

MODELING PROTOCOL

Greenfield Simple Cycle Combustion Turbine Project

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1. INTRODUCTION

CTC Property LLC "CTC" is proposing to construct and operate a data center that will be located at 5420 Tulane Road, Memphis, Shelby County, Tennessee. This will be a grass roots operation and facility. The proposed facility will produce its own electricity for sale and will include simple cycle combustion turbines (CT) and supporting equipment. Two (2) turbine models will be used for the site, the Solar PGM-130 and Solar Titan 350. The CT units will fire natural gas as the only fuel. The combination of turbines will generate a base load rating of approximately 1.56 gigawatts (GW). The proposed project will require a Prevention of Significant Deterioration (PSD) permit as a major modification to a new source. Project-related emissions are anticipated to exceed the PSD significant emission rate (SER) thresholds for filterable particulate matter (PM), total particulate matter with an aerodynamic diameter of 10 microns or less (PM₁₀), total particulate matter with an aerodynamic diameter of 2.5 microns or less (PM_{2.5}), nitrogen oxides (NO_x), volatile organic compounds (VOC), sulfur dioxide (SO₂), carbon monoxide (CO), and greenhouse gases (GHG) in terms of carbon dioxide equivalents (CO₂e) and therefore require a PSD air quality/dispersion modeling analysis.

A dispersion modeling protocol has been prepared following available policy and guidance. Trinity Consultants (Trinity), on behalf of CTC, has prepared this protocol describing the proposed methodologies and data resources to be used for any modeling compliance demonstration for the potential project. This protocol includes an overview of the required PSD modeling analyses, and a detailed description of the methodology proposed. The analyses include evaluation and consideration of National Ambient Air Quality Standards (NAAQS), PSD Increment, additional impacts analyses, visibility and non-air quality impacts, as well as consideration of impacts to Class I Areas.

The following figures show the approximate location of the proposed CTC facility, as well as the approximate facility boundary area that would be utilized in the modeling analysis.

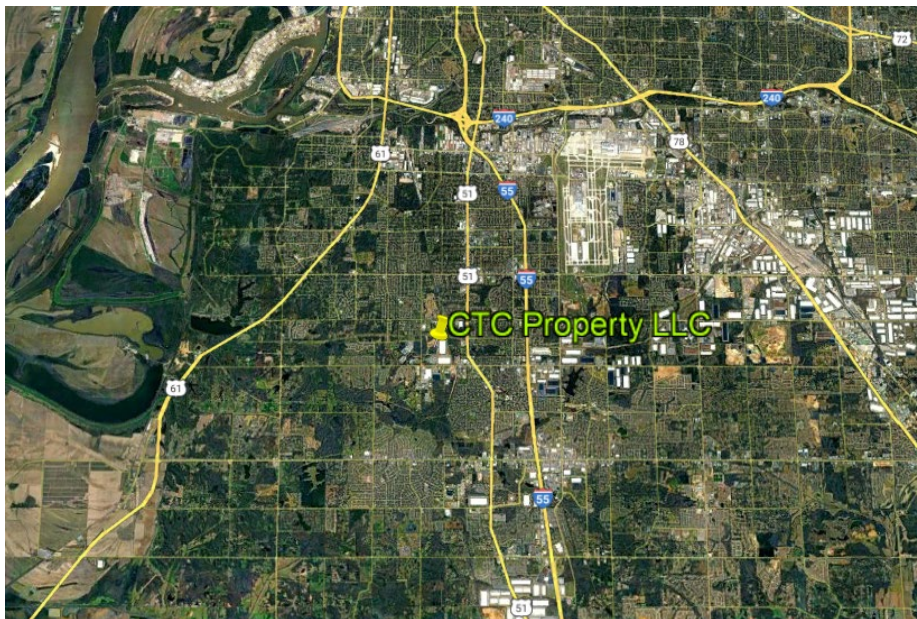


Figure 1. CTC Area Map

Figure 2 depicts the ambient boundary area of the proposed CTC facility. The boundary area indicated below is either fenced or signed/patrolled, to restrict and control access to CTC property.



Figure 2. CTC Ambient Boundary Area

1.1 PSD Applicability

Part C of Title I of the Clean Air Act, 42 U.S.C. §§7470-7492, is the statutory basis for the PSD program. The U.S. Environmental Protection Agency (EPA) has codified PSD definitions, applicability, and requirements in 40 CFR Part 52.21. PSD is one component of the New Source Review (NSR) permitting program applicable in areas that are designated in attainment of the NAAQS. Shelby County, where the facility is located, is currently designated as unclassifiable or in attainment for all criteria pollutants.¹

CTC is requesting authorization to construct and operate an assortment of simple-cycle combustion turbines and supporting equipment. Since the proposed facility will be a major source under the PSD permitting program, emissions from the proposed project must be evaluated and compared to the SER thresholds for regulated pollutants under the PSD program. CTC has evaluated emissions increases of CO, NO_x, filterable PM, total PM₁₀, total PM_{2.5}, CO_{2e}, SO₂, and VOC resulting from the proposed project for comparison to their respective PSD SER to determine whether PSD permitting is required, as identified in Table 1.

¹ 40 CFR §81.301

Table 1. Proposed Project Emissions Increases

Pollutant	Project Emissions (tpy)	PSD Significant Emission Rate (tpy)	PSD Triggered? (Yes/No)
Filterable PM	325.72	25	Yes
Total PM ₁₀	325.72	15	Yes
Total PM _{2.5}	325.72	10	Yes
SO ₂	161.65	40	Yes
NO _x	408.11	40	Yes
VOC	391.14	40	Yes
CO	261.35	100	Yes
CO _{2e}	6,465,286	75,000	Yes

Since the project potential emissions of filterable PM, total PM₁₀, total PM_{2.5}, NO_x, VOC, SO₂ and CO exceed their respective SERs, the proposed project is required to undergo PSD review for each pollutant. Because these pollutants trigger PSD permitting, PSD review is also required for CO_{2e} because the calculated CO_{2e} project emission increases exceed the applicable SER.

1.2 Project Emissions

CTC has proactively chosen to implement Lowest Achievable Emission Rate (LAER) for NO_x emissions from the turbines. Best Available Control Technology (BACT) will be applied to the remaining pollutants. These are discussed in detail in the CTC PSD Permit Application, Volume 1.

Table 2. Proposed BACT Limits for Combustion Turbines

Pollutant	Proposed BACT Limit	Comment
NO _x	2 ppm (15% O ₂), achieved with SCR	Top-ranked control option, energy and secondary environmental impacts partly mitigated through collateral pollutant (NH ₃) emission standard.
CO	2 ppm (15% O ₂), achieved with oxidation catalyst	Top-ranked control option(s).
VOC	2 ppm (15% O ₂)	Top-ranked control option(s).
Particulate	5% opacity	Top-ranked control option. Visible emissions standard proposed in connection with work practice standard.
SO ₂	Use pipeline natural gas not to exceed 1 gr S per 100 scf.	Top-ranked control option.
NH ₃	5 ppm (0% O ₂)	Standard to minimize secondary impacts from NO _x control option. Consistent with SCR vendor recommendations for NH ₃ injection rate.
CO ₂	Natural gas fuel and efficient equipment design	Top-ranked control option(s).

LAER is achieved via combustion-zone NO_x mitigation (Solar SoLoNO_x technology) and post-combustion Selective Catalytic Reduction (SCR). Peak flame-zone temperatures are reduced in the proposed Solar PGM-130 and Solar Titan 350 turbines via dry combustion controls: advanced low-NO_x emission combustors, which enhance air-fuel mixing. An SCR system will reside in each Solar turbine exhaust path. By installing similar technology that other sources have used to achieve LAER, CTC adopts 2 ppmvd NO_x at 15% O₂ during steady-state operations

2. PSD MODELING ANALYSES

Trinity has prepared this modeling protocol to describe the modeling methodologies and data resources that will be used to evaluate the project's short-range (less than 50 kilometers from plant) air quality impacts in Class II areas as well as long range, regional impacts (50 to 300 kilometers from plant) to Class I area visibility, soils, and vegetation.

The dispersion modeling analyses will be conducted in consideration of the following guidance documents in addition to direct regulatory guidance provided by SCHD:

- ▶ *Guideline on Air Quality Models* 40 CFR 51, Appendix W (EPA, Revised, January 17, 2017)
- ▶ User's Guide for the AMS/EPA Regulatory Model – AERMOD, (EPA, April 2021)
- ▶ AERMOD Implementation Guide (EPA, last revised November 2024)
- ▶ New Source Review Workshop Manual (EPA, Draft, October 1990)
- ▶ Modeling Procedures for Demonstrating Compliance with PM_{2.5} NAAQS (EPA, Memorandum from Mr. Stephen Page, March 23, 2010)
- ▶ Revised Draft Guidance for Ozone and Fine Particulate Matter Modeling (EPA, Memorandum from Mr. Richard A. Wayland, September 20, 2021)
- ▶ *Revised Policy on Exclusions from "Ambient Air"* (EPA, Memorandum from Mr. Andrew R. Wheeler, December 2, 2019)
- ▶ Tennessee Division of Air Pollution Control Dispersion Modeling Guidance (DRAFT, TDEC, Jan 2017)
- ▶ *Guidance for PM_{2.5} Permit Modeling* (EPA, Memorandum from Mr. Stephen Page, May 20, 2014)
- ▶ Tennessee Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate Formation in Tennessee Under the New Source Review (NSR) Prevention of Significant Deterioration Program (PSD), (TDEC, November 22, 2019)
- ▶ Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier I Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program (EPA, Memorandum from Mr. Richard A Wayland, April 30, 2019)
- ▶ Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program (EPA Memorandum from Mr. Peter Tsirigotis, April 17, 2018)
- ▶ Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program (EPA Memorandum from Mr. Richard Wayland, April 30, 2024)
- ▶ Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO₂ National Ambient Air Quality Standard (EPA, Memorandum from Mr. Tyler Fox, March 1, 2011); and
- ▶ Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO₂ National Ambient Air Quality Standard (EPA, Memorandum from Mr. R. Chris Owen and Roger Brode, September 30, 2014).
- ▶ Interpretation of "Ambient Air" in Situations Involving Leased Land Under the Regulations for Prevention of Significant Deterioration (PSD) (EPA, Memorandum from Stephen D. Page to Regional Air Division Directors, June 22, 2007).
- ▶ *Q/D Screening Method* (ADEC/AQM, Mr. Alan E. Schuler, June 19, 1997)

Tasks performed in a standard PSD modeling analysis are presented in the flowchart in Figure 3.

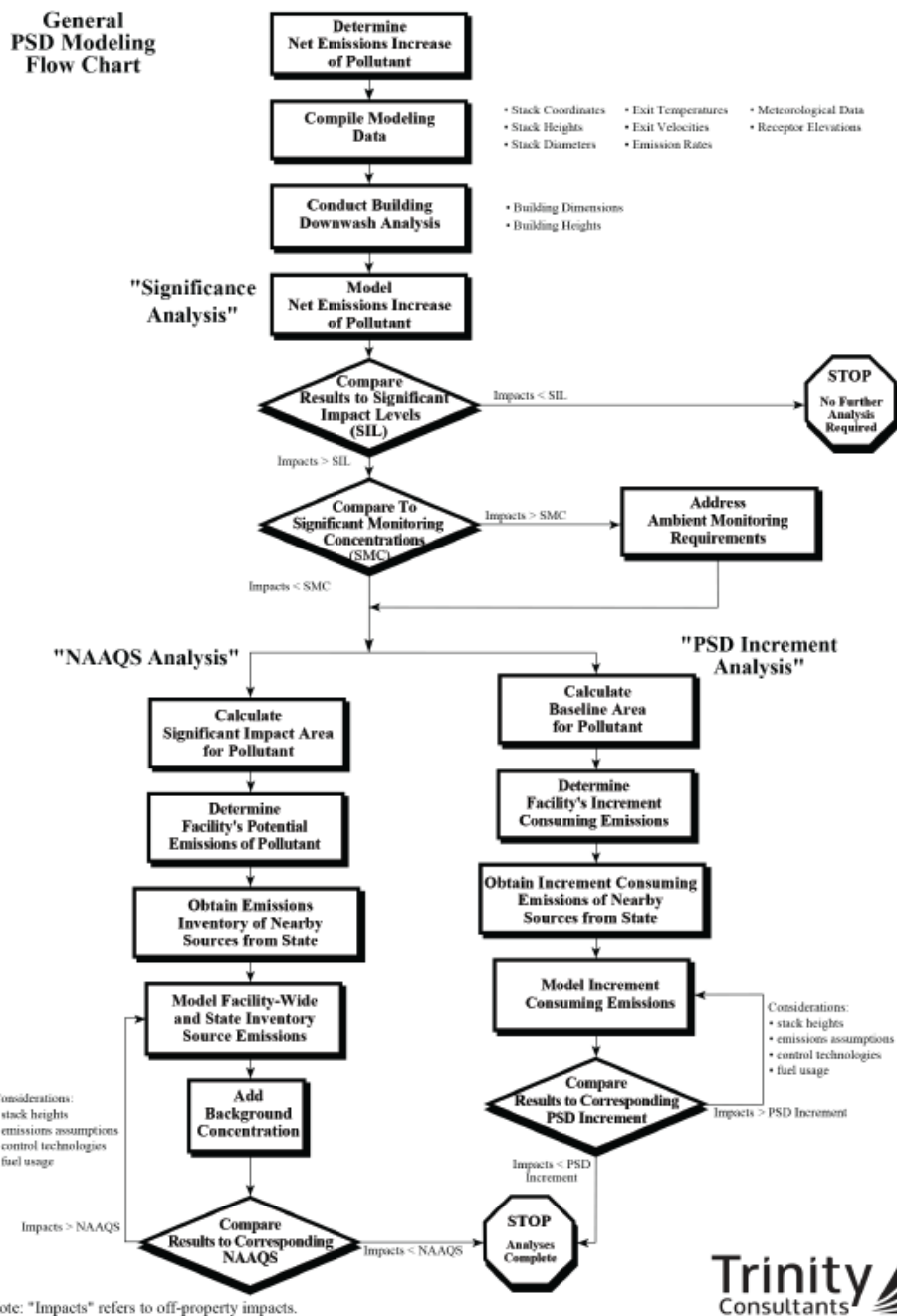


Figure 3. PSD Modeling Flow Chart

2.1 Source Analysis

CTC will model the project-associated sources for the significance analysis. For any off-site impact calculated in the significance modeling analysis greater than the SIL for a given pollutant, a NAAQS/Increment analysis incorporating nearby sources is required (full or cumulative impact analysis). For the cumulative impact

analysis, all sources at the facility (with the exception of emergency equipment such as diesel-fired backup generators and fire pumps) and the appropriate inventory sources will be included.

Modeling analysis for each ambient-air standard will utilize inputs that represent the most conservative, or a “worst-case”, operating scenario. The “worst-case” operating scenario, for modeling purposes, represents the load and ambient temperature conditions when worst-case concentrations occur because combustion turbine performance varies with generation load and temperature. This “worst-case” operating scenario was established by selecting the maximum hourly emission rate from any load operating scenario and pairing it with the worst dispersion characteristics. Those are defined by using the coolest (relative) exhaust temperature from any scenario, and the lowest exhaust velocity. The stack parameters selected to represent “worst-case” are provided in Table 3.

Table 3. Modeled Source Parameters

Proposed Unit	Stack Height (m)	Stack Temp (K)	Stack Velocity (m)	Stack Inside Diameter (m)
350	24.4	740.3	22.4	3.35
130	15.2	766.5	21.5	2.74

2.2 Model Selection

Dispersion models predict downwind pollutant concentrations by simulating the evolution of the pollutant plume over time and space for specific set of input data. These data inputs include the pollutant’s emission rate, source parameters, terrain characteristics, and atmospheric conditions.

According to the 40 CFR 51, Appendix W (the *Guideline*), the extent to which a specific air quality model is suitable for the evaluation of source impacts depends on (1) the meteorological and topographical complexities of the area; (2) the level of detail and accuracy needed in the analysis; (3) the technical competence of those undertaking such simulation modeling; (4) the resources available; and (5) the accuracy of the database (i.e., emissions inventory, meteorological, and air quality data).

Taking these factors under consideration, CTC will use the AERMOD modeling system to represent all project emissions sources at the facility. AERMOD is the default model for evaluating impacts attributable to industrial facilities in the near-field (i.e., source receptor distances of less than 50 km), and is the recommended model in the *Guideline*.

2.2.1 AERMOD

The latest version (24142) of the AERMOD modeling system will be used to estimate maximum ground-level concentrations in all Class II Area analyses for this application. AERMOD is a refined, steady-state, multiple source, Gaussian dispersion model and was promulgated in December 2005 as the preferred model for use by industrial sources in this type of air quality analysis.² The AERMOD model has the Plume Rise Modeling Enhancements (PRIME) incorporated in the regulatory version, so the direction-specific building downwash dimensions used as inputs are determined by the Building Profile Input Program, PRIME version (BPIP PRIME), version 04274.³ BPIP PRIME is designed to incorporate the concepts and procedures expressed in

² 40 CFR Part 51, Appendix W, Guideline on Air Quality Models, Appendix A.1 AMS/EPA Regulatory Model (AERMOD).

³ Earth Tech, Inc., *Addendum to the ISC3 User’s Guide, The PRIME Plume Rise and Building Downwash Model*, Concord, MA.

the GEP Technical Support document, the Building Downwash Guidance document, and other related documents, while incorporating the PRIME enhancements to improve prediction of ambient impacts in building cavities and wake regions.⁴

The AERMOD modeling system is composed of three modular components: AERMAP, the terrain preprocessor; AERMET, the meteorological preprocessor; and AERMOD, the dispersion and post-processing module. AERMAP is the terrain pre-processor that is used to import terrain elevations for selected model objects and to generate the receptor hill height scale data that are used by AERMOD to drive advanced terrain processing algorithms. National Elevation Dataset (NED) data available from the United States Geological Survey (USGS) are utilized to interpolate surveyed elevations onto user specified receptor, building, and source locations in the absence of more accurate site-specific (i.e., site surveys, GPS analyses, etc.) elevation data. AERMET generates a separate surface file and vertical profile file to pass meteorological observations and turbulence parameters to AERMOD. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the meteorological site shown to be representative of the application site.

CTC will use the BREEZE[®] graphical interface, developed by Trinity Consultants, to assist in developing the model input files for AERMOD. This software program incorporates the most recent versions of AERMOD (dated 24142) and AERMAP (dated 24142) and provides capability for image-generating. Using the procedures outlined in the *Guideline* as a reference, the AERMOD dispersion modeling for this project will be performed using only regulatory default options.

2.2.2 Urban Versus Rural Dispersion Options

Classification of land use in the immediate area surrounding a facility is important in determining the appropriate dispersion coefficients to select for a particular modeling application. The selection of either rural or urban dispersion coefficients for a specific application should follow one of two procedures. These include a land use classification procedure or a population-based procedure to determine whether the area is primarily urban or rural.⁵

Of the two methods, the land use procedure is considered more definitive. The land use within the total area circumscribed by a 3-km radius circle around the facility was classified using the land use typing scheme proposed by Auer. If land use types 23 (Developed, Medium Intensity), or 24 (Developed, High Intensity) account for 50% or more of the circumscribed area, urban dispersion coefficients should be used; otherwise, rural dispersion coefficients are appropriate.

AERSURFACE (v24142) was used for the extraction of the land-use values in the domain. The results of the land use analysis evaluation were as follows.

Each USGS NLCD 2016 land use class was compared to the most appropriate Auer land use category to quantify the total urban and rural area. Table 4 summarizes the results of this land use analysis. As shown, approximately 84% of the area can be classified as rural, which is well in excess of the 50% threshold established in the Auer procedure. There, rural dispersion coefficients will be used in AERMOD.

⁴ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised)*, Research Triangle Park, North Carolina, EPA 450/4-80-023R, June 1985.

⁵ 40 CFR Part 51, Appendix W, the Guideline on Air Quality Models (January 2017) – Section 7.2.1.1(b)(i)

Table 4. Summary of Land Use Analysis

Category ID	Category Description	Number of Grid Cells	Percent	Dispersion Class
11	Open Water	48	0.2%	Rural
21	Developed, Open Space	10,215	32.5%	Rural
22	Developed, Low Intensity	8,678	27.6%	Rural
23	Developed, Medium Intensity	3,437	10.9%	Urban
24	Developed, High Intensity	1,558	5.0%	Urban
31	Barren Land	1	0.0%	Rural
41	Deciduous Forest	266	0.8%	Rural
42	Evergreen Forest	63	0.2%	Rural
43		3,847	12.2%	Rural
52	Shrub/Scrub	225	0.7%	Rural
71	Grassland/Herbaceous	34	0.1%	Rural
81	Pasture/Hay	1,743	5.5%	Rural
82	Cultivated Crops	207	0.7%	Rural
90	Woody Wetlands	1,042	3.3%	Rural
95	Emergent Herbaceous Wetlands	46	0.1%	Rural
Total		31,410	100%	
Urban			15.9%	
Rural			84.1%	

2.2.3 Building Downwash Analysis

AERMOD incorporates the PRIME downwash algorithms. Direction specific building parameters required by AERMOD are calculated using the BPIP-PRIME preprocessor (version 04274). CTC structures will be built into the model and downwash influences will be evaluated appropriately.

2.2.4 Receptor Grid and Coordinate System

Modeled concentrations will be calculated at ground-level receptors placed along the facility fenceline and on a variable Cartesian receptor grid. Fenceline receptors will be spaced no further than 50 meters apart. Beyond the fenceline, receptors will be spaced 100 meters apart on a Cartesian grid extending out to a distance sufficient to resolve the maximum concentration, but at least extending outward to 5 km in all directions. Additionally, less refined receptor grids will extend from the finest grid out to 10 km in each direction, with receptors spaced 250 meters apart from 5 km – 8 km from the facility and 500 meters from 8 km to 10 km from the facility. If the SIL is exceeded for any pollutant, additional modeling will be performed to determine the size of the significant impact area (SIA).

In general, the receptors will cover a region extending from all edges of the proposed facility ambient boundary to the point where impacts from the project are no longer expected to be significant. The boundary will be defined as all areas that are fenced and/or not accessible to the general public as shown in Figure 2.

For any pollutants exceeding the Class II SIL, a polar grid of receptors out to the SIA will be used to conduct the cumulative modeling for demonstrating compliance with the applicable NAAQS and PSD Increments. If the maximum concentration falls outside of the fine receptor grid, an additional 100-m spaced receptor grid will be used to ensure that the maximum is captured. If an air quality standard is exceeded, the MAXDCONT option in AERMOD will be used to determine if the proposed project is significant (above the corresponding SIL) at the receptors exceeding the standard.

Receptor elevations and hill heights required by AERMOD will be determined using the AERMAP terrain preprocessor (version 24142). Terrain elevations from the USGS 1-arc second NED will be used for AERMAP processing. In all modeling analysis data files, the location of emission sources, structures, and receptors will be represented in the UTM coordinate system, zone 15, NAD-83.

2.2.5 Meteorological Data

Given that site-specific meteorological data is not available for the proposed site, surface data collected by a representative meteorological site will be used. According to Appendix W, the selection of meteorological data to be used in the modeling analysis should be based on spatial and climatological (temporal) representativeness (EPA, 2017). The representativeness of the data is based on the following:

1. The proximity of the meteorological monitoring site to the area under consideration;
2. The complexity of terrain;
3. The exposure of the meteorological site; and
4. The period during which data are collected.

Site-specific meteorological data or data from National Weather Service (NWS) stations, universities, Federal Aviation Administration (FAA) stations, military stations, and others should be used if possible (EPA, 2017). The determination of representativeness of site-specific data for AERMOD applications cannot be based solely on proximity (EPA, 2018a). According to Appendix W, the implementation of NWS Automated Surface Observing Stations (ASOS) in the early 1990's should not preclude the use of NWS ASOS data if such a station is determined to be representative of the modeled area (EPA, 2017). Given that site-specific meteorological data is not available for the CTC site, surface data collected by a representative meteorological site will be used. Surface meteorological sites located within 120 km of the proposed site with available comprehensive meteorological data during the 2019-2023 period were evaluated.

Table 5. Meteorological Surface Stations Near Proposed Facility

Met Station ID	WBAN ID	Site Description	Base Elevation (m)	Distance from CTC (km)	Recoverability 2019-2023
AWM	53959	WEST MEMPHIS MUNICIPAL	63.7	23.1	92.19%
MEM	13893	MEMPHIS	76.8	5.7	99.18%
OLV	13815	OLIVE BRANCH	124.1	22.7	91.65%
NQA	93839	MILLINGTON REGIONAL	102.4	41.3	88.75%
UTM	23903	TUNICA MUNICIPAL	57.0	45.6	59.92%
CKM	00314	CLARKSDALE COUNTY	51.6	90.0	69.41%
JBR	03953	JONESBORO MUNICIPAL	79.9	105.5	89.78%
HKA	53869	BLYTHEVILLE MUNICIPAL	77.5	102.8	95.06%

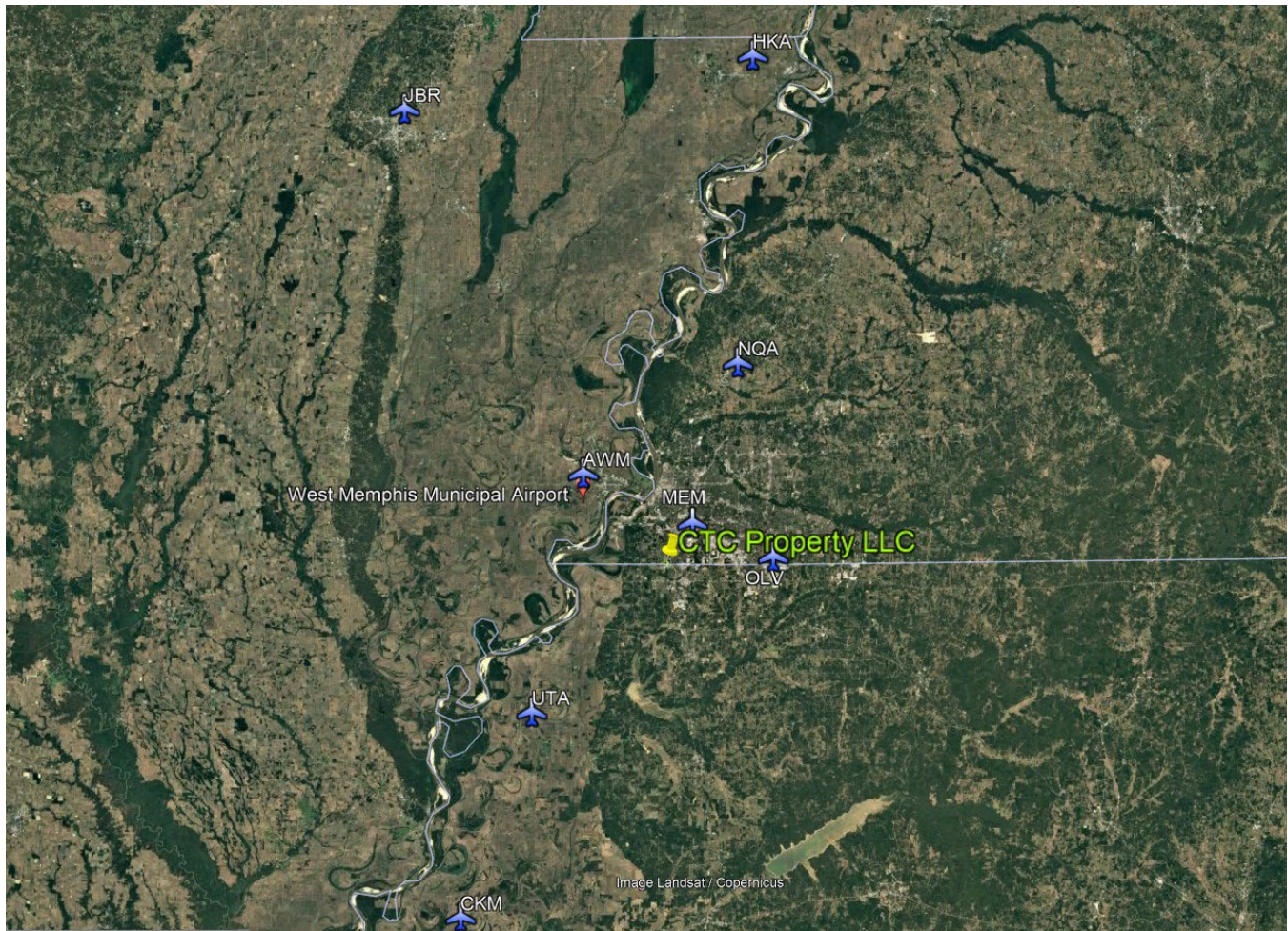


Figure 4. Meteorological Surface Stations Near Proposed Facility

All sites were analyzed for data completeness with AERMET using the latest available 5-year data set for each site. Based on the results, the three sites with the greatest recoverability (AWM, MEM, HKA) were analyzed further to determine recoverability by quarter over the 5-year period (2019-23). MEM showed greater than 90% recoverability for every quarter of each year. AWM showed less than 90% for one quarter and just above 90% for at least two more quarters during the 5-year period. HKA also showed less than 90% recoverability for one quarter and had several quarters below 95%. Given that MEM has complete, recent data and is located in such close proximity to the CTC site, MEM was reviewed to confirm representativeness.

Regulatory application of AERMOD necessitates careful evaluation of the meteorological data for input to AERMET. Data representativeness, in the case of AERMOD, means utilizing data of an appropriate type for constructing realistic boundary layer profiles.⁶ Calculations of the boundary layer parameters are dependent on the surface characteristics in the vicinity of the modeled facility. The surface characteristics are quantified by the assignment of three variables: albedo, Bowen ratio, and surface roughness length.

⁶ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guideline on Air Quality Models*, Appendix W, Revised January 17, 2017.

AERSURFACE was used to determine surface characteristics using land cover data from the U.S. Geological Survey (USGS) National Land Cover Data (NLCD) 2016 archives and look-up tables of surface characteristics that vary by land cover type and season.⁷ The surface variables were set to vary by season using 12 sectors. For the AERSURFACE analysis, the mean of the surface characteristics generated for average moisture conditions at each of the nearby meteorological stations were compared to the proposed CTC site. The results of the AERSURFACE analysis showed that MEM site has surface characteristics comparable to the proposed CTC site.

Table 6. Surface Characteristics of Selected Meteorological Stations

Meteorological Station ID	Mean Albedo	Mean Bowen Ratio	Mean Surface Roughness
Proposed CTC Site	0.165	0.700	0.029
MEM	0.170	0.883	0.042

The MEM meteorological site was also evaluated with a land cover analysis, a terrain analysis, a climate analysis, and a wind-rose analysis. For the land cover analysis, a one kilometer (km) radius was centered on the meteorological tower location, and the land use was categorized based on the 2019 NLCD.⁸ Impervious and canopy differences among the sites were also examined. The results showed that the MEM site had similar spatial distribution of land use, impervious coverage, and canopy coverage to CTC.

From the results of all analyses, the MEM NWS site was chosen to best represent the land use, terrain and exposure of the CTC site. According to Appendix W, Section 8.4.2(b), the surface characteristics input to AERMET should be representative of the land cover in the vicinity of the meteorological data, i.e., the location of the meteorological tower for measured data.⁹ Therefore, surface characteristics representative of the MEM NWS site will be used in AERMET. The area surrounding the proposed site and the MEM NWS is shown in Figure 5.

⁷ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *User's Guide for AERSURFACE Tool*, Research Triangle Park, North Carolina, EPA 454/B-20-008, February 2020.

⁸ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guideline on Air Quality Models*, Appendix W, Revised January 17, 2017.

⁹ Ibid.

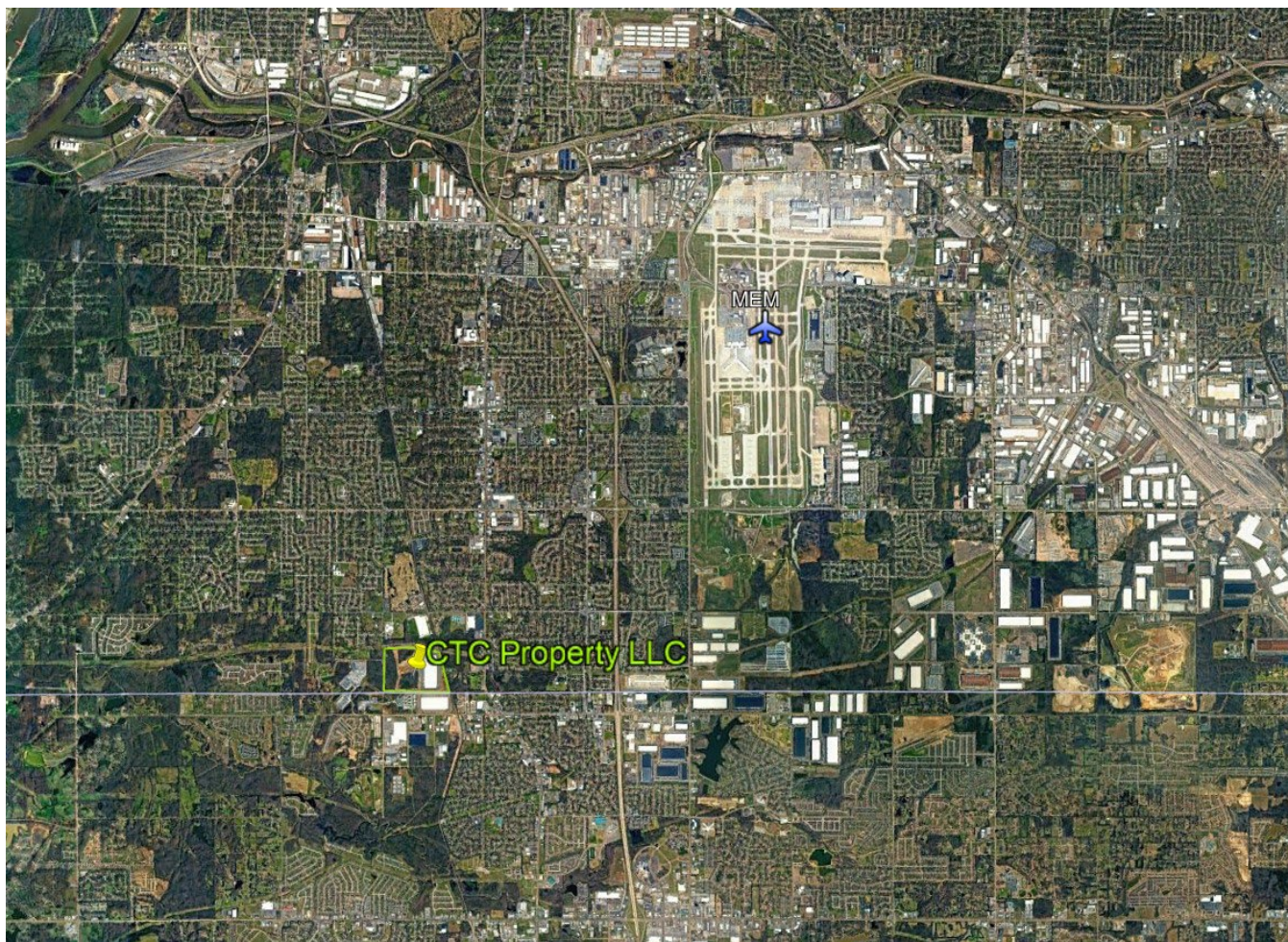


Figure 5. CTC Site and MEM Site

Characterization of surface moisture conditions for the NWS MEM site for each year of meteorology is presented in Table 7. The surface moisture conditions were determined by comparing precipitation for the period of data to be processed to the 30-year climatological record, selecting “wet” conditions if precipitation is in the upper 30th percentile, “dry” conditions if precipitation is in the lower 30th percentile, and “average” conditions if precipitation is in the middle 40th percentile.¹⁰

¹⁰ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *ERMOD Implementation Guide*, Research Triangle Park, North Carolina, EPA 454/B-23-009, 2023.

Table 7. Average Yearly Surface Moisture Conditions for MEM

Year	Annual Precipitation ¹	Surface Moisture Classification ²
2019	73.14	WET
2020	58.85	AVG
2021	51.80	AVG
2022	51.96	AVG
2023	51.96	AVG

¹. <https://www.ncdc.noaa.gov/cdo-web/search>.

². <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/county/time-series>.

According to Appendix W, the EPA has integrated the ADJ_U* option into AERMET as a regulatory option to address issues with model over-prediction of ambient concentrations from some sources associated with under-prediction of the surface friction velocity (u^*) during light wind, stable conditions.¹¹ The ADJ_U* option is specifically recommended for sources using standard NWS airport meteorological data, site-specific meteorological data without turbulence parameters, or prognostic meteorological inputs derived from prognostic meteorological models. The ADJ_U* option will be used in AERMET Stage 3.

For upper air data, the closest upper air station is located at the NWS in North Little Rock, AR. Twice daily soundings from the NWS KLZK for the 2019-2023 period will be used in AERMET.

The proposed facility is located in Shelby County, TN. The Tennessee Department of Environment and Conservation (TDEC), provided available meteorological data based on the Memphis International Airport surface station (ID 13893), and the North Little Rock upper air station (ID 3952).¹² The meteorological data set provided by TDEC covered the time period from 2019 to 2023, and included meteorological data processed with the ADJ_U* option of AERMET using AERMET v18081. The data was processed and prepared using the surface characteristics of the Memphis International Airport surface station. A surface station elevation of 271 ft will be utilized in the modeling analyses.

This meteorological data set, obtained from TDEC, is proposed for use for all modeling analyses with AERMOD.

2.2.6 Source Types and Parameters

The AERMOD dispersion model allows for emission units to be represented as point, area, or volume sources. Point sources with unobstructed vertical releases will be modeled with their actual stack parameters (i.e., height, diameter, exhaust gas temperature, and gas exit velocity). Any capped/horizontal point sources will be modeled using the capped/horizontal point source options of the AERMOD model. Fugitive sources (volume/area sources) will be modeled with appropriate parameters given the nature/characteristics of the source and release in question.

¹¹ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guideline on Air Quality Models*, Appendix W, Revised January 17, 2017.

¹² E-mail from Haidar Alrawi of TDEC to Jonathan Hill of Trinity, dated September 16, 2024.

2.2.7 GEP Stack Height Analysis

EPA has promulgated stack height regulations that restrict the use of stack heights in excess of “Good Engineering Practice” (GEP) in air dispersion modeling analyses. Under these regulations, that portion of a stack in excess of the GEP height is generally not creditable when modeling to determine source impacts. This essentially prevents the use of excessively tall stacks to reduce ground-level pollutant concentrations.

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to the wake effects of the structure. The wind direction-specific downwash dimensions and the dominant downwash structures used in this analysis are determined using BPIP. In general, the lowest GEP stack height for any source is 65 meters by default.¹³ A preliminary evaluation has indicated that none of the proposed emission unit stacks will exceed GEP height.

2.2.8 Ozone and PM_{2.5} Formation

In April 2018, the EPA released guidance recommending SILs for ozone and PM_{2.5} (EPA, 2018a). Although this guidance was not a final agency action and did not create any binding requirements on permitting authorities, permit applicants, or the public, the recommended SILs could be used to demonstrate that a proposed source does not cause or contribute to a violation of the NAAQS or PSD increments. On April 30, 2024, the EPA provided supplemental guidance to the SILs for ozone and PM_{2.5} which retained the SILs for ozone and 24-hour PM_{2.5} and recommended new, lower SILs for annual PM_{2.5} (EPA, 2024). CTC will use the latest recommended Class II SILs for ozone and PM_{2.5} to assess potential secondary pollutant impacts from the proposed facility.

In July 2022, the EPA provided final guidance on how to implement the modeling requirements to show PSD compliance for ozone and PM_{2.5}.¹⁴ To make the required NAAQS or PSD increment compliance demonstration, proposed sources should provide a full accounting of the combined impacts of each allowable precursor (and the direct component of PM_{2.5}) emissions on ambient concentrations of the relevant ozone and PM_{2.5} NAAQS if any precursor(s) (or the direct component of PM_{2.5}) would be emitted in a significant amount. In other words, for ozone, if either NO_x or VOC precursor emissions would be emitted in a significant amount (i.e., above their SER), then both precursors should be included in the assessment of ozone impacts. For PM_{2.5}, if a source would emit a significant amount of one or more of NO_x, SO₂, or direct PM_{2.5} emissions, then the source should include NO_x and SO₂ precursor as well as direct PM_{2.5} emissions in the assessment of PM_{2.5} impacts. Primary impacts of PM_{2.5} will be estimated with the AERMOD modeling system.

To estimate ozone and total PM_{2.5} impacts, the EPA released final guidance on the use of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 demonstration tool.¹⁵ The tool relates single source impacts on secondary pollutants (ozone and secondary PM_{2.5}) with an air quality threshold to determine if such an impact causes or contributes to a violation of the appropriate NAAQS and PSD Increments.¹⁶ MERPs reflect levels of increased precursor emissions that are not expected to cause a significant contribution to ozone

¹³ 40 CFR §51.100(ii)

¹⁴ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidance for Ozone and Fine Particulate Matter Permit Modeling*, Research Triangle Park, North Carolina, July 2022.

¹⁵ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program*, Research Triangle Park, North Carolina, 2019.

¹⁶ Ibid.

and PM_{2.5}. In practice, MERPs are intended to be used with SILs as analytical tools for PSD air quality analyses.

The November 22, 2019 TDEC guidance document titled *Tennessee Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate Formation in Tennessee Under the New Source Review (NSR) Prevention of Significant Deterioration Program (PSD)* identified four hypothetical sites to represent sources in Tennessee: Shelby County, TN; Giles County, TN; Barren County, KY; and Ashe County, NC.¹⁷ The Shelby County (Memphis) hypothetical source is chosen as the representative source for the ozone MERPs analysis. The greater metropolitan Memphis area is less than 50 km from the project location, and the project site and hypothetical source are in the same regional area for influences on ozone formation from VOC and NO_x emissions. The appropriate tpy/stack height combination will be chosen for the pollutants in question and the calculations conducted will be consistent with TDEC and EPA guidance to evaluate project-based impacts compared to the ozone SIL. If a refined analysis for ozone becomes necessary, then the procedures provided in TDEC and EPA guidance will be utilized to evaluate project based impacts compared to existing background concentrations of ozone and the ozone NAAQS.

The TDEC guidance document established a state-specific Tier 1 procedure for a demonstration that a project will not cause or contribute to ambient air quality impacts of PM_{2.5} associated with secondary PM_{2.5} emissions. The modeling report to be provided with the permit application for this project will include a Tier 1 assessment for secondary PM_{2.5} in accordance with TDEC's MERPs guidance, using the above discussed Shelby County, TN hypothetical source. Project based emissions for NO_x and SO₂ will be used to derive an applicable concentration contribution to the significance modeling results for PM_{2.5}. If significance modeling results for PM_{2.5} exceed the SILs, then NAAQS based secondary PM_{2.5} impacts will be estimated per information provided on Page 14 of TDEC guidance. For any required PM_{2.5} PSD Increment evaluation, offsite source NO₂ emissions from increment consumers from the regional inventory will be utilized to derive an estimated secondary PM_{2.5} impact as part of the PSD Increment evaluation. Precursor based emission impacts on all PM_{2.5} modeling for this project will be considered.¹⁸

2.2.8.1.1 Ozone Assessment

Ozone impacts for the SILs analysis will be calculated as the sum of the ratio of precursor emissions to the MERPs following TDEC guidance as outlined in Equation 3.1.¹⁹ If the sum of the ratios is less than 1, then ozone impacts are below the ozone SIL and no cumulative analysis is necessary.

$$\left(\frac{NOX \text{ Emissions}}{NOX \text{ MERP}} \right) + \left(\frac{VOC \text{ Emissions}}{VOC \text{ MERP}} \right) < 1$$

If ozone impacts are greater than one (1), a cumulative ozone impact analysis will be performed following TDEC guidance. If a cumulative ozone analysis is needed, the 3-year monitoring design value will be added

¹⁷ Tennessee Department of Environment and Conservation, *Tennessee Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate Formation in Tennessee Under the New Source Review (NSR) Prevention of Significant Deterioration Program (PSD)*, November 2019.

¹⁸ Appropriate secondary PM_{2.5} impacts for the Class I SILs analysis will be derived from the similar TDEC worst case hypothetical sources using the distance based data made available on the EPA Qlik website, using the Shelby County, TN site as a representative site. The Shelby County, TN site is the closest potential hypothetical source location to the project location, and is located in the same regional airshed as the project location. (<https://www.epa.gov/scram/merps-view-qlik>)

¹⁹ Tennessee Department of Environment and Conservation, *Tennessee Guidance on the Use of EPA's MERPs to Account for Secondary Ozone and Fine Particulate Formation in Tennessee Under the New Source Review (NSR) Prevention of Significant Deterioration Program (PSD)*, November 2019.

to the product of the ozone SIL with the ratio of the proposed emission increases of each precursor to its representative MERP. If the calculated cumulative ozone impacts do not exceed the NAAQS, precursor emissions from CTC will not cause or contribute to a violation of the ozone NAAQS.

2.2.8.1.2 Secondary PM_{2.5} Assessment

Combined primary and secondary impacts of PM_{2.5} for the 24-hour and annual SILs analyses will be assessed using the highest modeled primary PM_{2.5} concentration, the applicable Class II SILs, precursor emissions, and the representative MERPs. Because the TN MERPs equations for annual PM_{2.5} have not incorporated the revised SILs at the time of this protocol submission, the EPA MERPs equations will be used for estimating secondary annual PM_{2.5}. If the combined impacts are less than the guidance-established thresholds, the PM_{2.5} SILs will not be exceeded, and no additional analyses will be necessary.

24-hour PM_{2.5}.

If PM_{2.5} impacts are greater than the SIL thresholds, a cumulative PM_{2.5} impact analysis will be performed. For the NAAQS analysis, the monitoring design value will be added to the project's highest modeled PM_{2.5} impacts from the cumulative analyses and to representative MERP ratios.

For the PSD increment consumption analysis, the direct and the secondary component of PM_{2.5} increment consumption from the proposed project as well as direct PM_{2.5} emissions and precursor emissions from any nearby PM_{2.5} increment sources will be included. No background monitoring values will be applied.

If the cumulative total 24-hour and annual PM_{2.5} impacts do not exceed the corresponding NAAQS or the PSD Increments, emissions from CTC will not cause or contribute to a violation of the PM_{2.5} standards.

2.2.9 NO₂ Modeling Approach

The revised *Guideline* now indicates Ambient Ratio Method 2 (ARM2) has replaced ARM as the regulatory default Tier 2 NO₂ modeling method. CTC proposes to utilize ARM2 for modeling NO₂ for the 1-hour and annual SIL and NAAQS modeling assessments, and for the annual PSD increment modeling assessment. Should further refinement be needed with Tier 3 modeling methods, such as the Ozone Limiting Method (OLM) or Plume Volume Molar Ratio Method (PVMRM), CTC will contact the SCHD.

2.2.10 PM_{2.5} Precursor Emissions Modeling

The April 2019 EPA guidance document titled *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM_{2.5} under the PSD Permitting Program* establishes Tier 1 procedures for demonstrating that a project will not cause or contribute to ambient air quality impacts of PM_{2.5} associated with secondary PM_{2.5} emissions. The modeling report to be provided with this permit application will include a Tier 1 assessment for secondary PM_{2.5} in accordance with the most recent EPA MERPs guidance. Precursor based emission impacts on all PM_{2.5} modeling for this project will be calculated and added to the direct PM_{2.5} impacts determined from the AERMOD model in all SIL and cumulative analyses (if required).

2.3 Class II Significance and NAAQS Analysis

The Significance Analysis is conducted to determine whether emissions increases associated with the potential project could cause a significant impact on the area surrounding the facility. "Significance" is analyzed based on modeling only the new, modified, or associated sources comprising the project; no existing unmodified or associated sources, nor regional facility sources, are included.

“Significant” impacts are defined by design concentration thresholds commonly referred to as the SILs. CTC will model the project associated sources for significance. All project associated sources for the potential project will be new facility sources, and thereby modeled as part of the significance analysis, at their potential emission rates.

Table 8 lists the SIL, NAAQS, and Class II PSD Increments for all relevant NSR regulated pollutants for the potential project, subject to modeling, which will be undergoing PSD permitting.²⁰

Table 8. Significant Impact Levels, NAAQS, Class II PSD Increments, and Significant Monitoring Concentrations for Relevant NSR Regulated Pollutants

Pollutant	Averaging Period	PSD Class II SIL ($\mu\text{g}/\text{m}^3$)	Primary and Secondary NAAQS ($\mu\text{g}/\text{m}^3$)	Class II PSD Increment ($\mu\text{g}/\text{m}^3$)	Significant Monitoring Concentration ($\mu\text{g}/\text{m}^3$)
PM ₁₀	24-hour	5	150	30	10
	Annual	1	--	17	--
PM _{2.5}	24-hour	1.2	35	9	--
	Annual	0.13	9	4	--
SO ₂	1-hour	7.8	196	--	--
	3-hour	25	1,300	512	--
	24-hour	5	365	91	13
	Annual	1	80	20	--
NO ₂	1-hour	7.5	188	--	--
	Annual	1	100	25	14
Ozone	8-hour	1 ppb	137	--	VOC or NO _x emissions increase > 100 tpy
CO	1-hour	500	40,000	--	--
	8-hour	2,000	10,000	--	575

The highest design concentrations out of all given modeling years for each pollutant-averaging time is then compared to the SIL shown in Table 1 to determine if the ambient air impact is significant. In the case of 24-hour and annual PM_{2.5} evaluations, EPA guidance states that the applicant should determine the maximum concentration at each receptor per year, then average those values on a receptor-specific basis over the 5 years of meteorological data prior to comparing with the appropriate SIL. This methodology will be used for both the PM_{2.5} NAAQS and Increment SIL analyses.

2.4 Class II Cumulative Impact Analysis

When modeled design concentrations are less than the applicable SIL, further analyses (NAAQS and PSD Increment) are not required for that pollutant-averaging period. If modeled impacts are greater than the SIL, a full NAAQS and PSD Increment analysis is required for that pollutant and averaging period to demonstrate that the project neither causes nor contributes to any exceedances.

²⁰ Class I analyses are addressed in a following section.

The PSD regulations were enacted primarily to “prevent significant deterioration” of air quality in areas of the country where the air quality was better than the NAAQS. Therefore, to promote economic growth in areas where attainment of the NAAQS occurs, some deterioration in ambient air concentrations is allowed. To achieve this goal, the EPA established PSD Increments for PM₁₀, PM_{2.5}, SO₂, and NO₂. The PSD Increments are further broken into Class I, II, and III Increments. Since all short-term Class II Increments (Table 2) are not to be exceeded more than once per year, the H2H modeled impacts for 24-hour averaging periods for respective pollutants from among the five modeled meteorological years will be compared against the short-term Increment. The highest annual average concentrations will be compared against the annual Increment.

Table 9. Class II Increments

Pollutant	Averaging Period	Class II Increment (µg/m ³)
PM _{2.5}	24-hour	9
	Annual	4
PM ₁₀	24-hour	30
	Annual	17
SO ₂	3-hour	512
	24-hour	91
	Annual	20
NO ₂	Annual	25

2.4.1 Regional Source Inventory (Class II Modeling)

For any off-site impact calculated in the Significance Analysis that is greater than the SIL for a given pollutant, a NAAQS/Increment analysis incorporating nearby sources is required. The initial SIA radius will be the radius of the pollutant-specific largest distance to which the SIL is exceeded. These distances are anticipated to be less than 6 km for PM₁₀, PM_{2.5}, and NO₂ (including 1-hr NO₂).

CTC proposes to limit all offsite inventory sources for consideration to only those sources within 50 km of the proposed facility. A comprehensive emissions inventory of all nearby point sources will be requested from SCHD. Nearby sources will also be requested from the Mississippi Department of Environmental Quality (MDEQ) and the Arkansas Division of Environmental Quality (ADEQ). This inventory will be used to determine which nearby sources will be included in the cumulative impact modeling. All nearby sources of the pollutant within the SIA will be included in the modeling regardless of the level of emissions. For nearby sources up to 50 km outside the SIA, a Q/D (emission rate/distance) screening assessment will be used to determine the additional sources to be modeled. Application of the Q/D assessment involves determining the total annual emission rate (Q) of all sources at a nearby plant and dividing by its distance (D) from the proposed CTC site. If the ratio is greater than or equal to 20, the nearby source will be included in the NAAQS/Increment analysis. Clusters of sources will also be evaluated for inclusion in the modeling if they have a combined Q/D greater than or equal to 20. Sources with a Q/D less than 20 and sources beyond 50 km will be indirectly accounted for in the background monitored concentration. No building downwash will be performed for these sources.

Limiting the extent and scope of the modeling inventory is supported by EPA statements in the most recently revised Appendix W. Alternative methods for inventory development may be used in accordance with the *Guideline* which states that

*"The number of nearby sources to be explicitly modeled in the air quality analysis is expected to be few except in unusual situations. In most cases, the few nearby sources will be located within the first 10 to 20 km from the source(s) under consideration. Owing to both the uniqueness of each modeling situation and the large number of variables involved in identifying nearby sources, no attempt is made here to comprehensively define a "significant concentration gradient." Rather, identification of nearby sources calls for the exercise of professional judgment by the appropriate reviewing authority..."*²¹

Given use of ambient monitoring and background data within the greater Memphis area, many of the nearby source emissions will likely already be accounted for within the ambient background monitoring concentrations, leading credence to the use of a limited inventory area for the modeling assessment.

If a PSD increment consumption analysis is required, the construction date of the nearby sources that met the criteria for inclusion in the NAAQS analysis will be reviewed, and all sources which were constructed after the major source baseline date will be included in the PSD increment consumption analysis.

2.4.2 Background

Ambient background monitoring concentrations are necessary for any required full NAAQS analysis for the facility. Nearby ambient background monitoring stations were reviewed, and the following stations were chosen as appropriately representative ambient background monitoring stations for the pollutants indicated. Preference was given to ambient monitoring sites in Tennessee inside the Memphis metropolitan area. The monitors selected are:

- ▶ PM₁₀/PM_{2.5} – Memphis 6388 Haley Rd. Shelby Farms Site (AQS Site ID 47-157-0075)
- ▶ NO₂ – Memphis 5767 Macon Cove Site (AQS Site ID 47-157-0100)

The Shelby Farms Site was chosen for PM₁₀/PM_{2.5} consideration as it was not a "near road" monitor, was in a geographic location more similar to the area around the proposed site than other monitors in the Memphis area, and it is considered an urban scale monitor, considering more regional scale impacts to the monitor. While not the geographically closest ambient PM_{2.5} monitor to the proposed site, this monitoring location is in a more representative geographic area (e.g. not in high traffic or downtown Memphis area), than other more nearby monitors.

The Macon Cove site was chosen for NO₂ background values as it is considered an urban scale/regional monitor in the Memphis area. Although it is a near road monitor, this should provide a more conservative background value for use in the NO₂ modeling analysis.

While background concentrations in the form of the NAAQS standards will be derived for use in the NAAQS modeling analyses results summaries, background concentrations may be derived for use in the NAAQS analyses based on a season and hour-of-day approach. Available EPA guidance (e.g. *Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the NO₂ National Ambient Air Quality Standard, September 2014*) would be used for derivation of the season and hour of day background concentrations. Locations of the selected background monitors are shown in Figure 6.

²¹ Appendix W, Section 8.3.3.b.iii

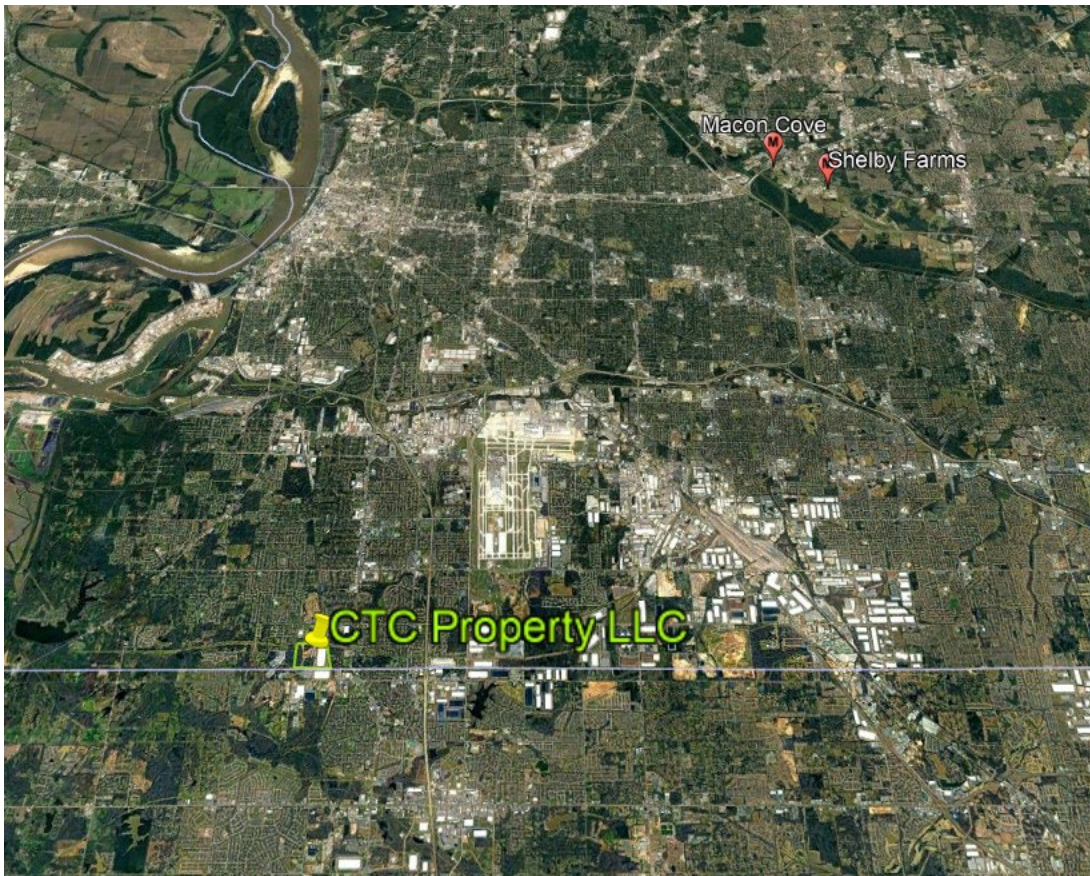


Figure 6. Location of Selected Background Monitors

2.5 Class I Area Impact Analysis

The Class I Area Impact Analysis is conducted to determine whether emissions increases associated with the potential project could cause a significant impact on pristine areas of the United States, such as national parks, forests, and wildlife refuges.

2.5.1 Class I Significance Analysis

With the Class I Significance Analysis, applicants must show that the proposed project will not cause or contribute to violations of any Class I SILs. Additional AERMOD modeling will be performed to assess potential impacts on the Class I SILs. Since AERMOD is EPA's preferred model for assessing impacts at distances up to 50 km, and the nearest Class I area is located over 200 km away, a 360-degree receptor ring will be placed at 50 km from the project site. If the concentrations at these receptors fall below the Class I SILs, the concentrations at the Class I areas would likewise be below the SILs.

2.5.2 Class I AQRV Area Analysis

Class I areas are federally protected areas for which more stringent air quality standards apply to protect unique natural, cultural, recreational, and/or historic values. The Class I area of primary concern for the proposed facility is the Mingo Wilderness in Missouri, as it is the closest Class I area to the facility. The Mingo Wilderness is located approximately 210 km away from the proposed facility. The following Class I

areas are located within 300 km of the proposed facility (with the approximate distance to the proposed facility listed) ²²:

- ▶ Mingo National Wildlife Refuge (210 km)
- ▶ Sipsey Wilderness (251 km)



Figure 7. Class I Areas Within 300 km of CTC

All other Class I areas are located at distances greater than 300 km from the proposed facility.

The Federal Land Managers (FLM) have the authority to protect air quality related values (AQRVs), and to consider in consultation with the permitting authority whether a proposed major emitting facility will have an adverse impact on such values. AQRVs for which PSD modeling is typically conducted include visibility and deposition of sulfur and nitrogen.

The ratio of emissions to Class I distance (e.g., Q/D) for this project for the Class I areas within 300 km will be considered in order to determine if the FLM will require a full AQRV analysis. The FLM's AQRV Work Group (FLAG) 2010 guidance states that a Q/D value of ten or less indicates that AQRV analyses should not be required.²³ The Q/D ratio for all Class I areas within 300 km of the facility was evaluated and demonstrated that impacts will be less than 10. Initial screening criteria were calculated for the Class I areas using proposed CTC plant maximum daily emission estimates, and are presented in Table 10. As shown, AQRV analyses will not be required for this project.

²² All distances approximate and based on data obtained from the Class I Area distance tool as published by the FL DEP at <https://floridadep.gov/air/air-business-planning/content/class-i-areas-map>

²³ U.S. Forest Service, National Park Service, and U.S. Fish and Wildlife Service. 2010. *Federal land managers' air quality related values work group (FLAG): phase I report, revised (2010)*. Natural Resource Report NPS/NRPC/NRR, 2010/232. National Park Service, Denver, Colorado.

Table 10. Class I Q/D Screening Analysis

A	Mingo Wilderness Area	Sipsey Wilderness Area
SO₂	161.7	161.7
NO_x	408.1	408.1
PM₁₀	325.7	325.7
H₂SO₄	0	0
Total Emissions	895.5	895.5
Distance (km)	210	251
Q/d	4.3	3.6

2.5.3 Ambient Monitoring Requirements

In addition to determining whether the applicant can forego further modeling analyses, the PSD Significance Analysis is also used to determine whether the applicant is exempt from ambient monitoring requirements. To determine whether pre-construction monitoring should be considered, the maximum impacts attributable to the proposed project are assessed against Significant Monitoring Concentrations (SMC). The SMC for the applicable averaging periods are provided in 40 CFR §52.21(i)(5)(i) and are listed in Table 1.

A pre-construction air quality analysis using continuous monitoring data may be required for pollutants subject to PSD review per 40 CFR §52.21(m). If either the modeled impact from an emissions increase or the existing ambient concentration is less than the SMC, an applicant may be exempt from pre-construction ambient monitoring. The SMC value for PM_{2.5} was vacated on January 22, 2013, however, EPA responded to the vacatur by indicating that existing monitors should be sufficient to fulfill ambient PM_{2.5} monitoring requirements. Given the extensive network of ambient PM_{2.5} monitors in the Memphis area, the existing ambient monitoring network should satisfy any ambient PM_{2.5} monitoring requirements.

2.5.4 Ozone Ambient Impact Analysis

Elevated ground-level ozone concentrations are the result of photochemical reactions among various chemical species. These reactions are more likely to occur under certain ambient conditions (e.g., high ground-level temperatures, light winds, and sunny conditions). The chemical species that contribute to ozone formation, referred to as ozone precursors, include NO_x and VOC emissions from both anthropogenic (e.g., mobile and stationary sources) and natural sources (e.g., vegetation). Pursuant to 40 CFR 52.21, ambient ozone monitoring will not be required unless a facility's emissions increase is greater than 100 tpy of VOC or NO_x.

EPA also recently issued guidance specifying a SIL value for ozone of 1 ppb, and has developed a new potential demonstration (the MERPs guidance) to provide a framework for a Tier 1 demonstration that can illustrate that a project will not cause or contribute to any violation of ambient ozone standards. The April 2019 EPA guidance document titled *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM_{2.5} Under The PSD Permitting Program* will be used to provide a Tier 1 demonstration that ozone impacts from the project will not cause or contribute to ambient air quality levels of ozone.

2.6 Additional Impact Analysis

The PSD regulations require an additional impacts analysis for each pollutant emitted by a source, including the analysis of the effects of emissions on soils, vegetation and visibility caused by any increase in emissions from the source and from associated growth. The depth of the analysis performed generally depends on existing air quality, the quantity of air emissions, and the sensitivity of local soils and vegetation. The additional analysis will follow EPA's guidance provided in the New Source Review Workshop Manual (EPA, 1990).

An economic growth analysis is intended to assess the amount of new growth that is likely to occur in support of the new project and to estimate emissions resulting from associated growth. Associated growth relates to any residential and commercial/industrial growth that may result from the proposed project. Residential growth depends on the number of new employees and the availability of housing in the area, while associated commercial and industrial growth consists of new sources providing services to the new employees and the facility. The proposed project will not result in a change of the current resources necessary to operate and support the project. Therefore, additional economic growth impacts from the proposed project will be minimal. No significant air quality degradation due to associated growth will be expected. Construction activities will also be planned so that no adverse air quality or visibility impacts occur.

The potential for soil and vegetation impacts from increased emissions from CTC will be evaluated on recreationally and commercially valuable vegetation located in the area. The criteria for evaluating impacts on soils and vegetation will be taken from the EPA's, "A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals".²⁴ Estimated ambient impacts from CTC will be compared to minimum impact levels for effects on sensitive vegetation as suggested by the EPA. These screening values represent the minimum concentrations at which adverse growth effects or tissue injury in exposed vegetation are reported. Likewise, the potential for soil impacts will also be assessed. State-of-the-art construction equipment and emission controls will be used to keep potential air pollutant impacts less than ambient air quality standards, which are protective of secondary effects on soils and vegetation. Therefore, no adverse impacts to soils or vegetation within the site vicinity are anticipated.

To assess near-field visual impacts from CTC at Class II sensitive areas, the methodology and assumptions outlined in the FLAG report and the EPA's Workbook for Plume Visual Screening and Analysis will be reviewed. As directed by SCHD, the nearest sensitive areas within 20 km of ACT will be evaluated for VISCREEN modeling. The sensitive areas will include regional and international airports as well as state and national parks.

Table 11. Class II Sensitive Areas Within 20 km of CTC

Class II Sensitive Area	Distance from CTC (km)
T.O. Fuller State Park	8.1
Isle-a-port Airport (AP)	12.0
Memphis Intl. AP	4.6
Old Forest State Natural Area	16.3

²⁴ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals*, Research Triangle Park, North Carolina, 1980.

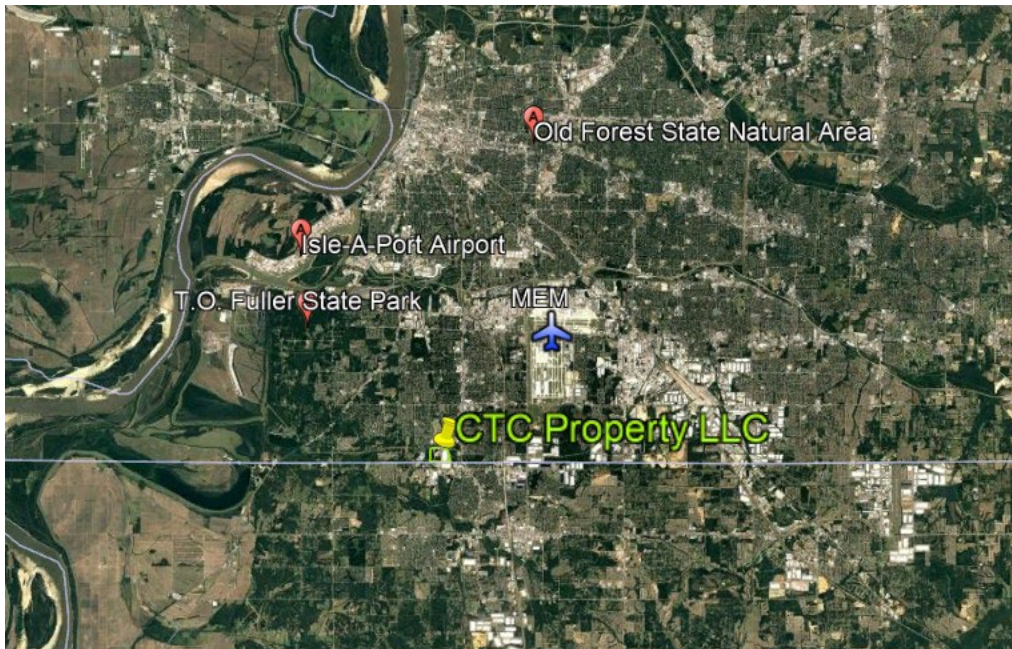


Figure 8. Class II Sensitive Areas Within 20 km of CTC

3. SUMMARY AND APPROVAL OF MODELING PROTOCOL

CTC is supplying this written preliminary protocol so that SCHD can formally comment on, approve the methodologies to be used for this analysis, and request any additional information. CTC requests a written response to this protocol as soon as possible. All modeling files and reports will be provided electronically, as part of the permit application.