Appendix C

Air Quality Technical Memorandum

8-Hour Ozone (2008) Nonattainment Areas

Data is current as of September 30, 2023

EXTREME
Los Angeles-South Coast Air Basin, CA
Riverside County (Coachella Valley), CA
San Joaquin Valley, CA

SEVERE 15
Dallas-Fort Worth, TX
Denver-Boulder-Greeley-Ft. Collins-Loveland, CO
Houston-Galveston-Brazoria, TX
Kern County (Eastern Kern), CA
Los Angeles-San Bernardino Counties (West Mojave Desert), CA
Morongo Band of Mission Indians, CA
New York-N. New Jersey-Long Island, NY-NJ-CT
Sacramento Metro, CA
San Diego County, CA

SERIOUS
Greater Connecticut, CT
Nevada County (Western part), CA
Ventura County, CA

MODERATE
Baltimore, MD
Imperial County, CA
Mariposa County, CA
Pechanga Band of Luiseno Mission Indians of the Pechanga Reservation, CA
Phoenix-Mesa, AZ

MARGINAL
Allentown-Bethlehem-Easton, PA
Calaveras County, CA
Chico (Butte County), CA
Dukes County, MA
Jamestown, NY
Lancaster, PA
Philadelphia-Wilmington-Atlantic City, PA-NJ-MD-DE
Pittsburgh-Beaver Valley, PA
Reading, PA
San Francisco Bay Area, CA
San Luis Obispo (Eastern San Luis Obispo), CA
Seaford, DE
Tuscan Buttes, CA
Upper Green River Basin Area, WY

Lehigh County, Pennsylvania

CLEAN AIR ACT GENERAL CONFORMITY RULE APPLICABILITY and AIR EMISSIONS ANALYSES

October 2023

1. INTRODUCTION

The purpose of the Proposed Project is to meet future demand on the cargo service at the airport with construction of a new 20,000 square-foot cargo facility. It is anticipated that the construction of the facility would occur over three years between 2025 and 2027 and the expanded airside and landside cargo operations would begin from 2028 and reach to a full capacity in 2033.

The following air quality emissions analysis performed for the Proposed Action as part of the EA entails:

- Estimate foreseeable air pollutant emissions including criteria pollutants and greenhouse gases (GHG) during all phases of the Proposed Action, direct and indirect that can be reasonably estimated.
- Perform Clean Air Act (CAA) General Conformity Rule (GCR) analysis for the Federal approval action from Federal Aviation Administration (FAA).

1.1 Criteria Pollutants

The National Ambient Air Quality Standards (NAAQS) are the basis to measure the effects of mobile and stationary pollutant sources in ambient air to protect public health and welfare from the adverse impacts associated with ambient air pollutants, as required under the CAA. The US Environmental Protection Agency (USEPA) has established NAAQS for six contaminants, referred to as criteria pollutants, and they are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3, with nitrogen oxides (NO_x) and volatile organic compounds (VOCs) as precursors), particulate matter (including with diameters up to 10 µm [PM_{10}] and up to 2.5 µm [$PM_{2.5}$]), lead (Pb), and sulfur dioxide (SO_2).

The CAA requires geographic areas to be designated according to their ability to attain the NAAQS, and these areas are categorized for each criteria pollutant as:

- *Attainment Area* – Areas where no exceedance of NAAQS for a specific criteria pollutant occurred.
- *Nonattainment Area* – Areas where exceedance of NAAQS for a specific criteria pollutant occurred.
- *Maintenance Area* – Areas that have previously been designated as a nonattainment area but are still in need of efforts to maintain the improved conditions in the future. Most of the CAA rules for nonattainment areas are still applicable to a maintenance area.

If an area is designated as nonattainment for a criteria pollutant under the NAAQS, state governments must develop a specific State Implementation Plan (SIP) and implement control plans to reduce the emission level of that pollutant. The SIP provides for implementation, maintenance, and enforcement of the NAAQS; it includes emission limitations and control measures to attain and maintain the NAAQS.

The 1990 amendments to the CAA require federal agencies to ensure that their actions conform to the SIP in a nonattainment area. Conformity to a SIP, as defined in the CAA, means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of the standards. The federal agency responsible for a proposed action is required to determine if its proposed action conforms to the applicable SIP.

The USEPA has developed two sets of conformity regulations; federal actions are differentiated into transportation projects and non-transportation-related projects:

- Transportation projects funded or approved by Federal Highway Administration (FHWA) or Federal Transit Administration (FTA) which are governed by the "transportation conformity" regulations (40 CFR Parts 51 and 93), effective on December 27, 1993 and revised on August 15, 1997.
- Non-FHWA/FTA projects or components of an FHWA/FTA transportation project requiring actions by other Federal agencies which are governed by the "general conformity" regulations (40 CFR Parts 6, 51 and 93) described in the final rule for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* published in the *Federal Register* on November 30, 1993. The

GCR is applicable to the Federal Aviation Administration (FAA) approval action for the Proposed Action and a GCR applicability analysis is required.

1.3 Greenhouse Gases

GHG emissions trap heat in the atmosphere and contribute to global warming. Under Section 202(a) of the CAA, the USEPA has recognized the potential risks to public health and welfare and signed an endangerment finding regarding GHG emissions. The USEPA's finding states that six key current and projected concentrations of well-mixed GHG emissions in the atmosphere threaten the public health and welfare of current and future generations. These GHG pollutants include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). Each GHG is assigned a global warming potential (GWP). The global warming potential is the ability of a gas or aerosol to trap heat in the atmosphere. The global warming potential rating system is standardized to CO_2, which has a value of one. The equivalent CO_2 (CO_2e) rate is calculated by multiplying the emissions of each GHG by its GWP and adding the results together to produce a single, combined emissions rate representing all GHGs.

2. GENERAL CONFORMITY

2.1 Attainment and Nonattainment Areas

The GCR applies to federal actions occurring in air basins designated as nonattainment areas for the NAAQS or in attainment areas subject to maintenance plans (maintenance areas). Federal actions occurring in air basins that are in attainment with the NAAQS are not subject to the conformity rule.

The Proposed Action would take place in Lehigh County, Pennsylvania, a part of the Allentown-Bethlehem-Easton marginal nonattainment area for 2008 8-hour O_3 and Allentown moderate nonattainment area for 2006 $PM_{2.5}$ NAAQS, and an attainment area for other criteria pollutants. O_3 is principally formed from nitrogen oxides (NO_x) and volatile organic compounds (VOC) through chemical reactions in the atmosphere in the presence of sunlight.

2.2 De Minimis Emission Levels

To focus general conformity requirements on those federal actions which have the potential for significant air quality impacts, threshold (*de minimis*) emissions rates were established in the final rule. A formal conformity determination is required when the annual net total of direct and indirect emissions from a federal action (occurring in a nonattainment or maintenance area) for a criterion pollutant would equal or exceed the annual *de minimis* level for that pollutant. Table 1 lists the *de minimis* levels for each pollutant based on the area designation.

Since Lehigh County where the proposed action would occur is in a marginal nonattainment area for O_3 within an O_3 transport region and moderate nonattainment area for $PM_{2.5}$ NAAQS, the de minimis levels of 100 tons per year of NO_x and $PM_{2.5}$, and 50 tons per year of VOC are applicable to the Proposed Action.

Table 1: *De Minimis* Emission Levels for Criteria Air Pollutants

Pollutant	Nonattainment Designation	Tons/ Year
Ozone*	Serious	50
	Severe	25
	Extreme	10
	Other nonattainment or maintenance areas outside ozone transport region	100
	Marginal and moderate nonattainment areas inside ozone transport region	50/100**

Carbon Monoxide	All	100
Sulfur Dioxide	All	100
Lead	All	25
Nitrogen Dioxide	All	100
Particulate Matter ≤ 10 microns	Moderate	100
	Serious	70
Particulate Matter ≤ 2.5 microns***	Moderate	100
	Serious	70
Notes: * Applies to ozone precursors – volatile organic compounds (VOC) and nitrogen oxides (NO_x). ** VOC/NO_x; *** Applies to $PM_{2.5}$ and its precursors.		

2.3 Analysis

The GCR applicability analysis was performed to determine whether a formal conformity analysis would be required. Pursuant to the GCR, all reasonably foreseeable emissions (both direct and indirect) associated with the implementation of the Proposed Action were quantified and compared to the applicable annual *de minimis* levels to determine if further analysis is required.

The conformity analysis for a federal action examines the combined impacts of the direct and indirect emissions from stationary and mobile sources. Direct emissions are emissions of a criterion pollutant or its precursors that are caused or initiated by a federal action and occur at the same time and place as the action. Indirect emissions, occurring later in time and/or further removed in distance from the action itself, must be included in the determination if both of the following apply:

- The federal agency can practicably control the emissions and has continuing program responsibility to maintain control.
- The emissions caused by the federal action are reasonably foreseeable.

Increased direct and indirect emissions of NO_x, VOC, and $PM_{2.5}$ would result from the following potential construction and operational activities associated with the Proposed Action:

- Use of diesel and gas-powered construction equipment.
- Movement of trucks containing construction and removal materials.
- Earth disturbance associated fugitive dust.
- Commuting of construction workers.
- Aircraft engines, auxiliary power unit (APU), and ground support equipment (GSE).
- Movement of new commuter vehicles and trucks.

3. EMISSIONS ESTIMATE

Construction emissions were estimated from 2025 to 2027. For the Proposed Project's operations, emissions were estimated for two phases of operations: starting year of 2028 and 2033 when the Proposed Project will be in full service capacity.

3.1 Construction Emissions Estimate

There are two categories of engine sources for which emissions were estimated: nonroad equipment and on-road vehicles including trucks and commuter vehicles.

During the proposed cargo facility construction, emissions would be generated from equipment, including excavators, loaders, rollers, generators, impact drivers, and dump and concrete trucks, associated with

construction of cargo apron, access road, parking lot, building foundation and structure, etc.

After a consultation with Pennsylvania Department of Environmental Protection (Trowbridge, January 4, 2023), the FAA Airport Construction Emissions Inventory Tool (ACEIT-Version 1.0) was used to develop construction activity resource inputs such as sizes, types, operating hours, and number of units of construction engines to be used during each construction phase. These activity resource inputs were further used for construction air emissions estimate. The ACEIT tool default level (Level 1) options was elected for producing construction equipment activity data set.

Emission factors for each concerned pollutant including criteria pollutants and GHGs from on-site equipment engines were developed using the USEPA's "Motor Vehicle Emission Simulator" emission model (Version MOVES3) associated with the Lehigh County (where the Proposed Project is located) default model input parameters for each pollutant. The same model was also used to estimate on-site and off-site truck and commuter vehicle engine emission rates for each pollutant, including GHGs in terms of CO_2e.

The below USEPA-recommended formula was used to calculate hourly emissions from equipment engine sources including excavators, front end loaders, and other machines:

$$M_i = N \times HP \times LF \times EF_i$$

where:
M_i = mass of emissions of i^{th} pollutants during inventory period;
N = source population (units);
HP = average rated horsepower;
LF = typical load factor; and
EF_i = average emissions of i^{th} pollutant per unit of use (e.g., grams per horsepower-hour) predicted by MOVES3.

During construction, in addition to engine emissions, fugitive dust emissions would result from construction truck travel on-site over unpaved roads, unstabilized land via wind erosion, and soil handing. These emissions were calculated based on the ACEIT tool-predicted activity data set with the USEPA procedures provided in AP-42, *Compilation of Air Pollutant Emissions Factors* built into the ACEIT tool.

The combined annual construction emissions estimated for each criterial pollutant and GHGs in terms of CO2 are summarized in Table 2.

The evaluated mobile sources were motor vehicles traveling on roadways and parking facilities within the Study Area. Air emissions associated with motor vehicles are a function of site-specific data such as traffic volumes, speeds, travel distances, vehicle fleet mix, fuel type, and meteorological factors. Emission factors for criteria pollutants were developed using EPA's MOVES model. Vehicle mixes within MOVES were assumed to include passenger cars, combination short-haul trucks. Posted speeds of 35 miles per hour (mph) and 45 mph were assumed based on the type of roadway segment; and 55 mph were used for vehicles traveling within Route 22.

3.2 Operational Emissions Estimate

After the completion of cargo facility, new airside and landsite operational emissions would occur since cargo operational activities would be expanded.

The existing year 2023 airside emissions inventory was prepared for the following airport-related sources – aircraft engines during landing and takeoff (LTO) and taxiing, APUs, and GSE.

The FAA-Aviation Environmental Design Tool (AEDT, version 3e) was used based on the 2023 average annual day flight schedule associated with the stage lengths, fleet mix, and annual operations. Criteria pollutants emissions and GHGs in terms of CO_2 were calculated using AEDT default emission factors for each pollutant and the default mixing height of 3,000 feet for criteria pollutants and 10,000 feet for CO_2. The AEDT-estimated fuel consumption levels were used to estimate CH_4 and N_2O emissions using USEPA-provided CH_4 and N_2O emission factors applicable for jet fuel in *Inventory of U.S. Greenhouse Gas*

Emissions and Sinks: 1990-2018. The airside CO_2e levels were then derived by combing CO_2 emissions and CH_4 and N_2O emissions by multiplying the 100-year GWPs of 25 and 298 for CH_4 and N_2O, respectively.

GSE represent an array of specially designed vehicles and equipment that support and service aircraft in an airport's gate and terminal area. Some aircraft also have APUs that provide power to an aircraft when the engines are not on such as when gate-power/pre-conditioned air (PCA) are not available at an airport's gate). In this analysis, emissions from GSE, including any applicable APUs, were calculated using AEDT default parameters and emission factors.

The future build years of 2028 and 2033 airside emission inventories were determined using the same methodology described above by including additional aircraft operations associated with the Proposed Action.

The net increase in landside criteria pollutant and GHGs in terms of CO_2e emissions were estimated for motor vehicles traveling on roadways between the proposed cargo facility and local distribution centers within the Study Area. Air emissions associated with motor vehicles are a function of site-specific data such as traffic volumes, speeds, travel distances, vehicle fleet mix, fuel type, and meteorological factors. Emission factors for criteria pollutants and GHGs were developed using EPA's MOVES3 model in association with the national default parameters established for Lehigh County. Truck mix was conservatively assumed 100 percent of combination short-haul trucks resulting highest emissions. Post speeds of 35 miles per hour (mph) and 45 mph were assumed based on the type of roadway segment around the airport; and 55 mph were used for vehicles traveling along Route 22. For each landside vehicle, an average of three minutes of idling per trip on airport was assumed in estimating idling emission. An average travel distance of 15 miles for each vehicle trip was assumed in estimating on-road travel emissions.

Average annual daily traffic (AADT) was derived based on the peak hour traffic volume assumed to be 10 percent of AADT associated with the proposed cargo operation analyzed in the 2022 traffic study (The Pidcock Company, March 2022). The AADT for both passenger cars and combination short-haul trucks were assumed to occur during the full capacity year of 2033 with 50 percent them to occur during the starting year of 2028. These AADT volumes were multiplied by 365 days per year to predict total landside annual motor vehicle emissions.

4. GCR CONFORMITY COMPLIANCE

Table 2 presents estimated total annual emissions for NOx, VOC and PM2.5 under both construction and operational conditions which are below the corresponding *de minimis* levels. Therefore, the Proposed Action would be in compliance with the CAA GCR conformity requirements and would not be subject to the GCR determination.

5. OTHER POLLUTANT EMISSIONS

Table 2 also provides estimated construction emissions for NAAQS attainment pollutants and GHG emissions for NEPA disclosure purposes.

Table 2. Total Projected Annual Emissions (short tons)

Activity Year	Pollutant (tons/year)						
	NOx	VOC	$PM_{2.5}$	PM_{10}	CO	Sox	CO2e
Construction (Year 2025 – 2027)							
2025	0.07	0.06	0.00	0.02	0.83	0.00	109.5522
2026	0.58	5.25	0.02	0.23	5.52	0.01	1077.426
2027	0.82	0.16	0.06	0.84	2.00	0.00	929.2698
Operation (Year 2028)							
Aircraft LTOs	4.49	0.05	0.02	0.02	0.57	0.29	1193.49
Aircraft Taxi	0.95	0.12	0.02	0.02	1.56	0.21	559.32
Aircraft GSE	0.09	0.03	0.01	0.01	0.73	0.00	--
Aircraft APU	0.15	0.01	0.01	0.01	0.07	0.02	--
On-road Vehicles	18.25	0.62	0.19	0.32	10.95	0.02	5493.25
Total	23.93	0.83	0.25	0.38	13.88	0.53	7246.07
Operation (Year 2033)							
Aircraft LTOs	13.37	0.11	0.05	0.05	1.14	0.77	3470.97
Aircraft Taxi	1.91	0.25	0.04	0.04	3.09	0.41	1122.26
Aircraft GSE	0.26	0.09	0.01	0.02	2.01	0.00	--
Aircraft APU	0.40	0.02	0.04	0.04	0.18	0.04	--
On-road Vehicles	32.85	1.02	0.28	0.54	18.25	0.04	10238.25
Total	48.79	1.50	0.43	0.69	24.67	1.27	14831.48
GCR De Minimis Thresholds	100	50	100	N/A	N/A	N/A	N/A
Exceeding GCR De Minimis Thresholds	No	No	No	N/A	N/A	N/A	N/A
Notes: N/A: not applicable							

6. REFERNCES

The Pidcock Company. March 2022. Transportation Impact Assessment for the North Cargo Area Development.

Trowbridge, Brian, C., Pennsylvania Department of Environmental Protection, email correspondence on using ACEIT and MOVES3 for construction emissions analysis.

US Federal Aviation Administration (USFAA). May 2022. Aviation Environmental Design Tool (AEDT – Version 3e) Technical Manual.

USFAA. May 2022. Aviation Environmental Design Tool (AEDT – Version 3e) User Guide.

USFAA. 2014. Guidance for Estimating Airport Construction Emissions.

US Environmental Protection Agency (USEPA). November 30, 1993. 40 CFR Parts 6, 51, and 93. Determining Conformity of Federal Actions to State or Federal Implementation Plans. Final Rule.

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USEPA 1992. Procedures for Emission Inventory Preparation. Volume IV: Mobile Sources. USEPA. EPA420-R-92-009. December 1992.

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USEPA, 2020. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2018.

USEPA, 2023. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2021.

Oscarson, Bryan

From: Trowbridge, Brian <britrowbri@pa.gov>
Sent: Wednesday, January 4, 2023 1:51 PM
To: Oscarson, Bryan
Cc: Ryan Meyer (rmeyer@lnaa.com); FAA-Harrisburg Airports District Office (heather.f.davis-jenkins@faa.gov); Andrew Brooks (Andrew.Brooks@faa.gov); Trostle, Chris
Subject: RE: Lehigh Valley International Airport - Construction Emissions

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Bryon,

Thank you for the recent call with some additional information on the scope of the project and the ACEIT software.

To clarify my previous e-mail, the Bureau agrees that your proposed methodology using the current version of the ACEIT software to estimate construction equipment and activity, in combination with using the emissions factors from the current version of MOVES3, to estimate direct and indirect project emissions for the purposes of General Conformity applicability, is acceptable.

Please let me know if you have any additional questions.

Regards,
Brian

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From: Oscarson, Bryan <Bryan.Oscarson@aecom.com>
Sent: Friday, December 16, 2022 4:07 PM
To: Trowbridge, Brian <britrowbri@pa.gov>
Cc: Ryan Meyer (rmeyer@lnaa.com) <rmeyer@lnaa.com>; FAA-Harrisburg Airports District Office (heather.f.davis-

jenkins@faa.gov) <heather.f.davis-jenkins@faa.gov>; Andrew Brooks (Andrew.Brooks@faa.gov) <andrew.brooks@faa.gov>
Subject: [External] Lehigh Valley International Airport - Construction Emissions

ATTENTION: *This email message is from an external sender. Do not open links or attachments from unknown senders. To report suspicious email, use the Report Phishing button in Outlook.*

Good afternoon, Brian –

Heather Davis-Jenkins, with the FAA's Harrisburg Airports District Office, has referred me to you for consultation about a question that pertains to General Conformity. AECOM is preparing an environmental assessment for a development project at Lehigh Valley International Airport (ABE) in Allentown, PA, and we need to quantify the airport construction emissions for comparison to applicable de minimis thresholds for criteria pollutants.

Since 2014, our industry has largely relied on the methodology included in ACRP Report 102: Guidance for Estimating Airport Construction Emissions and its companion software—the Airport Construction Emissions Inventory Tool (ACEIT, v1, 2014). To bring consistency to airport construction emissions inventories, ACEIT enables users to rely on default information about the construction process for typical airport projects to develop on-road and non-road inventories using EPA emission factors embedded in the program.

The issue is that the EPA emissions factors embedded in the ACEIT program were superseded by the release of MOVES3 (2020). ACRP is in the process of updating the ACEIT model to include the new emissions factors, but v.2 is not expected to be released for another year or more. Because v1 is outdated and v2 is not ready, AECOM is proposing to 1) use the default construction equipment activity information in ACEIT (v1) and 2) prepare the emission inventories outside of ACEIT.

The primary source of emission factors will be the MOVES model, version 3.04. MOVES will be used for all on-road vehicle emission factors including brake and tire particulate matter and all nonroad equipment emission factors. Emission factors for disturbed soils, fugitive emissions from paving surfaces, fugitive emissions from building coatings, storage piles, and re-entrained dust from roadway surfaces will be estimated using factors and methodologies as contained in AP-42.

FAA is the lead federal agency responsible for making the air quality determination for this airport project. Therefore, on behalf of the FAA and the Airport, we are seeking PADEP review and concurrence to use the approach described herein. Please do not hesitate to let us know if you have any questions or need more information. We are happy to provide a detailed project information, air quality analysis protocol, and/or whatever other information might be helpful.

Thank you have a nice weekend.

Bryan

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Airport Construction Emissions Inventory Tool (ACEIT)
Version 1.0
Run Date & Time: 7/19/2022 10:02:28 AM

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STUDY

Study Name

LVIA Air Cargo Facility

Study Description

New air cai aircraft ap access roa employee parking and truck parking/staging area and a supplemental fuel farm.

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EMISSIONS INVENTORY - SUMMARY

Total Emissions by Year*
Units for Non-Greenhouse Gases Emission: Short Ton
Units for Greenhouse Gases (CO2, CH4, and N2O) Emission: Metric Ton

Year	CO	NOx	SO2	PM10	PM2.5	VOC	CO2	CH4	N2O
2022	0.825801	0.067812	0.000578	0.02295	0.003611	0.05872	98.68625	0.013536	0.001206
2023	5.521924	0.584748	0.007331	0.227655	0.024317	5.252931	970.2202	0.096409	0.016087
2024	1.99881	0.822247	0.003008	0.84113	0.05599	0.161224	836.9714	0.053513	0.015807

Total Emissions by Source Categories
Units for Non-Greenhouse Gases Emission: Short Ton
Units for Greenhouse Gases Emission: Metric Ton

Year	Emission S	CO	NOx	SO2	PM10	PM2.5	VOC	CO2	CH4	N2O
2022	NonRoad	0.0331	0.0276	0.0001	0.0027	0.0026	0.007	27.22	0.0002	--
2022	OnRoad	0.792701	0.040212	0.000478	0.00125	0.001011	0.05172	71.46625	0.013336	0.001206
2022	Fugitive	0	0	0	0.019	--	0	--	--	--
2022	TOTAL	0.825801	0.067812	0.000578	0.02295	0.003611	0.05872	98.68625	0.013536	0.001206
2023	NonRoad	0.097	0.2707	0.0013	0.0174	0.0168	0.0181	433.14	0.0014	--
2023	OnRoad	5.181374	0.298826	0.003233	0.009255	0.007517	0.333831	537.0802	0.095009	0.016087
2023	Fugitive	0.24355	0.015222	0.002798	0.201	--	4.901	--	--	--
2023	TOTAL	5.521924	0.584748	0.007331	0.227655	0.024317	5.252931	970.2202	0.096409	0.016087
2024	NonRoad	0.368	0.7322	0.002	0.0552	0.0535	0.063	641.04	0.0042	--
2024	OnRoad	1.63081	0.090047	0.001008	0.002912	0.00249	0.098224	195.9314	0.049313	0.015807
2024	Fugitive	0	0	0	0.783018	--	0	--	--	--
2024	TOTAL	1.99881	0.822247	0.003008	0.84113	0.05599	0.161224	836.9714	0.053513	0.015807

A 3-year construction schedule was evaluated at the start of the NEPA process in 2022 to estimate construction emissions. The results showed that the construction emissions were well below de minimis levels for each year. The project start date has been rescheduled (2025- 2027) but the construction duration has not changed and the results of the analysis remain the same.

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ASSUMPTIONS

Emission factors were developed from the following models:

On-Road Vehicles: MOVES2010b, revised January 2013

Non-Road Equipment: NONROAD2008a, July 2009

In addition to the overall project size dimensions (e.g., Length and width) provided by the user, an additional 10 ft length and 10 ft width is added to account for disturbance areas.

The number of employees is based on the higher of two methods: (1) number of equipment, and (2) multiply the project cost in million by 11.

The average employee travels 30 miles round-trip from home to construction site each day.

The average on-road material delivery round-trip distance per truck is 40 miles per day.

For calculating fugitive, re-entrained PM emissions from on-road and non-road material delivery and handling equipment, a nominal VMT of 5 miles is used for each vehicle per day.

In deriving emission factors from NONROAD, the horsepower for each equipment represents the most popular in each equipment category.

The total length of each modeled scenario is used to define the number of days associated with vehicle/equipment evaporative emissions.

The choice of location and season are assumed to adequately represent differences in fuel characteristics affecting emissions.

Only two seasons (Summer and Winter) are used to represent all seasons.

14 U.S. Counties are used to represent all other counties in the U.S. (all other counties are mapped to the 14).

The default methods assume that all construction equipment use diesel as well as heavy-duty on-road vehicles, while passenger vehicles (including motorcycles) use gasoline.

Fugitive emissions are only modeled for:

- Asphalt drying
- Asphalt storage and batching
- Concrete mixing/batching
- Soil handling
- Unstabilized land and wind erosion
- Material movement (unpaved roads)
- Material movement (paved roads)

On-Road vehicle speeds are not explicitly modeled. The associated emission factors for each modeled vehicle from MOVES represent averages over the driving cycles, the roadway type, and daily temperature variations.

The default equipment hours-of-use data are developed based on the overall size of the project provided by the user and activity rates based on expert engineering judgment.

Under the Construction Activity Type list (Activity Tab), when a choice between asphalt and concrete materials occurs, asphalt is always selected as default. To choose concrete, de-select the aphalt item and select the corresponding concrete item.

Two trips per day were assumed for each on-road material handling trucks.

Only CO2, CH4, and N2O are used to represent greenhouse gas emissions. Other potential greenhouse gases including air conditioning refrigerants were not included.

The following equipment are always modeled using diesel emission factors since gasoline-based emission factors are not available:

- Asphalt Deliveries/Ten Wheelers
- Bulldozer
- Concrete Ready Mix Trucks
- Concrete Ready Trucks Mix for Cores
- Concrete Truck
- Crack Filler (Trailer Mounted)
- Delivery of Tanks (3)
- Distributing Tanker
- Dozer
- Dump Truck
- Dump Truck (12 cy)
- Excavator
- Excavator for U/G Services/Tanks
- Flat Bed or Dump Trucks
- Flatbed Truck
- Grader
- Grout Wheel Truck
- Hoist Equipment with 40 Ton Rig
- Hydralic Hammer
- Hydroseeder
- Line Painting Truck and Sprayer
- Material Deliveries
- Off-Road Truck
- Pickup Truck
- Scraper
- Seed Truck Spreader
- Small Dozer
- Survey Crew Trucks
- Ten Wheelers
- Ten Wheelers- Material Delivery
- Tool Truck
- Tractor Trailer- Equipment Delivery
- Tractor Trailer- Material Delivery
- Tractor Trailer- Steel Deliveries
- Tractor Trailer- Stone Delivery
- Tractor Trailer- Topsoil & Seed
- Tractor Trailer- Truck Delivery
- Tractor Trailer with Boom Hoist- Curbs Del & Place
- Tractor Trailer with Boom Hoist- Delivery
- Tractor Trailers- Rebar Deliveries
- Tractor Trailers Temp Fac.
- Truck for Topsoil & Seed Del&Spread
- Water Truck
- Excavator with Bucket
- Excavator with Hoe Ram

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