

Exhibit 6



LEE HARRIS
MAYOR

SHELBY COUNTY HEALTH DEPARTMENT



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Shelby County Health Department

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June 2, 2025

Via Electronic Mail: (panderson@selc.org)

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**RE: Response to Public Comments on Draft Construction
Air Permit No. 01156-01PC for CTC Property LLC**

Dear Mr. Anderson:

The Shelby County Health Department, Pollution Control Section (the Department) would like to thank Southern Environmental Law Center (SELC) for comments regarding the Draft Construction Air Permit for CTC Property LLC, source No. 01156, located within an industrial-zone complex at 3231 Paul R. Lowry Road in Memphis, Tennessee, provided in a correspondence dated April 30, 2025. The Department acknowledges and responds to the comments received from the SELC, which comments were supported by Memphis Community Against Pollution, Young, Gifted & Green, and the Chickasaw Group of the Tennessee Chapter of the Sierra Club.

The majority of the SELC comments focus primarily on the temporary turbine engines that will soon be removed from the site, not the permanent turbines associated with the air construction permit. SELC asserts in varying degrees that granting the air construction permit will improperly allow the temporary turbine engines on site to continue operating indefinitely. The draft permit under review will ensure that CTC will be authorized to construct and operate only 15 permanent turbines at the facility.

Since CTC has not requested a permit for the temporary turbine engines, which are scheduled to be removed from the site by the end of July 2025, comments focused on those engines are beyond the scope of this air permit process.

The following are Department responses to the comments referenced in your submittal.

Comment I: *“The Department Cannot Issue the Permit Without Addressing the 35 Existing Unpermitted Turbines”*

As indicated above, any concerns regarding the temporary natural gas-fired turbine engines that are scheduled to be removed prior to 365 days on site is beyond the scope of this permit action.

SELC noted the permit application evaluation (PAE) states that xAI has already constructed 15 SMT-130 turbines on the site, only eight of the 35 temporary turbines are SMT-130 turbines. The PAE also inaccurately states that each of the 15 SMT-130 turbines is already equipped with Selective Catalytic Reduction (SCR). This was an error in the PAE and has been corrected in Section III of the PAE under “Purpose of Application” as follows:

“The Department received an initial filing application for the Center on January 3, 2025, along with the revisions submitted on January 7, February 5, and March 7, 2025. This permit is being processed as a construction permit (Construction Permit No. 01156-01PC).

The Center will consist of fifteen (15) natural gas-fired Solar SMT-130 turbine generators, each rated at 16.48 megawatts. 150 MW of capacity will also be supplied by Memphis Light, Gas, and Water (MLGW), which helps meet the energy demands of information technology hardware and supporting infrastructure.

Each turbine will be equipped with Solar’s Dry Low Emission (DLE)/SoLoNO_x control technology, followed by selective catalytic reduction (SCR) and oxidation catalyst systems to reduce emissions of nitrogen oxides (NO_x), carbon monoxide (CO), and volatile organic compounds (VOC). As a result, the Center qualifies for synthetic minor permitting and is classified as an area source for hazardous air pollutants (HAPs).”

In regards to an apparent allegation that the facility “began actual construction” of a “stationary source” prior to receiving a required air construction permit for that source, the Department considers this incorrect for two reasons.

First, the temporary turbine engines are “nonroad engines,” not “stationary sources,” because they are portable and have not remained at the same site for more than one year.^{1,2} Furthermore, the United States Environmental Protection Agency (USEPA) is aware of and has not objected to the determination that the temporary turbine engines are not subject to stationary source air permitting requirements.

Second, bringing the temporary turbine engines onsite did not constitute “beginning actual construction” of a stationary source because they are not permanent, and a source only “begins actual construction” when it conducts an activity that is intended to be “permanent” and involves work “on an emission unit.”²

1 See 42 USC § 7602(z) (“The term ‘stationary source’ means generally any source of an air pollutant *except* those emissions resulting directly from an internal combustion engine for transportation purposes or from a *nonroad engine*.”); 40 CFR § 1068.30 (“A nonroad engine is an internal combustion engine that meets any of the following criteria: (1)(iii) “By itself or in or on a piece of equipment, it is *portable or transportable*, meaning *designed to be and capable of being carried or moved from one location to another*. Indicia of transportability include, but are not limited to, wheels, skids, carrying handles, dolly, trailer, or platform.” (2) “An internal combustion engine is not a nonroad engine if it meets any of the following criteria:” ... (2)(iii) “The engine ... remains or will remain at a location for more than 12 consecutive months.”)

2 40 CFR § 52.21(b)(11) (“Begin actual construction means, in general, initiation of physical on-site construction activities on an emissions unit which are of a permanent nature.”) See also USEPA Memorandum, “Interpretation of ‘Begin Actual Construction’ Under the New Source Review Preconstruction Permitting Regulations, at (Mar 25, 2020) (“EPA further stated that the NSR rules ‘prohibit any construction activities that are of a permanent nature related to the specific project for which a PSD permit is needed,’ as opposed to ‘general construction not related to the emission unit(s) in question, prior to receipt of a construction permit.’”).

Bringing the temporary turbine engines on site; therefore, did not constitute beginning actual construction of a stationary source without a required air permit (even if those permitting requirements could apply to nonroad engines).³

The existing temporary turbines at CTC are not relevant to the permit that CTC has requested for the 15 permanent turbines that it plans to construct with SCR control technology. CTC's permit application met all legally applicable requirements for issuance of an air construction permit for these 15 units.

Comment II: *"All 35 Gas Turbines Operating on the Site Require a Permit"*

A. "The Local Implementation Plan Requires Large Combustion Turbines—Even if Temporary or Portable—to Get a Construction Permit Before Installation"

The Department does not agree with this comment. The Department considers the 35 temporary turbines as inapplicable to this air permitting process for 15 permanent turbines to be constructed at the site. Furthermore, it is the position of the Department that the permitting, testing, and monitoring requirements for a combustion turbine subject to a New Source Performance Standard (NSPS) is not appropriate or suitable for temporary combustion turbines.

The permanent turbines CTC plans to construct are subject to air permitting requirements and CTC has applied for an air construction permit prior to beginning actual construction of those permanent emission units. In that application, CTC provided all of the information necessary to confirm that the permanent turbines would meet all applicable requirements, including information confirming that the total potential to emit of the facility would be below the major source threshold of 100 tons per year (tpy) of each criteria pollutant and below 25 tons per year of total Hazardous Air Pollutants (HAPs) and 10 tons per year of any individual HAP. To ensure those requirements would be met, CTC agreed to accept federally enforceable emission limitations and permit conditions reflecting the state-of-the-art emission controls CTC plans to install on the permanent emission units.

B. "There is No Exemption in the Local Implementation Plan nor the Clean Air Act for 'Temporary' or 'Portable' Large Gas Turbines"

It is the position of the Department that no exemption is needed because stationary permitting requirements do not apply to nonroad engines or to temporary activities that do not constitute "beginning actual construction."

³ In Federal register/Vol. 89, No. 240/Friday, December 13, 2024/Proposed Rules (Page 101345) the USEPA recognizes that "on occasion, owners/operators of industrial and commercial facilities or utilities need temporary combustion turbines for electric or direct mechanical energy production for short-term use while the primary generating equipment is not available, transmission, is being repaired and/or upgraded, or for some other unforeseen event.

"Temporary turbines generally can be expected to use combustion control technology that limits NO_x emissions to rates of 25 ppm or lower. It is less clear whether SCR technologies are capable of being used in conjunction with temporary or portable combustion turbines. In addition, the permitting, testing, and monitoring requirements for a combustion turbine subject to an NSPS may not be appropriate or suitable for temporary combustion turbines. The need for temporary combustion turbines generally is a result of unforeseen events, and the permitting itself could take longer than the need for temporary generation. The USEPA has historically considered engines or boilers in one location for less than a period of 180 days to 1 year to be temporary equipment not subject to regulation under their respective NSPS or NESHAP subparts."

The “364-day” rule referenced by SELC is based on EPA’s definition of “nonroad engine” [Reference 42 USC § 7602(z), 40 CFR § 1068.30]. The definition distinguishes nonroad engines from stationary sources in recognition of the different regulatory scheme needed for the two different types of emission sources. Because the portable turbine engines are only temporary, they also do not constitute the kind of permanent construction for which a stationary construction permit is needed. However, once the engines are installed or they remain on site for more than 12 months, they could become stationary sources subject to air permitting.

The Department will not authorize construction of any permanent turbine engines until it has issued a permit to begin actual construction of a stationary source. It is also the Department’s understanding that CTC will remove all temporary turbine engines prior to remaining on site for 365 days. CTC projects these units will be removed by the end of July 2025.

C. “The 35 Turbines at the xAI Facility are a New Major Source that Requires a PSD Permit”

As previously stated, the temporary turbine engines are not relevant to this air permit process. The 15 permanent turbines that are the subject of the draft construction air permit do not qualify as a major source. The permit contains federally enforceable emission limitations ensuring that emissions will not exceed 100 tpy, which is the major source threshold for a Title V operating permit and significantly below the 250 tpy PSD major source threshold.

D. “The Draft Permit Does Not Satisfy PSD Permitting Requirements, including Source Impact Analysis Regarding NO_x and Ozone”

The permit contains federally enforceable emission limitations for the 15 permanent turbines that are the subject of the draft construction air permit. These limitations ensure that emissions will not exceed 100 tpy, which is the major source threshold for a Title V operating permit and significantly below the 250 tpy PSD major source threshold.

To confirm that the facility will not cause or contribute to an exceedance of a National Ambient Air Quality Standard (NAAQS), CTC voluntarily conducted a dispersion modeling analysis (See Attachment A) that would satisfy the requirements for a PSD permit, even though one is not required.

The dispersion modeling results demonstrate that the impacts of the facility are below the Significant Impact Levels (SILs) that USEPA established to determine whether a potential impact could be meaningful enough to warrant further review.

EPA’s 2024 guidance on SILs explains that “the method used to develop the ozone and PM_{2.5} SILs in 2018 was based on the inherent variability in the historical ambient monitoring data and the level of the corresponding standard.”⁴ USEPA explained the methodology further as follows:

⁴ EPA Memorandum, “Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program,” at 3 (Apr. 30, 2024).

This peer-reviewed approach relies upon the fact that there is inherent variability in observed ambient data due to the intrinsic variability of emissions and meteorology controlling transport and formation of pollutants. The approach uses statistical theory and methods to model that intrinsic variability to identify a level of change in ambient concentrations that is acceptably similar to the measured ambient concentrations, thereby representing an insignificant change in air quality.

Notably, the 2018 guidance that USEPA reaffirmed in 2024 confirms the SILs may be used regardless of current air quality conditions in a particular area.⁵ Accordingly, permitting authorities may use the SILs to confirm that the source under review will not cause or contribute to a NAAQS exceedance even in areas where air quality has been impacted by other sources. Because modeling results below the SILs are within the natural variability of ambient concentrations, they “indicate that changes in air quality within this range are not meaningful, and, thus, do not contribute to a violation of the NAAQS”. The results of the modeling are summarized in the attached report and included below for convenience:

Table 1
Class II Significant Analysis Results

Pollutant	Averaging Period	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	PM _{2.5} MERP Contribution ($\mu\text{g}/\text{m}^3$)	Total PM _{2.5} Impact ($\mu\text{g}/\text{m}^3$)	SIL	Exceeds SIL	Radius of Significant Impact (km)
SO ₂	Annual	0.05	--	--	1	No	N/A
	24-hr	0.49	--	--	5	No	N/A
	3-hr	2.31	--	--	25	No	N/A
	1-hr	2.55	--	--	7.8	No	N/A
NO ₂	Annual	0.13	--	--	1	No	N/A
	1-hr	6.73	--	--	7.5	No	N/A
PM ₁₀	Annual	0.12	0.001	0.13	1	No	N/A
	24-hr	1.21	0.050	1.26	5	No	N/A
PM _{2.5}	Annual	0.11	0.001	0.12	0.13	No	N/A
	24-hr	0.92	0.050	0.97	1.2	No	N/A
CO	8-hr	2.73	--	--	500	No	N/A
	1-hr	15.53	--	--	2,000	No	N/A

CTC also evaluated the potential ozone impacts of the NO_x emissions that will be permitted at the facility using the methodologies for evaluating ozone impacts from major source permits (even though the facility will not be a major source) that have been developed by USEPA and the Tennessee Department of Environment and Conservation (TDEC). That analysis confirmed that the maximum potential impact associated with the new permitted facility would be just 0.16 parts per billion (ppb), compared to USEPA’s SIL for ozone of 1 ppb and the NAAQS of 70 ppb.

⁵ EPA Memorandum, “Guidance on Significant Impact Levels for Ozone and Fine Particles in the [PSD] Permitting Program,” at 10 (Apr. 17, 2018).

Accordingly, the impact of the source is just 0.2 percent of the NAAQS and less than one-fifth of the SIL that USEPA has determined as the level representing an impact that is meaningful enough to justify further review.

Based on these modeling results, no further review of the impacts of the source to ambient air would be required, even if it was subject to the source impact analysis requirement applicable to PSD permits.

In addition to voluntarily modeling of the potential impacts, CTC has also voluntarily agreed to install the level of emission control that would be required for a PSD major source in a nonattainment area --- Lowest Achievable Emission Rate (LAER) --- even though the facility will be a synthetic minor source in an attainment area. LAER will include state-of-the-art SCR systems designed to achieve 2.0 parts per million (ppm) of NO_x.

E. "The Local Implementation Plan Requires a 'Post-Construction' Construction Permit to Demonstrate Compliance with Local Requirements and Ambient Air Quality Standards"

Temporary turbine engines at the site are scheduled to be removed prior to 365 days on site. Once removed, no permit will be required because the temporary nonroad engines will no longer exist. Post-construction permitting is only required for permanent stationary sources constructed without a construction permit that will remain in place, not temporary nonroad engines that are removed within 365 days.

F. "The Health Officer Must Deny the Permit Because It Fails to Ensure Compliance with Local Requirements and Ambient Air Quality Standards"

SELC has presented no evidence to support the assertion that issuance of the permit for the 15 permanent turbines will fail to protect air quality in South Memphis.

The Department also notes that the state-of-the-art controls to be installed on the 15 permanent turbines exceeds the requirements for a synthetic minor source. This level of control is typically only applicable to a major source in a designated nonattainment area.

Comment III: *"xAI Is an Unpermitted Major Source and the Seven New Turbines Would Be a Major Modification Subject to PSD"*

The Department does not agree with this comment. This comment continues to focus on the temporary turbine engines that are scheduled to be removed prior to 365 days on site. Once removed, no permit will be required because the temporary nonroad engines will no longer exist.

CTC has not yet begun actual construction on the new facility that will contain 15 permanent turbines. These 15 permanent turbines will have permit limits to ensure that criteria pollutant emissions will not exceed 100 tpy, which is the major source threshold for a Title V operating

permit and significantly below the 250 tpy PSD major source threshold. PSD permitting requirements are therefore not applicable.

The draft construction air permit will be for a synthetic minor source based on the federally enforceable emission limitations therein. A “major modification” can only occur at a “major stationary source,” and this is not applicable to the 15 permanent turbines.

Comment IV: *The Department Can and Must Require xAI to Obtain Emissions Offsets”*

The Department does not agree with this comment. Offsets are only required in areas designated by the USEPA as a nonattainment area. Shelby County is currently designated as in attainment for every NAAQS.

Furthermore, offsets are only required for construction of new major sources or major modifications of existing major sources. The 15 permanent turbines to be constructed will have federally enforceable emission limitations to ensure that criteria emissions will not exceed 100 tpy. This results in classification of the facility as a synthetic minor source; therefore, offset requirements are not applicable.

Comment V: *“Evidence Suggests that the Draft Permit Does Not Represent xAI’s Intended Long-Term Operations”*

The Department does not agree with this comment. It is the understanding of the Department that CTC does not plan to expand the site further.

A. “xAI Likely Intends to Operate More than 15 Turbines on a Permanent Basis”

It is the understanding of the Department that CTC desires and ultimately plans to receive most of its electricity from the Tennessee Valley Authority and use its permanent turbines as back-up during the life of the permit. The Department has no evidence of plans to expand the turbine footprint at the site beyond the 15 permanent turbines being permitted. If more power was required in the future, any modifications would undergo the appropriate permitting process in a manner consistent with all applicable regulations.

B. “The Draft Permit Does Not Include Ancillary Equipment Currently on Site and Typical of Similar Operations”

At the request of the Department, CTC provided a list of ancillary equipment on site including emissions calculations and a facility-wide emission summary that is included as Attachment B herein. Each of these units is deemed insignificant by the Department and does not affect the classification of the source as a synthetic minor. The Department notes the generators, although subject to 40 CFR Part 60, subpart IIII and 40 CFR Part 63, subpart ZZZZ, may still be exempt from the permit as insignificant sources in accordance with City of Memphis Code Section 16-77

[Reference Rules and Regulation of Tennessee, Rule 1200-03-09-.04(4)(a) and 1200-03-09-.02(c)] consistent with State of Tennessee guidance. An attachment including these insignificant emission units will be included as an appendix to the permit.

C. “The Department Must Ensure xAI Is Not Engaged in Sham Permitting.”

The Department considers the content of the draft permit as accurately reflecting the source’s planned mode of operation. Additionally, worst case loads were used in determining emissions. At the request of SELC, the Department agrees to the addition of a permit condition to the permit implementing PSD’s Source Obligation Rule (40 CFR 52.21(r)(4)) as follows:

“Should this facility become a major stationary source solely by virtue of relaxation of any enforceable limitation on the capacity of the source or modification otherwise to emit a pollutant, then the requirements of 40 CFR § 52.21 paragraphs (j) through (s) shall apply to the source or modification as though construction had not yet commenced on the source or modification. [Reference 40 CFR § 52.21(r)(4)]”.

Comment VI: *“The Draft Permit’s Synthetic Minor Limits Are Insufficient to Ensure the Facility’s Emissions Do Not Exceed Major Sources Thresholds”*

The Department does not agree with this comment. The Department considers the synthetic minor limits within this permit as enforceable both as a legal and practical matter. USEPA has long recognized that periodic performance testing combined with parametric monitoring is sufficient to demonstrate compliance with synthetic minor limits. For example, the NSPS requirements that will apply to the permanent, stationary turbines to be constructed at the site make clear that multiple options are available for conducting the monitoring needed to demonstrate compliance.⁶

Because the compliance demonstration requirements included in the draft permit are at least as stringent as those typically recognized by USEPA as sufficient demonstrations of compliance with continuous short-term performance standards, they are clearly sufficient for demonstrating compliance with the longer-term annual limits that will ensure the facility remains a synthetic minor source.

A. “The Department Cannot Exempt xAI From Synthetic Minor Limits During Initial Permitted Operations”

As indicated previously, any concerns regarding the temporary natural gas-fired turbine engines that are scheduled to be removed prior to 365 days on site is beyond the scope of this permit review. The Department considers the 35 temporary turbines as inapplicable to this air permitting process for 15 permanent turbines to be constructed at the site. Furthermore, it is the opinion of this Department that the permitting, testing, and monitoring requirements for combustion turbines subject to an NSPS are not appropriate or suitable for temporary combustion turbines.

⁶ See, e.g., 40 CFR §§ 60.4335–4355 (establishing multiple options for monitoring requirements needed to demonstrate compliance with NO_x emission limits)

Furthermore, CTC is not “exempt” from limits during initial operation. The permit allows the facility the same period of construction and shakedown that is available to all regulated facilities prior to demonstrating initial compliance for the 15 permanent turbines. This policy of allowing newly constructed facilities time to achieve and demonstrate compliance with relevant limits and standards is recognized in USEPA regulations.⁷

B. “The Department Must Require Continuous Emissions Monitoring Systems (CEMS) for NO_x”

The compliance demonstration requirements included in the permit are similar to those typically recognized by USEPA to be sufficient to ensure compliance. Moreover, the type of emission units to be installed at the facility are well-understood and the basis for emission factors is acceptable. This will be further confirmed by initial and periodic performance testing.

CTC will also continuously monitor the operating parameters relevant to emission rates to ensure a high level of emissions control performance. CEMS are not required for this synthetic minor facility by regulation and are unnecessary for reasons stated above.

SELC also noted *“a potential deficiency in xAI’s NO_x emissions calculations that further warrants the use of CEMS rather than periodic stack testing”*

Trinity Consultants (Trinity) stated that the conversion between parts per million (PPM) NO_x at 15% oxygen and pound per megawatt hour (lb/MWh) electric output mainly depends on two parameters: 1) the molar exhaust volume and 2) the heat rate of the combustion turbine. The latter form of emission factor, called an “output base standard” is lower for higher efficiency units at the same outlet concentration (ppm) of the pollutant. CTC used documented heat rates provided by equipment vendors and EPA recommended molar exhaust volume figures to determine its emissions factors.

Trinity further explained that in developing 40 CFR Part 60, Subpart KKKK (Subpart KKKK), EPA assumed an efficiency of 23% for the purposes of correlating the ppm-based standard to the lb/MWh standard.⁸

CTC’s turbines have efficiencies on the order of 33-39%, resulting in a lower conversion factor. Therefore, Trinity does not believe that a requirement to install CEMS is necessary to better support the conversion between outlet NO_x concentration and mass emissions per unit electricity generated. The conversion between the two figures depends on the efficiency of the electric generating units, which is something CEMS does not measure. Permit required performance testing, compliant with Subpart KKKK requirements, is sufficient.

⁷ See, e.g., 40 CFR § 60.8 (requiring initial performance tests within 180 days of initial startup of a facility subject to a federal new source performance standard).

⁸ Reference Federal Register, Vol. 71, July 6, 2006, 38482-38483.

SELC pointed to the difference between EPA's conversion in Subpart KKKK and the conversion in CTC's application. This difference is because EPA assumed 23% efficiency when developing Subpart KKKK emission factors, while CTC's units are 33-39% efficient. More efficient turbines have a lower mass emission factor.

C. "Stack Testing for Formaldehyde Once Every Five Years is Insufficient"

CTC has also taken multiple steps to ensure that formaldehyde emissions do not present a health concern to the community. First, although the facility will be an area source of HAPs, and therefore not subject to the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Stationary Combustion Turbines (Subpart YYYY) applicable only to major sources of HAPs, the permanent turbine engines will be designed to meet that standard, which represents the maximum achievable control technology (MACT) of 91 ppbv formaldehyde at 15% O₂. This limit will be added to Table 4 within the permit.

Trinity also noted that after the application had been submitted, Solar provided vendor specific emission factors for formaldehyde predicting emissions below the Subpart YYYY standard. The formaldehyde emission factor used in the permit application is AP-42 based (0.00071 lb/MMBtu), notably higher than that provided by Solar (~0.00021 lb/MMBtu); therefore, actual formaldehyde emissions are expected to be lower than those stated in the application, further supporting no reasonable need for additional monitoring.

Second, CTC included formaldehyde in its dispersion modeling analysis to ensure the facility would not generate concentrations of formaldehyde in the ambient air that might present a health concern. Neither the Tennessee Department of Environmental Conservation (TDEC) nor the Shelby County Health Department has adopted an ambient standard for formaldehyde, so CTC compared its modeling results to the most stringent thresholds available (The California Office of Environmental Health Hazard Assessment (OEHHA) acute, 8-hr and chronic standards). That comparison is as follows:

Table 2
Formaldehyde Analysis Results

Pollutant	Averaging Period	Modeled Concentration (µg/m³)	REL (µg/m³)	Exceeds REL
formaldehyde	1-hr	1.99	55	No
	8-hr	0.35	9	No
	annual	0.013	9	No

Given these results, which confirm the formaldehyde emissions from the facility will not approach the level that could warrant further review for potential health risks, the Department considers initial testing and subsequent testing every 5 years as sufficient to demonstrate compliance.

Furthermore, monitoring within this permit is also fully compliant with 40 CFR Part 60, Subpart KKKK.

Comment VII: *“The Department Should Consider the Environmental Justice Impacts of Permitting xAI to Operate Along With the Many Other Sources in Southwest Memphis”*

No legal basis exists for denying or altering an otherwise lawful air construction permit on the basis of cumulative impacts or environmental justice concerns. Additionally, the permit application included an extensive evaluation of environmental justice.

This response will become part of the PAE. The Department thanks you for your input.

Sincerely,



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Source File No. 01156

ATTACHMENT A

Ambient Air Modeling Analysis

AMBIENT AIR MODELING ANALYSIS

Greenfield Simple Cycle Combustion Turbine Project SCHD Draft Permit 01156-01PC-031925

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1. EXECUTIVE SUMMARY

CTC Property LLC "CTC" proposes to operate a data center at 3231 Paul R Lowry Road, Memphis, Shelby County, Tennessee. The facility was formerly an Electrolux factory. The Shelby County Health Department (SCHD) issued a draft synthetic permit on March 31, 2025, for the construction of fifteen (15) Solar SMT-130 combustion turbines (CTs) rated at 16.5 megawatts (MW) and equipped with selective catalytic reduction (SCR) and oxidation catalyst (OxCat).

While not required by current SCHD regulations, this modeling analysis is prepared in support of the draft permit decision to issue the permit as final. CTC has conducted modeling for multiple criteria pollutants with established significant impact levels (SILs) and National Ambient Air Quality Standards (NAAQS), specifically for carbon monoxide (CO), nitrogen dioxide (NO_x), sulfur dioxides (SO₂), and particulate species (PM₁₀, and PM_{2.5}). The ozone-based impacts of the project's NO_x and VOC emissions increases have also been assessed and are summarized in the Modeled Emission Rates for Precursors (MERPs) section. Lastly, CTC also conducted modeling for formaldehyde

1.1 Modeling Summary

Ambient PM₁₀, SO₂, PM_{2.5}, CO and NO₂ impacts from the project, in the form of the standard, are below the Class II Significant Impact Levels (SILs) for all applicable averaging periods. The ambient air quality analyses described in this report demonstrate that the proposed project will neither cause nor contribute to an exceedance of any NAAQS.

Neither the Tennessee Department of Environment and Conservation (TDEC) nor SCHD have established HAP ambient standards except for hydrogen fluoride (HF) and hydrogen chloride (HCl). Therefore, modeled concentrations were conservatively compared to those established by California's Office of Environmental Health Hazard Assessment (OEHHA). The ambient air quality analysis for formaldehyde demonstrates that the proposed project will not exceed OEHHA's acute, 8-hour, and chronic Reference Exposure Levels (RELs).

1.2 Report Contents

This modeling analysis report is organized as follows:

- ▶ Section 2 contains a description of the facility and proposed project;
- ▶ Section 3 describes the ambient air analysis modeling procedures;
- ▶ Section 4 discusses the technical approach employed in the modeling analyses;
- ▶ Section 5 describes the results of the ambient air dispersion analyses;

2. PROPOSED PROJECT DESCRIPTION

Figure 2-1 provides a map of the area surrounding the proposed project location. The approximate central Universal Transverse Mercator (UTM) coordinates of the facility (centered around the emissions sources) are 759.422 kilometers (km) East and 3,883.340 km North in Zone 15 (NAD 83). The area surrounding the facility is predominantly rural.

Figure 2-1. Project Site Location Map



The property boundary area (ambient air boundary) of the facility will be controlled so that the general public will not have access. The proposed boundary of the facility is shown in Figure 2-2 (yellow line visible drawn around the facility).

Figure 2-2. Facility Ambient Air Boundary and General Site Layout



3. AMBIENT AIR ANALYSIS METHODOLOGY

The following sections detail the methods and models used to demonstrate that the proposed project will not cause or contribute to an exceedance of any NAAQS. The dispersion modeling analyses were conducted in accordance with the following guidance documents:

- ▶ *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 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 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).

Shelby County, where the facility is located, is currently designated as "attainment" or "unclassifiable" for all criteria pollutants.¹ The proposed project will qualify for synthetic minor permitting. However, this modeling analysis was prepared to demonstrate that projected emissions increases would not cause or contribute to any modeled NAAQS exceedances or HAP issues. Numerous criteria pollutants with established NAAQS will be emitted, specifically CO, NO₂, SO₂, PM₁₀, and PM_{2.5}. The ozone-based impacts of the project's NO_x and VOC emissions increases are assessed and summarized in the MERP section. Formaldehyde results are also discussed.

¹ 40 CFR 81.343

3.1 Class II Significance Analysis

The Class II Significance Analysis is conducted to determine whether the calculated emissions increases for SO₂, CO, NO₂, PM₁₀ and PM_{2.5} would exceed certain ambient concentration thresholds commonly referred to as the SILs, shown in Table 3-1.

Table 3-1. Significant Impact Levels, NAAQS and PSD Class II Increments

Pollutant	Averaging Period	PSD Class II SIL (µg/m ³)	Primary and Secondary NAAQS (µg/m ³)	Class II PSD Increment (µg/m ³)
PM ₁₀	24-hour	5	150 ⁽¹⁾	30
	Annual	1	--	17
PM _{2.5}	24-hour	1.2 ⁽²⁾	35 ⁽⁴⁾	9 ⁽³⁾
	Annual	0.13 ⁽²⁾	9 ⁽⁵⁾	4 ⁽³⁾
NO ₂	1-hour	7.5	188 ⁽⁶⁾	N/A
	Annual	1	100 ⁽⁷⁾	25
SO ₂	1-hr	7.8	196	N/A
	3-hr	25	1,300	512
	24-hour	5	---	91
	Annual	1	---	20
CO	1-hr	2,000	40,000	N/A
	8-hr	500	10,000	N/A

⁽¹⁾ Not to be exceeded more than three times in 3 consecutive years (highest sixth high modeled output).

⁽²⁾ EPA has recently provided updated guidance (April 2024) which recommended use of a 24-hr PM_{2.5} SIL of 1.2 µg/m³, and an annual SIL of 0.13 µg/m³.

⁽³⁾ The 3-year average of the 98th percentile 24-hour average concentration (highest eighth high modeled output).

⁽⁴⁾ The 3-year average of the annual arithmetic average concentration (highest first high modeled output).

⁽⁵⁾ The 3-year average of the 98th percentile of the daily maximum 1-hr average (highest eighth high modeled output).

⁽⁶⁾ Annual arithmetic average (highest first high modeled output).

The highest design concentrations out of all given modeling years for each pollutant-averaging time is then compared to the SIL level shown in Table 3-1 to determine if the ambient air impact is significant. In the case of 1-hour NO₂, 1-hour SO₂, 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. All other pollutants and averaging periods are assessed based on their maximum concentrations in any of the five (5) modeled years.

When modeled design concentrations are less than the applicable SIL, as is the case for this analysis, further analyses (NAAQS and PSD Increment) are not required for that pollutant-averaging period combination.

As detailed further in Section 4.7.5, the Significance Analysis for PM_{2.5} and PM₁₀ also considered secondary PM_{2.5} impacts from the project NO_x and SO₂ emissions, in accordance with the updated EPA April 2024 MERPs guidance. Impacts of secondary formation of ozone are also considered through the evaluation of the project VOC and NO_x emissions, in accordance with the EPA April 2024 MERPs guidance. Addition of secondary PM_{2.5} were conservatively added to the PM₁₀ SIL results prior to comparing to the SIL.

3.2 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, an ambient ozone impact analysis is not required unless a project's emissions increase is greater than 100 tpy of VOC or NO_x. Although this project's increase in emissions is less than 100 tpy of NO_x and VOC, an ozone impacts analysis was conservatively conducted through evaluation of the MERPs.

EPA has issued guidance specifying a SIL value for ozone of 1 ppb, and has developed a demonstration methodology (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 exceedance of ambient ozone standards.² 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* was used in conjunction with the most recent April 2024 EPA guidance, to provide a Tier 1 demonstration that ozone impacts from the project will not cause or contribute to ambient air quality levels of ozone. Both VOC and NO_x emissions increases from the project were considered. Details regarding that analysis can be found in Section 4.7.5 of this report.

3.3 Formaldehyde Ambient Impact Analysis

As previously mentioned, neither TDEC nor SCHD have established HAP ambient standards for formaldehyde. Therefore, modeled concentrations will be compared to those established by California's OEHHA³, shown in Table 3-2.

Table 3-2. California OEHHA Acute, 8-Hour and Chronic REL Summary

Pollutant	Averaging Period	Inhalation REL (µg/m ³)
formaldehyde	1-hr	55
	8-hr	9
	Annual	9

Details regarding that analysis can be found in Section 5.2 of this report.

² *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* (Memorandum from Mr. Richard A. Wayland, U.S. EPA, to Regional Air Division Directors, April 30, 2019).

³ Appendix B. Acute, 8-Hour, and Chronic Reference Exposure Levels (RELs) Summary Table, <https://www.oehha.ca.gov/sites/default/files/media/downloads/crnrr/appendix20bfinalwithnickel.pdf>

4. MODEL SELECTION AND METHODOLOGY

This section includes a summary of the modeling methodology used for this analysis.

4.1 Model Selection – AERMOD

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 into consideration, CTC utilized 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*.

The latest version (v24142) of the AERMOD modeling system was used to estimate maximum ground-level concentrations in all analyses conducted 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.⁴ 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 04274.⁵ BPIP PRIME is designed to incorporate the concepts and procedures expressed in 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.⁶

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.

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

⁵ Earth Tech, Inc., Addendum to the ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model, Concord, MA.

⁶ 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.

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.

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 sources to be evaluated in this modeling assessment with vertically obstructed releases will be evaluated using the appropriate options for horizontal or capped point sources within AERMOD.

4.2 Modeled Sources

CTC modeled the project-associated sources for the significance analysis. This includes the facility's 15 Solar SMT-130 turbines (EU01-EU15) that will be installed as part of this project.

4.3 Receptor Grid and Coordinate System

Modeled concentrations were calculated at ground-level receptors placed along the facility's fence line and on a variable Cartesian receptor grid. Fence line receptors were spaced no further than 50 meters apart. Beyond the fence line, receptors were 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 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.

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

Receptor, source, and building elevations and hill heights required by AERMOD were determined using the AERMAP terrain preprocessor (version 24142). Terrain elevations from the USGS 1/3-arc second NED were used for AERMAP processing.

In all modeling analysis data files, the location of emission sources, structures, and receptors are represented in the UTM coordinate system, Zone 15, NAD-83.

4.4 Meteorological Data

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.⁷ 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;

⁷ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guideline on Air Quality Models*, Appendix W, Revised January 17, 2017.

3. The exposure of the meteorological site; and
4. The period during which data are collected.

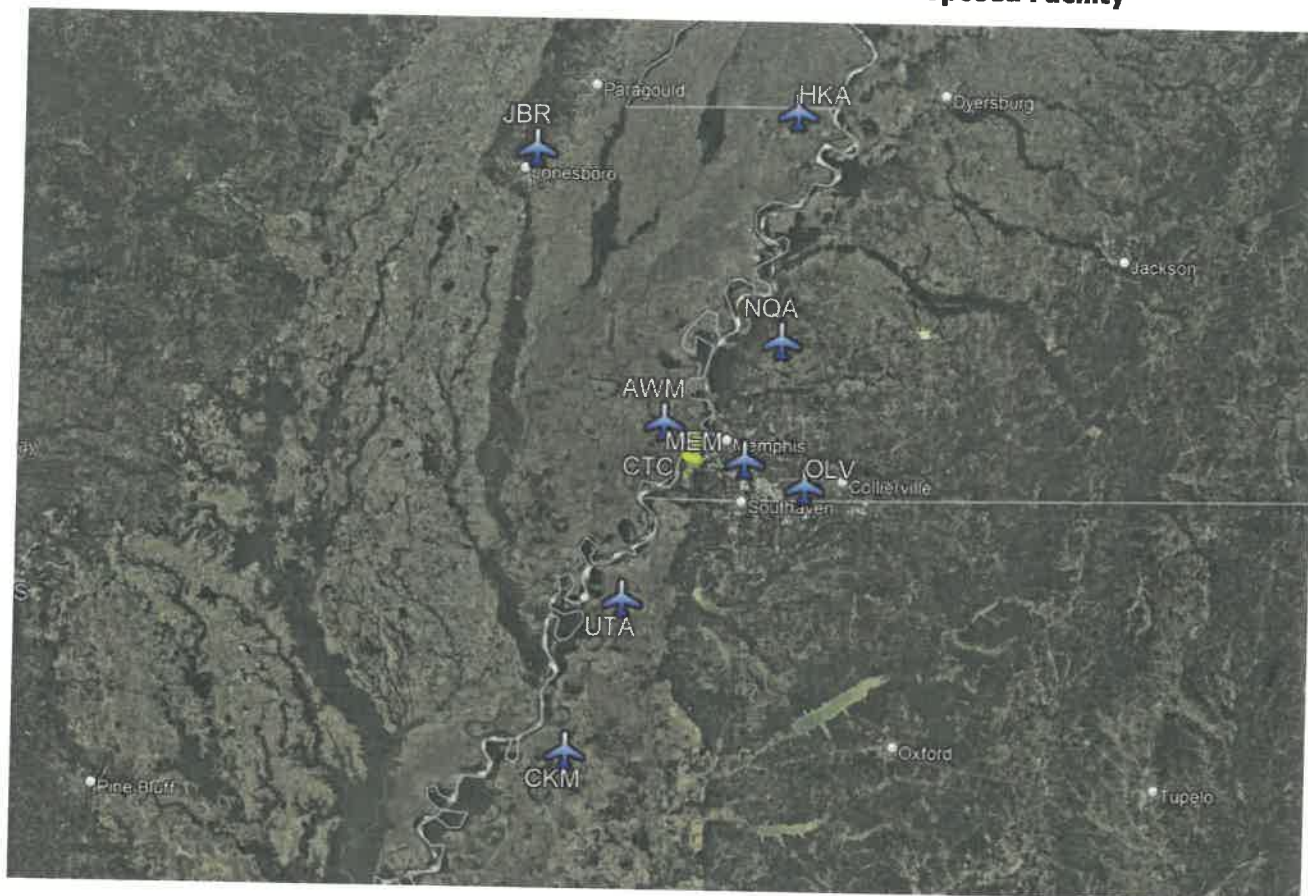
Site-specific meteorological data or data from National Weather Service (NWS) stations, universities, Federal Aviation Administration (FAA) stations, military stations, and others should be used if possible. The determination of representativeness of site-specific data for AERMOD applications cannot be based solely on proximity.⁸ 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.⁹ Given that site-specific meteorological data is not available for the CTC site, surface data collected by a representative meteorological site were 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 4-1. 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	12.0	92.19%
MEM	13893	MEMPHIS	76.8	15.9	99.18%
OLV	13815	OLIVE BRANCH	124.1	33.9	91.65%
NQA	93839	MILLINGTON REGIONAL	102.4	42.9	88.75%
UTA	23903	TUNICA MUNICIPAL	57.0	42.4	59.92%
CKM	00314	CLARKSDALE COUNTY	51.6	86.6	69.41%
JBR	03953	JONESBORO MUNICIPAL	79.9	100.1	89.78%
HKA	53869	BLYTHEVILLE MUNICIPAL	77.5	103.4	95.06%

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 4-1. 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.

Characterization of surface moisture conditions for the NWS MEM site for each year of meteorology is presented in Table 4-2. 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 4-2. 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 was 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 were used in AERMET.

The proposed facility is located in Shelby County, TN. 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 v23132. The data was processed and prepared using the surface characteristics of the Memphis International Airport surface station. A surface station elevation of 271 ft was utilized as the "PROFBASE" input in the modeling analyses.

This meteorological data set, obtained from TDEC, was used for all modeling analyses with AERMOD.

4.5 Building Downwash Analysis

AERMOD incorporates the Plume Rise Model Enhancements (PRIME) downwash algorithms. Direction specific building parameters required by AERMOD are calculated using the BPIP-PRIME preprocessor (version 04274). Facility structures were built into the model and downwash influences were evaluated appropriately.

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.

4.6 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 None of the facility’s emission unit stacks exceed GEP height.

4.7 Modeled Emission Sources

As discussed in Section 3.1 of this report, the Significance Analysis evaluates the potential emissions of the facility emissions sources and does not take into consideration any regional off-site emissions sources. This section discusses the emission sources considered, emission rates, and modeling methods utilized in the ambient air modeling analyses.

4.7.1 Representation of Emission Sources

CTC modeled the project-associated sources for the Significance Analysis. This includes emissions increases from the new combustion turbines. Each turbine was modeled concurrently at the maximum hourly rate during normal operations. The stack parameters associated with those maximum hourly emissions are provided in Table 4-3.

Table 4-3. Modeled Source Parameters

Proposed Unit	Stack Height (m)	Stack Temp (K)	Stack Velocity (m)	Stack Inside Diameter (m)
130	35.0	850	73.3	9.0

4.7.2 Significance Analysis

The Significance Analysis was conducted to determine whether the emissions increases associated with the proposed project result in impacts greater than or equal to the SIL. The significance modeling utilized worst-case short-term emissions derived for evaluation of long term (e.g., annual) conditions.

4.7.3 Formaldehyde Analysis

The formaldehyde analysis was conducted to determine whether the emissions increases associated with the proposed project result in impacts greater than or equal to the California OEHHA RELs. The modeling utilized worst-case short-term emissions derived for evaluation of long term (e.g., annual) conditions.

¹³ 40 CFR §51.100(ii)

4.7.4 NO₂ Modeling Approach

The revised *Guideline* indicates Ambient Ratio Method 2 (ARM2) has replaced ARM as the regulatory default Tier 2 NO₂ modeling method. CTC has utilized ARM2, in regulatory default mode, for modeling NO₂ for the 1-hour and annual SIL and NAAQS modeling assessments, as applicable, using the default conversion ratios.

All emissions data was input into the AERMOD model as NO_x, with the model providing output results in terms of NO₂.

4.7.5 Tier 1 Analysis - Consideration of Modeled Emission Rates for Precursors (MERPs)

In April 2018, the EPA released guidance recommending SILs for ozone and PM_{2.5}.¹⁴ 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 an exceedance 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}.¹⁵ CTC used 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}.¹⁶ 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} were 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.¹⁷ 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 an exceedance of the appropriate NAAQS and PSD Increments.¹⁸ MERPs reflect levels of increased precursor emissions that are not expected to cause a significant contribution to

¹⁴ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, Memorandum, April 17, 2018.

¹⁵ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Supplement to the Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program*, April 30, 2024.

¹⁶ 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.

¹⁷ 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.

¹⁸ Ibid.

ozone 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.¹⁹ 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 was chosen for the pollutants in question and the calculations conducted were consistent with TDEC and EPA guidance to evaluate project-based impacts compared to the ozone SIL.

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. Project based emissions for NO_x and SO₂ were used to derive an applicable concentration contribution to the significance modeling results for PM_{2.5}.

4.7.5.1 Ozone MERPS Assessment

All MERP data was pulled from the EPA MERPs View Qlik database, for the Shelby County site.²⁰ The 10 meter stack data was utilized from Qlik. The SIL analysis demonstration for the proposed project is as follows:

$$((87.14 \text{ tpy NO}_x \text{ project emissions increase} / 500 \text{ tpy hypothetical source}) * (0.694398 \text{ ppb hypothetical source impact})) + (84.82 \text{ tpy VOC project emissions increase} / 500 \text{ tpy hypothetical source}) * (0.250293 \text{ ppb hypothetical source impact})) = 0.16 \text{ ppb}$$

As the predicted ozone value is less than the SIL value of 1 ppb, a cumulative analysis for ozone was not required.

4.7.5.2 PM_{2.5} MERPS Assessment

As mentioned above, all MERP data was pulled from the EPA View Qlik database. The 10 meter stack data was utilized from Qlik. The SILs analysis demonstration is as follows:

For annual PM_{2.5}:

$$((87.14 \text{ tpy NO}_x \text{ project emissions increase} / 500 \text{ tpy NO}_x \text{ hypothetical source}) * (0.003261 \text{ } \mu\text{g}/\text{m}^3 \text{ hypothetical source impact})) + (29.58 \text{ tpy SO}_2 \text{ project emissions increase} / 500 \text{ tpy SO}_2 \text{ hypothetical source}) * (0.008668 \text{ } \mu\text{g}/\text{m}^3)) = 1.08\text{E-}03 \text{ } \mu\text{g}/\text{m}^3$$

For daily PM_{2.5}:

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.

²⁰ <https://www.epa.gov/scram/merps-view-qlik>

$$((87.14 \text{ tpy NO}_x \text{ project emissions increase} / 500 \text{ tpy NO}_x \text{ hypothetical source}) * (0.060261 \mu\text{g}/\text{m}^3 \text{ hypothetical source impact})) + (29.58 \text{ tpy SO}_2 \text{ project emissions increase} / 500 \text{ tpy SO}_2 \text{ hypothetical source}) * (0.671154 \mu\text{g}/\text{m}^3)) = 5.02\text{E-}02 \mu\text{g}/\text{m}^3$$

The above considerations of additive effects of secondary PM_{2.5} to direct primary PM_{2.5} should be considered highly conservative, since it is highly unlikely that there would be temporal and spatial alignment of primary and secondary PM_{2.5} impacts, particularly for the short term 24-hr averaging period in the near field of the facility, where modeled primary PM_{2.5} impacts are at their highest.

Secondary PM_{2.5} has been added into the summary tables for all PM_{2.5} SIL results in Section 5.

5. SUMMARY OF RESULTS

This section summarizes the results of the dispersion modeling analyses.

5.1 Class II Significance Analyses

As discussed in Section 3.1, Significance Analyses were conducted to determine the need for further pollutant modeling. The results of the Class II Significance Analyses for each pollutant are provided in Table 5-1 and represent the maximum modeled concentrations from the significance runs.

Table 5-1. Class II Significance Analysis Results

Pollutant	Averaging Period	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	PM _{2.5} MERP Contribution ($\mu\text{g}/\text{m}^3$)	Total PM _{2.5} Impact ($\mu\text{g}/\text{m}^3$)	SIL	Exceeds SIL	Radius of Significant Impact (km)
SO ₂	Annual	0.05	--	--	1	No	N/A
	24-hr	0.49	--	--	5	No	N/A
	3-hr	2.31	--	--	25	No	N/A
	1-hr	2.55	--	--	7.8	No	N/A
NO ₂	Annual	0.13	--	--	1	No	N/A
	1-hr	6.73	--	--	7.5	No	N/A
PM ₁₀	Annual	0.12	0.001	0.13	1	No	N/A
	24-hr	1.21	0.050	1.26	5	No	N/A
PM _{2.5}	Annual	0.11	0.001	0.12	0.13	No	N/A
	24-hr	0.92	0.050	0.97	1.2	No	N/A
CO	8-hr	2.73	--	--	500	No	N/A
	1-hr	15.53	--	--	2,000	No	N/A

1. PM₁₀ and PM_{2.5} results include MERPs contribution to the predicted modeled impact.

As shown in Table 5-1, all PM₁₀, PM_{2.5}, NO₂, SO₂, and CO modeled impacts for the project are less than the applicable Class II SILs. As such, by definition, the project does not cause or contribute to an exceedance of the NAAQS for PM₁₀, PM_{2.5}, NO₂, SO₂, or CO. MERPs contribution to the predicted modeled impact, as derived in the analysis in Section 4.7.5, are considered in Table 5-1.

5.2 Formaldehyde Analysis

As discussed in Section 3.13.3, formaldehyde was modeled for comparison to California's OEHHA RELs. The results are provided in Table 5-2 and represent the maximum modeled concentrations from the runs.

Table 5-2. Formaldehyde Analysis Results

Pollutant	Averaging Period	Modeled Concentration ($\mu\text{g}/\text{m}^3$)	REL ($\mu\text{g}/\text{m}^3$)	Exceeds REL
formaldehyde	1-hr	1.99	55	No
	8-hr	0.35	9	No
	annual	0.013	9	No

As shown in Table 5-2, all formaldehyde modeled impacts for the project are less than the applicable REL.

ATTACHMENT B

Insignificant Emission Units



Unit	Description	Uncontrolled Emissions																	
		NO _x		CO		VOC		SO ₂		PM ₁₀		PM _{2.5}		Ammonia		Total HAPs			
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TUR-1	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-2	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-3	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-4	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-5	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-6	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-7	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-8	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-9	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-10	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-11	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-12	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-13	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-14	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-15	SMT130 Turbine	5.95	26.05	6.03	26.43	1.90	8.32	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
SSM-1	SMT130 SSM	84.38	0.31	7605.00	27.89	435.00	1.60	-	-	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
COOL	Cooling Towers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GEN-1	500 kW Engine	0.38	0.10	3.86	0.96	0.01	3.70E-03	1.36	0.34	1.92	8.43	1.92	8.43	-	-	-	-	-	-
GEN-2	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.03	6.69E-03	-	-
GEN-3	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.04	0.01	-	-
GEN-4	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.04	0.01	-	-
GEN-5	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.04	0.01	-	-
PRS-1	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
PRS-2	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
PRS-3	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
PRS-4	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
Total		180.05	395.10	7767.84	429.47	464.07	126.70	8.19	29.95	18.76	81.61	18.76	81.61	17.47	76.52	2.84	11.60		

Unit	Description	Controlled Emissions																	
		NO _x		CO		VOC		SO ₂		PM ₁₀		PM _{2.5}		Ammonia		Total HAPs			
		lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy	lb/hr	tpy
TUR-1	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-2	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-3	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-4	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-5	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-6	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-7	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-8	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-9	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-10	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-11	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-12	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-13	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-14	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
TUR-15	SMT130 Turbine	1.32	5.79	1.01	4.41	1.27	5.55	0.45	1.97	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
SSM-1	SMT130 SSM	84.38	0.31	7605.00	27.89	435.00	1.60	-	-	1.11	4.86	1.11	4.86	1.16	5.10	0.18	0.77		
COOL	Cooling Towers	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
GEN-1	500 kW Engine	0.38	0.10	3.86	0.96	0.01	3.70E-03	1.36	0.34	1.92	8.43	1.92	8.43	-	-	-	-	-	-
GEN-2	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.03	6.69E-03	-	-
GEN-3	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.04	0.01	-	-
GEN-4	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.04	0.01	-	-
GEN-5	1000 kW Engine	1.37	0.34	1.99	0.50	0.13	0.03	0.02	4.50E-03	6.06E-03	1.52E-03	6.06E-03	1.52E-03	-	-	0.04	0.01	-	-
PRS-1	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
PRS-2	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
PRS-3	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
PRS-4	Plum T6500	0.15	0.64	0.12	0.54	8.09E-03	0.04	8.82E-04	3.86E-03	0.01	0.05	0.01	0.05	-	-	2.78E-03	0.01	-	-
Total		110.66	91.19	7632.41	99.08	454.57	85.05	8.19	29.95	18.76	81.61	18.76	81.61	17.47	76.52	2.84	11.60		

Stack ID	Description	Citation	Potential to Emit
GEN-1	500 kW Tier 4 Office Generator Engine	1200-03-09-.04(4)(a) 1200-03-09-.04(2)(c)	< 5 tons/yr <1,000 lb/yr HAP emitted
GEN-2	1000 kW Tier 4 Black Start Engine	1200-03-09-.04(4)(a) 1200-03-09-.04(2)(c)	< 5 tons/yr <1,000 lb/yr HAP emitted
GEN-3	1000 kW Tier 4 Black Start Engine	1200-03-09-.04(4)(a) 1200-03-09-.04(2)(c)	< 5 tons/yr <1,000 lb/yr HAP emitted
GEN-4	1000 kW Tier 4 Black Start Engine	1200-03-09-.04(4)(a) 1200-03-09-.04(2)(c)	< 5 tons/yr <1,000 lb/yr HAP emitted
GEN-5	1000 kW Tier 4 Black Start Engine	1200-03-09-.04(4)(a) 1200-03-09-.04(2)(c)	< 5 tons/yr <1,000 lb/yr HAP emitted
PRS-1	1.5 MMBtu/hr PLUM Pressure Reduction System	1200-03-09-.04(2)(a)(3)	< 5 tons/yr <1,000 lb/yr HAP emitted
PRS-2	1.5 MMBtu/hr PLUM Pressure Reduction System	1200-03-09-.04(2)(a)(3)	< 5 tons/yr <1,000 lb/yr HAP emitted
PRS-3	1.5 MMBtu/hr PLUM Pressure Reduction System	1200-03-09-.04(2)(a)(3)	< 5 tons/yr <1,000 lb/yr HAP emitted
PRS-4	1.5 MMBtu/hr PLUM Pressure Reduction System	1200-03-09-.04(2)(a)(3)	< 5 tons/yr <1,000 lb/yr HAP emitted
COIL-1	Cooling Tower #1	1200-03-09-.04(4)(b) 1200-03-09-.04(5)(f)(15)	< 5 tons/yr <1,000 lb/yr HAP emitted
COIL-2	Cooling Tower #2	1200-03-09-.04(4)(b) 1200-03-09-.04(5)(f)(15)	< 5 tons/yr <1,000 lb/yr HAP emitted

Tier 4-Certified 500 kW Generator Engine

The diesel-fueled generator engine will be installed for office emergency use. This engine will be subject to 40 CFR Part 63, Subpart ZZZZ and compliance is demonstrated via compliance with 40 CFR Part 60, Subpart IIII. Equipment information and emissions estimates are included.

Emissions from Emergency Engine*Engine Data*

Generator	C18 ATAAC Generator Engine (diesel)	Notes
Engine Type	Compression Ignition	
Power	500 kW	
Heat Input Rate	4.7 MMBtu/hr	33.4 gal/hr * 140,000 Btu/gal; vendor fuel use
Hours of Operation	500 hr/yr	

Criteria and HAP Pollutant Emissions

Pollutant	Emission Factor	Emission Factor Units	Emission Rate		Emission Factor Reference
			(lb/hr)	(tpy)	
NO _x	0.35	g/kW-hr	0.38	0.10	NO _x , VOC and PM - CAT vendordata CO - 40 CFR Part 1039, App. I (Tier 4) standard for a 500 kW engine
CO	3.5		3.86	0.96	
VOC	0.01		0.01	3.70E-03	
PM/PM ₁₀ /PM _{2.5}	0.01		0.01	1.52E-03	
SO ₂	0.29	lb/MMBtu	1.36	0.34	AP-42 Table 3.3-1 for diesel engines (4/25)
Benzene	9.33E-04	lb/MMBtu	4.36E-03	1.09E-03	AP-42 Table 3.3-2 for diesel engines (4/25)
Toluene	4.09E-04		1.91E-03	4.78E-04	
Xylenes	2.85E-04		1.33E-03	3.33E-04	
Propylene	2.58E-03		1.21E-02	3.02E-03	
Formaldehyde	1.18E-03		5.52E-03	1.38E-03	
Acetaldehyde	7.67E-05		3.59E-04	8.97E-05	
Acrolein	9.25E-05		4.33E-04	1.08E-04	
POM (total PAH)	1.68E-04		7.86E-04	1.96E-04	
Total HAP	5.72E-03		0.027	0.007	

*Sample Calculations*Short-Term NO_x Emissions

$$\frac{0.35 \text{ g}}{\text{kW-hr}} \times \frac{0.500 \text{ kW}}{1} \times \frac{453.592 \text{ g}}{\text{lb}} = \frac{0.38 \text{ lb}}{\text{hr}}$$

Long-Term NO_x Emissions

$$\frac{0.38 \text{ lb}}{\text{hr}} \times \frac{500 \text{ hr}}{\text{yr}} \times \frac{\text{ton}}{2,000 \text{ lb}} = \frac{0.10 \text{ ton}}{\text{yr}}$$

**ELECTRIC POWER - Technical Spec Sheet
STANDARD****C18 ACERT****455 ekW/ 569 kVA/ 60 Hz/ 1800 rpm/ 480 V/ 0.8 Power Factor****Rating Type: PRIME****Emissions: U.S. EPA Tier 4 Final Nonroad Genset
Emission Standards**

Image shown may not reflect actual configuration

C18 ACERT**455 ekW/ 569 kVA****60 Hz/ 1800 rpm/ 480 V****Metric****English**

Package Performance		
Genset Power Rating with Fan @ 0.8 Power Factor	455 ekW	
Genset Power Rating	569 kVA	
Aftercooler (Separate Circuit)	N/A	N/A

Fuel Consumption		
100% Load with Fan	126.6 L/hr	33.4 gal/hr
75% Load with Fan	96.7 L/hr	25.6 gal/hr
50% Load with Fan	69.2 L/hr	18.3 gal/hr
25% Load with Fan	43.2 L/hr	11.4 gal/hr

Cooling System ¹		
Engine Coolant Capacity	26.9 L	7.1 gal

Inlet Air		
Combustion Air Inlet Flow Rate	36.3 m ³ /min	1208.0 cfm
Max. Allowable Combustion Air Inlet Temp	50 °C	122 °F

Exhaust System		
Exhaust Stack Gas Temperature	426.3 °C	799.3 °F
Exhaust Gas Flow Rate	66.5 m ³ /min	2349.7 cfm
Exhaust System Backpressure (Maximum Allowable)	10.0 kPa	40.0 in. water

**ELECTRIC POWER - Technical Spec Sheet
STANDARD**

C18 ACERT
455 kW/ 569 kVA/ 60 Hz/ 1800 rpm/ 480 V/ 0.8 Power Factor

Rating Type: PRIME

Emissions: U.S. EPA Tier 4 Final Nonroad Genset
Emission Standards

Heat Rejection		
Heat Rejection to Jacket Water	256 kW	14548 Btu/min
Heat Rejection to Exhaust (Total)	462 kW	26276 Btu/min
Heat Rejection to Aftercooler	101 kW	5721 Btu/min
Heat Rejection to Atmosphere from Engine	26.1 kW	1483 Btu/min
Heat Rejection to Atmosphere from Generator	25.5 kW	1450 Btu/min

Alternator ²	
Motor Starting Capability @ 30% Voltage Dip	1729 skVA
Current	684 amps
Frame Size	LC6124G
Excitation	AR
Temperature Rise	105 ° C

Emissions (Nominal) ³		
NOx	122.8 mg/Nm ³	0.26 g/hp-hr
CO	N/A	N/A
HC	3.9 mg/Nm ³	0.01 g/hp-hr
PM	1.6 mg/Nm ³	0.0 g/hp-hr

DEFINITIONS AND CONDITIONS

1. For ambient and altitude capabilities consult your Cat dealer. Air flow restriction (system) is added to existing restriction from factory.
2. UL 2200 Listed packages may have oversized generators with a different temperature rise and motor starting characteristics. Generator temperature rise is based on a 40° C ambient per NEMA MG1-32.
3. Emissions data measurement procedures are consistent with those described in EPA CFR 40 Part 89, Subpart D & E and ISO8178-1 for measuring HC, CO, PM, NOx. Data shown is based on steady state operating conditions of 77° F, 28.42 in HG and number 2 diesel fuel with 35° API and LHV of 18,390 btu/lb. The nominal emissions data shown is subject to instrumentation, measurement, facility and engine to engine variations. Emissions data is based on 100% load and thus cannot be used to compare to EPA regulations which use values based on a weighted cycle.

Tier 4-Certified 1000 kW Black Start Generator Engine

This diesel-fueled generator engine will be installed for black start purposes. This engine will be subject to 40 CFR Part 63, Subpart ZZZZ and compliance is demonstrated via compliance with 40 CFR Part 60, Subpart IIII. Equipment information and emissions estimates are included.

Emissions from Black Start Engine*Engine Data*

Generator	Cummins Inc. QST30-G17 Generator Engine (diesel)	Notes
Engine Type	Compression Ignition	
Power	1,482 HP	
	1,000 kW	
Heat Input Rate	10.1 MMBtu/hr	72 gal/hr * 140,000 Btu/gal
Hours of Operation	500 hr/yr	

Criteria and HAP Pollutant Emissions

Pollutant	Emission Factor	Emission Factor Units	Emission Rate		Emission Factor Reference
			(lb/hr)	(tpy)	
NO _x	0.42	g/hp-hr	1.37	0.34	Manufacturer's emissions data
CO	0.61		1.99	0.50	
VOC	0.04		0.13	0.03	
PM/PM ₁₀ /PM _{2.5}	0.01		0.03	8.17E-03	
SO ₂	1.21E-05	lb/hp-hr	0.02	4.50E-03	AP-42 Table 3.4-1 for large (>600 hp) diesel engines (4/25)
Benzene	7.76E-04	lb/MMBtu	7.82E-03	1.96E-03	AP-42 Tables 3.4-3 and 3.4-4 for large (>600 hp) diesel engines (4/25)
Toluene	2.81E-04		2.83E-03	7.08E-04	
Xylenes	1.93E-04		1.95E-03	4.86E-04	
Propylene	2.79E-03		2.81E-02	7.03E-03	
Formaldehyde	7.89E-05		7.95E-04	1.99E-04	
Acetaldehyde	2.52E-05		2.54E-04	6.35E-05	
Acrolein	7.88E-06		7.94E-05	1.99E-05	
POM (total PAH)	2.12E-04		2.14E-03	5.34E-04	
Total HAP	4.36E-03		0.044	0.011	

*Sample Calculations*Short-Term NO_x Emissions

$$\frac{0.42 \text{ g}}{\text{hp-hr}} \times \frac{1,482 \text{ hp}}{1} \times \frac{453.592 \text{ g}}{\text{lb}} = \frac{1.37 \text{ lb}}{\text{hr}}$$

Long-Term NO_x Emissions

$$\frac{1.37 \text{ lb}}{\text{hr}} \times \frac{0,500 \text{ hr}}{\text{yr}} \times \frac{\text{ton}}{2,000 \text{ lb}} = \frac{0.34 \text{ ton}}{\text{yr}}$$



Exhaust Emission Data Sheet

DQFAH

60 Hz Diesel Generator Set

EPA Emission

Engine Information:

Model:	Cummins Inc. QST30-G17	Bore:	5.51 in. (140 mm)
Type:	4 Cycle, 50° V 12 Cylinder Diesel	Stroke:	6.50 in. (165 mm)
Aspiration:	Turbocharged and Low Temperature After cooled	Displacement:	1860 cu. in. (30.5 liters)
Compression Ratio:	14.7:1		
Emission Control Device:	SCR & DPF		
Emission Level :	Stationary Non-Emergency, T4F capable (with DPF)		

	1/4	1/2	3/4	Full	Full	
PERFORMANCE DATA	Standby	Standby	Standby	Standby	Prime	
BHP @ 1800 RPM (60 Hz)	371	741	1112	1482	1322	
Fuel Consumption (gal/Hr)	19	36	54	72	64	
Exhaust Gas Flow (CFM)	2780	4500	6370	7540	6950	
Exhaust Gas Temperature (°F)	620	760	814	890	873	
EXHAUST EMISSION DATA						
HC (Total Unburned Hydrocarbons)	0.02	0.01	0.03	0.04	0.03	
NOx (Oxides of Nitrogen as NO ₂)	0.72	0.40	0.35	0.42	0.39	
CO (carbon Monoxide)	1.06	0.64	0.60	0.61	0.60	
PM (Particular Matter)	0.00	0.00	0.00	0.00	0.00	
SO ₂ (Sulfur Dioxide)	0.00	0.00	0.00	0.00	0.00	
Smoke (Bosch)	0	0	0	0	0	

All Values are Grams/HP-Hour, Smoke is Bosch #

TEST CONDITIONS

Data is representative of steady-state engine speed (± 36 RPM) at designated genset loads. Pressures, temperatures, and emission rates were stabilized.

Fuel Specification:	ASTM D975 No. 2-D diesel fuel with ULSD, and 40-48 cetane number..
Fuel Temperature:	99 $\pm$ 9 °F (at fuel pump inlet)
Intake Air Temperature:	77 $\pm$ 9 °F
Barometric Pressure:	29.6 $\pm$ 1 in. Hg
Humidity:	NOx measurement corrected to 75 grains H ₂ O/lb dry air
Reference Standard:	ISO 8178

The NO_x, HC, CO and PM emission data tabulated here are representative of test data taken from a single engine under the test conditions shown above. Data for the other components are estimated. These data are subjected to instrumentation and engine-to-engine variability. Field emission test data are not guaranteed to these levels. Actual field test results may vary due to test site conditions, installation, fuel specification, test procedures and instrumentation. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.



**2024 EPA Tier4 Certified Exhaust
Emission Compliance Statement
1000DQFAH
Stationary Non-Emergency,
60 Hz Diesel generator set**

Compliance Information:

The engine used in this generator set complies with Tier 4 emissions limit of U.S. EPA New Source Performance Standards for stationary non-emergency engines under the provisions of 40 CFR 60 Subpart III when tested per ISO8178 D2.

Engine Manufacturer: Cummins Inc.
EPA Certificate Number: RCEXL78.0AAA-003
Effective Date: 04/12/2023
Date Issued: 04/12/2023
EPA Engine Family (Cummins Emissions Family): RCEXL78.0AAA

Engine Information:

Model: QST30-G17 Bore: 5.51 in. (140 mm)
Engine Nameplate HP: 1490 Stroke: 6.50 in. (165 mm)
Type: 4 Cycle, 50°V, 12 Cylinder Diesel Displacement: 1860 cu. in. (30.5 liters)
Aspiration: Turbocharged & Low Temperature Aftercooled Compression Ratio: 14.7:1
Emission Control Device: SCR & DPF

Diesel Fuel Emissions Limits

D2 cycle exhaust emissions	Grams per BHP-hr				Grams per kW _m -hr			
	NO _x	NMHC	CO	PM	NO _x	NMHC	CO	PM
EPA T4F Emissions Limit	0.50	0.14	2.6	0.02	0.67	0.19	3.5	0.03

Test methods: EPA emissions recorded per 40 CFR Part 60, 89, 1039, 1065 and weighted at load points prescribed in the regulations for constant speed engines.

Diesel fuel specifications: Cetane number: 40-50. Reference: ASTM D975 No. 2-D, 7-15 ppm Sulfur.

Reference conditions: Air inlet temperature: 25°C (77°F), Fuel inlet temperature: 40°C (104°F). Barometric pressure: 100 kPa (29.53 in Hg), Humidity: 10.7 g/kg (75 grains H₂O/lb) of dry air; required for NO_x correction, Restrictions: Intake restriction set to a maximum allowable limit for clean filter; Exhaust back pressure set to a maximum allowable limit.

Tests conducted using alternate test methods, instrumentation, fuel or reference conditions can yield different results. Engine operation with excessive air intake or exhaust restriction beyond published maximum limits, or with improper maintenance, may result in elevated emission levels.

Plum T6500 Natural Gas Burner

This burner is for a pressure reduction system.

Burner Data

		Notes
Rated Heat Input	1.5 MMBtu/hr	Plum vendor data
Natural Gas Usage	1.47E-03 MMscf/hr	
Hours of Operation	8,760 hr/yr	

Natural Gas Combustion Emissions

Pollutant	Emission Factor ¹ (lb/MMscf)	Emission Rates (lb/hr) (tpy)	
SO ₂	0.6	8.82E-04	3.86E-03
NO _x	100	0.15	0.64
CO	84	0.12	0.54
VOC	5.5	0.01	0.04
PM	7.6	0.01	0.05
PM ₁₀	7.6	0.01	0.05
PM _{2.5}	7.6	0.01	0.05

¹ From AP-42 Section 1.4, Tables 1.4-1 and 1.4-2, Uncontrolled Small Boilers (<100) (July 1998).

*Sample Calculations**Short-Term PM Emission Rate:*

$$\frac{7.6 \text{ lb}}{\text{MMscf}} \times \frac{1.47\text{E-}03 \text{ MMscf}}{\text{hr}} = \frac{0.01 \text{ lb}}{\text{hr}}$$

Long-Term PM Emission Rate:

$$\frac{0.01 \text{ lb}}{\text{hr}} \times \frac{8,760 \text{ hr}}{1 \text{ yr}} \times \frac{1 \text{ ton}}{2,000 \text{ lb}} = \frac{0.05 \text{ ton}}{\text{yr}}$$

HAP Emissions:

Pollutant	Emission Factor ² (lb/MMscf)	Emission Rates	
		(lb/hr)	(tpy)
Acenaphthene	1.80E-06	2.65E-09	1.16E-08
Acenaphthylene	1.80E-06	2.65E-09	1.16E-08
Anthracene	2.40E-06	3.53E-09	1.55E-08
Benzo(a)anthracene	1.80E-06	2.65E-09	1.16E-08
Benzene	2.10E-03	3.09E-06	1.35E-05
Benzo(a)pyrene	1.20E-06	1.76E-09	7.73E-09
Benzo(b)fluoranthene	1.80E-06	2.65E-09	1.16E-08
Benzo(g,h,i)perylene	1.20E-06	1.76E-09	7.73E-09
Benzo(k)fluoranthene	1.80E-06	2.65E-09	1.16E-08
Chrysene	1.80E-06	2.65E-09	1.16E-08
Dibenzo(a,h)anthracene	1.20E-06	1.76E-09	7.73E-09
1,4-Dichlorobenzene	1.20E-03	1.76E-06	7.73E-06
7,12-Dimethylbenz(a)anthracene	1.60E-05	2.35E-08	1.03E-07
Fluoranthene	3.00E-06	4.41E-09	1.93E-08
Fluorene	2.80E-06	4.12E-09	1.80E-08
Formaldehyde	7.50E-02	1.10E-04	4.83E-04
Hexane	1.80E+00	2.65E-03	1.16E-02
Indeno(1,2,3-c,d)pyrene	1.80E-06	2.65E-09	1.16E-08
Lead	5.00E-04	7.35E-07	3.22E-06
3-Methylchloranthrene	1.80E-06	2.65E-09	1.16E-08
2-Methylnaphthalene	2.40E-05	3.53E-08	1.55E-07
Naphthalene	6.10E-04	8.97E-07	3.93E-06
Phenanthrene	1.70E-05	2.50E-08	1.10E-07
Polycyclic Organic Matter (POM)	8.82E-05	1.30E-07	5.68E-07
Pyrene	5.00E-06	7.35E-09	3.22E-08
Toluene	3.40E-03	5.00E-06	2.19E-05
Arsenic Compounds (inorganic including arsine)	2.00E-04	2.94E-07	1.29E-06
Beryllium Compounds	1.20E-05	1.76E-08	7.73E-08
Cadmium Compounds	1.10E-03	1.62E-06	7.09E-06
Chromium Compounds (Trivalent, Total)	1.40E-03	2.06E-06	9.02E-06
Cobalt Compounds	8.40E-05	1.24E-07	5.41E-07
Manganese Compounds	3.80E-04	5.59E-07	2.45E-06
Mercury Compounds	2.60E-04	3.82E-07	1.67E-06
Nickel Compounds	2.10E-03	3.09E-06	1.35E-05
Selenium Compounds	2.40E-05	3.53E-08	1.55E-07
Total HAP	1.89	2.78E-03	0.01

² From AP-42 Tables 1.4-2 and 1.4-3 (July 1996).



T6500 Pressure Reduction System



Technical Specifications

Design Code:	ASME B31.3, NFPA 70
Electrical Approvals:	Intertek Approval on Control Panel for Class 1, Zone 2
Inlet Design Pressure:	1310 psig
Design Temp:	-40°F to 300°F
Downstream Pressure:	75 to 400 psig
Design Flow Rate:	6.5 MM SCF per day (4,514 SCFM)
Trailer Inputs:	3" Class 600
Power Requirements:	Solar 24VDC controls w/ battery system (No external Power Required)
Main Burner:	1,500,000 BTU/HR
Pilot Burner:	7,000 BTU/HR
Remote Monitoring:	Cloud-based ScadaCore system including alarm call outs
Fuel Type:	Sweet Natural Gas
Heat Transfer Fluid:	Propylene Glycol (50-50)
Filtration:	Inlet Filter/Separator with Discharge Mesh Strainer

Burner System & Shutdown Setpoints:

Burner Off Temp:	70°C (158°F)
Burner On Temp:	80°C (176°F)
Burner Alarm Temp:	90°C (194°F)
Discharge Gas Pressure:	Set based on customer required pressure
Discharge Temp Low:	-5°C (23°F)

COOLING TOWERS PM/PM₁₀/PM_{2.5} EMISSIONS (Insignificant Activities)

PM₁₀ emissions were estimated using the following methodology:

$$\text{Emissions (lb/hr)} = \text{cooling water flow rate (gal/min)} * 60 \text{ min/hr} * \text{drift rate\%/100} * \text{solids (ppm)}/1,000,000 * 8.34 \text{ lb water/gal}$$

$$\text{Emissions (tpy)} = \text{emissions (lb/hr)} * 8,760 \text{ hr/yr} * \text{ton}/2,000 \text{ lb}$$

Cooling Tower Name	TDS Concentration	Drift Rate	Flow Rate	PM/PM ₁₀ /PM _{2.5} Emissions	
	(ppm) ¹	(%) ²	(gpm)	(lb/hr)	(tpy)
Cooling Tower #1	4,250	0.0005	76,000	0.81	3.54
Cooling Tower #2	4,250	0.0005	105,000	1.12	4.89
			Total =	1.92	8.43

¹ Data provided by Adam Rampel in May 10, 2025 email

² Facility information states that drift rate <0.0005%.

Example Calculations

$$\begin{aligned} & 76,000 \text{ gal/min} * 60 \text{ min/hr} * 0.0005\%/100 * 1,000 \text{ ppm}/1,000,000 * 8.34 \text{ lb water/gal water} * 8,760 \text{ hr/yr} * \\ & \text{ton}/2,000 \text{ lb} \\ & = 0.83 \text{ tons PM/year} \end{aligned}$$