ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
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MEMORANDUM

Date: October 4, 2024

To: Paul Osazuwa, Construction Unit, Permits/BOA

From: Jason Tran, Modeling Unit, Permits/BOA

Subject: Powertrain Rockford, Inc., ID 201803AAF, Permit Application 24030001

Powertrain Rockford, Inc., (Powertrain) submitted a construction permit application (#24030001) on March 4, 2024, for a proposed project providing for the construction of two new parts painting lines, which includes drying ovens, spray booths, and cleanup lines. In the application, Powertrain requested two new paint lines in addition to its existing facility. In addition to the two new paint lines, Powertrain proposed to construct a new business expansion, which consists of additional spray booths, welding operations, and a friction clutch machine. This would provide an increase in production. The existing facility is located at 1200 Windsor Road in Love Park, Illinois. Centering coordinates for this facility are UTM Zone 16 coordinates 331,882 meters Easting and 4,688,091 meters Northing.

As of the date of this permitting decision, Powertrain is in an area of Environmental Justice ("EJ") concern as identified using Illinois EPA EJ Start. The issued permit would provide for increases in permitted emissions of nitrogen oxides (NOx), carbon monoxide (CO), volatile organic compounds (VOCs), particulate matter (PM) and sulfur dioxide (SO_2). Consequently, the Illinois EPA requested Powertrain to submit an air quality analysis as part of its permit application to ensure the project would not threaten or compromise existing National Ambient Air Quality Standards (NAAQS) for any pollutant with an increase in permitted emissions.

In response to Illinois EPA's request, Powertrain had Environmental Resources Management, Inc. (ERM) conduct an air quality review of $PM_{2.5}$, PM_{10}, SO_2, NOx, CO, and ozone (O_3) emissions. ERM also conducted an air quality review for hazardous air pollutants (HAPs).

Modeling Unit Review

ERM submitted an air quality analysis summary on June 4, 2024. Modeling files were transmitted electronically to the Modeling Unit on June 6, 2024. ERM submitted revised modeling files with a summary of updates on August 13, 2024. The updated modeling analysis revised the modeled emission rates for the HAPs analysis.

The following main dot entries identify key aspects of the modeling methodology used in this analysis:

- ERM used AERMOD (v. 23132), the AMS/USEPA Regulatory Model. AERMOD is a federally approved regulatory model appropriate for use in an air quality analysis of this nature. The audit runs conducted by the Modeling Unit used v. 23132.

- Modeling inputs utilized IEPA- and USEPA-recommended default regulatory options, which simulate phenomena such as atmospheric stability, plume rise, and downwash. The modeling analysis incorporated five years of locally representative meteorology. The Modeling Unit obtained National Weather Service (NWS) meteorological data files for years 2019 through 2023 from the National Centers for Environmental Information (NCEI) which consisted of surface data collected at the Chicago Rockford International Airport surface station in Rockford, Illinois, and upper air data collected at the National Weather Surface office in Lincoln, Illinois. Surface and upper air stations were selected because of their proximity and representativeness to the project site in Madison County. The Modeling Unit provided the applicant with meteorology data processed with AERMET (v. 23132). The Modeling Unit used 2019 through 2023 files processed with AERMET (v. 23132) in its review.

- ERM processed National Elevation Data (NED) terrain elevations from USGS using the most recent version of AERMAP (v. 18081) to develop the receptor terrain elevations and hill height scales required by AERMOD. The site elevation at the Powertrain facility is approximately 223 meters above mean sea level.

- ERM used a Cartesian grid in their distribution of 4,259 receptors. The following receptor grid densities were used:
    - 50 m spacing of receptors from the facility's boundary out to 500 meters.
    - 100 m spacing of receptors from 500 meters to 2000 meters.
    - 250 m spacing of receptors from 2000 meters to 5000 meters.
    - 500 m spacing of receptors from 5000 meters to 10000 meters.

- ERM selected the urban modeling option in their analysis. The Modeling Unit conducted an Auer's Analysis as part of its review to characterize the area surrounding Powertrain and determine whether the AERMOD urban option should be implemented. The Modeling Unit developed its Auer's Analysis using 2021 National Land Cover Data (NLCD) within a 3-km radius of the facility. Results of the analysis showed that the surrounding area is 52 % rural and 48% urban. The Modeling Unit audit also utilized the rural modeling option.

- ERM used USEPA's Building Profile Input Program (BPIPPRM) to account for downwash effects of on-site structures. All on-site nearby buildings were included in the modeling analysis.

- NO_2 modeling options consist of multiple tiers. Tier 1 assumes that all NOx emitted from emission units at the source converts to NO_2. Tier 2 is based upon a representative atmospheric equilibrium default value that was developed using conversion ratios generated from monitored concentrations of NOx and NO_2. Tier 3 allows the user to perform a detailed analysis using either the Ozone Limiting Method (OLM) or the Plume Volume Molar Ratio Method (PVMRM) regulatory screening options in AERMOD. These options consider the chemical mechanism of ozone titration and the resulting NO_2 concentrations. Based on the submitted modeling files, ERM used a Tier 2 approach to model NO_2. ERM selected the regulatory default Ambient Ratio Method (ARM2) option in AERMOD which uses a range of ambient NO_2/NOx ratios, with 0.5 as the lower limit and 0.9 as the upper limit.

Source Impact Analysis

ERM performed a source impact analysis to determine if more detailed modeling would be required for any NOx, SO_2, $PM_{2.5}$, PM_{10} or CO averaging period. ERM modeled allowable emission increases from the project, which are the difference between the proposed permitted emissions and current actual emissions of existing units at the facility. The results of this analysis are compared against significant impact levels for each pollutant and averaging period. The results of this analysis can be found in **Table 1** below.

Table 1
Source Impact Analysis Results

Pollutant	Averaging Period	Maximum Modeled Impact ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)
NO_2	1-hour	66.06	7.52
	Annual	4.36	1
SO_2	1-hour	0.56	7.85
	3-hour	0.53	25
	24-hour	0.19	5
	Annual	0.03	1
$PM_{2.5}$	24-hour	1.18 (1)	1.2
	Annual	0.08 (1)	0.13
PM_{10}	24-hour	1.33	5
	Annual	0.09	1
CO	1-hour	67.99	2000
	8-hour	37.86	500

(1) The maximum model impact also includes secondary $PM_{2.5}$ concentrations.

Ozone and Secondary $PM_{2.5}$ Formation

ERM considered the precursor emission increases of NOx, SO_2, and VOM to evaluate the impact on the NAAQS from secondarily formed O_3 and $PM_{2.5}$. Results from the analysis were compared against SILs for O_3 and $PM_{2.5}$ to determine if further analysis should be completed.

To estimate the O_3 and secondary $PM_{2.5}$ formation, a Tier 1 demonstration was performed following guidance[1,2,3] from USEPA on modeled emission rates for precursors (MERPs). This approach utilizes air quality modeling results from hypothetical sources with precursor emission estimates to evaluate the project's impacts against SILs for O_3 and $PM_{2.5}$.

ERM used the lowest MERP values from different locations in the Upper Midwest for this analysis to demonstrate conservative estimates of O_3 and secondary $PM_{2.5}$ formation. It should be noted that a recent clarification memorandum from USEPA on April 30, 2024, noted that MERP values presented as an emission rate should no longer be utilized as they are based upon an annual $PM_{2.5}$ SIL value that is no longer appropriate. As such, the Illinois EPA verified ERMs MERPs analysis using the approach outlined by USEPA in the recent guidance memorandum.

Illinois EPA elected to use a more representative hypothetical source located in Stephenson County, Illinois at approximately 49 kilometers away from the Powertrain facility. The Illinois EPA's analysis concluded ERM's MERPs approach provided more conservative results. Both the Illinois EPA analysis and ERM's analysis concluded that impacts were less than significant for all averaging periods of $PM_{2.5}$ and O_3.

Table 3 shows the comparison of Illinois EPA's and ERM's estimated facility secondary $PM_{2.5}$ impacts. The calculated concentrations were based on project emissions of 4.48 tpy of NOx and 0.03 tpy of SO_2.

Table 3
MERPs Analysis for Secondary $PM_{2.5}$

Pollutant	Averaging Period	Concentration ($\mu g/m^3$)		SIL ($\mu g/m^3$)
		ERM	Illinois EPA	
$PM_{2.5}$	24-hour	0.00189	0.00064	1.2
	Annual	0.000092	0.000019	0.13

Table 4 shows the comparison of Illinois EPA's and ERM's estimated facility O_3 impacts compared to the SIL. The calculated concentrations were based on project emissions of 4.48 tpy of NOx and 58.88 tpy of VOCs.

[1] USEPA (2024). *Clarification 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*. Office of Air Quality Planning and Standards, Research Triangle Park, NC.
[2] USEPA (2019). *Guidance on the Use of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program*. Publication No. EPA 454/R–19–003. Office of Air Quality Planning and Standards, Research Triangle Park, NC.
[3] USEPA (2022). *Guidance for Ozone and Fine Particulate Matter Permit Modeling*. Publication No. EPA 454/R–22–005. Office of Air Quality Planning and Standards, Research Triangle Park, NC.

Table 4
MERPs Analysis for Ozone

Pollutant	Averaging Period	Concentration (ppb)		SIL (ppb)
		ERM	Illinois EPA	
O_3	8-hour	0.074	0.028	1.0

The project is not significantly impacting concentrations of O_3 or $PM_{2.5}$ from secondary formation estimated in the MERPs analysis tables above.

NAAQS Analysis

Based on the results from the source impact analysis, ERM conducted a NAAQS analysis for NO_2 (both 1-hour and annual averaging periods). ERM developed a cumulative modeling analysis that incorporated background concentrations based on nearby monitoring data as well as a nearby emission inventory of sources not represented by the background monitor concentration.

ERM utilized representative background data collected from Illinois's air monitoring network. NO_2 design values for 2021 to 2023 that were obtained from the monitor located in Schiller Park, Illinois (AQS ID: 17-031-3103). This monitor was chosen based on the relative proximity to the Powertrain facility at approximately 105 kilometers. This was the closest NO_2 monitor, and it is located in an urban region where concentrations are expected to be a conservative representation of background for the Rockford area facility location.

ERM was provided an inventory of sources from the Modeling Unit that included sources located within a 10 km radius from the center of the facility.

For the 1-hour NO_2 analysis, intermittent sources were excluded from the nearby source inventory based on a guidance[4] memorandum issued by the USEPA in 2011 that allows for exclusion of nearby intermittent sources when modeling for the 1-hour NO_2 standard.

The modeled concentrations included impacts from the facility and nearby emission inventory sources. The total concentrations are the summation of the modeled concentrations and background concentrations, and these impacts are compared to the respective NAAQS, as shown in **Table 5**. The results shown in the following table display the NO_2 modeling results provided by ERM. The modeling analysis indicated that both hourly and annual NO_2 emissions would be below their respective NAAQS values.

[4] USEPA (2011). *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard.*

Table 5
NAAQS Modeling Results

Pollutant	Averaging Period	Modeled Concentration (µg/m^3)	Background Concentration (µg/m^3)	Total Concentration (µg/m^3)	NAAQS (µg/m^3)
NO_2	1-Hour	90.69(1)	65.19(a)	155.88	188.14
	Annual	16.73(2)	21.16(b)	37.89	100

(1) Average of the 8th highs over five years.
(2) Highest annual high value over five years.
(a) Three-year average of the 98th percentile daily max 1-hour values.
(b) Highest annual concentration over three years of monitoring data.

Air Toxics Analysis

As part of the air quality analysis for Powertrain, the Modeling Unit requested the facility evaluate the impacts of toxic air pollutant emissions from the facility. ERM provided the Modeling Unit with emission calculations for potential HAP emissions from the facility. The largest source of HAP emissions comes from use of Toluene at the facility. The Modeling Unit performed a screening analysis using the Air Emissions Risk Analysis (AERA) Guidance[5]. It was determined from the use of the MPCA Risk Assessment Screening Spreadsheet (RASS) that Powertrain should conduct a dispersion modeling analysis for emissions of 1,6 -Hexamethylene diisocyanate. The initial risk screening determined that modeled impacts from Toluene would be minimal.

The Modeling Unit provided ERM with reference concentration levels for this pollutant from California's Office of Environmental Health Hazard Assessment (OEHHA), and Michigan's Department of Environment, Great Lakes and Energy (EGLE). The results of ERM's analysis are displayed in **Table 6** below. All modeled concentrations were below their respective reference concentrations.

Table 6
HAPs Analysis Results

Pollutant	CAS Number	Averaging Period	Maximum Modeled Impact (µg/m^3)	Threshold (µg/m^3)	Reference
1,6-Hexamethylene diisocyanate	822-06-0	1-hour	0.04	0.3	OEHHA REL(1)
		8-hour	0.014	0.06	OEHHA REL(1)
		Annual	0.0014	0.2	EGLE ITSL(2)

(1) OEHHA Reference Exposure Levels (REL) are established for pollutants based on exposure durations.
(2) ELGE Initial Threshold Screening Level (ITSL) are established for pollutants based on exposure durations.

[5] Minnesota Pollution Control Agency. (2024) Air Emissions Risk Analysis (AERA) Guidance. Retrieved from https://www.pca.state.mn.us/sites/default/files/aq9-18.pdf.

Summary

The Modeling Unit has reviewed the air quality analysis provided by ERM on behalf of Powertrain. The Modeling Unit audit of this analysis confirms that Powertrain's proposed operation would not exceed the NAAQS for any NO_2 averaging times. The audit also confirms that emissions of CO, VOM, NOx, and SO_2 would not have significant impacts on $PM_{2.5}$ and ozone formation. Lastly, the audit also confirms the emissions of HAPs are within safe limits.

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