

**SCREENING CALPUFF BART APPLICABILITY MODELING ANALYSIS
TXU ENERGY ■ MONTICELLO FACILITY**

TCEQ ACCOUNT NUMBER: TF-0013-B

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April 2007

Project 074401.0037



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1. INTRODUCTION

TXU operates the Monticello Steam Electric Station in Mount Pleasant, Texas. The Texas Commission on Environmental Quality (TCEQ) Account Number for the TXU Monticello Facility is TF-0013-B. The TXU Monticello Facility is considered eligible to be regulated under the U.S. Environmental Protection Agency's (EPA) Best Available Retrofit Technology (BART) provisions of the Regional Haze Rule.

The results of the initial BART Screening performed by TCEQ's contractor determined that the TXU Monticello Steam Electric Station could not be screened out of further analyses as part of a larger collection of sources grouped geographically and by source category. Preliminary analyses showed impacts from the modeled group that included the Monticello Facility was above the threshold for contributing to visibility impairment at one Class I area due to particulate matter (PM) emissions. Therefore, a site-specific BART Applicability Analysis was required to be conducted for the Monticello Facility to determine whether the facility is subject to or exempt from BART.

This report summarizes TXU's BART Applicability Analysis and resulting determination that the Monticello Facility is exempt from BART since the air quality modeling analyses described in this report demonstrate that the plant does not contribute to visibility impairment at federally-protected Class I areas. Accordingly, no BART Determination is required for the Monticello Facility.

TXU's site-specific evaluation of BART-eligibility and the modeling methods used to determine applicability of BART as described in this report are based on the following documents:

- TCEQ, "Final Report, Screening Analysis of Potential BART-Eligible Sources in Texas," Work Order No. 582-04-65563-06-10, September 27, 2006 and "Addendum I, BART Exemption Screening Analysis," December 6, 2006.
- TCEQ, "Best Available Retrofit Technology (BART) Modeling Protocol to Determine Sources Subject to BART in the State of Texas," January 22, 2007.
- Central Region Air Planning Association, *CENRAP BART Modeling Protocol*, December 15, 2005.
- U.S. EPA, *Guidance for Tracking Progress under the Regional Haze Rule* (EPA-454/B-03-004), September 2003.
- U.S. EPA, *Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule* (EPA-454/B-03-005), October 2003.

The *TCEQ BART Modeling Protocol* is incorporated by reference for TXU's source-specific modeling analyses. The *TCEQ BART Modeling Protocol* and related information available at the TCEQ BART website established common technical approaches for quantifying emissions from BART-eligible emission units and conducting screening and refined modeling analyses using the

CALPUFF modeling system and common data resources.¹ TXU's analyses generally adhere to the recommendations made in the *TCEQ BART Modeling Protocol* as described in this report and adapted to the source-specific analysis of visibility impacts attributable to the Monticello Facility. TXU has also submitted a BART Modeling Protocol to TCEQ for review.² Appendix A contains a copy of the submitted protocol for documentation purposes.

1.1.1 ASSESSMENT OF CONTRIBUTION TO VISIBILITY IMPAIRMENT AND BART APPLICABILITY

The *TCEQ BART Modeling Protocol* was issued in January 2007 and prescribes modeling techniques and data resources to conduct screening and refined analyses to assess whether a BART-eligible source is subject to BART. Causation is defined as a single-source impact of 1.0 deciviews (dv) or more and contribution is defined as a single-source impact of 0.5 dv or more, each evaluated on a 24-hour average basis. The deciview is a metric used to represent normalized light extinction attributable to visibility-affecting pollutants. To determine whether a BART-eligible plant causes or contributes to visibility impairment, U.S. EPA guidance requires the use of an air quality model, specifically recommending the CALPUFF modeling system, to quantify the impacts attributable to a single BART-eligible source. Because contribution to visibility impairment is sufficient cause to require a BART determination, 0.5 dv is the critical threshold for assessment of BART applicability.

The change in deciviews based on the source and background light extinction is based on the following equation:

$$\Delta dv = 10 * \ln \left[\frac{b_{\text{ext, background}} + b_{\text{ext, source}}}{b_{\text{ext, background}}} \right]$$

The background extinction coefficient $b_{\text{ext, background}}$ is affected by various chemical species and the Rayleigh scattering phenomenon and can be calculated as shown in the following equation:

$$b_{\text{ext, background}} (\text{Mm}^{-1}) = b_{\text{SO}_4} + b_{\text{NO}_3} + b_{\text{OC}} + b_{\text{Soil}} + b_{\text{Coarse}} + b_{\text{ap}} + b_{\text{Ray}}$$

¹ <http://www.tceq.state.tx.us/implementation/air/sip/bart/haze.html>

² The protocol document was submitted to Mr. Daniel Jamieson of TCEQ via email on April 12, 2007.

where,

$b_{SO_4} = 3[(NH_4)_2SO_4]f(RH)$	$[(NH_4)_2SO_4]$ denotes the ammonium sulfate concentration
$b_{NO_3} = 3[NH_4NO_3]f(RH)$	$[NH_4NO_3]$ denotes the ammonium nitrate concentration
$b_{OC} = 4[OC]$	$[OC]$ denotes the concentration of organic carbon
$b_{Soil} = 1[Soil]$	$[Soil]$ denotes the concentration of fine soils
$b_{Coarse} = 0.6[Coarse Mass]$	$[Coarse Mass]$ denotes the concentration of coarse dusts
$b_{ap} = 10[EC]$	$[EC]$ denotes the concentration of elemental carbon
$b_{Ray} = \text{Rayleigh Scattering} (10 \text{ Mm}^{-1} \text{ by default})$	Rayleigh Scattering is scattering due to air molecules
$f(RH) = \text{Relative Humidity Function}$	
$[] = \text{Concentration in } \mu\text{g}/\text{m}^3$	

Values for the parameters listed above specific to the natural background conditions at the Class I areas considered in this analysis are provided on an annual average basis in the U.S. EPA's *Guidance for Estimating Natural Visibility Conditions under the Regional Haze Rule*.³

The extinction coefficient due to emissions of visibility-affecting pollutants from a BART-eligible source $b_{ext,source}$ is calculated using an air quality model. The extinction due to the BART-eligible source will be calculated as shown in the following equation.

$$b_{ext,source} (\text{Mm}^{-1}) = b_{SO_4} + b_{NO_3} + b_{PMC} + b_{PMF} + b_{SOA} + b_{EC}$$

where,

$b_{SO_4} = 3[(NH_4)_2SO_4]f(RH)$	$[(NH_4)_2SO_4]$ denotes the ammonium sulfate concentration
$b_{NO_3} = 3[NH_4NO_3]f(RH)$	$[NH_4NO_3]$ denotes the ammonium nitrate concentration
$b_{SOA} = 4[SOA]$	$[SOA]$ denotes the concentration of secondary organic aerosols
$b_{PMF} = 1[PMF]$	$[PMF]$ denotes the concentration of fine PM
$b_{PMC} = 0.6[PMC]$	$[PMC]$ denotes the concentration of coarse PM
$b_{EC} = 10[EC]$	$[EC]$ denotes the concentration of elemental carbon
$f(RH) = \text{Relative Humidity Function}$	
$[] = \text{Concentration in } \mu\text{g}/\text{m}^3$	

1.1.2 POTENTIALLY AFFECTED CLASS I AREAS

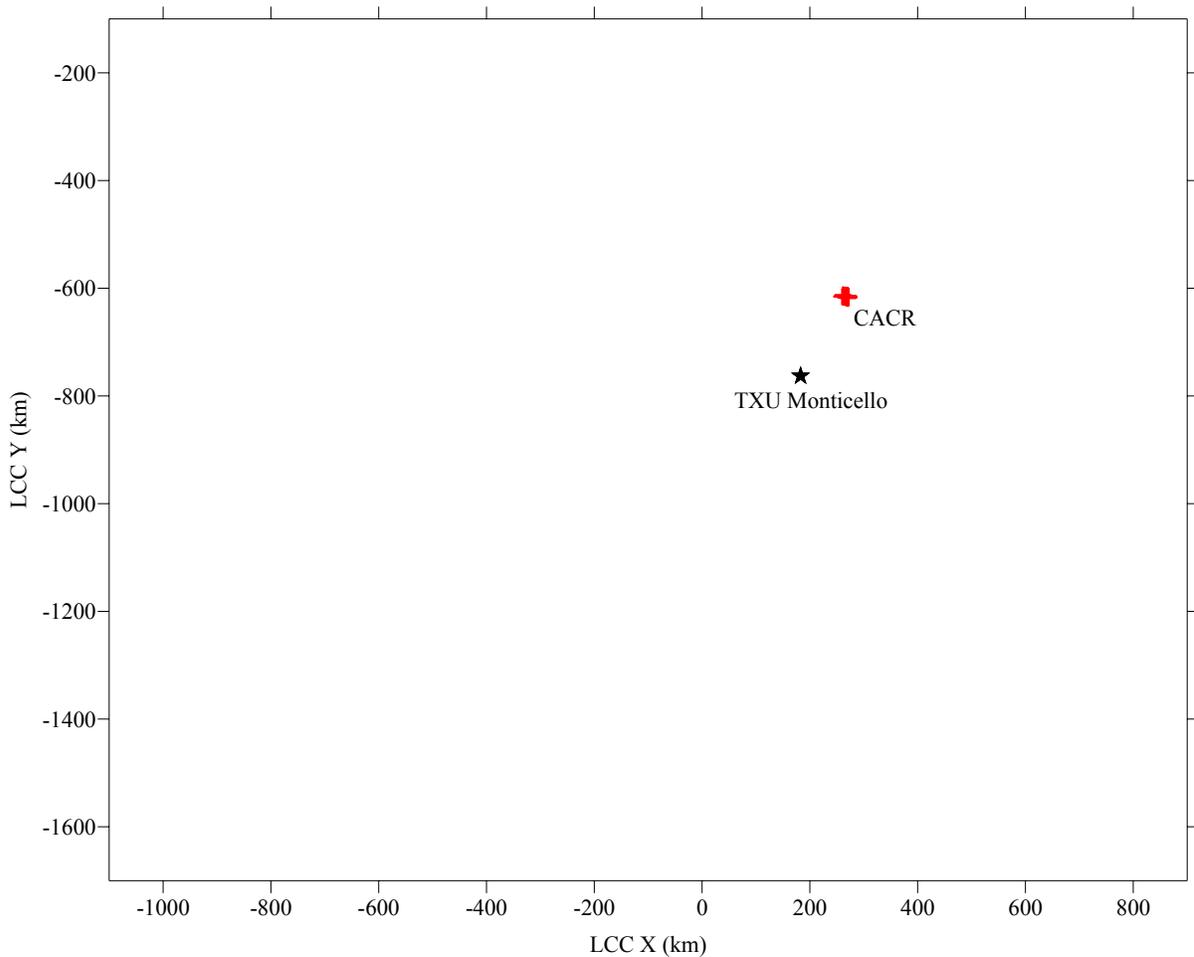
TXU used the screening modeling technique described in the *TCEQ BART Modeling Protocol* to determine whether BART-eligible operations at the Monticello Facility contribute to visibility impairment at any Class I areas. The December 2006 addendum to the *TCEQ BART Screening Analysis Report* noted that the preliminary screening analysis

³ U.S. EPA, *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule*, Table 2-1, Attachment A, September 2003, EPA-454/B-03-005.

only resulted in impacts above 0.5 dv for one Class I area for the source group or model plant that included the Monticello Facility. Therefore, only that one Class I area is required to be included in TXU's analysis to determine whether the source contributes to visibility impairment.

The required Class I area for the TXU Monticello facility is Caney Creek, which is located approximately 163 km northeast from the Monticello facility. A plot of the Class I area with respect to the Monticello facility is provided in Figure 1-1.

FIGURE 1-1. PLOT OF CLASS I AREA REQUIRED BY TCEQ TO BE EVALUATED IN THE BART ANALYSIS



1.1.3 CALPUFF MODELING ANALYSES

As recommended by the U.S. EPA BART guidelines, the CALPUFF modeling system was used to compute the 24-hour average visibility impairment attributable to TXU's Monticello Facility to assess whether the 0.5 dv contribution threshold is exceeded, and if so, the frequency, duration, and magnitude of any exceedance events. CALPUFF is a refined air quality modeling system that is capable of simulating the dispersion, chemical

transformation, and long-range transport of multiple visibility-affecting pollutant emissions from a single source and is therefore preferred for BART applicability and determination analyses.

2. EMISSION SOURCE INFORMATION

This section of the report describes the emission units that comprise the BART-eligible sources at the TXU Monticello Facility. Emissions of PM from the BART-eligible sources at TXU's Monticello Facility are described in the following sections.

2.1 MODELED STACK PARAMETERS AND EMISSIONS

The TXU Monticello Steam Electric Station is subject to the U.S. EPA Clean Air Interstate Rule (CAIR) which provides a Federal framework requiring states to reduce emissions of SO₂ and NO_x. TXU is required to evaluate its SO₂ and NO_x emissions in terms of CAIR. As such, per discussions with TCEQ, the BART eligibility modeling for TXU is only required for PM emissions.

TXU reviewed the criteria for BART-eligibility and determined that the emission units described in Appendix B comprise the BART-eligible sources at the Monticello Facility based on the source category and date-in-existence eligibility criteria. Actual stack parameters were input into the CALPUFF model to represent the point of visibility-affecting pollutant emissions. The location of each point source was represented consistently in the Lambert Conformal Coordinate system. Each exhaust discharges vertically without obstruction. Since the Caney Creek Class I area is located more than 160 km from the plant, pursuant to the TCEQ BART modeling protocol, effects of building downwash were not considered.

Emissions of PM from all BART-eligible emission sources at TXU's Monticello Facility were included in the BART Modeling. Per TCEQ Guidance all PM emissions from the TXU BART eligible sources were modeled using the worst-case assumption that all particulate matter is PM_{2.5}. The PM profile for sulfate, elemental carbon and secondary organic aerosols are not known and all PM was modeled as PM_{2.5}. The maximum 24-hour average PM emission rate with normal operations from the highest emitting day of each year from the coal-fired boilers for the years 2002 through 2005 was used in the BART determination modeling. The maximum 24-hour average emission was calculated using stack test emission rates during normal operations multiplied by the maximum 24-hour heat input for each unit for the modeling period. Emissions from all other BART eligible sources (fugitives and sources with less than one pound per hour emission rate) were based on the TCEQ's CAMx screening modeling. All particulate emissions from the fugitives and small sources were modeled out of Boiler 3 (S3) to be conservative. By releasing the particulates from a higher stack and at a greater velocity, the emissions can travel farther. This approach is conservative for long-range transport modeling analysis. Appendix B summarizes the stack parameters and emission rates for the BART-eligible emission units at TXU's Monticello Facility.

3. AIR QUALITY MODELING ANALYSES

The BART Modeling Protocol submitted by TXU in April 2007 describes the modeling methods, data resources, and technical options used to conduct the screening analysis for the Monticello Facility. The air quality modeling was conducted following the methods described in the *TCEQ BART Modeling Protocol* and the TXU Screening BART modeling protocol submitted in April 2007 (refer to Appendix A for details).

4. SCREENING ANALYSIS RESULTS

Screening analyses of visibility impacts attributable to TXU's Monticello Facility were conducted to determine whether the plant is subject to BART using a conservative assessment.

4.1 SCREENING ANALYSIS IMPACTS AT CANEY CREEK WA

Table 4-1 summarizes the modeled peak, 24-hour average visibility impacts at Caney Creek Wilderness Area (WA) attributable to TXU's Monticello Facility. This table summarizes the results calculated by using the methods described in the Modeling Protocol for representing annual average natural background conditions. Results are presented in terms of the maximum visibility impact and the day at which the maximum visibility impact occurred.

TABLE 4-1. PEAK 24-HOUR AVERAGE VISIBILITY IMPACTS AT CANEY CREEK WA

Year	Maximum Modeled Impact (Δdv)	Julian Day For Maximum Impact
2001	0.365	194
2002	0.329	355
2003	0.325	83

The results presented in Table 4-1 indicate that refined analyses were not necessary to evaluate visibility impacts at the Caney Creek WA since the screening analysis impacts, based on annual average natural background conditions, are below the impact contribution threshold of 0.5 dv.

4.2 SUMMARY OF SCREENING ANALYSES

Because screening analyses of visibility impacts to TXU's Monticello Facility indicated peak 24-hour average impacts are below the 0.5 dv contribution threshold at all Class I areas evaluated, no further BART analysis was required.

5. CONCLUSIONS

Using analysis methods prescribed by the U.S. EPA, CENRAP, and TCEQ, TXU conducted BART Applicability Analyses of emissions of visibility-affecting pollutants from BART-eligible emission units at the Monticello Facility. The results of this analysis indicate that TXU is not subject to BART; hence, the site is not required to conduct a BART Determination, because the BART-eligible sources do not contribute to visibility impairment at the Caney Creek WA, as demonstrated by a screening modeling analysis that quantified the maximum 24-hour average visibility impact as being less than the 0.5 dv contribution threshold. Upon review of this BART Applicability Analysis, TCEQ is expected to confirm TXU's determination that BART does not apply.

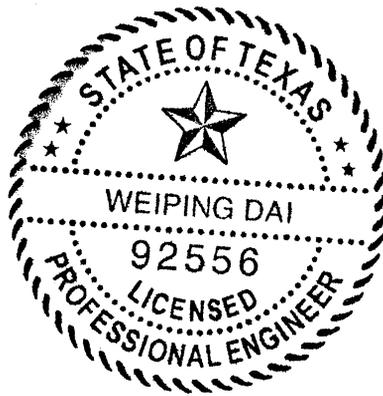
TXU reserves the right to revise the applicability analyses and determinations described in this report if new methods are approved for regulatory use by the U.S. EPA and TCEQ.

6. PROFESSIONAL ENGINEER SEAL

PROFESSIONAL ENGINEER SEAL

To the best of my knowledge, the representations made in this modeling demonstration document are true and accurate. The emission source data used in the analysis was provided by the client or determined from the client-provided data. By affixing my seal below, I submit that the engineering work and calculations performed in this modeling demonstration document were either performed by myself or under my direct supervision, as defined in Section 131.81 of the Texas Engineering Practice Act.

Place P.E. Seal below this line



Weiping Dai
Signature

04/26/2007
Date

Weiping Dai, Managing Consultant, Trinity Consultants
Printed Name, Title, and Affiliation

**BART SCREEN MODELING PROTOCOL
Submitted to TCEQ on April 12, 2007**

SCREENING CALPUFF BART MODELING PROTOCOL
TXU ENERGY ▪ MONTICELLO FACILITY

TCEQ ACCOUNT NUMBER: TF-0013-B

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1. INTRODUCTION

TXU operates the Monticello Steam Electric Station in Mount Pleasant, Texas. The Texas Commission on Environmental Quality (TCEQ) Account Number for the TXU Monticello Facility is TF-0013-B. The TXU Monticello Facility is considered eligible to be regulated under the U.S. Environmental Protection Agency's (EPA) Best Available Retrofit Technology (BART) provisions of the Regional Haze Rule. This protocol describes the proposed methodology for the Screening CALPUFF BART exemption modeling analysis for the TXU Monticello Facility.

1.1 BEST AVAILABLE RETROFIT TECHNOLOGY RULE BACKGROUND

On July 1, 1999, the U.S. EPA published a final rule regarding Regional Haze Regulations and BART Determinations, known as the Regional Haze Rule (RHR). The objective of the RHR is to improve visibility in 156 specific areas across the United States, known as Class I areas. The Clean Air Act defines Class I areas as certain national parks (over 6000 acres), wilderness areas (over 5000 acres), national memorial parks (over 5000 acres), and international parks that were in existence prior to August 7, 1977.

On July 6, 2005, the EPA published amendments to its 1999 RHR to include guidance for making source-specific Best Available Retrofit Technology (BART) determinations. The BART rule defines BART-eligible sources as sources that meet the following criteria:

- (1) Have potential emissions of at least 250 tons per year of a visibility-impairing pollutant,
- (2) Began operation between August 7, 1962 and August 7, 1977, and
- (3) Are listed in one of the 26 source categories in the guidance.

BART-eligible sources are subject-to-BART if the sources are "reasonably anticipated to cause or contribute to visibility impairment in any federal mandatory Class I area." EPA has determined that sources are reasonably anticipated to cause or contribute to visibility impairment if the visibility impacts from a source are greater than 0.5 deciviews (dv) when compared against a natural background. States have the authority to exempt certain BART-eligible sources from installing BART controls if the results of the dispersion modeling demonstrate that the source cannot reasonably be anticipated to cause or contribute to visibility impairment in a Class I area.

1.2 MODELING PROTOCOL BACKGROUND

To promote consistency between sources in conducting modeling related to BART, TCEQ published a BART modeling protocol (January 2007). TCEQ has indicated that all facilities may use the protocol to determine if their site-specific sources are subject to BART. The modeling methods established by the TCEQ in the BART modeling protocol are based on the use of a CALMET meteorological data set developed under "no-obs" mode by CENRAP. In other words, this data set incorporated only mesoscale meteorological data (i.e., MM5 data for 2001, 2002, and 2003) and did not incorporate surface, upper air, precipitation or over water station observation data.

The Federal Land Managers (FLMs) commented that observations should be used in refined CALPUFF modeling. Thus, TCEQ indicated in their protocol that modeling using the CENRAP data set is considered screen modeling, and that sources may use observational data if they wish to conduct a more refined modeling analysis. It is TXU's intent to conduct a Screen CALPUFF modeling analysis to evaluate the applicability of BART to the Monticello facility.

1.3 OBJECTIVE

The objective of this document is to provide a protocol summarizing the modeling methods and procedures that will be followed in the Screening CALPUFF analysis for the TXU Facility in Monticello, Texas. If the highest deciview value predicted by the SCREEN analysis is above EPA's recommended visibility contribution threshold of 0.5 Δv , TXU will consider using the refined CALPUFF modeling for further analysis.

1.4 LOCATION OF SOURCES AND THE CANEY CREEK CLASS I AREA

The sources listed in Table 1-1 are the sources that have been identified by TXU as sources that meet the three criteria for BART-eligible sources.

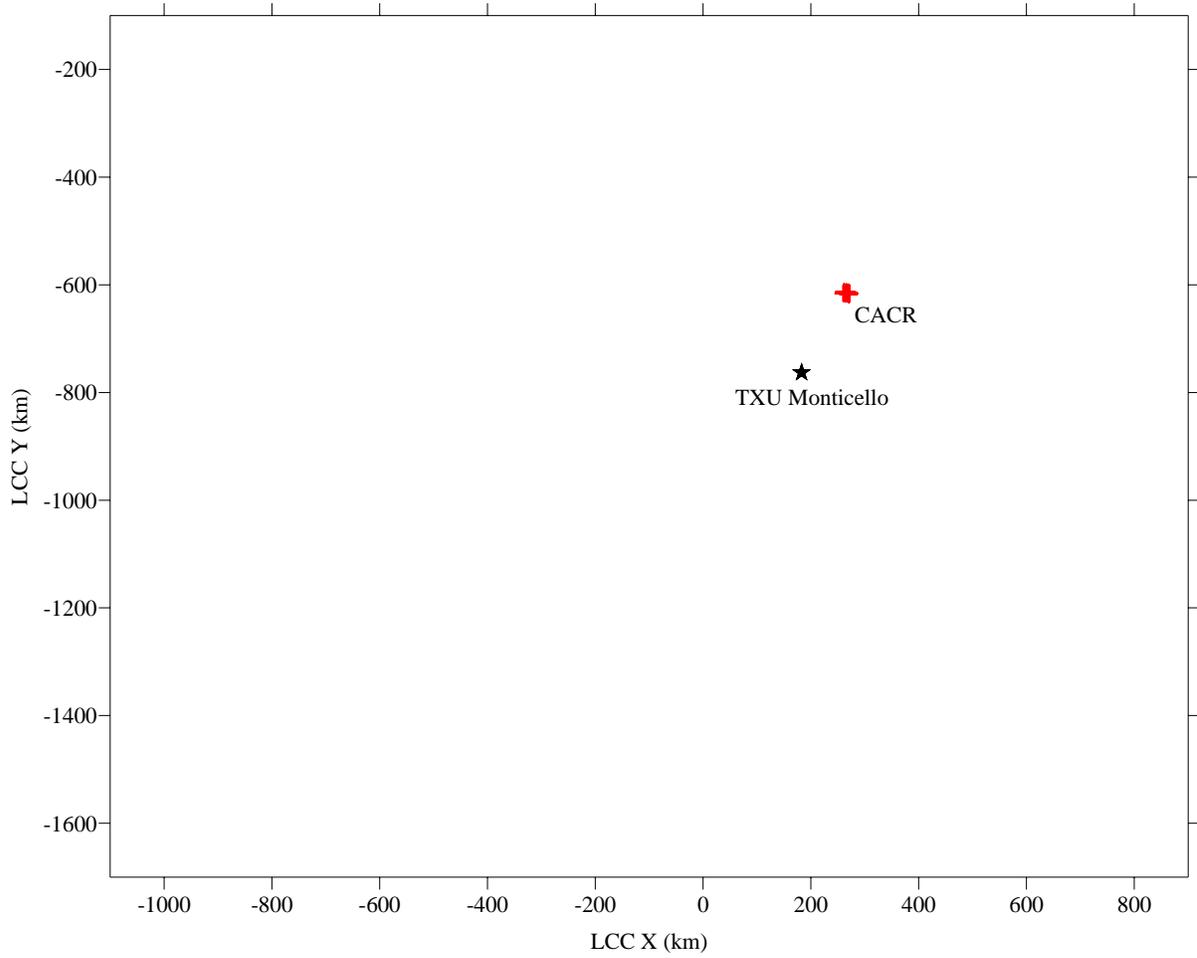
TABLE 1-1 LIST OF ALL SOURCES IN BART-ELIGIBLE SOURCE GROUP

EPN	Source Description
S1	Unit 1 Coal-fired Boiler
S2	Unit 2 Coal-fired Boiler
S3 ¹	Unit 3 Coal-fired Boiler
L12SRW	Unit 1 & 2 Coal Stacker Reclaimer

TCEQ provided a list of Class I areas that each facility is required to model in the BART modeling analysis. The required Class I area for the TXU Monticello facility is Caney Creek, which is located approximately 163 km northeast from the Monticello facility. A plot of the Class I area with respect to the Monticello facility is provided in Figure 1-1.

¹ To be conservative, all small and fugitive sources were added to S3 because it is the highest stack.

**FIGURE 1-1. PLOT OF CLASS I AREA REQUIRED BY TCEQ TO BE EVALUATED
IN THE BART ANALYSIS**



2. CALPUFF MODEL SYSTEM

As recommended by the U.S. EPA BART guidelines, the CALPUFF modeling system will be used to compute the 24-hour average visibility impairment attributable to TXU's Monticello Facility to assess whether the 0.5 dv contribution threshold is exceeded, and if so, the frequency, duration, and magnitude of any exceedance events. CALPUFF is a sophisticated air quality modeling system that is capable of simulating the dispersion, chemical transformation, and long-range transport of multiple visibility-affecting pollutants and is therefore preferred for the BART applicability and determination analyses. The CALPUFF modeling system is described in technical detail in the *TCEQ BART Modeling Protocol (January 2007)*.

2.1 MODELING PROGRAM VERSIONS

The versions of the CALPUFF modeling system programs that are proposed for the TXU Screening BART modeling analysis are listed in Table 2-1.

TABLE 2-1. CALPUFF MODELING SYSTEM VERSIONS

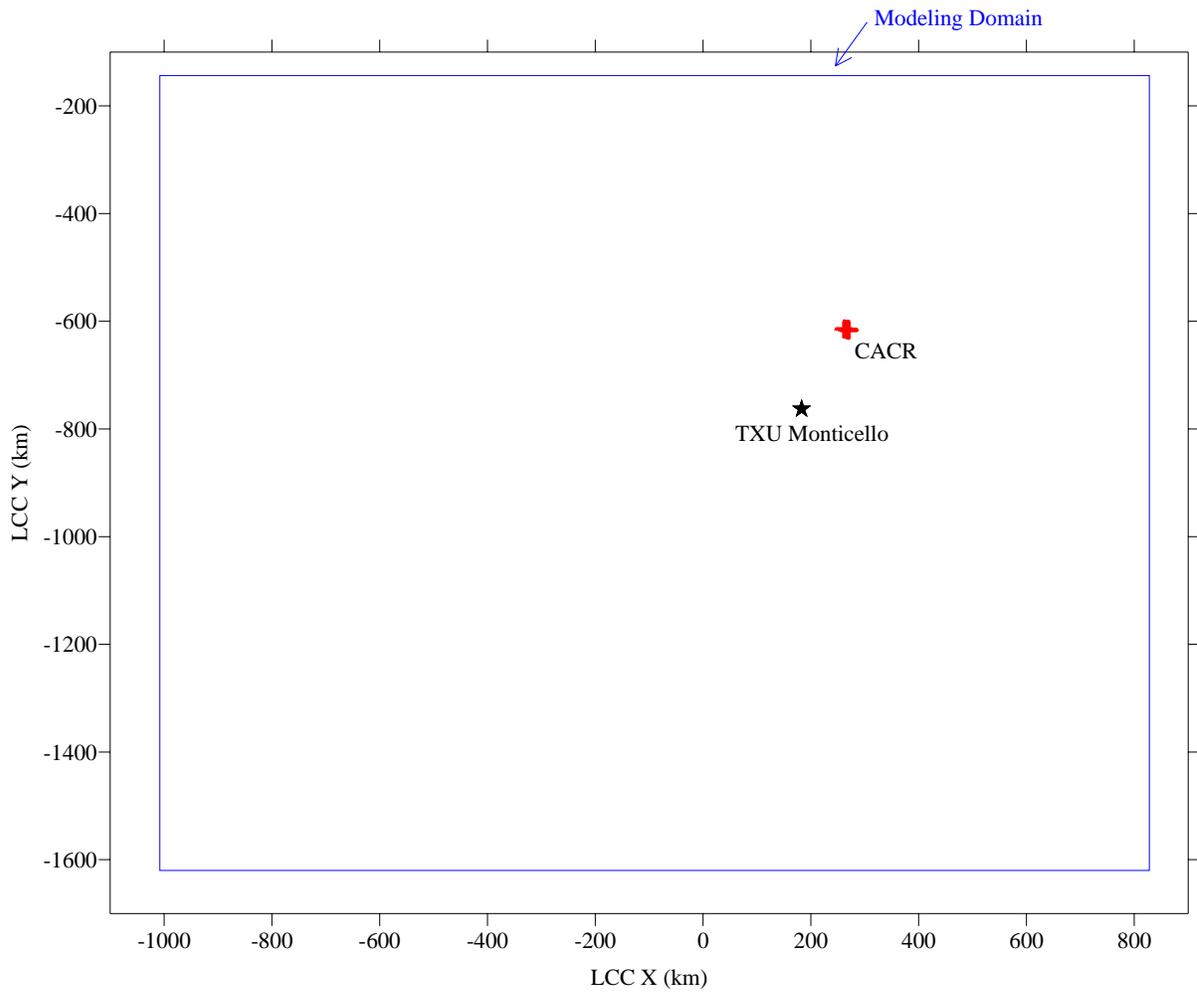
Processor	Description	Version	Level
CALMET	Meteorological data processor used by CENRAP	5.53a	040716
CALPUFF	Plume dispersion model	5.711a	040716
CALPOST	Post-processing utility for visibility impact	5.51	030709

2.2 MODELING DOMAIN

The proposed modeling domain for TXU's BART modeling analysis is the same as the domain used in the CENRAP meteorological data. The map projection for the modeling domain is in Lambert Conformal Conic (LCC) and the datum will be World Geodetic System 84 (WGS-84). The reference point for the modeling domain is Latitude 40°N, Longitude 97°W (LCC point 0, 0). The meteorological grid spacing will be 6 km, resulting in 306 grid points in the X direction and 246 grid points in the Y direction.

A plot of the proposed modeling domain with respect to the Class I area being modeled is provided in Figure 2-1. Note that the modeling domain extends at least 50 km in all directions beyond the TXU Monticello Facility and the Class I area of interest.

FIGURE 2-1. CENRAP CALPUFF MODELING DOMAIN



3. CALMET

The CENRAP CALMET meteorological data will be used for the Screening CALPUFF BART modeling analysis. The CENRAP data takes into account geophysical data, including terrain and land use, and Mesoscale Model Meteorological data. CENRAP developed three 6-km CALMET meteorological datasets for three years (2001-2003) to span across all potential BART eligible sources within the southern CENRAP states. USGS 90-meter Digital Elevation Model (DEM) files were used by CENRAP to generate the terrain data at 6-km resolution for input to the southern sub-regional CALMET run. Likewise, USGS 90-meter Composite Theme Grid (CTG) files were used by CENRAP to generate the land use data at 6-km resolution for input to the CALMET run.

It is intended that all of the screening modeling for TXU's Monticello Facility will use the 6-km CENRAP CALMET data. However, if refined CALPUFF modeling is necessary, the meteorological data sets will be updated. The potential refinements to the meteorological data set may include the use of surface/upper air/precipitation observations in conjunction with the MM5 data, a finer grid resolution, and other relevant settings.

4. CALPUFF

The CALPUFF model uses the meteorological data from CALMET together with the emission source, receptor, and chemical reaction information to predict hourly concentrations of modeled species. Trinity will conduct a three-year CALPUFF analysis using data and model settings as described below.

4.1 EMISSION SOURCE DATA

Based on the TCEQ preliminary modeling analysis using CAMx, the Monticello Steam Electric Station is not screened out due to its particulate matter (PM) emissions from the BART eligible sources. As such, it is required that the Monticello facility demonstrate the exemption status through further dispersion modeling or propose proper BART control through an engineering analysis.

The TXU Monticello Steam Electric Station is subject to the U.S. EPA Clean Air Interstate Rule (CAIR) which provides a Federal framework requiring states to reduce emissions of SO₂ and NO_x. TXU is required to evaluate its SO₂ and NO_x emissions in terms of CAIR. As such, per discussions with TCEQ, the BART eligibility modeling for TXU is only required for PM emissions.

Emissions of PM from the all BART-eligible emission sources at TXU's Monticello Facility will be included in the BART screening analysis. Per TCEQ Guidance all PM emissions from the TXU BART eligible sources will be modeled using the worst-case assumption that all particulate matter is PM_{2.5}. The maximum 24-hour average PM emission rate with normal operations from the highest emitting day of each year from the coal-fired boilers for the years 2002 through 2005 will be used in the BART determination screening modeling. The maximum 24-hour average emission will be calculated using stack test emission rates during normal operations multiplied by the maximum 24-hour heat input for each unit for the modeling period. Emissions from all other BART eligible sources (fugitives and sources with less than one pound per hour emission rate) will be based on the TCEQ CAMx screening modeling. This approach should provide conservative estimates of the emissions.

4.2 RECEPTOR LOCATIONS

The National Park Service (NPS) has electronic files available on their website that include the discrete locations and elevations of receptors to be evaluated for the Caney Creek Class I area. This receptor information will be incorporated into the CALPUFF model.

4.3 CALPUFF MODEL CONTROL PARAMETERS

Appendix A provides a sample CALPUFF input file that will be used in TXU's modeling analysis.

Hourly concentration outputs from CALPUFF will be processed through CALPOST to determine visibility conditions. A three-year CALPOST analysis will be conducted to determine the visibility change in deciview (dv) caused by TXU's BART-eligible sources when compared to a natural background.

5.1 LIGHT EXTINCTION ALGORITHM

The EPA currently approved algorithm will be used for reconstructing light extinction. The light extinction equation is provided below.

$$b_{\text{ext}} = 3 * f(\text{RH}) * [(\text{NH}_4)_2\text{SO}_4] + 3 * f(\text{RH}) * [\text{NH}_4\text{NO}_3] + 4 * [\text{OC}] + 1 * [\text{PM}_{10}] + 0.6 * [\text{PM}_{2.5}] + 10 * [\text{EC}] + b_{\text{Ray}}$$

The algorithm will be used to calculate the daily light extinction attributable to PM emissions from TXU's BART-eligible sources and light extinction attributable to a natural background. As noted above, all PM will be modeled as fine particulates per TCEQ Guidance. The change in deciviews based on the source and background light extinction will be evaluated using the equation below.

$$\Delta \text{dv} = 10 * \ln \left[\frac{b_{\text{ext, background}} + b_{\text{ext, source}}}{b_{\text{ext, background}}} \right]$$

5.2 CALPOST PROCESSING METHOD

The CALPOST Method 6 option, which calculates hourly light extinction impacts for the source and background using monthly average relative humidity adjustment factors, will be used in the Screening CALPUFF analysis. Monthly Class I area-specific relative humidity adjustment factors based on the centroid of the Class I areas as included in Table A-3 of EPA's *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program* will be employed. Each hour's source-caused extinction is calculated by first using the hygroscopic components of the source-caused concentrations, due to ammonium sulfate and nitrate, and monthly Class I area-specific relative humidity values. The contribution to the total source-caused extinction from ammonium sulfate and nitrate is then added to the other, non-hygroscopic components of the particulate concentration (from coarse and fine soil, secondary organic aerosols, and from elemental carbon) to yield the total hourly source-caused extinction.² The relative humidity factors for the Class I areas listed to be evaluated in the analysis are provided in Table 5-1.

² Since only PM emissions are required for the TXU BART eligibility modeling, only the non-hygroscopic portions of the equation will impact the model predicted extinction change.

TABLE 5-1. MONTHLY HUMIDITY FACTORS

Class I Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Caney Creek	3.4	3.1	2.9	3.0	3.6	3.6	3.4	3.4	3.6	3.5	3.4	3.5

5.3 NATURAL BACKGROUND

The EPA default average annual aerosol concentrations for the U.S. that are included in Table 2-1 of EPA's *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Program* will be used in CALPOST. These values are also listed in the TCEQ BART Modeling Protocol Table 5. The annual average concentrations are provided in Table 5-2.

TABLE 5-2. DEFAULT AVERAGE ANNUAL NATURAL BACKGROUND LEVELS

Class I Area	Region	SO₄	NO₃	OC	EC	Soil	Coarse Mass
Caney Creek	EAST	0.23	0.10	1.40	0.02	0.50	3.00

5.4 EVALUATING BART-EXEMPTION

The highest deciview value output by CALPOST from 2001 through 2003 will be compared to the contribution threshold of 0.5 Δ dv. If the highest daily Δ dv value output by CALPOST for each year (2001-2003) is less 0.5 Δ dv, it will be concluded that the sources are exempt from BART and that no further analysis is necessary. If the highest daily Δ dv value output by CALPOST for any 1-year is greater than 0.5 Δ dv, it will be concluded that further analysis is necessary.

5.5 SUMMARY OF CALPOST CONTROL PARAMETERS

Appendix B provides a sample CALPOST input file that Trinity proposes to use in TXU's modeling analysis.

SAMPLE CALPUFF CONTROL FILE

TXU BART Screening Analysis
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 =01PFC1V.LST	!
CONC.DAT	output	! CONDAT =01PFC1V.DAT	!
DFLX.DAT	output	* DFDAT =	*
WFLX.DAT	output	* WFDAT =	*
VISB.DAT	output	! VISDAT =01PFC1V.VIS	!
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 =ozone_2001.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 = F !
 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
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0101-0110.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0111-0120.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0121-0131.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0201-0210.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0211-0220.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0221-0228.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0301-0310.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0311-0320.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0321-0331.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0401-0410.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0411-0420.SOUTH.DAT ! !END!
none	input	! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001 \CMET.2001.0421-0430.SOUTH.DAT ! !END!

```

none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0501-0510.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0511-0520.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0521-0531.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0601-0610.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0611-0620.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0621-0630.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0701-0710.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0711-0720.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0721-0731.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0801-0810.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0811-0820.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0821-0831.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0901-0910.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0911-0920.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.0921-0930.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1001-1010.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1011-1020.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1021-1031.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1101-1110.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1111-1120.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1121-1130.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1201-1210.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1211-1220.SOUTH.DAT      ! !END!
none      input      ! METDAT=Z:\CENRAP\CALMET.6KM.SOUTH\2001
\CMET.2001.1221-1231.SOUTH.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 ! IDBY = 1 !
Hour (IBHR) -- No default ! IBHR = 0 !

Base time zone (XBTZ) -- No default ! XBTZ = 0.0 !
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 = 6 !

Number of chemical species
to be emitted (NSE) Default: 3 ! NSE = 1 !

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)

Method used to simulate building
downwash? (MBDW) Default: 1 ! MBDW = 1
!
 1 = ISC method
 2 = PRIME method

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, using formatted BCON.DAT file

2 = yes, using unformatted CONC.DAT file

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 =          PM10 !         !END!
```

OUTPUT GROUP SPECIES NUMBER NAME (0=NONE, (Limit: 12 1=1st CGRUP, Characters 2=2nd CGRUP, in length) 3= etc.)	MODELED (0=NO, 1=YES)	EMITTED (0=NO, 1=YES)	Dry DEPOSITED (0=NO, 1=COMPUTED-GAS 2=COMPUTED-PARTICLE 3=USER-SPECIFIED)
! SO2 =	1,	0,	1,
0 !			
! SO4 =	1,	0,	2,
0 !			
! NOX =	1,	0,	1,
0 !			
! HNO3 =	1,	0,	1,
0 !			
! NO3 =	1,	0,	2,
0 !			
! PM10 =	1,	1,	2,
0 !			

!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.

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-G). 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-G WGS-84 GRS 80 Spheroid, Global coverage (WGS84)
NAS-C NORTH AMERICAN 1927 Clarke 1866 Spheroid, MEAN FOR CONUS
(NAD27)
NWS-27 NWS 6370KM Radius, Sphere
NWS-84 NWS 6370KM Radius, Sphere
ESR-S ESRI REFERENCE 6371KM Radius, Sphere

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

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 = 306 !
No. Y grid cells (NY) No default ! NY = 246 !
No. vertical layers (NZ) No default ! NZ = 10 !

Grid spacing (DGRIDKM) No default ! DGRIDKM = 6. !
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 = -1008.
! Y coordinate (YORIGKM) No default ! YORIGKM = -1620.
! 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)
306 ! X index of UR corner (IECOMP) No default ! IECOMP =
(1 <= IECOMP <= NX)
246 ! Y index of UR corner (JECOMP) No default ! JECOMP =
(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/MESH DN.

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


```

!      (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 = 1

```

```

!      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

```

----- WET FLUXES -----   ----- DRY FLUXES -----
----- MASS FLUX -----
SPECIES

```

/GROUP	PRINTED?	SAVED ON DISK?	PRINTED?	SAVED ON DISK?
PRINTED?	SAVED ON DISK?	SAVED ON DISK?	PRINTED?	SAVED ON DISK?
!	SO2 =	0,	1,	0,
0,	0,	0 !	0,	0,
!	SO4 =	0,	1,	0,
0,	0,	0 !	0,	0,
!	NOX =	0,	1,	0,
0,	0,	0 !	0,	0,
!	HNO3 =	0,	1,	0,
0,	0,	0 !	0,	0,
!	NO3 =	0,	1,	0,
0,	0,	0 !	0,	0,
!	PM10 =	0,	1,	0,
0,	0,	0 !	0,	0,

OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

= F !	Logical for debug output (LDEBUG)	Default: F	! LDEBUG
= 1 !	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 =
10 !	Met. period to end output (NN2)	Default: 10	! NN2 =
!END!			

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

Subgroup (6a)

0 !	Number of terrain features (NHILL)	Default: 0	! NHILL =
= 0 !	Number of special complex terrain receptors (NCTREC)	Default: 0	! NCTREC
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 EXPO 2 NO. (m)	XC SCALE 1 (km)	YC SCALE 2 (km)	THETAH AMAX1 (deg.) (m)	ZGRID AMAX2 (m)	RELIEF (m)	EXPO 1 (m)
----	----	----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----

Subgroup (6c)

COMPLEX TERRAIN RECEPTOR INFORMATION

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

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	DIFFUSIVITY	ALPHA STAR	REACTIVITY
MESOPHYLL RESISTANCE	HENRY'S LAW	COEFFICIENT	
NAME	(cm**2/s)		
(s/cm)	(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. !
! PM10 =	0.48,	2. !

!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 !
! PM10 =	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 = 40.00, 40.00, 40.00, 40.00, 40.00, 40.00, 40.00, 40.00,
40.00, 40.00, 40.00, 40.00 !

Monthly ammonia concentrations
(Used only if MCHEM = 1, or 3)
(BCKNH3) in ppb Default: 12*10.
! BCKNH3 = 3.00, 3.00, 3.00, 3.00, 3.00, 3.00, 3.00, 3.00, 3.00,
3.00, 3.00, 3.00 !

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 MAQCHEM = 1 and
 MH2O2 = 0 or MH2O2 = 1 and all hourly H2O2 data missing)
(BCKH2O2) in ppb Default: 12*1.
! BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00,
1.00, 1.00, 1.00 !

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

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 turbulence 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)
(MXLEN) Default: 1.0 ! MXLEN
= 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

Minimum mixing height (m)
(XMINZI) Default: 50. ! XMINZI
= 20.0 !

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
(PLX0(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				
---	---	---	---	---	---

! PLX0 = 0.07, 0.07, 0.10, 0.15,
0.35, 0.55 !

Default potential temperature gradient
for stable classes E, F (degK/m)
(PTG0(2)) Default: 0.020, 0.035
! PTG0 = 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
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 = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0 !

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
(SHSPILITH)                             Default:  2.          !
SHSPILITH = 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 !

Boundary Condition (BC) Puff control variables

Minimum height (m) to which BC puffs are mixed as they are
emitted
(MBCON=2 ONLY). Actual height is reset to the current mixing
height
at the release point if greater than this minimum.
(HTMINBC) Default: 500. ! HTMINBC
= 500.0 !

Search radius (in BC segment lengths) about a receptor for
sampling
nearest BC puff. BC puffs are emitted with a spacing of one
segment
length, so the search radius should be greater than 1.
(RSAMPBC) Default: 4. ! RSAMPBC
= 10.0 !

Near-Surface depletion adjustment to concentration profile used
when
sampling BC puffs?
(MDEPBC) Default: 1 ! MDEPBC
= 1 !
0 = Concentration is NOT adjusted for depletion
1 = Adjust Concentration for depletion

!END!

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

Subgroup (13a)

Number of point sources with
parameters provided below (NPT1) No default ! NPT1 = 4 !

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	X	Y	Stack	Base	Stack	Exit	Exit
Bldg.	Emission	Coordinate	Coordinate	Height	Elevation	Diameter	Vel.	Temp.
No.	Rates	(km)	(km)	(m)	(m)	(m)	(m/s)	(deg.
Dwash								K)
1	! SRCNAM = 18TD7000 ! S1							
1	! X =	182.78,	-763.182,	121.92,	114,	6.55,	24.69,	453.13,
0,		0,0,0,0,0,	447.359!					
	1 ! FMFAC = 1 !							
	1 ! END !							
2	! SRCNAM = 18TD7001 ! S2							
2	! X =	182.728,	-763.121,	121.92,	115,	6.55,	24.69,	453.13,
0,		0,0,0,0,0,	441.597!					
	2 ! FMFAC = 1 !							
	2 ! END !							
3	! SRCNAM = 18TD7002 ! S3							
3	! X =	182.725,	-762.997,	140.208,	115,	7.77,	26.52,	438.13,
0,		0,0,0,0,0,	279.479!					
	3 ! FMFAC = 1 !							
	3 ! END !							
4	! SRCNAM = 18TD7003 ! L12SRW							
4	! X =	182.827,	-762.903,	3.048,	116,	0.001,	0.0001,	295.37,
0,		0,0,0,0,0,	10.572!					
	4 ! FMFAC = 1 !							
	4 ! END !							

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 height, width, length and X/Y offset (in meters)

every 10 degrees. LENGTH, XBADJ, and YBADJ are only needed for

MBDW=2 (PRIME downwash option)

a

Building height, width, length, and X/Y offset from the source are treated

as a separate input subgroup for each source and therefore must end with

an input group terminator. The X/Y offset is the position, relative to the

stack, of the center of the upwind face of the projected building, with the

x-axis pointing along the flow direction.

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

Source No.	Effect. Height (m)	Base Elevation (m)	Initial Sigma z (m)	Emission Rates
-----	-----	-----	-----	-----

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 (km) FOR EACH VERTEX(4) OF EACH POLYGON

Source 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
= 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 (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 transitional rise is computed Default: 6 !
 NLRISE = 6 !

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

a
 Source Emission Beg. X Beg. Y End. X End. Y Release Base

No. Elevation	Coordinate Rates (km)	Coordinate (km)	Coordinate (km)	Coordinate (km)	Height (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 ILNTU (e.g. 1 for g/s).

Subgroup (15c)

a

BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA

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,
- 4 = Speed & Stab. (6 groups of 6 scaling factors, where first group is DEC-JAN-FEB) 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 = 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 (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

Emission Rates	X Coordinate (km)	Y Coordinate (km)	Effect. Height (m)	Base Elevation (m)	Initial Sigma y (m)	Initial Sigma z (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 = 80
!
!END!

Subgroup (17b)

a
NON-GRIDDED (DISCRETE) RECEPTOR DATA

Receptor No.	X Coordinate (km)	Y Coordinate (km)	Ground Elevation (m)	Height Above Ground (m)	b
36899000	! X = 269.691,	-618.618,	365,	0	! !END! CACR
36899001	! X = 270.454,	-618.593,	365,	0	! !END! CACR
36899002	! X = 271.217,	-618.568,	368,	0	! !END! CACR
36899003	! X = 268.136,	-617.743,	411,	0	! !END! CACR
36899004	! X = 268.899,	-617.719,	462,	0	! !END! CACR
36899005	! X = 269.661,	-617.694,	431,	0	! !END! CACR
36899006	! X = 270.424,	-617.669,	518,	0	! !END! CACR
36899007	! X = 271.186,	-617.644,	487,	0	! !END! CACR
36899008	! X = 271.949,	-617.619,	396,	0	! !END! CACR
36899009	! X = 265.056,	-616.917,	518,	0	! !END! CACR
3689900A	! X = 265.819,	-616.893,	523,	0	! !END! CACR
3689900B	! X = 266.581,	-616.868,	548,	0	! !END! CACR
3689900C	! X = 267.344,	-616.844,	579,	0	! !END! CACR
3689900D	! X = 268.106,	-616.819,	547,	0	! !END! CACR
3689900E	! X = 268.869,	-616.795,	538,	0	! !END! CACR
3689900F	! X = 269.631,	-616.77,	640,	0	! !END! CACR
3689900G	! X = 270.394,	-616.745,	608,	0	! !END! CACR
3689900H	! X = 259.69,	-616.162,	335,	0	! !END! CACR
3689900I	! X = 260.453,	-616.138,	431,	0	! !END! CACR
3689900J	! X = 261.215,	-616.114,	457,	0	! !END! CACR
3689900K	! X = 261.977,	-616.09,	414,	0	! !END! CACR
3689900L	! X = 262.74,	-616.066,	426,	0	! !END! CACR
3689900M	! X = 263.502,	-616.042,	426,	0	! !END! CACR
3689900N	! X = 264.265,	-616.017,	388,	0	! !END! CACR
3689900O	! X = 265.027,	-615.993,	388,	0	! !END! CACR
3689900P	! X = 265.789,	-615.969,	365,	0	! !END! CACR
3689900Q	! X = 266.552,	-615.944,	386,	0	! !END! CACR
3689900R	! X = 267.314,	-615.92,	396,	0	! !END! CACR
3689900S	! X = 268.077,	-615.895,	426,	0	! !END! CACR
3689900T	! X = 268.839,	-615.871,	446,	0	! !END! CACR
3689900U	! X = 269.601,	-615.846,	441,	0	! !END! CACR
3689900V	! X = 270.364,	-615.821,	457,	0	! !END! CACR
3689900W	! X = 271.126,	-615.796,	465,	0	! !END! CACR
3689900X	! X = 271.889,	-615.772,	442,	0	! !END! CACR
3689900Y	! X = 272.651,	-615.747,	426,	0	! !END! CACR
3689900Z	! X = 259.661,	-615.238,	304,	0	! !END! CACR
36899010	! X = 260.424,	-615.214,	304,	0	! !END! CACR
36899011	! X = 261.186,	-615.19,	319,	0	! !END! CACR
36899012	! X = 261.948,	-615.166,	334,	0	! !END! CACR
36899013	! X = 262.711,	-615.142,	370,	0	! !END! CACR
36899014	! X = 263.473,	-615.118,	405,	0	! !END! CACR
36899015	! X = 264.235,	-615.093,	409,	0	! !END! CACR
36899016	! X = 264.998,	-615.069,	450,	0	! !END! CACR
36899017	! X = 265.76,	-615.045,	518,	0	! !END! CACR
36899018	! X = 266.522,	-615.02,	609,	0	! !END! CACR
36899019	! X = 267.285,	-614.996,	534,	0	! !END! CACR
3689901A	! X = 268.047,	-614.971,	517,	0	! !END! CACR
3689901B	! X = 268.809,	-614.947,	575,	0	! !END! CACR
3689901C	! X = 269.571,	-614.922,	600,	0	! !END! CACR
3689901D	! X = 270.334,	-614.897,	609,	0	! !END! CACR
3689901E	! X = 271.096,	-614.873,	609,	0	! !END! CACR

3689901F	!	X =	271.858,	-614.848,	561,	0	!	!	END!	CACR
3689901G	!	X =	260.395,	-614.29,	335,	0	!	!	END!	CACR
3689901H	!	X =	261.157,	-614.266,	432,	0	!	!	END!	CACR
3689901I	!	X =	261.919,	-614.242,	487,	0	!	!	END!	CACR
3689901J	!	X =	262.681,	-614.218,	499,	0	!	!	END!	CACR
3689901K	!	X =	263.444,	-614.194,	514,	0	!	!	END!	CACR
3689901L	!	X =	264.206,	-614.169,	442,	0	!	!	END!	CACR
3689901M	!	X =	264.968,	-614.145,	439,	0	!	!	END!	CACR
3689901N	!	X =	265.73,	-614.121,	395,	0	!	!	END!	CACR
3689901O	!	X =	266.493,	-614.097,	400,	0	!	!	END!	CACR
3689901P	!	X =	267.255,	-614.072,	426,	0	!	!	END!	CACR
3689901Q	!	X =	268.017,	-614.047,	487,	0	!	!	END!	CACR
3689901R	!	X =	268.779,	-614.023,	548,	0	!	!	END!	CACR
3689901S	!	X =	269.541,	-613.998,	548,	0	!	!	END!	CACR
3689901T	!	X =	270.304,	-613.973,	548,	0	!	!	END!	CACR
3689901U	!	X =	271.066,	-613.949,	535,	0	!	!	END!	CACR
3689901V	!	X =	261.128,	-613.342,	304,	0	!	!	END!	CACR
3689901W	!	X =	261.89,	-613.318,	334,	0	!	!	END!	CACR
3689901X	!	X =	262.652,	-613.294,	396,	0	!	!	END!	CACR
3689901Y	!	X =	263.414,	-613.27,	457,	0	!	!	END!	CACR
3689901Z	!	X =	264.176,	-613.246,	457,	0	!	!	END!	CACR
36899020	!	X =	264.939,	-613.221,	426,	0	!	!	END!	CACR
36899021	!	X =	265.701,	-613.197,	411,	0	!	!	END!	CACR
36899022	!	X =	266.463,	-613.173,	406,	0	!	!	END!	CACR
36899023	!	X =	267.225,	-613.148,	396,	0	!	!	END!	CACR
36899024	!	X =	267.987,	-613.124,	401,	0	!	!	END!	CACR
36899025	!	X =	268.749,	-613.099,	397,	0	!	!	END!	CACR
36899026	!	X =	261.099,	-612.418,	322,	0	!	!	END!	CACR
36899027	!	X =	261.861,	-612.394,	334,	0	!	!	END!	CACR

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.

SAMPLE CALPOST CONTROL FILE

TXU BART Analysis - Caney Creek CALPOST
2001

----- Run title (3 lines)

CALPOST MODEL CONTROL FILE

INPUT GROUP: 0 -- Input and Output File Names

Input Files

File	Default File Name	
Conc/Dep Flux File	MODEL.DAT	! MODDAT =01PFC1V.DAT !
Relative Humidity File	VISB.DAT	! VISDAT =01PFC1V.VIS !
Background Data File	BACK.DAT	*BACKDAT = *
Transmissometer/ Nephelometer Data File	VSRN.DAT	*VSRDAT = *

Output Files

File	Default File Name	
List File	CALPOST.LST	! PSTLST =CACR.vis.01.lst !

Pathname for Timeseries Files (blank) * TSPATH = *
(activate with exclamation points only if
providing NON-BLANK character string)

Pathname for Plot Files (blank) * PLPATH = *
(activate with exclamation points only if
providing NON-BLANK character string)

User Character String (U) to augment default filenames
(activate with exclamation points only if
providing NON-BLANK character string)

Timeseries TSttUUUU.DAT * TSUNAM = *

Top Nth Rank Plot RttUUUUU.DAT * TUNAM = *
or RttiiUUU.GRD

Exceedance Plot XttUUUUU.DAT * XUNAM = *
or XttUUUUU.GRD

Echo Plot jjjtthhU.DAT * EUNAM = *
(Specific Days) or jjjtthhU.GRD

Visibility Plot V24UUUUU.DAT * VUNAM = *
(Daily Peak Summary)

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
NOTE: (2) Filenames for ALL PLOT and TIMESERIES FILES are constructed
using a template that includes a pathname, user-supplied
character(s), and fixed strings (tt,ii,jjj, and hh), where
tt = Averaging Period (e.g. 03)
ii = Rank (e.g. 02)
jjj= Julian Day
hh = Hour(ending)
are determined internally based on selections made below.
If a path or user-supplied character(s) are supplied, each
must contain at least 1 non-blank character.

!END!

INPUT GROUP: 1 -- General run control parameters

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

METRUN = 0 - Run period explicitly defined below
METRUN = 1 - Run all periods in CALPUFF data file(s)

Starting date: Year (ISYR) -- No default ! ISYR = 2001
!
(used only if Month (ISMO) -- No default ! ISMO = 1 !
METRUN = 0) Day (ISDY) -- No default ! ISDY = 1 !
Hour (ISHR) -- No default ! ISHR = 0 !

Number of hours to process (NHRS) -- No default ! NHRS = 8760
!

Process every hour of data?(NREP) -- Default: 1 ! NREP = 1 !
(1 = every hour processed,
2 = every 2nd hour processed,
5 = every 5th hour processed, etc.)

Species & Concentration/Deposition Information

Species to process (ASPEC) -- No default ! ASPEC = VISIB
!
(ASPEC = VISIB for visibility processing)

Layer/deposition code (ILAYER) -- Default: 1 ! ILAYER = 1 !
'1' for CALPUFF concentrations,
'-1' for dry deposition fluxes,
'-2' for wet deposition fluxes,
'-3' for wet+dry deposition fluxes.

Scaling factors of the form: -- Defaults: ! A = 0.0 !
X(new) = X(old) * A + B A = 0.0 ! B = 0.0 !
(NOT applied if A = B = 0.0) B = 0.0

```

Add Hourly Background Concentrations/Fluxes?
(LBACK) -- Default: F ! LBACK = F !

Receptor information
-----

Gridded receptors processed? (LG) -- Default: F ! LG = F !
Discrete receptors processed? (LD) -- Default: F ! LD = T !
CTSG Complex terrain receptors processed?
(LCT) -- Default: F ! LCT = F !

--Report results by DISCRETE receptor RING?
(only used when LD = T) (LDRING) -- Default: F ! LDRING = F !

--Select range of DISCRETE receptors (only used when LD = T):

Select ALL DISCRETE receptors by setting NDRECP flag to -1;
OR
Select SPECIFIC DISCRETE receptors by entering a flag (0,1) for each
0 = discrete receptor not processed
1 = discrete receptor processed
using repeated value notation to select blocks of receptors:
416*0, 1048*1, 1482*0
Flag for all receptors after the last one assigned is set to 0
(NDRECP) -- Default: -1
! NDRECP = 80*1!

--Select range of GRIDDED receptors (only used when LG = T):

X index of LL corner (IBGRID) -- Default: -1 ! IBGRID = -1 !
(-1 OR 1 <= IBGRID <= NX)

Y index of LL corner (JBGRID) -- Default: -1 ! JBGRID = -1 !
(-1 OR 1 <= JBGRID <= NY)

X index of UR corner (IEGRID) -- Default: -1 ! IEGRID = -1 !
(-1 OR 1 <= IEGRID <= NX)

Y index of UR corner (JEGRID) -- Default: -1 ! JEGRID = -1 !
(-1 OR 1 <= JEGRID <= NY)

Note: Entire grid is processed if IBGRID=JBGRID=IEGRID=JEGRID=-1

--Specific gridded receptors can also be excluded from CALPOST
processing by filling a processing grid array with 0s and 1s. If the
processing flag for receptor index (i,j) is 1 (ON), that receptor
will be processed if it lies within the range delineated by IBGRID,
JBGRID,IEGRID,JEGRID and if LG=T. If it is 0 (OFF), it will not be
processed in the run. By default, all array values are set to 1 (ON).

Number of gridded receptor rows provided in Subgroup (1a) to
identify specific gridded receptors to process
(NGONOFF) -- Default: 0 ! NGONOFF = 0
!

!END!

```

Subgroup (1a) -- Specific gridded receptors included/excluded

Specific gridded receptors are excluded from CALPOST processing by filling a processing grid array with 0s and 1s. A total of NGONOFF lines are read here. Each line corresponds to one 'row' in the sampling grid, starting with the NORTHERNMOST row that contains receptors that you wish to exclude, and finishing with row 1 to the SOUTH (no intervening rows may be skipped). Within a row, each receptor position is assigned either a 0 or 1, starting with the westernmost receptor.

0 = gridded receptor not processed
1 = gridded receptor processed

Repeated value notation may be used to select blocks of receptors:
23*1, 15*0, 12*1

Because all values are initially set to 1, any receptors north of the first row entered, or east of the last value provided in a row, remain ON.

(NGXRECP) -- Default: 1

INPUT GROUP: 2 -- Visibility Parameters (ASPEC = VISIB)

Maximum relative humidity (%) used in particle growth curve
(RHMAX) -- Default: 98 ! RHMAX = 95.0

!

Modeled species to be included in computing the light extinction

Include SULFATE? (LVSO4) -- Default: T ! LVSO4 = F !
Include NITRATE? (LVNO3) -- Default: T ! LVNO3 = F !
Include ORGANIC CARBON? (LVOC) -- Default: T ! LVOC = F !
Include COARSE PARTICLES? (LVPMC) -- Default: T ! LVPMC = F !
Include FINE PARTICLES? (LVPMF) -- Default: T ! LVPMF = T !
Include ELEMENTAL CARBON? (LVEC) -- Default: T ! LVEC = F !

And, when ranking for TOP-N, TOP-50, and Exceedance tables,

Include BACKGROUND? (LVBK) -- Default: T ! LVBK = T !

Species name used for particulates in MODEL.DAT file

COARSE (SPECPMC) -- Default: PMC ! SPECPMC = PMC !
FINE (SPECPMF) -- Default: PMF ! SPECPMF = PM10

!

Extinction Efficiency (1/Mm per ug/m**3)

MODELED particulate species:

PM COARSE (EETPMC) -- Default: 0.6 ! EETPMC = 0.6 !
PM FINE (EETPMF) -- Default: 1.0 ! EETPMF = 1.0 !

BACKGROUND particulate species:

PM COARSE (EETMCBK) -- Default: 0.6 ! EETMCBK = 0.6 !

Other species:

```

AMMONIUM SULFATE (EESO4) -- Default: 3.0 ! EESO4 = 3.0 !
AMMONIUM NITRATE (EENO3) -- Default: 3.0 ! EENO3 = 3.0 !
ORGANIC CARBON (EEOC) -- Default: 4.0 ! EEOC = 4.0 !
SOIL (EESOIL)-- Default: 1.0 ! EESOIL = 1.0 !
ELEMENTAL CARBON (EEEC) -- Default: 10. ! EEEC = 10.0 !

```

Background Extinction Computation

Method used for background light extinction

(MVISBK) -- Default: 2 ! MVISBK = 6 !

- 1 = Supply single light extinction and hygroscopic fraction
 - IWAQM (1993) RH adjustment applied to hygroscopic background
 - and modeled sulfate and nitrate
- 2 = Compute extinction from speciated PM measurements (A)
 - Hourly RH adjustment applied to observed and modeled sulfate and nitrate
 - RH factor is capped at RHMAX
- 3 = Compute extinction from speciated PM measurements (B)
 - Hourly RH adjustment applied to observed and modeled sulfate and nitrate
 - Receptor-hour excluded if RH>RHMAX
 - Receptor-day excluded if fewer than 6 valid receptor-hours
- 4 = Read hourly transmissometer background extinction measurements
 - Hourly RH adjustment applied to modeled sulfate and nitrate
 - Hour excluded if measurement invalid (missing, interference, or large RH)
 - Receptor-hour excluded if RH>RHMAX
 - Receptor-day excluded if fewer than 6 valid receptor-hours
- 5 = Read hourly nephelometer background extinction measurements
 - Rayleigh extinction value (BEXTRAY) added to measurement
 - Hourly RH adjustment applied to modeled sulfate and nitrate
 - Hour excluded if measurement invalid (missing, interference, or large RH)
 - Receptor-hour excluded if RH>RHMAX
 - Receptor-day excluded if fewer than 6 valid receptor-hours
- 6 = Compute extinction from speciated PM measurements
 - FLAG RH adjustment factor applied to observed and modeled sulfate and nitrate

Additional inputs used for MVISBK = 1:

```

Background light extinction (1/Mm)
(BEXTBK) -- No default ! BEXTBK = 12.0 !
Percentage of particles affected by relative humidity
(RHFRAC) -- No default ! RHFRAC = 10.0 !

```

Additional inputs used for MVISBK = 6:

Extinction coefficients for hygroscopic species (modeled and background) are computed using a monthly RH adjustment factor in place of an hourly RH factor (VISB.DAT file is NOT needed). Enter the 12 monthly factors here (RHFAC). Month 1 is January.

(RHFAC) -- No default ! RHFAC = 3.4, 3.1, 2.9, 3.0, 3.6, 3.6, 3.4, 3.4, 3.6, 3.5, 3.4, 3.5!

Additional inputs used for MVISBK = 2,3,6:

Background extinction coefficients are computed from monthly CONCENTRATIONS of ammonium sulfate (BKSO4), ammonium nitrate (BKNO3), coarse particulates (BKPMC), organic carbon (BKOC), soil (BKSOIL), and elemental carbon (BKEC). Month 1 is January. (ug/m**3)

(BKSO4) -- No default ! BKSO4 = 0.23, 0.23, 0.23, 0.23, 0.23, 0.23, 0.23, 0.23, 0.23, 0.23, 0.23, 0.23 !
(BKNO3) -- No default ! BKNO3 = 0.10, 0.10, 0.10, 0.10, 0.10, 0.10, 0.10, 0.10, 0.10, 0.10, 0.10, 0.10 !
(BKPMC) -- No default ! BKPMC = 3.0, 3.0, 3.0, 3.0, 3.0, 3.0, 3.0, 3.0, 3.0, 3.0, 3.0, 3.0 !
(BKOC) -- No default ! BKOC = 1.4, 1.4, 1.4, 1.4, 1.4, 1.4, 1.4, 1.4, 1.4, 1.4, 1.4, 1.4 !
(BKSOIL) -- No default ! BKSOIL= 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50, 0.50 !
(BKEC) -- No default ! BKEC = 0.02, 0.02, 0.02, 0.02, 0.02, 0.02, 0.02, 0.02, 0.02, 0.02, 0.02, 0.02 !

Additional inputs used for MVISBK = 2,3,5,6:

Extinction due to Rayleigh scattering is added (1/Mm)
(BEXTRAY) -- Default: 10.0 ! BEXTRAY = 10.0!

!END!

INPUT GROUP: 3 -- Output options

Documentation

Documentation records contained in the header of the CALPUFF output file may be written to the list file. Print documentation image?

(LDOC) -- Default: F ! LDOC = F !

Output Units

```
Units for All 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
```

Visibility: extinction expressed in 1/Mega-meters (IPRTU is ignored)

Averaging time(s) reported

```
1-hr averages      (L1HR) -- Default: T    !    L1HR = F    !
3-hr averages      (L3HR) -- Default: T    !    L3HR = F    !
24-hr averages     (L24HR) -- Default: T    !    L24HR = T    !
Run-length averages (LRUNL) -- Default: T    !    LRUNL = F    !

User-specified averaging time in hours - results for
an averaging time of NAVG hours are reported for
NAVG greater than 0:
                    (NAVG) -- Default: 0    !    NAVG = 0    !
```

Types of tabulations reported

- 1) Visibility: daily visibility tabulations are always reported for the selected receptors when ASPEC = VISIB. In addition, any of the other tabulations listed below may be chosen to characterize the light extinction coefficients.
[List file or Plot/Analysis File]
- 2) Top 50 table for each averaging time selected
[List file only]
(LT50) -- Default: T ! LT50 = F !
- 3) Top 'N' table for each averaging time selected
[List file or Plot file]
(LTOPN) -- Default: F ! LTOPN = F !

-- Number of 'Top-N' values at each receptor selected (NTOP must be <= 4)
(NTOP) -- Default: 4 ! NTOP = 4 !

-- Specific ranks of 'Top-N' values reported
(NTOP values must be entered)
(ITOP(4) array) -- Default: ! ITOP = 1, 2, 3, 4

!

1,2,3,4

4) Threshold exceedance counts for each receptor and each averaging time selected
 [List file or Plot file]
 (LEXCD) -- Default: F ! LEXCD = F !

-- Identify the threshold for each averaging time by assigning a non-negative value (output units).
 -- Default: -1.0
 Threshold for 1-hr averages (THRESH1) ! THRESH1 = -1.0 !
 Threshold for 3-hr averages (THRESH3) ! THRESH3 = -1.0 !
 Threshold for 24-hr averages (THRESH24) ! THRESH24 = -1.0 !
 Threshold for NAVG-hr averages (THRESHN) ! THRESHN = -1.0 !

-- Counts for the shortest averaging period selected can be tallied daily, and receptors that experience more than NCOUNT counts over any NDAY period will be reported. This type of exceedance violation output is triggered only if NDAY > 0.

Accumulation period(Days)
 (NDAY) -- Default: 0 ! NDAY = 0 !
 Number of exceedances allowed
 (NCOUNT) -- Default: 1 ! NCOUNT = 1 !

5) Selected day table(s)

Echo Option -- Many records are written each averaging period selected and output is grouped by day
 [List file or Plot file]
 (LECHO) -- Default: F ! LECHO = F !

Timeseries Option -- Averages at all selected receptors for each selected averaging period are written to timeseries files. Each file contains one averaging period, and all receptors are written to a single record each averaging time.
 [TSttUUUU.DAT files]
 (LTIME) -- Default: F ! LTIME = F !

-- Days selected for output
 (IECHO(366)) -- Default: 366*0
 ! IECHO = 366*0 !
 (366 values must be entered)

Plot output options

Plot files can be created for the Top-N, Exceedance, and Echo tables selected above. Two formats for these files are available, DATA and GRID. In the DATA format, results at all receptors are listed along with the receptor location [x,y,val1,val2,...]. In the GRID format, results at only gridded receptors are written, using a compact representation. The gridded values are written in rows (x varies), starting with the most southern row of the grid. The GRID format is given the .GRD extension, and includes headers compatible with the SURFER(R) plotting software.

A plotting and analysis file can also be created for the daily

peak visibility summary output, in DATA format only.

Generate Plot file output in addition to writing tables
to List file?

(LPLT) -- Default: F ! LPLT = F !

Use GRID format rather than DATA format,
when available?

(LGRD) -- Default: F ! LGRD = F !

Additional Debug Output

Output selected information to List file
for debugging?

(LDEBUG) -- Default: F ! LDEBUG = F !

!END!

MODELED STACK PARAMETERS AND EMISSION RATES

TXU Monticello - BART Screening Analysis Modeling Parameters

EPN	Description	Latitude	Longitude	LCC X (km)	LCC Y (km)	Stack Height (m)	Elevation (m)	Diameter (m)	Exit Velocity (m/s)	Temperature (K)	PM (lb/hr)
S1		33.090555	-95.03722	182.78	-763.182	121.92	114	6.55	24.69	453.13	447.359
S2		33.091111	-95.03777	182.728	-763.121	121.92	115	6.55	24.69	453.13	441.597
S3		33.092222	-95.03777	182.725	-762.997	140.208	115	7.77	26.52	438.13	279.479
L12SRW		33.093055	-95.03666	182.827	-762.903	3.048	116	0.001	0.0001	295.37	10.572

¹ Latitude and Longitude values are from TCEQ Spreadsheet.

² All parameters and emission rates (excluding lat/long) came from Client.

³ Lat/Long were converted to LCC using the following coordinates:

Ref. Latitude	-97
Ref. Longitude	40
Std. Parallel	33
Std. Parallel	45

⁴ To be conservative, all source < 1 lb/hr are modeled out of S3 because it is the highest stack.

⁵ To be conservative, all fugitive source emissions are assumed to be PM Fine.

⁶ Elevations for Kilns came from Permit, Elevation for L12SRW came from BEEST input files.

TXU Monticello - BART Screening Analysis Small Sources Modeled Out Stack S3

Source	Description	PM (lb/hr)
S3S	Unit 3 Start Up Boiler	0.018
S3S	Unit 2 Start Up boiler	0.005
LHS1231W	U. 1&2 lignite storage pile	0.013
LHS307W	Unit 3 lignite storage pile	0.011
LHS312A	U. 3 Stacker reclaimer conveyor to pile	0.007
LHS1251	U. 1&2 lignite transfer tower #2 fugitives	0.002
LHS1291	U. 2 N. Lignite tripper house & blr feed bins exhaust vent	0.002
LHS1281	U. 2 S. Lignite tripper house & blr feed bins exhaust vent	0.002
LHS1241	U. 1&2 lignite transfer crusher tower 1	0.002
FAS1-1FUG	U 3 N. fly ash silo rotary unloaders	0.015
S1D1	Emergency Diesel Gen 1	0.001
S1D2	Tainter Gate Emergency Diesel Gen	0.006
LHS1211	U. 1&2 lignite unloading hopper to conveyor exhaust vent	0.001
LHS1261	U. 1 N. lignite tripper house & blr feed bins exhaust vent	0.002
LHS1271	U. 1 S. lignite tripper house & blr feed bins exhaust vent	0.002
LHS1292A	U. 1&2 stacker reclaimer	0.017
LHS1293B	U. 1&2 lignite pile underground reclaim	0.003
LHS1221	U. 1&2 lignite unloading hopper to conveyor fugitives	0.062
L3SRW	U. 3 Stacker reclaimer fugitives	0.053
LHS312B	U. 3 stacker reclaimer bucket to conveyor transfer	0.007
FAS2-1FUG	U. 1&2 S fly ash silo transfer fugitives	0.028
L12SSPW	U. 1&2 lignite live storage stackout pile wind fugitives	0.034
S3D1	Emergency Diesel Gen 3	0.001
L3SSSW	U. 3 lignite live storage stackout surge pile	0.008
L12TSC	U. 1&2 lignite conveyor 1 to telescoping chute	0.021
LHS1293A	U. 1&2 lignite pile underground reclaim	0.001
LHS1231M	U. 1&2 lignite storage pile	0.003
L12SSPM	U 1&2 lignite live storage stackout surge pile	0.004
LHS307M	Unit 3 lignite storage pile maintenance fugitives	0.001
LHS1292F	U. 1&2 stacker reclaimer conveyor transfer	0.009
LHS1292E	U. 1&2 stacker reclaimer conveyor transfer	0.009
LHS1292D	U. 1&2 stacker reclaimer conveyor transfer	0.009
LHS1292C	U. 1&2 stacker reclaimer conveyor transfer	0.009
LHS1292B	U. 1&2 stacker reclaimer	0.017
FADAW	Fly ash disposal area wind fugitives	0.006
FADAM	Fly ash disposal area maint. fugitives	0.120
WCDSM	Western coal dead storage pile maintenance fugitives	0.011
L3SSSM	U. 3 lignite live storage stackout surge pile	0.010
L12DSPM	U 1&2 lignite Dead storage	0.039
TOTAL		0.572

ELECTRONIC MEDIA DATA AND FILE INDEX

CALPUFF

01PFC1V.*fff*

02PFC1V.*fff*

03PFC1V.*fff*

fff = **inp** denotes CALPUFF input files

fff = **lst** denotes CALPUFF output summary files

fff = **dat** denotes CALPUFF output concentration files

fff = **vis** denotes CALPUFF output relative humidity data files

CALPOST

Caney Creek

CACR.VIS.01.*fff*

CACR.VIS.02.*fff*

CACR.VIS.03.*fff*

fff = **inp** denotes CALPUFF input files

fff = **lst** denotes CALPUFF output summary files