PSD AIR QUALITY ANALYSIS

MODELING GUIDELINES

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AIR DIVISION

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METEOROLOGICAL SECTION

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PSD AIR QUALITY ANALYSIS

The purpose of this document is two-fold. First, it summarizes the general modeling requirements that are acceptable within the State of Alabama for Prevention of Significant Deterioration (PSD) Air Quality Analyses. Second, it will provide guidance on the various modeling procedures and input data to be used when performing these analyses. Deviations from the information presented here should always be coordinated with the ADEM Air Division for approval. Please refer to Section VI for significant items required in the PSD Air Quality Analysis.

I. APPLICABLE POLLUTANTS

The PSD air quality evaluation should address all pollutants listed in Table 2. For a major new source, discussion with the Air Division Permitting Staff is required to determine PSD applicability. Table 1 below shows those PSD source categories with 100 tons/year major source thresholds for major new sources.

TABLE 1

PSD SOURCE CATEGORIES WITH 100 tpy MAJOR NEW SOURCE THRESHOLDS

1. Fossil fuel-fired steam electric plants of more than 250 million Btu/hrheat input
2. Coal cleaning plants (with thermal dryers)
3. Kraft pulp mills
4. Portland cement plants
5. Primary zinc smelters
6. Iron and steel mill plants
7. Primary aluminum ore reduction plants
8. Primary copper smelters
9. Municipal incinerators capable of charging more than 250 tons of refuse per day
10. Hydrofluoric acid plants
11. Sulfuric acid plants
12. Nitric acid plants
13. Petroleum refineries
14. Lime plants
15. Phosphate rock processing plants
16. Coke oven batteries
17. Sulfur recovery plants
18. Carbon black plants (furnace plants)
19. Primary lead smelters
20. Fuel conversion plants
21. Sintering plants
22. Secondary metal production plants
23. Chemical process plants
24. Fossil fuel boilers (or combinations thereof) totaling more than 250million Btu/hr heat input
25. Petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels
26. Taconite ore processing plants
27. Glass fiber processing plants
28. Charcoal production plants

A new source is also considered a major new source if it is any stationary source, other than the ones listed in Table 1, that emits or has the potential to emit 250 tons/year or more of any pollutant regulated by the Clean Air Act. Once a source is considered major, the remaining applicable pollutants are evaluated based on Table 2 below.

In addition, for a major modification, a source is subject if the net allowable yearly emissions exceed any of the designated significant emission rates listed below:

TABLE 2
CRITERIA FOR ESTABLISHING PSD SIGNIFICANCE
MAJOR MODIFICATIONS

Pollutant	Significant Emission Rate (Tons/Year)
Carbon Monoxide- CO	100
Nitrogen Oxides- NO_2	40
Sulfur Dioxide- SO_2	40
Particulate Matter- PM_{10}	15
Particulate Matter – $PM_{2.5}$	10
Ozone (volatile organic compounds)	40
Lead - Pb	0.6
Fluorides	3
Sulfuric Acid Mist	7
Total Reduced Sulfur (including H_2S)	10
Hydrogen Sulfide	10

The air quality analysis also applies to any pollutant whose emission rate from a proposed new or modified source is considered to be significant because the proposed source would be constructed within 10 kilometers of a Class I Area and would have an ambient impact on the Class I Area of greater than or equal to 1 $\mu g/m^3$ on a 24-hour basis.

Both the applicable National Ambient Air Quality Standards (NAAQS) and the PSD increments are subject to air quality analyses in a typical PSD review. The following tables list the ambient standards and increments.

TABLE 3
PSD NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

Pollutant	Averaging Period	Primary NAAQS ($\mu g/m^3$)	Secondary NAAQS ($\mu g/m^3$)	Model Value Used for Comparison to NAAQS
SO_2	1-Hour	196	None	5 yr average of High Fourth High daily maximum 1 hr concentrations
	3-Hour	None	1300	High Second High
PM_{10}	24-Hour	150	150	High Sixth High
$PM_{2.5}$	24-Hour	35	35	Highest average of Eighth high over 5 yrs
	Annual	9.0	12	Highest average of annual mean over 5 yrs
NO_2	1-Hour	188	None	5 yr average of High Eighth High daily maximum 1 hr concentrations
	Annual	100	100	Highest
CO	1-Hour	40,000	40,000	High Second High
	8-Hour	10,000	10,000	High Second High
O_3	8-Hour	(.070 ppm)	(.070 ppm)	NA*
Pb	Rolling 3-Mth	0.15	0.15	AERMOD LEAD POST

*- Ozone modeling is generally accomplished through photochemical modeling platforms for regional assessments.

TABLE 4
PSD INCREMENTS

Pollutant	Averaging Period	Class II Increment ($\mu g/m^3$)	Class I Increment ($\mu g/m^3$)	Model Value Used for Comparison to Increment
SO_2	3-Hour	512	25	High Second High
	24-Hour	91	5	High Second High
	Annual	20	2	Highest
PM_{10}	24-Hour	30	8	High Second High
	Annual	17	4	Highest
$PM_{2.5}$	24-Hour	9	2	High Second High
	Annual	4	1	Highest
NO_2	Annual	25	2.5	Highest

Consideration of Modeled Emission Rates for Precursors (MERPs)

As part of a modeling analyses, per the revised and updated 40 CFR Part 51, Appendix W, precursor emission impacts to ozone and $PM_{2.5}$ (secondary $PM_{2.5}$) should be considered. The ozone precursors are the pollutants VOC and NO_X, whereas the precursor emissions of interest for secondary $PM_{2.5}$ are NO_X and SO_2.

For more information about performing a MERPs analysis, please see EPA's April 30, 2024 Clarification on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program .

EPA has developed a MERPs View Qlik tool to aid in finding the results of EPA's hypothetical single source modeled impacts of Ozone and $PM_{2.5}$ to support PSD applications.

II. PRE-MODELING MEETINGS AND MODELING PROTOCOL

A. Applicants are expected to arrange a meeting with ADEM Air Division staff prior to any modeling effort to avoid any misconceptions. The general discussion should cover the following points:

1. The pollutants applicable to the project.

2. The models to be used in the analysis.

3. The meteorological data required for input to the models.

4. Any complexities that may cause the analysis to be other than a straightforward application of standard EPA guidelines. Examples of these would include the following:

   a. Building downwash issues such as squat or lattice buildings.

   b. Use of on-site or prognostic meteorological data instead of National Weather Service data.

   c. Merged parameters for multiple stacks.

   d. Modeling merged flows out of a single stack.

   e. Property lines, fence lines, and ambient air issues.

   f. Stack height changes.

   g. Modeling of non traditional sources, such as buoyant volume and area sources.

   h. Use of non-default options.

   i. Receptor grids.

B. A written modeling protocol **must** be submitted to the ADEM Air Division for review prior to the commencement of the modeling analysis. The protocol should include the items in paragraph A above and serve to document the agreements and understandings resulting from the pre-modeling meeting, if one occurred. Please refer to Schedule A of the ADEM Code of Regulations for the cost of the modeling protocol review. Please see Appendix E in this document for a detailed checklist of all components that need to be included in the modeling protocol.

C. Additional consultations with the ADEM Air Division staff may be necessary after initial modeling has been performed. This will allow the staff to keep abreast of the review and aid in resolving any problems that may arise.

III. SOURCE INFORMATION

The PSD Air Quality analysis should include the following source information:

A. A map showing the location of the source under review is required. In addition, figures illustrating the terrain and other identifiable features in the area of the proposed source(s) should be included with the application. This can be handled within the same diagram. All maps and diagrams should be scaled.

B. A scaled map of the facility clearly delineating the locations of all sources and buildings modeled. Building sizes and shapes on the map should be

drawn to scale. Also, a plant property discussion should be provided that includes detailed information for non-fenced areas along the plant property boundary.

C. A land use analysis, to determine if rural or urban dispersion coefficients should be used in the modeling, is required. It is recommended that the Auer scheme be used for this analysis. See Appendix A for details on using the Auer scheme. The permit applicant is required to demonstrate in a diagram if the surrounding 3-kilometer area can be classified as rural or urban.

D. Tables are required for identifying all baseline and increment sources used in the modeling, including all applicable stack parameters (UTM coordinate locations, emission rate, stack height, exit velocity, exit temperature and inner diameter), area source parameters (emission rate, southwest coordinates, height, width), and volume source parameters (emission rate, center coordinates, height, horizontal and vertical dimensions). For more information, please refer to the AERMOD User's Guide, which can be found at http://www.epa.gov/scram.

E. For all modeled sources, please provide a listing of the identifiers assigned to these sources in the modeling files.

IV. METEOROLOGICAL DATA

A. On-Site (Site-Specific) Data

1. A minimum of one year of meteorological data gathered on-site is preferred for use in air quality analyses, provided that the data meets quality assurance requirements. If it is likely that on-site meteorological data will be used in the modeling analysis, please follow the guidance below for submittal of the data:

2. Protocol for On-Site Meteorological Data Collection Program.

   If on-site meteorological data will be collected for the purpose of performing air quality modeling, a protocol document outlining the overall meteorological data program should be submitted to ADEM **prior** to the commencement of data collection. This protocol should cover the following points: location of the meteorological station relative to structures and stacks as well as terrain features; duration of meteorological data gathering, including beginning and ending dates; reason for collection of the data (models to be used, etc.); types of data to be collected and levels of collection; discussion of the instrumentation used; discussion of the siting and exposure of the instruments for all meteorological variables; details on the processing of the data including:

   a. Replacement of missing data.
   b. Calm wind processing.
   c. Data handling procedures.
   d. Computational methods.

and Quality Assurance procedures, including discussions on:

a. Instrument calibration and maintenance.
b. System audits.
c. Data validation.

3. Submission of Meteorological Data

If on-site data are available for use in air quality modeling, the data must be submitted to ADEM for approval **prior** to the commencement of modeling. The submittal should include justification for use of the data as well as the following:

a. A written summary report including a discussion of the overall monitoring program followed by details on: data sources, data quality, data completeness, data handling procedures, and computational methods. In addition, documentation on the following should be included: methods of missing data replacement and quality assurance procedures that will also include discussions of instrument calibration, instrument maintenance (routine and preventative) system audits, and data validation.

b. The actual data, submitted quarterly, as well as a final summary report. These reports will include the raw on-site data converted to hourly averages submitted in ASCII format. Lastly, the data in model ready form should be provided as part of the application.

c. A landuse map should be submitted to ADEM for approval demonstrating the landuse in the 12 sectors around the meteorological tower. Landuse around the tower should be thoroughly discussed in protocol submittal.

d. ADEM will determine if the setting for surface moisture in AERSURFACE should reflect wet, dry, or average conditions for the application site.

e. ADEM will provide monthly seasonal information needed to run the AERSURFACE model.

f. Inputs used in the AERSURFACE model should be listed in the modeling protocol for approval by ADEM.

g. On-site met data **cannot** use ADJ_U* in conjunction with turbulence data.

The document "Meteorological Monitoring Guidance for Regulatory Modeling Applications" (EPA-454/R-99-005, EPA February 2000) should be consulted for guidance on the collection, processing and submittal of on-site meteorological data.

B. National Weather Service (NWS) Data

1. In lieu of on-site meteorological data, representative National Weather Service (NWS) data may be used. The most recent readily available five years of representative data are required. See Appendix B to locate the representative NWS station for your facility. It is the responsibility of the applicant to ensure that the correct meteorological dataset is used. One- and five-minute ASOS wind data (wind speed, wind direction) is used in developing the data.
2. The pre-processed, hourly NWS meteorological data can be provided by the ADEM Air Division. Please refer to Schedule A of the ADEM Code of Regulations for the cost of meteorological data. These data will consist of the AERMET STAGE3 output files (*.pfl & *.sfc). A written request is required by the ADEM Air Division to receive the data. This request may also be submitted via e-mail. In most cases the interested party should have their request answered within a week's time. ADEM has processed the meteorological data with the ADJ_U* option.

C. Other Meteorological Data

With the advances in the processing speeds of computers, sources have begun to use prognostic meteorological data in permitting exercises. If a source chooses to use these data, there should be a pre-modeling meeting to discuss options for use, along with a stand-alone protocol developed detailing the development and processing of the dataset for review and comment. For more information associated with the use of prognostic meteorological data, please contact the Meteorological Section.

V. MODELING METHODOLOGY

A. Applicable Models

1. The air quality models to be used are those listed in the "Guideline on Air Quality Models", 40 CFR Part 51 Appendix W. To avoid unnecessary modeling efforts, it is strongly recommended that the applicant coordinate with the ADEM Air Division on the types of models to be used. This approval also applies to the use of guideline models in situations where they are not recommended. In those situations, it must be demonstrated that the recommended models listed in 40 CFR Part 51 Appendix W are not appropriate for a particular situation.
2. All air quality analyses should be performed using the most currently available versions of EPA guideline models. Access to all current models is possible through the EPA Web Page: http://www.epa.gov/scram.
3. If any modification (i.e. partitioning or parallel processing) of AERMOD is used, then the final modeling runs should be submitted using the regulatory version of AERMOD, or send equivalency runs to ADEM for review.

B. Significant Impact Area Determination Modeling

Determination of the Significant Impact Area (SIA) is based on modeling of the proposed major new source or modification only. New sources are modeled at their future maximum permitted emission rate. Modified sources may, on a case by case basis, be modeled with their actual emission rate over the last two representative years input as negative and their future permitted emission rate input as positive for determining the appropriate SIA. The applicant should consult with the Air Division permitter for the proper emission rates to be used in SIA determination modeling for modified sources. SIA determination modeling, at a minimum, should be performed utilizing at least a 10 kilometer (km) radius receptor grid. This grid should start at the edge of the controlled property line, and include appropriate grid spacing with the AERMOD model in default mode. All maximum concentrations should be resolved to 100 meters and concentrations should be decreasing at the edges of the grid. Additional grids may be necessary based on impacts. Five years of representative NWS data or one or more years of representative near or on site meteorological data should be used in the modeling. Building downwash should also be included. As discussion of the receptor grid should be included in the modeling protocol.

Receptor elevations should be considered in the modeling. National Elevation Data (NED) data sets for all areas in and close to Alabama can be downloaded, free of charge, from the following website: https://apps.nationalmap.gov/downloader/. 1/3 arc second resolution should be used.

The cartesian or polar grid used with this modeling should clearly show the distance to where highest short term and long term ambient concentrations fall below the significance levels given in Table 5. For the purposes of this discussion, we will call this distance the critical distance. The SIA is defined as a circular area centered on the proposed source with a radius equal to the critical distance. The SIA must be established for every averaging period of every applicable pollutant for every year of meteorological data. The SIA, for each applicable pollutant, over which NAAQS and/or Increment compliance modeling is performed, should be the largest of these areas.

If predicted concentrations fall below the Significant Impact Levels (SILs) listed in Table 5 below, for a given pollutant, then no further modeling is required for that pollutant. However, SILs alone cannot be the basis for determining PSD applicability, and additional discussion should be added to the analysis to justify no further modeling is necessary.

TABLE 5
SIGNIFICANT AMBIENT AIR QUALITY IMPACT LEVELS (SILs)
FOR CLASS II AREAS

Pollutant	Annual	24-Hour	8-Hour	3-Hour	1-Hour
SO_2	1 $\mu g/m^3$	5 $\mu g/m^3$	--	25 $\mu g/m^3$	7.8 $\mu g/m^{3*}$
PM_{10}	1 $\mu g/m^3$	5 $\mu g/m^3$	--	--	--
$PM_{2.5}$	0.13 $\mu g/m^3$	1.2 $\mu g/m^3$	--	--	--
NO_2	1 $\mu g/m^3$	--	--	--	7.5 $\mu g/m^{3*}$
CO	--	--	500 $\mu g/m^3$	--	2000 $\mu g/m^3$

*- EPA proposed SILs

NOTE: Please see Section F for the appropriate Class I significance levels.

Once the significant impact area is established for NAAQS/Increment compliance modeling, emission inventories of existing sources within the SIA will then be provided by the ADEM Air Division. The fee for this information can be found in Schedule A of the ADEM Code of Regulations. Please allow 4-6 weeks for inventories to be prepared by ADEM. These inventories will identify sources as baseline, increment consuming, or increment expanding and are in model ready format. The Air Division permitter should be contacted to request this information. When requesting an inventory please supply the actual SIA for each pollutant as well as the centroid UTMs and the pollutants of interest. Do not add kilometers to the SIA, as ADEM does that internally when preparing inventories. A maximum radius of 50 km will be used for the development of the inventory for the short term standards. Inventories should not be modified in any way without approval from the ADEM Meteorological Section.

C. Ambient Monitoring Requirements

1. Preconstruction Monitoring

The initial SIA determination modeling analysis must also address preconstruction monitoring requirements for all proposed sources whose predicted ambient impact exceeds any of the significant monitoring concentrations specified in Table 6 below.

TABLE 6
DE MINIMIS PRECONSTRUCTION MONITORING CONCENTRATIONS

POLLUTANT	SIGNIFICANT MONITORING CONCENTRATION ($\mu g/m^3$)	AVERAGING PERIOD
CO	575	8-hour average
NO_2	14	Annual average
SO_2	13	24-hour average
PM_{10}	10	24-hour average
$PM_{2.5}$	Contact ADEM	24-hour average
O_3	No specific concentration is prescribed*	
Pb	0.1	3-month average

*No significant monitoring concentration is provided for ozone. However, any source having a net increase of 100 tons per year or more of VOCs will be required to proceed to Paragraph 2 *Pre-Operation/Post-Operation Ozone Monitoring*.

The required steps for addressing preconstruction monitoring are outlined below:

Step A: Model only the major new or modified sources and compare concentrations against the de minimis monitoring levels (Table 6). Note that the source(s) included in this modeling are the same as those included in the SIA determination modeling. If these levels are not exceeded, monitoring is not required. If the de minimus levels are exceeded, proceed to Step B.

Step B: Model the existing sources at the facility and all sources within the significant impact area and compare the modeled concentrations to Table 6. Again, if the de minimis levels are not exceeded, monitoring is not required. If there are no existing sources at the facility or within the significant impact area, monitoring is not required. If the de minimus levels are exceeded, proceed to Step C.

Step C: Check with the ADEM Air Division for representative ambient monitoring data, which may exempt the applicant from preconstruction monitoring. If no such data exists, then the applicant may be required by the Air Division Chief to conduct its own source-specific monitoring.

2. Pre-Operation/Post-Operation Ozone Monitoring

As authorized in the Department's regulations, pre or post operation monitoring for ozone may be considered for any source that triggers PSD review for NOx or VOC.

Sources should anticipate discussing the possibility of ozone monitoring early in the permitting process. If monitoring is necessary, applicants should plan to monitor for at least three years. The monitoring system should be compatible with ADEM's data acquisition system. In addition, the data must meet Federal quality assurance procedures and quarterly reports must be submitted to ADEM

for review. In the event that monitoring is required, a protocol document should be submitted for review and approval by the ADEM Air and Field Operations Divisions **prior** to the commencement of collection of data. Applicants are strongly encouraged to discuss the possibility of ozone monitoring in a modeling protocol document or through consultation with ADEM prior to submittal of an application.

D. NAAQS/Class II Increment Compliance Modeling

NAAQS/Class II Increment compliance modeling is performed only if the SIA determination modeling indicates that the new or modified source(s) could have a significant impact on air quality. The purpose of NAAQS/Class II Increment compliance modeling is to demonstrate that the new or modified source(s) will not cause or contribute to a violation of a NAAQS or a PSD Increment. (NAAQS and PSD Class II Increments are listed in Tables 3 and 4).

NAAQS/Class II Increment compliance modeling must address all areas within the Significant Impact Area (SIA). All maximum predicted concentrations should be resolved to the nearest 100 meters. This includes maximum predicted annual concentrations as well as short term concentrations consistent with the form of the standard.

NAAQS/Class II Increment compliance modeling involves the source(s) under review as well as sources from within and near the SIA in the inventory provided by the ADEM Air Division. Modeling to address the NAAQS should include the source(s) under review as well as all increment consumers and baseline sources in the inventory provided. Modeling to address the PSD Increments should include the source(s) under review as well as all increment consumers and increment expanders in the inventory provided by the ADEM Air Division. All AERMOD modeling should be completed with receptor elevations and maximum concentrations resolved to 100 meter receptor spacing.

Background concentrations are required to be added to modeled ambient impacts when addressing the NAAQS. These background concentrations are used as a substitution for large industrial sources outside the area of concern, as well as those sources which cannot be properly modeled. The following table gives the appropriate statewide background levels.

TABLE 7
BACKGROUND CONCENTRATIONS

Pollutant	Averaging Period	Background Conc. ($\mu g/m^3$)
SO_2	1-Hour	CONTACT ADEM
	3-Hour	10
NO_2	1-Hour	CONTACT ADEM
	Annual	7.5
CO	1-Hour	100
	8-Hour	100
PM_{10} and $PM_{2.5}$		CONTACT ADEM

If any violations of the NAAQS or PSD increments are predicted, then the source under review must demonstrate that they do not cause or significantly contribute to any of the predicted violations. If this cannot be demonstrated, contact the ADEM Air Division for further instruction.

For Increment modeling, the major/minor source baseline dates for the state of Alabama can be found in Chapter 335-3-14 of the ADEM Admin. Code r. 335-3-x-.xx .

E. Good Engineering Practice (GEP) Review

A GEP review must be conducted for each proposed new or modified source to determine if building downwash effects need to be included in the modeling and to determine the appropriate stack heights to be used with the model(s). Any computer software used to obtain the necessary information for GEP stack heights and downwash parameters should be described in the application and input and outputs provided to ADEM for review in electronic form.

In order to facilitate ADEM's review, a scaled plant diagram showing the location of each structure and stack must be included in the application. Also, this diagram should show the plant property boundaries and any fenced areas around the plant.

F. Federal Class I Areas

Ambient impacts must be determined for any Class I area within 100 km of the proposed source. Proposed sources beyond 100 km from a Class I area should contact ADEM to discuss possible options for modeling.

The two Class I areas of primary concern for most sources locating in Alabama are the Sipsey Wilderness Area in Northwestern Alabama, and the Breton Wildlife Refuge off the coast of Louisiana. See Appendix C to determine the proximity of your facility to any of these areas.

In addition to the two Class I areas addressed above, a small portion of extreme northeast and southeast Alabama are within 100 km of the Cohutta Class I area

in northern Georgia and the Bradwell Bay Class I area in northwest Florida, respectively. Any sources in the northeastern portions of Cherokee, Dekalb or Jackson counties, or the southeastern portion of Houston county should contact the ADEM Air Division in order to determine if a Class I analysis should be performed for one of those Class I areas.

Class I Area Modeling:

Modeling to assess impacts at a Class I area should utilize the regulatory version of AERMOD modeling system, unless otherwise justified, and follow the guidance document entitled "**Interagency Workgroup on Air Quality Modeling (IWAQM) Phase II Summary Report and Recommendations for Modeling Long Range Transport Impacts**" EPA-454/R-98-019, December 1998. If using the CALPUFF model for AQRV impacts, please contact ADEM to discuss the meteorological data to be used in the CALPUFF modeling. Facilities beyond 50 km of a Class I area should contact the ADEM Air Division for discussion of the appropriate model to use. If using an alternative model, documentation should be provided to ADEM consistent with Section V(A) above.

There are two key components of a Class I analysis: a Class I increment analysis, and an air quality related value (AQRV) analysis.

1. Class I Increment

In general, a Class I Increment analysis consists of an initial "screening analysis" to determine whether the new or modified source will have a significant impact on air quality in the Class I area at Class I receptors. This determination is made by comparing the projected impacts from the source under review to the Class I "Significance Levels" (SILs) provided in Table 8 below. If impacts are below the Class I SILs, then the increment portion of the Class I analysis is complete. If impacts are above the Class I SILs, then a "Cumulative Class I Increment Analysis" will be performed. If this is the case, an inventory of sources will be developed by ADEM, **at cost to the facility**, for use in determining total increment consumption for the Class I area. Please contact the ADEM Meteorological Section before proceeding with Class I Increment modeling.

TABLE 8
SIGNIFICANCE LEVELS FOR CLASS I AREAS
Averaging Period

Pollutant*	Annual	24-Hour	3-Hour	1-Hour
SO_2	0.1 $\mu g/m^3$	0.2 $\mu g/m^3$	1.0 $\mu g/m^3$	--
PM_{10}	0.2 $\mu g/m^3$	0.3 $\mu g/m^3$	- -	--
$PM_{2.5}$	0.03 $\mu g/m^3$	0.27 $\mu g/m^3$	- -	--
NO_2	0.1 $\mu g/m^3$	- -	- -	--

*- Significance levels cannot not be used exclusively to remove a source from additional modeling.

2. Air Quality Related Value Analysis (AQRV)

An AQRV analysis may be required by the Federal Land managers. The current recommended AQRV analyses consist of an evaluation of regional haze as well as sulfur and nitrogen deposition at all Class I areas with the exception of Bradwell Bay which is only evaluated for deposition. The guidance documents that outline a recommended approach for the evaluation of these AQRV's are: The **"Federal Land Managers' Air Quality Related Values Workgroup (AQRV) Phase I Report" (October 2010)**, as well as **"Federal Land Managers' Interagency Guidance for Nitrogen and Sulfur Deposition Analysis" (November 2011)**. ADEM should be contacted to discuss the situations in which these analyses will be performed before proceeding. The ADEM Meteorological Section should be contacted to receive a form generated by the Federal Land Managers that summarizes emissions and distance to the Class I area, in order to determine whether an AQRV analysis is necessary. ADEM should be included in all correspondence with the appropriate Federal Land Manager.

VI. AIR QUALITY ANALYSIS CONTENTS

The following items should be contained in the modeling portion of a PSD application.

A. Text Contents

1. Description of model(s) used and any special assumptions or options employed. Justification should be included for the use of any non-regulatory options. If proprietary software is used, for example, to facilitate data input or process output, please identify the software.

2. Description of the meteorological input data used, with an explanation of any modification(s) made. If an alternate set of data is used, please include justification for using a specific set of meteorological data along with a demonstration of data representativeness.

3. Overall description of the methodology used in performing the analysis. This includes all steps necessary to identify the impacts for comparison with the PSD Increments and ambient standards (NAAQS).

4. Tables identifying the maximum increment consumption and ambient levels (including receptor locations and year of meteorology) for all averaging periods and pollutants considered, including the contribution of the new facility to these maxima if violations are predicted.

5. Figures of isopleths that illustrate the aerial extent of increment consumption and ambient levels. Location of maximum predicted

concentrations should be clearly noted and a comparison made to the air quality standard of concern. (Preferably the figures should have a background illustrating terrain or other identifiable features, such as a U.S.G.S. Map, for easy orientation).

6. Scaled facility plot should be provided. A discussion of the fenceline and/or other barriers to public access should be included.

B. Appropriate model output files substantiating points of concern, as described in the text, should be submitted.

1. Submit model output needed to verify the identification of the significant impact area and all reported maximum impact values with respect to PSD Increments and ambient standards. Modeling runs submitted should include:

a. Source input parameters for all sources modeled.

b. Identification of the meteorology used.

c. List of options used in the particular model run.

d. Concentration tables for averaging periods of concern.

2. The ADEM Air Division requires the applicant to submit results on a CD rom (or flash drive) which include all model input and output and preprocessor (i.e. AERMAP, etc.) files as well as any downwash program input and output files. This will assist both the ADEM Air Division and the applicant by speeding up the review process. Additional modeling files may be required by the ADEM Air Division, as necessary, during the course of the PSD review.

VII. ADDITIONAL IMPACT ANALYSIS

An analysis should be prepared to address the impact on visibility, soils and vegetation that would occur as a result of the source or modification and general commercial, residential, industrial, and other growth associated with the source or modification.

APPENDIX A

Urban/Rural Classification - Auer Method

The EPA "Guideline on Air Quality Models" EPA-450/2-78-027R-C, Appendix W of CFR Part 51 specifies a procedure to determine whether the character of the modeling area is primarily urban or rural. Two methods that can be used for performing this procedure are based on land use and population density. The land use procedure is the recommended approach.

The land use procedure classifies land use within an area circumscribed by a circle, centered on the source, with a radius of 3 kilometers. Table A-1 acts as a guide to help define the specific types of land use and their corresponding descriptions as defined by Auer (1978). If land use types I1, I2, C1, R2, and R3 account for 50 percent or more of the land use within 3 kilometers of the source, then the modeling regime is considered urban. Please note that the residential and industrial areas are often the pink and purple-colored areas identified on U.S.G.S. 7.5 minute topographic maps.

The population density procedure uses the same 3-kilometer circle as described above. The population within the circumscribed area is determined from Census Bureau Enumeration District data. This population is divided by the area of the circle to give the population density around the source. If the population density exceeds 750 people/km^2, the modeling regime is considered urban. Otherwise it is classified as rural.

Documentation of the Land Use Classification should be included in the application along with an illustrative representation of the area. If the Auer method is not used to determine classification, documentation should be provided in the protocol.

The classification of the area as urban will require additional input data in AERMOD. The AERMOD User's Guide should be consulted to determine what additional inputs are needed.

TABLE A-1
IDENTIFICATION AND CLASSIFICATION OF LAND USE TYPES
(AUER 1978)

Type	Use and Structure	Vegetation
I1	**Heavy Industrial** Major Chemical, steel & fabrication industries; general 3-5 story buildings, flat roofs.	Grass & tree growth extremely rare. Less than 5% vegetation.
I2	**Light-moderate industrial** Rail yards, truck depots, warehouses, industrial parks, minor fabrications; generally 1-3 story buildings, flat roofs.	Very limited grass, trees almost totally absent. Less than 5% vegetation.
C1	**Commercial** Office & apartment buildings, hotels, 10 story heights, flat roofs.	Limited grass & trees. Less than 15% vegetation.
R1	**Common residential** Single family dwelling with normal easements; generally 1 story, pitched roof structures, frequent driveways.	Abundant common lawns & light-moderate wooded. Greater than 70% vegetation.
R2	**Compact residential** Single, some multiple, family dwelling with close spacing, generally 2 story, pitched roof structures; garages (via alley) and ashpits, no driveways.	Limited lawn sizes & shade trees. Less than 30% vegetation.
R3	**Compact residential** Old multi-family dwellings with close (2m) lateral separation; generally 2 story, flat roof structures; garages (via alley) and ashpits, no driveways.	Limited lawn sizes, old established shade trees. Less than 35% vegetation.
R4	**Estate residential** Expansive family dwelling on multi acre tracts.	Abundant grass lawns & light wooded. Greater than 80% vegetation.
A1	**Metropolitan natural** Major municipal, state or federal parks, golf courses, cemeteries, campuses; occasional single story structure.	Nearly total grass & lightly wooded. Greater than 95% vegetation.
A2	**Agricultural rural**	Local crops (e.g., corn, soybeans). Greater than 95% vegetation.
A3	**Undeveloped** Uncultivated; wasteland.	Mostly wild grasses & weeds, lightly wooded. Greater than 90% vegetation.
A4	**Undeveloped rural**	Heavily wooded. Greater than 95% vegetation.
A5	**Water surfaces** Rivers; lakes.	

APPENDIX B

Representative National Weather Service Data

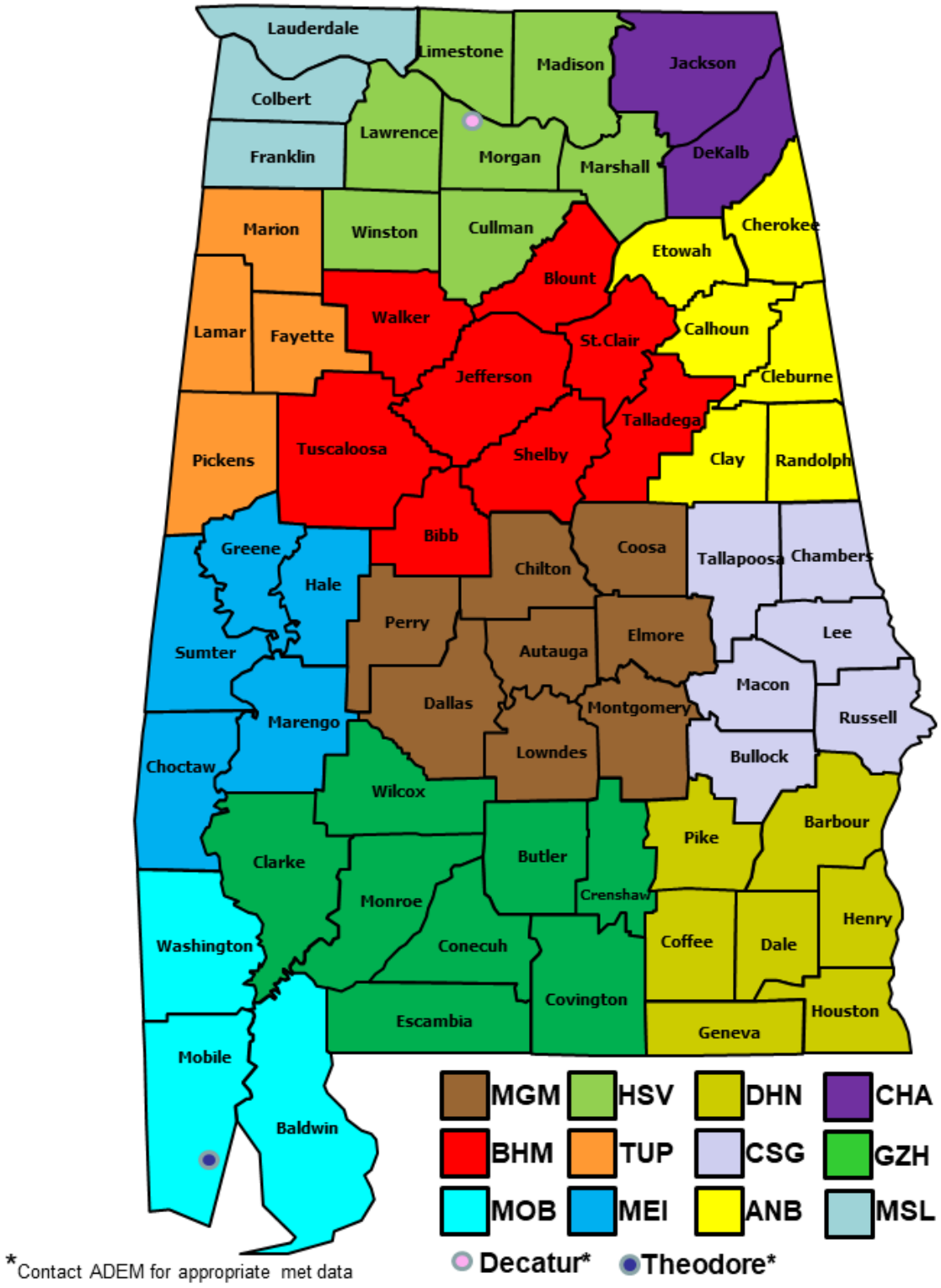
See Meteorological PSD Data Map on page 22 to identify the area of the State in which the proposed new source or modified source will be located. Based on this area, use the table below to determine which National Weather Service (NWS) station data to use in the modeling. The station identification numbers are also indicated:

Area	NWS Surface Station	ID #	Profile Base (m)	NWS Upper Air Station	ID #
HSV	Huntsville, Alabama	3856	196	Nashville, Tennessee	13897
CHA	Chattanooga, Tennessee	13882	210	Nashville, Tennessee	13897
TUP	Tupelo, Mississippi	93862	110	Alabaster, Alabama	53823
BHM	Birmingham, Alabama	13876	192	Alabaster, Alabama	53823
CSG	Columbus, Georgia	93842	120	Alabaster, Alabama	53823
MEI	Meridian, Mississippi	13865	94	Alabaster, Alabama	53823
MGM	Montgomery, Alabama	13895	62	Alabaster, Alabama	53823
MOB	Mobile, Alabama	13894	67	Slidell, Louisiana	53813
ANB	Anniston, Alabama	13871	183	Alabaster, Alabama	53823
DHN	Dothan, Alabama	13839	108	Tallahassee, Florida	93805
GZH	Evergreen, Alabama	53820	79	Alabaster, Alabama	53823
MSL	Muscle Shoals, Alabama	13896	171	Nashville, Tennessee	13897

NOTE: Contact ADEM to determine the appropriate data to be used in the Decatur and Theodore areas.

Please contact the ADEM Meteorological Section for additional information on how the meteorological regions were created.

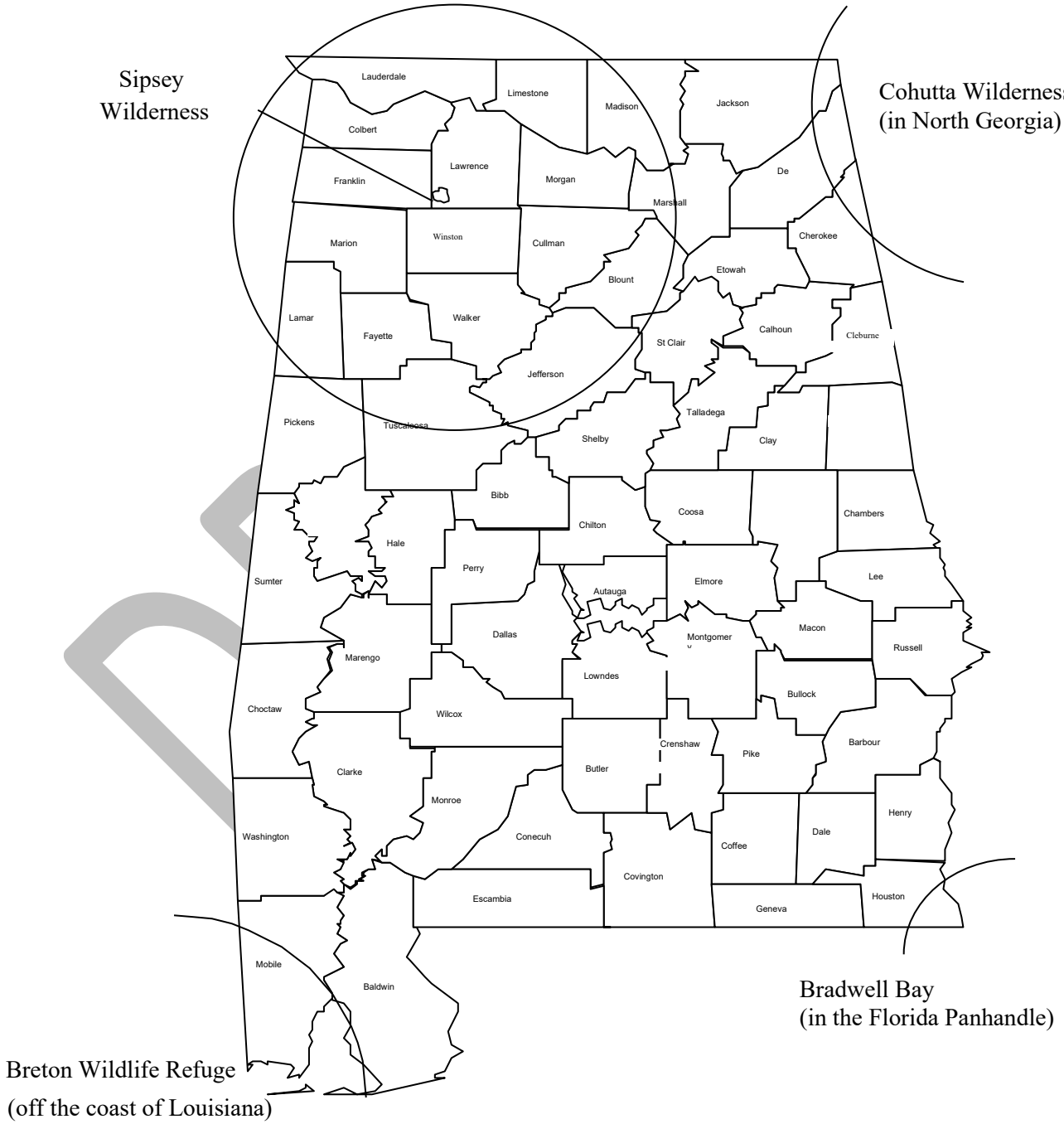
METEOROLOGICAL PSD DATA



*Contact ADEM for appropriate met data

APPENDIX C

Class I Areas
(within 100 km radius)



APPENDIX D

Pre-Application Meeting

A pre-application meeting should include (but is not limited to) discussion of the following information:

___ Surrounding topographic features (terrain, lakes, river valleys, coastlines, etc…)

___ Plant layout

___ Existing ambient monitoring network and monitor(s) locations

___ Representativeness of site-specific or prognostic meteorological model data if used

___ If using prognostic meteorological model data, discussion of the meteorological model setup and performance

___ Proposed new/modified facility emission source characterization

___ Emissions inventory development

___ Other major existing sources / potential nearby sources

___ Background concentrations

___ Buildings/structures that influence building downwash

___ Non ambient air areas (e.g. plant property)

___ Location of PSD Class I areas

___ Proposed methodology for demonstrating compliance with the NAAQS and PSD increments (screening or refined model or modeling technique, including any potential alternative techniques)

___ Any Non Default Options, including partitioning and parallel processing

APPENDIX E

Modeling Protocol Checklist

1. Project Description

____Project description narrative to establish an understanding of the new or modified source(s) and pollutants of concern.

2. Source Characterization| Information

___Type, size, number of units, location of source(s)

___Fugitive emissions, limited to sources which are quantifiable and related to the project at hand.

___Stack parameters

___Building dimensions and locations (preferably in UTM coordinates)

___GEP stack height analysis

___Tables for identifying all baseline and increment sources used in the modeling, including applicable stack parameters. {Point, Area, Volume}

___Land use analysis (AUER)

___Scaled source location maps to include:

* Location of source under review, to include terrain and identifiable features

* Locations of all sources and buildings modeled.

* Class I areas

3. PSD Air Quality Analysis

___Non ambient area (plant property/boundary details to include physical barriers. Documentation in segments around the property with a discussion about how each segment prohibits the public from access. Maps delineating the segments should be provided. Specifics about the barriers should be included [whether it is delineated by a fence, sign posting, security surveillance, topography, or similar type of physical barrier.])

___Emissions inventory development (ADEM will provide emissions inventories, at cost to the applicant when requested.)

___Background concentrations (ADEM will provide when requested.)

___Downwash analysis (with a scaled map with all buildings and stacks, along with a legend. Building/tier heights and dimensions/coordinates of building corners should be provided. Do not remove any of the buildings on site. All buildings/structures should be input and allow the software to remove any irrelevant structures.)

___ Existing ambient monitoring network/monitors

___ Base elevations for all sources. Indicate if the site is graded.

4. MET Data

___ Pre-processed hourly NWS data, provided by ADEM and used without change.

___ MET DATA <u>if not</u> provided by ADEM

A. *On-Site (Site-Specific) Data*

-1 year minimum of site-specific data

-Protocol for On-Site MET Data Collection Data/ Quality Assurance

-Submission of MET DATA to ADEM prior to modeling for review and approval, justification for data use

B. *Prognostic Meteorological Data*

-Please contact ADEM to discuss specifics

5. Air Quality Model Selection | Modeling

___Identification of model (provide the version number of AERMOD and any associated preprocessors). Ensure that the latest version of AERMOD and any associated preprocessors are being used.

___ Description of model options, and justification for model use

___Input parameters (include a table with all the facility's applicable sources, including UTM stack locations, stack parameters, and emission rates, as well as tables of inventory source stack parameters and locations)

___Model Outputs (predicted concentration tables for all pollutants and averaging periods)

___ For NO_2 modeling, a discussion of the modeling procedures that will be used to convert NOx to NO_2 should be provided, if used. If PMVRM or OLM is being used, a discussion about the in-stack ratio for the facility sources and the Ozone data that will be used in the analysis should be included, and justification for the in-stack ratio and Ozone data provided. If ARM2 is being used with anything but the default ratios of 0.5 to 0.9, justification will need to be provided. These procedures should be approved prior to the submittal of modeling.

___ The entire MERPs analysis and associated calculations for secondary $PM_{2.5}$ and/or Ozone should be included and approved by ADEM before the application is submitted.

6.Receptor Grid and Coordinate System

___Scaled map(s) of terrain; terrain data

___Plot of receptor grids with UTM coordinates (figures should be included.)

___Receptor placement- The receptor grid should be thoroughly laid out in the protocol, including spacing and downwind extent, including fenceline receptors.

___Domain to include all of SIA (include figures and table of SIAs)

7. PSD Federal Class I Area Impacts **(if applicable)**

___Class I increment analysis, if required

___Air Quality Related Value analysis for FLM review, if required

___Class I protocol, to include models used, emissions inventories, AQRVs, etc., should be submitted and approved prior to any modeling being submitted.

8. Additional Impacts Analysis

___To include local visibility, construction, etc

9. Conclusion/Compliance

___Methodology/discussion for demonstrating compliance with the NAAQS and PSD increments.

___Table with applicable significance levels, NAAQS, and Increment levels