TETRA TECH

MEMO

To:	Steven Reichert, Fuss & O'Neill, Inc.
From:	Liz Hendrick, CCM
Date:	November 12, 2020
Subject:	Hudson Logistics Center – Air Quality Impact Analysis Review

Executive Summary

Tetra Tech, Inc. (Tetra Tech) at the request of Fuss & O'Neill, Inc. (Fuss & O'Neill) performed a peer review of the Air Quality Study submitted for the Hudson Logistics Center project in Hudson, New Hampshire. Specifically, the air quality dispersion modeling files and accompanying report, *Air Quality Impact Analysis - Hudson Logistics Center*, prepared by Epsilon Associates, Inc. (Epsilon) that was originally submitted to the Town of Hudson, New Hampshire on July 8, 2020 and revised on October 26, 2020 was reviewed. Fuss & O'Neill provided Tetra Tech with the Air Quality Impact Report and a link to download a 69 gigabyte zipped file containing the electronic modeling files for this analysis from Epsilon.

This memo summarizes the findings of the review of the air quality modeling analysis based on the following elements:

- Review of the Air Quality Impact Analysis Report;
- Ambient Monitoring data for background concentrations;
- Stationary source parameters and pollutant emission rates (for both criteria and hazardous air pollutants (HAPs));
- Building Profile Input Program with the Prime downwash algorithms (BPIP-Prime) input and outputs;
- Mobile source emissions based on the U.S. EPA's Motor Vehicle Emissions Simulator (MOVES) model run;
- AERMOD model inputs, options and modeling methodology; and
- Interpretation of AERMOD modeling results.

Tetra Tech's review identified calculation errors, discrepancies and incorrect representation of monitored background concentrations. However, due to the small air quality impacts predicted from the development of the Hudson Logistics Center and the available margin between the predicted concentrations and the standards, these items identified should not jeopardize compliance with the air quality standards.

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Background

The Hudson Logistics Center is proposing the development of a distribution center off Lowell Road (Route 3A) in Hudson, New Hampshire (the Project). The Project will consist of three large warehouse buildings on the former Green Meadow Golf Club property. The Hudson Planning Board requested that an air quality impact analysis be conducted to assess whether the potential air quality impacts from the Project meet certain air quality standards as prescribed by the Town of Hudson Site Plan Review Ordinance under Section 275-6 (General Requirements). A refined air quality dispersion modeling analysis has been performed to assess the impacts to air quality near the Project for pollutant emissions from onsite combustion sources, as well as from Project-generated traffic.

Review of the Air Quality Impact Report

The air quality analysis performed by Epsilon was described in the *Air Quality Impact Analysis - Hudson Logistics Center, revised October 26, 2020* (the Report). This document presented a discussion of the modeled pollutants, air quality model and methodology, source parameters, emission rates and modeling results. The comments on the report are general in nature, as specific elements are described in more detail in the subsequent sections of this memo. Tetra Tech has the following comments on the report:

- Tetra Tech agrees with the use of the AERMOD modeling system, the USEPA regulatory model recommended for stationary sources and transportation projects, however the model version is listed in the report as 19091 (page 3-2 for AERMOD, and page 3-4 for AERMET). These both should be version 19191. The correct model version, 19191, was used in the modeling analysis.
- Tetra Tech agrees with the criteria pollutants selected for modeling, NO_2, PM_{10} and $PM_{2.5.}$ Please provide further justification for not modeling CO emissions from mobile sources with respect to Federal Highway Administration guidance.
- Please provide a justification for not addressing particulate matter emission in the form of fugitive dust from paved road surfaces.
- Tetra Tech agrees with the use of the AERMOD regulatory default model options.
- Tetra Tech agrees with the use of the Ambient Ratio Method (ARM2) with the default input ratios to address the atmospheric chemical conversion of emissions of nitrogen oxides to nitrogen dioxide.
- Tetra Tech agrees with the rural dispersion classification for the area within 3 km of the Project site.
- Tetra Tech agrees with the selection of the meteorological data used in the modeling.
- Tetra Tech feels that the receptor (locations at which the model will calculate predicted concentrations) placement in the modeling was adequate to capture the air quality impacts near the Project. The report indicates that 1,711 receptor locations were modeled.
- Tetra Tech agrees with the terrain elevation processing with AERMAP version 18081, that used 1/3 arc-second National Elevation Data from the United States Geological Survey to assign elevations for the receptors and offsite roadway sources. AERMAP was also used to assign base elevations to the onsite roadways, stationary sources and buildings. Perhaps these onsite base elevations should have been set according to the Project final grading plans.
- Tetra Tech feels that the report should address how the modeling and postprocessing of the Regulated Toxic Air Pollutants (RTAP) was conducted in more detail (see further discussion below).

Existing Air Quality

Section 2.2 Background Air Quality of the Report specifically discussed the ambient monitoring data that were used to characterize the existing air quality for the Project site and the ambient background concentrations that will be added to the model result prior to comparison with the National Ambient Air Quality Standards (NAAQS). The measured ambient air quality data selected for the Project is presented in Table 2-2 and supported with more detail in a Table in Attachment A. Tetra Tech reviewed the information presented and provide the following comments:

- The ambient concentrations presented for SO_2 are not correct and overstate the existing SO_2 ambient concentrations. Table 2-2 presents 1-hour SO_2 concentrations of 43.0, 31.7 and 38.3 µg/m^3, and 3-hour SO_2 concentrations of 30.7, 28.8 and 32.5 µg/m^3 for 2016, 2017 and 2018, respectively (see excerpt of Table 2-2 below). The Table in Attachment A indicates that these values are from the Concord, NH monitor, however the Concord, NH monitor only measured SO_2 concentrations in 2016, and did not monitor SO_2 concentrations in 2017 or 2018. In 2016 the measured concentrations at the Concord monitor for 1-hour SO_2 was reported as 4.9 ppb (12.8 µg/m^3) and the 3-hour SO_2 was reported as 5.0 ppb (13.1 µg/m^3), which are much less than the concentrations presented in Table 2-2. Even if the Concord monitor had continued collecting SO_2 data, the Londonderry monitor, which is much closer to and more representative of the Project site, should have been used. This would have also been consistent with the use of the Londonderry monitor to characterize the existing concentrations of $PM_{2.5}$, NO_2, and CO for this Project. The measured SO_2 concentrations at the Londonderry monitor are presented in the second Table below (Table 2-2 Corrected excerpt).

Table 2-2 Observed Ambient Air Quality Concentrations and Selected Background Levels

POLLUTANT	AVG TIME	Form	2016	2017	2018	Background (µg/m^3)	NAAQS	Percent of NAAQS
SO_2 (1)(5)	1-Hr (4)	99th %	43.0	31.7	38.3	37.6	196.0	19%
	3-Hr	H2H	30.7	28.8	32.5	32.5	1300.0	2%

Table 2-2 Corrected SO_2 Ambient Air Quality Concentrations and Selected Background

Pollutant	Avg Time	Form	2016	2017	2018	Background (µg/m^3)	NAAQS	Percent of NAAQS
SO_2	1-Hr	99th %	7.6	5.8	9.4	7.6	196	4%
	3-Hr	H2H	8.1	5.8	8.1	8.1	1300	1%

- Footnote 1 and Footnote 3 in Table 2-2 in the report incorrectly state the factors used to convert the SO_2 and NO_2 monitoring concentrations reported in ppb to µg/m^3. The Table 2-2 footnotes state the conversion factors as: 1 ppm SO_2 = 2.62 µg/m^3
  1 ppm NO_2 = 1.88 µg/m^3

  The correct conversion factors are:

  1 ppb SO_2 = 2.62 µg/m^3
  1 ppb NO_2 = 1.88 µg/m^3

  Although the factors in the footnotes were misstated, the correct conversion factors were applied to the NO_2 concentrations in Table 2-2.

Stationary source parameters and pollutant emission rates

The discussion of the stationary sources is found in Section 3.3.1 of the Report. Three natural gas-fired Generac SG625 engines are proposed. A spreadsheet (Hudson Logistics-revised-Sep2020.xlsx) was provided with the modeling files that showed the emission calculations. Tetra Tech reviewed the information presented and provide the following comments:

- Tetra Tech confirmed the horsepower rating, hourly heat input rate, exhaust flow, and exhaust temperature of the Generac SG625 engine.
- Tetra Tech confirmed the correct Subpart JJJJ NOx value was used in Table 3-3.
- Tetra Tech confirmed the AP-42 Table 3.2-2 emission factors for PM_{10} and $PM_{2.5}$, as well as the Hazardous Air Pollutant (HAP) emission factors, also from AP-42 Table 3.2-2.
- Tetra Tech confirmed the short-term and annualized (based on a maximum of 500 hours per year of operation) emission rates for NOx and HAPs were calculated correctly.
- Tetra Tech identified an error in the Excel file when calculating grams per second (g/s) for PM_{10} and $PM_{2.5}$ resulting in incorrect emission rates presented in Table 3-4 of the Report and incorrect emission rates used in the AERMOD modeling for PM_{10} and $PM_{2.5}$. The calculation for the Particulate Matter (PM) g/s rates in cells C49-50 and C56-57 on the "building" tab neglected to convert from pounds to grams. The original and corrected emission rates are summarized in the table below. The corrected emission rates are larger than those used in the modeling, however the modeled impacts of PM_{10} and $PM_{2.5}$ from the stationary sources will remain less than 0.01 $\mu g/m^3$ as reported in Table 4-1 of the Report if the revised emission rates were used.

Emergency Generator PM emission rates (per generator)

PM_{10} and $PM_{2.5}$	Short-term (g/s)	Annual (g/s)
As in Report (Table 3-4)	1.37E-07	7.83E-09
Corrected Emission Rates	6.22E-05	3.55E-06

Building Downwash

A discussion of the preparation of building parameters for input to AERMOD is found in Section 3.3.1.2 of the Report. The Building Profile Input Program with the Prime downwash algorithms (BPIP-Prime) was used. Tetra Tech reviewed the information presented and provide the following comments:

- Tetra Tech advises that the final graded Project base elevation be used so that the base elevations of each building and the adjacent emergency generator are the same.
- Tetra Tech confirmed that BPIP-Prime was executed properly for the three emergency generator stacks and the three warehouse buildings.

Motor Vehicle Emissions Simulator (MOVES) model run

A discussion of the mobile sources is found in Section 3.3.2 of the Report. The MOVES2014b computer program was used to estimate motor vehicle emission factors. Tetra Tech reviewed the information presented and provide the following comments:

- MOVES time settings – Please provide an explanation for the time settings used in MOVES, which evaluated emissions at March 8:00-8:59 only.
- MOVES source type fractions – Based on the files provided, the vehicle mix assumed in MOVES appears to be 24% passenger cars, 51% passenger trucks, 3% single-unit short haul trucks, and

12% combo long-haul trucks. Was a different vehicle mix assumed for the 'Diesel Exhaust Only' scenario (Lot emissions)? If so, what source type fractions were assumed?

- Attachment B Table 2022 Mitigated Build LOS-VOLs – The table presents peak LOS, delay (sec), and traffic volume (per hour) for weekday AM and PM under the 2022 Mitigated Build scenario. Please provide more information on how AM and PM peak traffic volume were calculated for each intersection.
- Attachment B Table 2022 Mitigated Build Intersection Peak Hour Emission Rates – Peak traffic volume (vph) is based on PM (peak) conditions, while delay time (s/veh) is based on the average of AM and PM conditions. Please provide justification for using peak conditions for traffic volumes, but average conditions for delay time.
- Attachment B Table 2022 Mitigated Build Intersection Peak Hour Emission Rates – Diesel Particulate emissions appear to be equal to PM2.5 emissions. Please update the emission rates for Diesel Particulate to be based on the 'Diesel Exhaust Only' MOVES emission rates.
- Attachment B Table 2022 Build Roadway Link Peak Hour Emission Rates (g/s) – Diesel Particulate emissions appear to be based on the PM2.5 emissions from the 'Diesel Exhaust Only' MOVES emission rates. Please update the emission rates for Diesel Particulate to be based on PM10 instead of PM2.5.
- Attachment B Table 2022 Build Onsite Lot Peak Hour Emission Rates – The table includes a column for Diesel Particulate emission rates that appear to be equal to the PM2.5 emission rates. Please update the emission rates for Diesel Particulate to be based on PM10 instead of PM2.5.
- Attachment B Table 2022 Build Onsite Lot Peak Hour Emission Rates – Peak truck traffic volumes for Lots A, B, and C were assumed to be 20, 26, and 13 vehicles per hour, respectively. The spreadsheet Link Data.xlsx shows peak traffic volumes for Lots A, B, and C were estimated to be 384, 270, and 141, respectively. Please clarify.
- Tetra Tech reviewed the emission factors presented in the Excel spreadsheets, but the MySQL output database files were not included in the files provided, therefore Tetra Tech was unable to verify the final MOVES results. Electronic files should be provided with the report.

AERMOD Model Inputs, Options and Modeling Methodology

Tetra Tech reviewed the AERMOD model runs and provide the following comments:

- Stationary Sources (STCK1, STCK2 and STCK3)
  - Release Height in Table 3-2 is 3.98 m, in the AERMOD modeling 3.96 m is used.
  - Gas Exit Velocity in Table 3-2 is 59.231 m/s, in the AERMOD modeling 59.31 m/s is used.
- The number of receptors described in the Report (Section 3.2.6) is 1,711. The PM_{10} and $PM_{2.5}$ runs each had 1,581 receptors which included onsite receptors. Concentrations should be predicted at offsite locations at the facility fence line and beyond representing "ambient" air (locations were the general public has access). The NO_2 and RTAPs runs used 1,711 receptors and properly removed receptors that were within the facility fence line.
- The PM_{10} and $PM_{2.5}$ predicted concentrations reported in Table 4-1, Table 4-2 and Table 4-3 represent onsite predicted concentrations. These should be based on the maximum design value concentrations predicted at offsite receptors. NO_2 impacts are correctly reported at offsite receptors in these tables based on the parameters modeled.
- No description of the mobile source parameters is included in the report. Please provide details explaining the assumptions used to derive the release heights, and horizontal and vertical dimensions of the volume sources used to represent intersections and roadways and the area sources representing the parking lots.

- Tetra Tech confirmed the emission rates and the temporal variation of the emissions as presented in the Attachment B and Attachment C tables, respectively, were applied properly in the AERMOD model runs.
- No description was provided for the post-processing methodology for the RTAPs impact analysis. It appears the methodology was based on unit emission runs for each source. Then a postprocessing step was used to scale the unit results to pollutant-specific impacts at each receptor (generating plot files) and then sum the pollutant-specific results for each source to get a total impact result. Tetra Tech reviewed the unit emission runs, but the postprocessing program used to create the pollutant specific results was not included in the files provided, therefore Tetra Tech was unable to verify the final RTAP results.