

NARRATIVE

TO: Cynthia Dorrough

FROM: Jada Levers

DATE: May 21, 2024

Facility Name: **Microsoft Corporation – FTY01 Facility**
AIRS No.: 097-00097
Location: Douglasville, GA (Douglas County)
Application #: 29231
Date of Application: March 6, 2024

Background Information

Microsoft Corporation was issued Permit No. 7376-097-0097-S-01-0 on October 13, 2022, to construct and operate twenty-one [21] emergency generators FTY01 Facility, located at 1601 North River Road, Douglasville, GA 30122. The facility is located in Douglas County, which was previously designated nonattainment area under Georgia Air Quality Control Rule 391-3-1-.03(8)(c)14(i) “Additional Provisions for Ozone Non-Attainment Areas”. As of October 17, 2022, Georgia is in attainment status for ozone National Ambient Air Quality Standards (NAAQS) in all counties in the Atlanta metro area, including Douglas County. The facility has a sitewide NO_x limit of 99 tons per year to limit the annual fuel usage and remain a synthetic minor source with respect to provisions of 391-3-1-.03(10)(b)1(i) which establishes the Title V major source threshold for each criteria pollutant as 100 tons per year.

Purpose of Application

Application No. 29231 was dated March 6, 2024, and received March 13, 2024 proposing to expand FTY01 Facility by installing twenty [20] 3,000 kW emergency generators each with a rated capacity of 28.23 MMBtu/hr and one [1] 500 kW emergency generator with a rated capacity of 4.80 MMBtu/hr at building 2 (GN22 through GN42). All generators will be diesel fueled with renewable hydrocarbon diesel used as an alternative fuel and they will provide backup power to servers and other electronic equipment in the event of a power outage in building 2. Public advisory expired on April 19, 2024.

Updated Equipment List

Table 1. Equipment List

Source Code	Input Heat Capacity (MMBtu/hr)	Description	Installation Date	Construction Date
Building 1				
GN1	4.80	500 kW Diesel-Fueled Emergency Generator	January 2023	August 2022
GN2 – GN21	28.23	3,000 kW Diesel-Fueled Emergency Generators	January 2023	August 2022

Source Code	Input Heat Capacity (MMBtu/hr)	Description	Installation Date	Construction Date
Building 2				
GN22	4.80	500 kW Diesel-Fueled Emergency Generator	2025	2025
GN23 – GN42	28.23	3,000 kW Diesel-Fueled Emergency Generators	2025	2025

Emissions Summary

FTY01 Facility will continue to operate under a Synthetic Minor Permit. The facility will limit their annual fuel usage to ensure that NO_x emissions stay below 99 tpy. Sitewide emissions are included in Appendix C of Application No. 29231. The facility would like to include Renewable Hydrocarbon Diesel as an alternative fuel for the expansion of the datacenter. Testing data from another Microsoft data center shows that Renewable Hydrocarbon Diesel has lower emission rates than ultra-low sulfur diesel (ULSD) at worst-case emission rates based on manufacturer data. Therefore, the USLD emission rates were used as the worst-case scenario at the facility.

The facility is proposing to track operational data (hours and load rate) measured and recorded to calculate monthly NO_x emissions, each calendar month, from all emergency generators located onsite (buildings 1 and 2). Monthly NO_x emissions from fuel combustion at the facility shall be determined using the following equation:

$$\text{Monthly NO}_x \text{ emissions } \left(\frac{\text{tons}}{\text{month}} \right) = \frac{\sum_{i=0}^{100\%} \text{NO}_x \text{ emission rate at load } \left(\frac{\text{lb}}{\text{hr}} \right) \times \text{Monthly Hours of Operation for all Generators at Load } \left(\frac{\text{hrs}}{\text{month}} \right)}{2000 \left(\frac{\text{lb}}{\text{ton}} \right)}$$

Where i = the engine load during the run

Previously, the emergency generators were limited to approximately 155 hours per year per generator (less than 500 hours of operation per year allotted for data centers to be exempt from emission standards in Georgia Rule (mmm)). With the new addition of emergency generators, the facility may operate for up to 500 hours per year per Georgia Rule (mmm) and ensure NO_x emissions remain under 99 tpy to avoid subjection to Title V. For runs at 10%, 25%, 50%, 75% or 100% load, the NO_x Emission Rate at Load will be equal to the corresponding emission rate in the table below. For runs at other loads, the NO_x Emission Rate at Load will be equal to the emission rate listed in the table below that corresponds to the next highest load.

Table 2. NO_x emission rates based on corresponding load.

Load Rate	10%	25%	50%	75%	100%
Emission Rate for 500-kW Generator (lb/hr)	1.33	2.19	3.86	7.70	9.87
Emission Rate for 3,000-kW Generators using ULSD (lb/hr)	7.17	11.34	20.38	38.83	63.48

Emissions were calculated using emission rates provided by the generator manufacture for all criteria air pollutants, except for sulfur dioxide, which was calculated using emission factors from *AP-42 Chapter 3.4*

– *Large Stationary Diesel and All Stationary Dual-fuel Engines* for the 500-kW generator and emission testing data from another facility for the 3,000-kW generators. The manufacturer provided data is provided in Appendix D of Application No. 29231.

Emissions of toxic air pollutants (benzene, toluene, xylene, formaldehyde, acetaldehyde, acrolein, and naphthalene) from combustion in the emergency generators were also calculated using *AP-42 Section 3.4 – Large Stationary Diesel and All Stationary Dual-Fuel Engines*.

Facility-Wide Emissions
(in tons per year)

Pollutant	Potential Emissions			Actual Emissions		
	Before Mod.	After Mod.	Emissions Change	Before Mod.	After Mod.	Emissions Change
PM/PM ₁₀ /PM _{2.5}	6.73	13.46	+6.73	2.08	2.08	0
NO _x	319.81*	639.62*	+319.81	99*	99*	0
SO ₂	2.61E-01	5.22E-01	+2.61E-01	0.36	0.36	0
CO	19.60	39.19	+19.60	6.07	6.07	0
VOC	7.54	15.07	+7.54	2.33	2.33	0
Max. Individual HAP	0.11	0.22	+0.11	0.03	0.03	0
Total HAP	0.22	0.45	+0.23	0.07	0.07	0
Total GHG (if applicable)	2.32E04	4.64E04	+2.32E04	7.20E03	7.20E03	0

*99 tpy NO_x limit

Regulatory Applicability

Georgia Rule 391-3-1.02 (2)(b) – Visible Emissions

Rule (b) limits visible emissions from any air contaminant source to not exceed 40 percent opacity. Emergency generators (Source IDs: GN22-GN42) will be subject to this rule and the facility will comply with this limitation through the exclusive use of ultra-low sulfur diesel (ULSD) fuel and renewable diesel fuel in the proposed generator engines. The opacity standards of Georgia Rule (b) will be subsumed by Subpart IIII.

Georgia Rule 391-3-1.02 (2)(g) – Sulfur Dioxide

Rule (g) limits all fuel burning equipment below 100 MMBtu/hr to burn no more than 2.5% fuel sulfur, by weight. Emergency generators (Source IDs: GN22-GN42) will be subject to this rule and the facility will comply with this limitation through the exclusive use of ultra-low sulfur diesel (ULSD) fuel and renewable diesel fuel in the proposed generator engines. The fuel sulfur standards of Georgia Rule (g) will be subsumed by Subpart IIII.

Georgia Rule 391-3-1.02 (2)(mmm) – NO_x emissions from Stationary Gas Turbines and Stationary Engines Used to Generate Electricity

Rule (mmm) limits NO_x emissions from any stationary engine used to generate electricity, whose capacity is greater than or equal to 100 kilowatts (kW) and is less than or equal to 25 megawatts (MW). Stationary

engines at data centers that meet the criteria in 391-3-1-.02(2)(mmm)8 are not subject to the emission limits in this rule. Generators (Source IDs: GN1-GN42) will limit annual operation to less than 500 hours per year to maintain synthetic minor source status.

40 CFR 60 Subpart IIII – Standards of Performance for New Stationary Sources

Subpart IIII applies to manufacturers, owners, and operators of stationary compression ignition (CI) internal combustion engines (ICE) that commenced construction after July 11, 2005. Since the facility plans to commence construction of emergency generators (Source IDs: GN22-GN42) in the year 2025, they will be subject to the emission and operating limitations of this subpart.

40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Source Categories

Subpart ZZZZ establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. A stationary RICE is defined as any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. The facility is considered an area source of HAPs because potential HAP emissions are below 10 tpy for any individual HAP and below 25 tpy for combination of HAPs. Emergency generators (Source IDs: GN22-GN42) are considered new emergency stationary RICE under this subpart because a stationary RICE located at an area source of HAPs is considered new if construction of the stationary RICE commenced on or after June 12, 2006. Per 40 CFR 63.6590(c)(1), new emergency generators meet the requirements of Subpart ZZZZ by meeting the emission and operating limitations for stationary CI ICE in 40 CFR 60 Subpart IIII.

Permit Conditions

Condition No. 2.1 has been modified to include the opacity standards of 40 CFR 60 Subpart IIII and subsume Georgia Rule (b).

Condition No. 2.3 has been modified to detail the operating standards of Subpart IIII.

Condition No. 2.4 has been modified to include new emergency generators (Source IDs: GN22-GN42) and establishes fuel sulfur limitations from Subpart IIII and subsume Georgia Rule (g).

Condition No. 2.5 has been modified to limit operational hours for all EGs, including new emergency generators (Source IDs: GN22-GN42), to 500 hours per year or less to be exempt from the NO_x emission standard per Georgia Rule (mmm).

Condition No. 2.6 has been modified to include new emergency generators (Source IDs: GN22-GN42) and establishes applicability for the RICE MACT (40 CFR 63 Subpart ZZZZ).

Condition No. 2.7 has been modified to include new emergency generators (Source IDs: GN22-GN42) and applicability to NSPS Subpart IIII.

New Condition No. 2.8 requires the Permittee to use diesel fuel oil in all emergency generators and establishes ASTM D975-21 fuel standards for the diesel fuel used for combustion.

Condition No. 5.2 has been modified to incorporate references to 40 CFR 63.6635 and include clarifying definitions from the RICE MACT, as well as include new emergency generators (Source IDs: GN22-GN42).

New Condition No. 5.3 requires the Permittee to verify each shipment of diesel fuel oil received for combustion in each emergency generator (Source IDs: GN1-GN42) complies with the requirements of Condition No. 2.8.

Condition No. 7.2 has been modified to include new emergency generators (Source IDs: GN22-GN42), include verbiage from 40 CFR 63.6660, and include reference to 40 CFR 60.4214.

Condition No. 7.3 has been modified to include new emergency generators (Source IDs: GN22-GN42) in the 500 hours per year or less operational limit for all EGs combined (Source IDs: GN1-GN42).

Condition No. 7.4 has been modified to include new emergency generators (Source IDs: GN22-GN42) when calculating monthly the twelve-month rolling total of the non-emergency service operating time.

Condition No. 7.5 has been modified to include new emergency generators (Source IDs: GN22-GN42) when calculating the monthly NO_x emissions from diesel fuel combustion. The equation for calculating monthly NO_x emissions has also been modified to allow for changing loads and emission rates.

Condition No. 7.6 has been modified to include new emergency generators (Source IDs: GN22-GN42) in the 12-month rolling total for NO_x emissions.

Condition No. 7.7 has been modified to include new emergency generators (Source IDs: GN22-GN42) and include reference to 40 CFR 60.4202.

Condition No. 7.8 has been modified to include new emergency generators (Source IDs: GN22-GN42).

Condition No. 7.9 has been modified to include reference Condition No. 2.8 when verifying diesel fuel oil shipments.

New Condition No. 7.10 requires the Permittee to submit an annual report according to the requirements of 40 CFR 63.6650(h) if the Permittee operates the emergency generators (Source IDs: GN1-GN42) according to Condition No. 2.3.c.i.

Toxic Impact Assessment

The GEPD's Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions (hereinafter referred to as "the Guideline") provides requirements for assessing the impacts of toxic air pollutant (TAP) emissions from a proposed project. If a facility's emissions of a specific TAP are less than the minimum emission rate (MER) provided for that TAP in Appendix A of the Guideline, no further analysis is required for that TAP. Otherwise, an air dispersion modeling analysis is required to demonstrate that the facility's emissions of that TAP will not exceed the acceptable ambient concentration (AAC) provided for that TAP in Appendix A of the Guideline. A comparison of each potential TAP emission expected to be emitted by the Facility to the applicable MERs is provided in Table 3, which indicates that a Toxic Impact Assessment (TIA) was required only for benzene.

Table 3. Comparison of Facility-Wide TAP Emissions to Georgia MERs

Pollutants	Facility-Wide Potential Emissions (lb/yr)	Georgia MER (lb/yr)	Toxic Impact Analysis (TIA) Required?
Benzene	180.56	31.63	Yes
Toluene	65.38	1,216,650	No

Xylenes	44.91	24,333	No
Formaldehyde	18.36	267	No
Acetaldehyde	5.86	1,107	No
Acrolein	1.83	4.87	No
Naphthalene	30.25	729.99	No

A TIA was conducted for benzene using the USEPA's SCREEN3 modeling software (version 13043), which calculates maximum 1-hour average impacts. A model run was prepared for a single emergency generator engine from each group, based on the engine at the site in that group located nearest the fence line and an emission rate of 1 g/s for each engine.

Per Appendix A of the Guideline, benzene has both a short-term (i.e., 15-minute average) AAC and a long-term (i.e., annual average) AAC. As such, separate short-term and long-term modeled benzene emission rates were developed since the generators will not operate continuously throughout the year. The short-term average emission rate provided to the model was the maximum potential hourly emission rate for a single generator (lb/hr/gen). The long-term average emission rate was calculated based on the assumption that each generator will operate for a maximum of 200 hours per year using the following equation:

$$\text{Long - Term Modeled Emission Rate per generator} \left(\frac{\text{lb}}{\text{hr}} \right) = \frac{\text{Short - Term Emission Rate} \left(\frac{\text{lb}}{\text{hr-gen}} \right) \times 200 \left(\frac{\text{hr}}{\text{yr}} \right)}{8,760 \left(\frac{\text{hr}}{\text{yr}} \right)}$$

These calculated emission rates were converted from units of lb/hr to g/s for entry to the model. The maximum 1-hour average ambient impact attributable to the Facility was calculated for benzene using the single-generator 1-hour average concentration predicted by the model as follows:

$$\text{Facility - wide Maximum 1 hour impact} \left(\frac{\mu\text{g}}{\text{m}^3} \right) = \text{Max. 1 - hr from a single generator at } 1 \frac{\text{g}}{\text{s}} \left(\frac{\mu\text{g}}{\text{m}^3} \right) \times \text{Number of generators} \times \text{Emission rate per generator} \left(\frac{\text{g}}{\text{s-gen}} \right)$$

Maximum predicted 1-hour concentrations were developed for both the short-term and long-term averaging periods, and individual model runs were conducted for each Group of engine type, respectively. In accordance with the Guideline, the concentration predicted by the model for the short-term averaging period was summed for the two engine types and converted to a 15-minute average concentration by multiplying the 1-hour concentration by a factor of 1.32. A similar procedure was used for the long-term averaging period, except that a factor of 0.08 was used to convert the 1-hour average concentration to an annual average.

SCREEN3 modeling was performed for benzene to determine that the Maximum Ground-Level Concentration (MGLC) was less than the Acceptable Ambient Concentration (AAC). Further discussion for the Toxic Impact Analysis (TIA) is provided in Section 4.0 of Application No. 29231. The results of the TIA are presented in Table 4 below and demonstrate that the benzene impacts from the facility will be less than the AACs. Results and documentation for the TIA are also provided in Appendix E of Application No. 29231.

Table 4. Comparison of Modeled TAP Impacts with the AACs

Pollutant	Averaging Period	Modeled Impact (µg/m3)	AAC (µg/m3)	Exceeds AAC?
Benzene	15-minute	11.05	1,600	No
	Annual	0.02	0.13	No

Summary & Recommendations

Based on the above considerations, I recommend issuing Permit 7376-097-0097-S-01-1 for the installation and operation of twenty-one [21] new emergency generators (Source IDs: GN22-GN42) at FTY01 Facility. Public advisory expired on April 19, 2024, and there were no comments received. The facility will maintain a synthetic minor source and the Mountain District (Atlanta) office will continue compliance responsibility and receiving report submittals.

Addendum to Narrative

The 30-day public review started on May 22, 2024, and ended on June 21, 2024. Comments were not received by the Division.