where temperature
                                   classes have upper bounds (C) of:
                                   0, 5, 10, 15, 20, 25, 30, 35, 40,
                                   45, 50, 50+)


--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters
---------------------------

---------------
Subgroup (15a)
---------------

     Number of buoyant line sources
     with variable location and emission
     parameters (NLN2)                               No default   !  NLN2 =  0   !

     (If NLN2 > 0, ALL parameter data for
      these sources are read from the file: LNEMARB.DAT)

     Number of buoyant line sources (NLINES)         No default   ! NLINES =  0  !

     Units used for line source
     emissions below                (ILNU)           Default: 1   !  ILNU =   1  !
           1 =         g/s
           2 =        kg/hr
           3 =        lb/hr
           4 =      tons/yr
           5 =      Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =      Odour Unit * m**3/min
           7 =      metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (15c)        (NSLN1) Default: 0  !  NSLN1 =  0  !

     Maximum number of segments used to model
     each line (MXNSEG)                              Default: 7   ! MXNSEG =  7  !

     The following variables are required only if NLINES > 0.  They are
     used in the buoyant line source plume rise calculations.

        Number of distances at which                 Default: 6   ! NLRISE =  6  !
        transitional rise is computed

        Average building length (XL)                 No default   ! XL = .0 !
                                                     (in meters)

        Average building height (HBL)                No default   ! HBL = .0 !
                                                     (in meters)

        Average building width (WBL)                 No default   ! WBL = .0 !
                                                     (in meters)

        Average line source width (WML)              No default   ! WML = .0 !
                                                     (in meters)

        Average separation between buildings (DXL)   No default   ! DXL = .0 !
                                                     (in meters)

        Average buoyancy parameter (FPRIMEL)         No default   ! FPRIMEL = .0 !
                                                     (in m**4/s**3)

!END!
```

Subgroup (15b)

BUOYANT LINE SOURCE: CONSTANT DATA

Source No.	Beg. X Coordinate (km)	Beg. Y Coordinate (km)	End. X Coordinate (km)	End. Y Coordinate (km)	Release Height (m)	Base Elevation (m)	Emission Rates[a]

----

[a] Data for each source are treated as a separate input subgroup and therefore must end with an input group terminator.

[b] An emission rate must be entered for every pollutant modeled. Enter emission rate of zero for secondary pollutants that are modeled, but not emitted. Units are specified by ILNTU (e.g. 1 for g/s).

Subgroup (15c)

BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA[a]

Use this subgroup to describe temporal variations in the emission rates given in 15b. Factors entered multiply the rates in 15b. Skip sources here that have constant emissions.

IVARY determines the type of variation, and is source-specific:
(IVARY)   Default: 0

0 =	Constant	
1 =	Diurnal cycle	(24 scaling factors: hours 1-24)
2 =	Monthly cycle	(12 scaling factors: months 1-12)
3 =	Hour & Season	(4 groups of 24 hourly scaling factors, where first group is DEC-JAN-FEB)
4 =	Speed & Stab.	(6 groups of 6 scaling factors, where first group is Stability Class A, and the speed classes have upper bounds (m/s) defined in Group 12
5 =	Temperature	(12 scaling factors, where temperature classes have upper bounds (C) of: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 50+)

----

[a] Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters

Subgroup (16a)

Number of volume sources with
parameters provided in 16b,c (NVL1)   No default ! NVL1 = 0 !

Units used for volume source
emissions below in 16b   (IVLU)   Default: 1 ! IVLU = 1 !
      1 =   g/s

```
          2 =       kg/hr
          3 =       lb/hr
          4 =      tons/yr
          5 =      Odour Unit * m**3/s  (vol. flux of odour compound)
          6 =      Odour Unit * m**3/min
          7 =      metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0   !  NSVL1 =   0   !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)      No default   !  NVL2 =    0   !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!
```

```
---------------
Subgroup (16b)
---------------
                                      a
           VOLUME SOURCE: CONSTANT DATA
           ----------------------------
                                                                            b
       X UTM       Y UTM      Effect.    Base      Initial    Initial    Emission
     Coordinate  Coordinate   Height   Elevation   Sigma y    Sigma z     Rates
        (km)        (km)        (m)       (m)        (m)        (m)
     ----------  ----------   ------    ------     --------   --------   --------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IVLU
     (e.g. 1 for g/s).

---------------
Subgroup (16c)
---------------
                                                 a
           VOLUME SOURCE: VARIABLE EMISSIONS DATA
           ---------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 16b.  Factors entered multiply the rates in 16b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)
```

----

[a] Data for each species are treated as a separate input subgroup and therefore must end with an input group terminator.

INPUT GROUPS: 17a & 17b -- Non-gridded (discrete) receptor information

----

Subgroup (17a)

Number of non-gridded receptors (NREC) No default ! NREC = 744 !

!END!

Subgroup (17b)

NON-GRIDDED (DISCRETE) RECEPTOR DATA[a]

Receptor No.	X Coordinate (km)	Y Coordinate (km)	Ground Elevation (m)	Height[b] Above Ground (m)

RECEPTORS OBTAINED FROM THE NPS/FWS EXTRACTION PROGRAM
ALL RECEPTORS ARE LCC (KM)

PROJECT-SPECIFIC CLASS I AREA RECEPTORS

[a] Data for each receptor are treated as a separate input subgroup and therefore must end with an input group terminator.

[b] Receptor height above ground is optional. If no value is entered, the receptor is placed on the ground.

APPENDIX B

CONSTRUCTION PERMIT APPLICATION

Department of Environmental Protection

Division of Air Resource Management

APPLICATION FOR AIR PERMIT - LONG FORM

I. APPLICATION INFORMATION

Air Construction Permit – Use this form to apply for an air construction permit at a facility operating under a federally enforceable state air operation permit (FESOP) or Title V air permit. Also use this form to apply for an air construction permit:

- For a proposed project subject to prevention of significant deterioration (PSD) review, nonattainment area (NAA) new source review, or maximum achievable control technology (MACT) review; or
- Where the applicant proposes to assume a restriction on the potential emissions of one or more pollutants to escape a federal program requirement such as PSD review, NAA new source review, Title V, or MACT; or
- Where the applicant proposes to establish, revise, or renew a plantwide applicability limit (PAL).

Air Operation Permit – Use this form to apply for:

- An initial federally enforceable state air operation permit (FESOP); or
- An initial/revised/renewal Title V air operation permit.

Air Construction Permit & Title V Air Operation Permit (Concurrent Processing Option) – Use this form to apply for both an air construction permit and a revised or renewal Title V air operation permit incorporating the proposed project.

To ensure accuracy, please see form instructions.

Identification of Facility

1. Facility Owner/Company Name: **Smurfit-Stone Container Enterprises, Inc.**	
2. Site Name: **Panama City Mill**	
3. Facility Identification Number: **0050009**	
4. Facility Location...: Street Address or Other Locator: **One Everitt Avenue** City: **Panama City** County: **Bay** Zip Code: **32402**	
5. Relocatable Facility? ☐ Yes ☒ No	6. Existing Title V Permitted Facility? ☒ Yes ☐ No

Application Contact

1. Application Contact Name: **Tom Clements, Environmental Superintendent**
2. Application Contact Mailing Address... Organization/Firm: **Smurfit-Stone Container Enterprises, Inc.** Street Address: **One Everitt Avenue** City: **Panama City** State: **FL** Zip Code: **32402**
3. Application Contact Telephone Numbers... Telephone: **(850) 785-4311** ext. **470** Fax: **(850) 763-8530**
4. Application Contact Email Address: **tmclemen@smurfit.com**

Application Processing Information (DEP Use)

1. Date of Receipt of Application: 1-29-07	3. PSD Number (if applicable):
2. Project Number(s): 0050009-027-AC	4. Siting Number (if applicable):

APPLICATION INFORMATION

Purpose of Application

This application for air permit is submitted to obtain: (Check one)

Air Construction Permit

- ☒ Air construction permit.
- ☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL).
- ☐ Air construction permit to establish, revise, or renew a plantwide applicability limit (PAL), and separate air construction permit to authorize construction or modification of one or more emissions units covered by the PAL.

Air Operation Permit

- ☐ Initial Title V air operation permit.
- ☐ Title V air operation permit revision.
- ☐ Title V air operation permit renewal.
- ☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is required.
- ☐ Initial federally enforceable state air operation permit (FESOP) where professional engineer (PE) certification is not required.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit (Concurrent Processing)

- ☐ Air construction permit and Title V permit revision, incorporating the proposed project.
- ☐ Air construction permit and Title V permit renewal, incorporating the proposed project.

Note: By checking one of the above two boxes, you, the applicant, are requesting concurrent processing pursuant to Rule 62-213.405, F.A.C. In such case, you must also check the following box:

- ☐ I hereby request that the department waive the processing time requirements of the air construction permit to accommodate the processing time frames of the Title V air operation permit.

Application Comment

This application is to establish a permit limit for SO_2 emissions of 710 lb/hr (24-hour average) for the No. 4 Combination Boiler (EU 016).

APPLICATION INFORMATION

Scope of Application

Emissions Unit ID Number	Description of Emissions Unit	Air Permit Type	Air Permit Proc. Fee
016	No. 4 Combination Boiler	AC1B	NA

Application Processing Fee

Check one: ☐ Attached - Amount: $_______________ ☒ Not Applicable

APPLICATION INFORMATION

Owner/Authorized Representative Statement

Complete if applying for an air construction permit or an initial FESOP.

1.	Owner/Authorized Representative Name : B. G. Sammons, General Manager
2.	Owner/Authorized Representative Mailing Address... Organization/Firm: Smurfit-Stone Container Enterprises, Inc. Street Address: One Everitt Avenue City: Panama City State: FL Zip Code: 32402
3.	Owner/Authorized Representative Telephone Numbers... Telephone: (850) 785-4311 ext. Fax: (850) 763-6290
4.	Owner/Authorized Representative Email Address: bsammons@smurfit.com
5.	Owner/Authorized Representative Statement: *I, the undersigned, am the owner or authorized representative of the facility addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other requirements identified in this application to which the facility is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit.* Signature Date

Application Responsible Official Certification

Complete if applying for an initial/revised/renewal Title V permit or concurrent processing of an air construction permit and a revised/renewal Title V permit. If there are multiple responsible officials, the "application responsible official" need not be the "primary responsible official."

1. Application Responsible Official Name:

2. Application Responsible Official Qualification (Check one or more of the following options, as applicable):
   - ☐ For a corporation, the president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit under Chapter 62-213, F.A.C.
   - ☐ For a partnership or sole proprietorship, a general partner or the proprietor, respectively.
   - ☐ For a municipality, county, state, federal, or other public agency, either a principal executive officer or ranking elected official.
   - ☐ The designated representative at an Acid Rain source.

3. Application Responsible Official Mailing Address...
   Organization/Firm:
   Street Address:
   City: State: Zip Code:

4. Application Responsible Official Telephone Numbers...
   Telephone: ( ) - ext. Fax: ( ) -

5. Application Responsible Official Email Address:

6. Application Responsible Official Certification:

   I, the undersigned, am a responsible official of the Title V source addressed in this air permit application. I hereby certify, based on information and belief formed after reasonable inquiry, that the statements made in this application are true, accurate and complete and that, to the best of my knowledge, any estimates of emissions reported in this application are based upon reasonable techniques for calculating emissions. The air pollutant emissions units and air pollution control equipment described in this application will be operated and maintained so as to comply with all applicable standards for control of air pollutant emissions found in the statutes of the State of Florida and rules of the Department of Environmental Protection and revisions thereof and all other applicable requirements identified in this application to which the Title V source is subject. I understand that a permit, if granted by the department, cannot be transferred without authorization from the department, and I will promptly notify the department upon sale or legal transfer of the facility or any permitted emissions unit. Finally, I certify that the facility and each emissions unit are in compliance with all applicable requirements to which they are subject, except as identified in compliance plan(s) submitted with this application.

   ______________________________ Signature ______________________ Date

APPLICATION INFORMATION

Professional Engineer Certification

1.	Professional Engineer Name: **David A. Buff** Registration Number: **19011**
2.	Professional Engineer Mailing Address... Organization/Firm: **Golder Associates Inc.**** Street Address: **6241 NW 23rd Street, Suite 500** City: **Gainesville** State: **FL** Zip Code: **32653**
3.	Professional Engineer Telephone Numbers... Telephone: **(352) 336-5600** ext. **545** Fax: **(352) 336-6603**
4.	Professional Engineer Email Address: **dbuff@golder.com**
5.	Professional Engineer Statement:

I, the undersigned, hereby certify, except as particularly noted herein, that:*

(1) To the best of my knowledge, there is reasonable assurance that the air pollutant emissions unit(s) and the air pollution control equipment described in this application for air permit, when properly operated and maintained, will comply with all applicable standards for control of air pollutant emissions found in the Florida Statutes and rules of the Department of Environmental Protection; and

(2) To the best of my knowledge, any emission estimates reported or relied on in this application are true, accurate, and complete and are either based upon reasonable techniques available for calculating emissions or, for emission estimates of hazardous air pollutants not regulated for an emissions unit addressed in this application, based solely upon the materials, information and calculations submitted with this application.

(3) If the purpose of this application is to obtain a Title V air operation permit (check here ☐, if so), I further certify that each emissions unit described in this application for air permit, when properly operated and maintained, will comply with the applicable requirements identified in this application to which the unit is subject, except those emissions units for which a compliance plan and schedule is submitted with this application.

(4) If the purpose of this application is to obtain an air construction permit (check here ☒, if so) or concurrently process and obtain an air construction permit and a Title V air operation permit revision or renewal for one or more proposed new or modified emissions units (check here ☐, if so), I further certify that the engineering features of each such emissions unit described in this application have been designed or examined by me or individuals under my direct supervision and found to be in conformity with sound engineering principles applicable to the control of emissions of the air pollutants characterized in this application.

(5) If the purpose of this application is to obtain an initial air operation permit or operation permit revision or renewal for one or more newly constructed or modified emissions units (check here ☐, if so), I further certify that, with the exception of any changes detailed as part of this application, each such emissions unit has been constructed or modified in substantial accordance with the information given in the corresponding application for air construction permit and with all provisions contained in such permit.

Signature ______________________ Date ______________

(seal)

* Attach any exception to certification statement.

** **Board of Professional Engineers Certificate of Authorization #00001670**

II. FACILITY INFORMATION

A. GENERAL FACILITY INFORMATION

Facility Location and Type

1. Facility UTM Coordinates... Zone **16** East (km) **632.8** North (km) **3335.1**		2. Facility Latitude/Longitude... Latitude (DD/MM/SS) **30 / 08 / 30** Longitude (DD/MM/SS) **85 / 37 / 25**	
3. Governmental Facility Code: **0**	4. Facility Status Code: **A**	5. Facility Major Group SIC Code: **26**	6. Facility SIC(s): **2611** **2621**
7. Facility Comment : **This facility is in the Kraft Paper and Bleached Paper Grade subcategories of the pulp and paper industry.**			

Facility Contact

1. Facility Contact Name: **Tom Clements**
2. Facility Contact Mailing Address... Organization/Firm: **Smurfit-Stone Container Enterprises, Inc.** Street Address: **One Everitt Avenue** City: **Panama City** State: **FL** Zip Code: **32402**
3. Facility Contact Telephone Numbers: Telephone: **(850) 785-4311** ext. **470** Fax: **(850) 763-8530**
4. Facility Contact Email Address: **tmclemen@smurfit.com**

Facility Primary Responsible Official

Complete if an "application responsible official" is identified in Section I. that is not the facility "primary responsible official."

1. Facility Primary Responsible Official Name:
2. Facility Primary Responsible Official Mailing Address... Organization/Firm: Street Address: City: State: Zip Code:
3. Facility Primary Responsible Official Telephone Numbers... Telephone: ( ) - ext. Fax: ( ) -
4. Facility Primary Responsible Official Email Address:

Facility Regulatory Classifications

Check all that would apply *following* completion of all projects and implementation of all other changes proposed in this application for air permit. Refer to instructions to distinguish between a "major source" and a "synthetic minor source."

1. ☐ Small Business Stationary Source	☐ Unknown
2. ☐ Synthetic Non-Title V Source	
3. ☒ Title V Source	
4. ☒ Major Source of Air Pollutants, Other than Hazardous Air Pollutants (HAPs)	
5. ☐ Synthetic Minor Source of Air Pollutants, Other than HAPs	
6. ☒ Major Source of Hazardous Air Pollutants (HAPs)	
7. ☐ Synthetic Minor Source of HAPs	
8. ☒ One or More Emissions Units Subject to NSPS (40 CFR Part 60)	
9. ☐ One or More Emissions Units Subject to Emission Guidelines (40 CFR Part 60)	
10. ☒ One or More Emissions Units Subject to NESHAP (40 CFR Part 61 or Part 63)	
11. ☐ Title V Source Solely by EPA Designation (40 CFR 70.3(a)(5))	
12. Facility Regulatory Classifications Comment:	

FACILITY INFORMATION

List of Pollutants Emitted by Facility

1. Pollutant Emitted	2. Pollutant Classification	3. Emissions Cap [Y or N]?
Particulate Matter Total – PM	A	N
Particulate Matter – PM_{10}	A	N
Sulfur Dioxide – SO_2	A	N
Nitrogen Oxides – NO_x	A	N
Carbon Monoxide – CO	A	N
Volatile Organic Compounds - VOC	A	N
Total Reduced Sulfur – TRS	A	N
Sulfuric Acid Mist – SAM	A	N
Total Hazardous Air Pollutants – HAPs	A	N
Acetaldehyde – H001	A	N
Chlorine – H038	B	N
Chloroform – H043	B	N
Formaldehyde – H095	A	N
Hydrochloric Acid – H106	A	N
Mercury – H114	B	N
Methanol – H115	A	N
1,2,4-Trichlorobenzene – H174	A	N
Xylenes – H186	A	N

B. EMISSIONS CAPS

Facility-Wide or Multi-Unit Emissions Caps

1. Pollutant Subject to Emissions Cap	2. Facility Wide Cap [Y or N]? (all units)	3. Emissions Unit ID No.s Under Cap (if not all units)	4. Hourly Cap (lb/hr)	5. Annual Cap (ton/yr)	6. Basis for Emissions Cap

7. Facility-Wide or Multi-Unit Emissions Cap Comment:

C. FACILITY ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1.	Facility Plot Plan: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ____ ☒ Previously Submitted, Date: 12/2004
2.	Process Flow Diagram(s): (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ____ ☒ Previously Submitted, Date: 12/2004
3.	Precautions to Prevent Emissions of Unconfined Particulate Matter: (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought) ☐ Attached, Document ID: ____ ☒ Previously Submitted, Date: 12/2004

Additional Requirements for Air Construction Permit Applications

1.	Area Map Showing Facility Location: ☐ Attached, Document ID: ____ ☒ Not Applicable (existing permitted facility)
2.	Description of Proposed Construction, Modification, or Plantwide Applicability Limit (PAL): ☐ Attached, Document ID: ____
3.	Rule Applicability Analysis: ☒ Attached, Document ID: SSCE-FI-CC3
4.	List of Exempt Emissions Units (Rule 62-210.300(3), F.A.C.): ☐ Attached, Document ID: ____ ☒ Not Applicable (no exempt units at facility)
5.	Fugitive Emissions Identification: ☐ Attached, Document ID: ____ ☒ Not Applicable
6.	Air Quality Analysis (Rule 62-212.400(7), F.A.C.): ☐ Attached, Document ID: ____ ☒ Not Applicable
7.	Source Impact Analysis (Rule 62-212.400(5), F.A.C.): ☐ Attached, Document ID: ____ ☒ Not Applicable
8.	Air Quality Impact since 1977 (Rule 62-212.400(4)(e), F.A.C.): ☐ Attached, Document ID: ____ ☒ Not Applicable
9.	Additional Impact Analyses (Rules 62-212.400(8) and 62-212.500(4)(e), F.A.C.): ☐ Attached, Document ID: ____ ☒ Not Applicable
10.	Alternative Analysis Requirement (Rule 62-212.500(4)(g), F.A.C.): ☐ Attached, Document ID: ____ ☒ Not Applicable

FACILITY INFORMATION

Additional Requirements for FESOP Applications

1. List of Exempt Emissions Units (Rule 62-210.300(3)(a) or (b)1., F.A.C.): ☐ Attached, Document ID:_____ ☐ Not Applicable (no exempt units at facility)	

Additional Requirements for Title V Air Operation Permit Applications

1. List of Insignificant Activities (Required for initial/renewal applications only): ☐ Attached, Document ID:_____ ☐ Not Applicable (revision application)	
2. Identification of Applicable Requirements (Required for initial/renewal applications, and for revision applications if this information would be changed as a result of the revision being sought): ☐ Attached, Document ID:_____ ☐ Not Applicable (revision application with no change in applicable requirements)	
3. Compliance Report and Plan (Required for all initial/revision/renewal applications): ☐ Attached, Document ID:_____ Note: A compliance plan must be submitted for each emissions unit that is not in compliance with all applicable requirements at the time of application and/or at any time during application processing. The department must be notified of any changes in compliance status during application processing.	
4. List of Equipment/Activities Regulated under Title VI (If applicable, required for initial/renewal applications only): ☐ Attached, Document ID:_____ ☐ Equipment/Activities On site but Not Required to be Individually Listed ☐ Not Applicable	
5. Verification of Risk Management Plan Submission to EPA (If applicable, required for initial/renewal applications only) : ☐ Attached, Document ID:_____ ☐ Not Applicable	
6. Requested Changes to Current Title V Air Operation Permit: ☐ Attached, Document ID:_____ ☐ Not Applicable	

Additional Requirements Comment

ATTACHMENT SSCE-FI-CC3

RULE APPLICABILITY ANALYSIS

ATTACHMENT SSC-FI-CC3

RULE APPLICABILITY ANALYSIS

TITLE V CORE LIST (Effective: 03/01/02)

[**Note:** The Title V Core List is meant to simplify the completion of the "List of Applicable Regulations" for DEP Form No. 62-210.900(1), Application for Air Permit - Long Form. The Title V Core List is a list of rules to which all Title V Sources are presumptively subject. The Title V Core List may be referenced in its entirety, or with specific exceptions. The Department may periodically update the Title V Core List.]

Federal: ***(description)***

40 CFR 61, Subpart M: NESHAP for Asbestos.

~~40 CFR 82: Protection of Stratospheric Ozone.~~
~~40 CFR 82, Subpart B: Servicing of Motor Vehicle Air Conditioners (MVAC).~~
40 CFR 82, Subpart F: Recycling and Emissions Reduction.

State: ***(description)***

CHAPTER 62-4, F.A.C.: PERMITS (Effective 06/01/01)

62-4.030, F.A.C.: General Prohibition.
62-4.040, F.A.C.: Exemptions.
62-4.050, F.A.C.: Procedure to Obtain Permits; Application.
62-4.060, F.A.C.: Consultation.
62-4.070, F.A.C.: Standards for Issuing or Denying Permits; Issuance; Denial.
62-4.080, F.A.C.: Modification of Permit Conditions.
62-4.090, F.A.C.: Renewals.
62-4.100, F.A.C.: Suspension and Revocation.
62-4.110, F.A.C.: Financial Responsibility.
62-4.120, F.A.C.: Transfer of Permits.
62-4.130, F.A.C.: Plant Operation - Problems.
62-4.150, F.A.C.: Review.
62-4.160, F.A.C.: Permit Conditions.
62-4.210, F.A.C.: Construction Permits.
62-4.220, F.A.C.: Operation Permit for New Sources.

CHAPTER 62-210, F.A.C.: STATIONARY SOURCES - GENERAL REQUIREMENTS (Effective 06/21/01)

62-210.300, F.A.C.: Permits Required.
62-210.300(1), F.A.C.: Air Construction Permits.
62-210.300(2), F.A.C.: Air Operation Permits.
62-210.300(3), F.A.C.: Exemptions.
62-210.300(5), F.A.C.: Notification of Startup.
62-210.300(6), F.A.C.: Emissions Unit Reclassification.
62-210.300(7), F.A.C.: Transfer of Air Permits.

62-210.350, F.A.C.: Public Notice and Comment.
62-210.350(1), F.A.C.: Public Notice of Proposed Agency Action.
62-210.350(2), F.A.C.: Additional Public Notice Requirements for Emissions Units Subject to Prevention of Significant Deterioration or Nonattainment-Area Preconstruction Review.
62-210.350(3), F.A.C.: Additional Public Notice Requirements for Sources Subject to Operation Permits for Title V Sources.
62-210.360, F.A.C.: Administrative Permit Corrections.
62-210.370(3), F.A.C.: Annual Operating Report for Air Pollutant Emitting Facility.
62-210.400, F.A.C.: Emission Estimates.
62-210.650, F.A.C.: Circumvention.
62-210.700, F.A.C.: Excess Emissions.
62-210.900, F.A.C.: Forms and Instructions.
62-210.900(1), F.A.C.: Application for Air Permit – Title V Source, Form and Instructions.
62-210.900(5), F.A.C.: Annual Operating Report for Air Pollutant Emitting Facility, Form and Instructions.
62-210.900(7), F.A.C.: Application for Transfer of Air Permit – Title V and Non-Title V Source.

CHAPTER 62-212, F.A.C.: STATIONARY SOURCES - PRECONSTRUCTION REVIEW (Effective 08/17/00)

CHAPTER 62-213, F.A.C.: OPERATION PERMITS FOR MAJOR SOURCES OF AIR POLLUTION (Effective 04/16/01)

62-213.205, F.A.C.: Annual Emissions Fee.
62-213.400, F.A.C.: Permits and Permit Revisions Required.
62-213.410, F.A.C.: Changes without Permit Revision.
62-213.412, F.A.C.: Immediate Implementation Pending Revision Process.
62-213.415, F.A.C.: Trading of Emissions within a Source.
62-213.420, F.A.C.: Permit Applications.
62-213.430, F.A.C.: Permit Issuance, Renewal, and Revision.
62-213.440, F.A.C.: Permit Content.
62-213.450, F.A.C.: Permit Review by EPA and Affected States
62-213.460, F.A.C.: Permit Shield.
62-213.900, F.A.C.: Forms and Instructions.
62-213.900(1), F.A.C.: Major Air Pollution Source Annual Emissions Fee Form.
62-213.900(7), F.A.C.: Statement of Compliance Form.

CHAPTER 62-296, F.A.C.: STATIONARY SOURCES - EMISSION STANDARDS (Effective 03/02/99)

62-296.320(4)(c), F.A.C.: Unconfined Emissions of Particulate Matter.
62-296.320(2), F.A.C.: Objectionable Odor Prohibited.

CHAPTER 62-297, F.A.C.: STATIONARY SOURCES - EMISSIONS MONITORING
(Effective 03/02/99)

62-297.310, F.A.C.: General Test Requirements.
62-297.330, F.A.C.: Applicable Test Procedures.
62-297.340, F.A.C.: Frequency of Compliance Tests.
62-297.345, F.A.C.: Stack Sampling Facilities Provided by the Owner of an Emissions Unit.
62-297.350, F.A.C.: Determination of Process Variables.
62-297.570, F.A.C.: Test Report.
62-297.620, F.A.C.: Exceptions and Approval of Alternate Procedures and Requirements.

Miscellaneous:

CHAPTER 28-106, F.A.C.: Decisions Determining Substantial Interests
CHAPTER 62-110, F.A.C.: Exception to the Uniform Rules of Procedure, Effective 07-01-98
~~**CHAPTER 62-256, F.A.C.:** Open Burning and Frost Protection Fires, Effective 11-30-94~~
CHAPTER 62-257, F.A.C.: Asbestos Notification and Fee, Effective 02-09-99
CHAPTER 62-281, F.A.C.: Motor Vehicle Air Conditioning Refrigerant Recovery and Recycling, Effective 09-10-96

III. EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Application - For Title V air operation permitting only, emissions units are classified as regulated, unregulated, or insignificant. If this is an application for Title V air operation permit, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each regulated and unregulated emissions unit addressed in this application for air permit. Some of the subsections comprising the Emissions Unit Information Section of the form are optional for unregulated emissions units. Each such subsection is appropriately marked. Insignificant emissions units are required to be listed at Section II, Subsection C.

Air Construction Permit or FESOP Application - For air construction permitting or federally enforceable state air operation permitting, emissions units are classified as either subject to air permitting or exempt from air permitting. The concept of an "unregulated emissions unit" does not apply. If this is an application for air construction permit or FESOP, a separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air permitting are required to be listed at Section II, Subsection C.

Air Construction Permit and Revised/Renewal Title V Air Operation Permit Application – Where this application is used to apply for both an air construction permit and a revised/renewal Title V air operation permit, each emissions unit is classified as either subject to air permitting or exempt from air permitting for air construction permitting purposes and as regulated, unregulated, or insignificant for Title V air operation permitting purposes. **The air construction permitting classification must be used to complete the Emissions Unit Information Section of this application for air permit.** A separate Emissions Unit Information Section (including subsections A through I as required) must be completed for each emissions unit subject to air permitting addressed in this application for air permit. Emissions units exempt from air construction permitting and insignificant emissions units are required to be listed at Section II, Subsection C.

If submitting the application form in hard copy, the number of this Emissions Unit Information Section and the total number of Emissions Unit Information Sections submitted as part of this application must be indicated in the space provided at the top of each page.

A. GENERAL EMISSIONS UNIT INFORMATION

Title V Air Operation Permit Emissions Unit Classification

1. Regulated or Unregulated Emissions Unit? (Check one, if applying for an initial, revised or renewal Title V air operation permit. Skip this item if applying for an air construction permit or FESOP only.)

   ☒ The emissions unit addressed in this Emissions Unit Information Section is a regulated emissions unit.

   ☐ The emissions unit addressed in this Emissions Unit Information Section is an unregulated emissions unit.

Emissions Unit Description and Status

1. Type of Emissions Unit Addressed in this Section: (Check one)

   ☒ This Emissions Unit Information Section addresses, as a single emissions unit, a single process or production unit, or activity, which produces one or more air pollutants and which has at least one definable emission point (stack or vent).

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, a group of process or production units and activities which has at least one definable emission point (stack or vent) but may also produce fugitive emissions.

   ☐ This Emissions Unit Information Section addresses, as a single emissions unit, one or more process or production units and activities which produce fugitive emissions only.

2. Description of Emissions Unit Addressed in this Section:

   No. 4 Combination Boiler

3. Emissions Unit Identification Number: **016**

4. Emissions Unit Status Code:	5. Commence Construction Date:	6. Initial Startup Date:	7. Emissions Unit Major Group SIC Code:	8. Acid Rain Unit?
A			**26**	☐ Yes ☐ No

9. Package Unit:
   Manufacturer: Model Number:

10. Generator Nameplate Rating: MW

11. Emissions Unit Comment:

    The Batch Digester System and Multi-Effect Evaporator System may vent non-condensable gases (NCGs) to the No. 4 Combination Boiler as a backup control device. The No. 4 Combination Boiler may also be used for condensate stripper off-gas (SOG) destruction.

Emissions Unit Control Equipment

1. Control Equipment/Method(s) Description: **021 – Thermal destruction of TRS and HAP** **053 – Venturi Scrubber**	
2. Control Device or Method Code(s): **021, 053**	

E. EMISSIONS UNIT POLLUTANTS

List of Pollutants Emitted by Emissions Unit

1. Pollutant Emitted	2. Primary Control Device Code	3. Secondary Control Device Code	4. Pollutant Regulatory Code
PM	053		EL
PM_{10}	053		NS
SO_2	053		EL
NO_x			NS
CO			NS
VOC			NS
TRS	021		EL
Pb			NS
HAPs	021		NS
Formaldehyde – H095			NS
Hydrochloric Acid – H106			NS

F1. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION – POTENTIAL/ESTIMATED FUGITIVE EMISSIONS

(Optional for unregulated emissions units.)

Potential/Estimated Fugitive Emissions

Complete for each pollutant identified in Subsection E if applying for an air construction permit or concurrent processing of an air construction permit and a revised or renewal Title V permit. Complete for each emissions-limited pollutant identified in Subsection E if applying for an air operation permit.

1. Pollutant Emitted: **SO_2**	2. Total Percent Efficiency of Control:
3. Potential Emissions: **1,183** lb/hour **3,109.8** tons/year	4. Synthetically Limited? ☐ Yes ☒ No
5. Range of Estimated Fugitive Emissions (as applicable): to tons/year	
6. Emission Factor: **710 lb/hr SO_2, 24-hr average** Reference: **Proposed permit limit**	7. Emissions Method Code: **0**
8.a. Baseline Actual Emissions (if required): tons/year	8.b. Baseline 24-month Period: From: To:
9.a. Projected Actual Emissions (if required): tons/year	9.b. Projected Monitoring Period: ☐ 5 years ☐ 10 years
10. Calculation of Emissions: **24-hour & Annual: 710 lb/hr SO_2 x 8,760 hr/yr x 1 ton/2,000 lb = 3,109.8 TPY** **3-hour: Current permit limit: 1,183 lb/hr**	
11. Potential Fugitive and Actual Emissions Comment:	

F2. EMISSIONS UNIT POLLUTANT DETAIL INFORMATION - ALLOWABLE EMISSIONS

Complete if the pollutant identified in Subsection F1 is or would be subject to a numerical emissions limitation.

Allowable Emissions Allowable Emissions 1 of 2

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **710 lb/hr, 24-hr average**	4. Equivalent Allowable Emissions: **710** lb/hour **3,109.8** tons/year
5. Method of Compliance: **CEMS for SO_2.**	
6. Allowable Emissions Comment (Description of Operating Method): **Proposed permit limit as a 24-hour average.**	

Allowable Emissions Allowable Emissions 2 of 2

1. Basis for Allowable Emissions Code: **OTHER**	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units: **1,183.0 lb/hr**	4. Equivalent Allowable Emissions: **1,183.0** lb/hour tons/year
5. Method of Compliance: **Annual test using EPA Test Method 6.**	
6. Allowable Emissions Comment (Description of Operating Method): **Based on Permit No. 0050009-025-AV when incinerating NCG and SOG. Limit is 1,174 lb/hr when burning SOG but not NCG, 1,183 lb/hr when burning NCG but not SOG, and 772 lb/hr when not incinerating NCG or SOG.**	

Allowable Emissions Allowable Emissions ____ of ____

1. Basis for Allowable Emissions Code:	2. Future Effective Date of Allowable Emissions:
3. Allowable Emissions and Units:	4. Equivalent Allowable Emissions: lb/hour tons/year
5. Method of Compliance:	
6. Allowable Emissions Comment (Description of Operating Method):	

I. EMISSIONS UNIT ADDITIONAL INFORMATION

Additional Requirements for All Applications, Except as Otherwise Stated

1. Process Flow Diagram (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☒ Previously Submitted, Date **12/2004**
2. Fuel Analysis or Specification (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☒ Previously Submitted, Date **12/2004**
3. Detailed Description of Control Equipment (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☒ Previously Submitted, Date **12/2004**
4. Procedures for Startup and Shutdown (Required for all operation permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☒ Previously Submitted, Date **12/2004**
   ☐ Not Applicable (construction application)
5. Operation and Maintenance Plan (Required for all permit applications, except Title V air operation permit revision applications if this information was submitted to the department within the previous five years and would not be altered as a result of the revision being sought)
   ☐ Attached, Document ID: ____ ☐ Previously Submitted, Date ____
   ☒ Not Applicable
6. Compliance Demonstration Reports/Records
   ☐ Attached, Document ID: ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☐ Previously Submitted, Date: ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☐ To be Submitted, Date (if known): ____
   Test Date(s)/Pollutant(s) Tested: ____
   ☒ Not Applicable
   Note: For FESOP applications, all required compliance demonstration records/reports must be submitted at the time of application. For Title V air operation permit applications, all required compliance demonstration reports/records must be submitted at the time of application, or a compliance plan must be submitted at the time of application.
7. Other Information Required by Rule or Statute
   ☐ Attached, Document ID: ____ ☒ Not Applicable

EMISSIONS UNIT INFORMATION
Section [1]
No. 4 Combination Boiler

Additional Requirements for Air Construction Permit Applications

1. Control Technology Review and Analysis (Rules 62-212.400(10) and 62-212.500(7), F.A.C.; 40 CFR 63.43(d) and (e)) ☐ Attached, Document ID: _____ ☒ Not Applicable	
2. Good Engineering Practice Stack Height Analysis (Rule 62-212.400(4)(d), F.A.C., and Rule 62-212.500(4)(f), F.A.C.) ☐ Attached, Document ID: _____ ☒ Not Applicable	
3. Description of Stack Sampling Facilities (Required for proposed new stack sampling facilities only) ☐ Attached, Document ID: _____ ☒ Not Applicable	

Additional Requirements for Title V Air Operation Permit Applications

1. Identification of Applicable Requirements ☐ Attached, Document ID: _____ ☐ Not Applicable	
2. Compliance Assurance Monitoring ☐ Attached, Document ID: _____ ☐ Not Applicable	
3. Alternative Methods of Operation ☐ Attached, Document ID: _____ ☐ Not Applicable	
4. Alternative Modes of Operation (Emissions Trading) ☐ Attached, Document ID: _____ ☐ Not Applicable	
5. Acid Rain Part Application ☐ Certificate of Representation (EPA Form No. 7610-1) ☐ Copy Attached, Document ID: _____ ☐ Acid Rain Part (Form No. 62-210.900(1)(a)) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Repowering Extension Plan (Form No. 62-210.900(1)(a)1.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ New Unit Exemption (Form No. 62-210.900(1)(a)2.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Retired Unit Exemption (Form No. 62-210.900(1)(a)3.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NOx Compliance Plan (Form No. 62-210.900(1)(a)4.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Phase II NOx Averaging Plan (Form No. 62-210.900(1)(a)5.) ☐ Attached, Document ID: _____ ☐ Previously Submitted, Date: _____ ☐ Not Applicable	

Additional Requirements Comment
