Appendix E – Record of Non-Applicability (RONA) and Air Quality Emissions Estimates
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RECORD OF NON-APPLICABILITY (RONA) FOR CLEAN AIR ACT CONFORMITY

UNITED STATES ARMY CORPS OF ENGINEERS

PROPOSED DECOMMISSIONING AND DEMOLITION OF THE SM-1 REACTOR FACILITY AT FORT BELVOIR IN FAIRFAX COUNTY, VIRGINIA

Introduction

The United States Environmental Protection Agency’s (USEPA’s) Determining Conformity of General Federal Actions to State or Federal Implementation Plans; Final Rule (40 Code of Federal Regulations (CFR) Parts 51 and 93) provides the implementing guidance to document Clean Air Act (CAA) Conformity Determination requirements. The General Conformity Rule requires federal actions or federally funded actions planned to occur in a non-attainment or maintenance area to be reviewed prior to their implementation to ensure that the actions would not interfere with State’s plans to meet or maintain the National Ambient Air Quality Standards (NAAQS). It is the responsibility of the federal agency to determine whether a Federal action conforms to the applicable implementation plan before the action is taken (40 CFR §51.850(a)).

Federal actions may be exempt from a formal Conformity Determination if: (1) the actions fit within one of the exemption categories or (2) their emissions do not exceed designated de minimis levels for criteria pollutants (40 CFR §93.153(c)). The exemption categories apply to actions that would result in no emission increase or an increase in emission that is clearly de minimis.

Proposed Action

Action Proponent: United States Army Corps of Engineers (USACE)

Location: Stationary Medium Power Model 1 (SM-1) Reactor Facility, United States (US) Army Garrison Fort Belvoir, Fairfax County, Virginia

Proposed Action Name: Decommissioning and Demolition of the SM-1 Reactor Facility

Proposed Action and Emission Summary: USACE maintains the SM-1 Reactor Facility in accordance with Army Regulation (AR) 50-7, Army Reactor Program, and Reactor Possession Permit No. SM1-1-09 issued by the US Army Nuclear and Countering Weapons of Mass Destruction Agency (USANCA). The Army Reactor Office (ARO), established by USANCA, oversees the Army Reactor Program (ARP) and designates the ARP Manager. USACE proposes to complete the decommissioning and demolition of SM-1 (Proposed Action). Prior to the removal of contaminated structures, equipment, and media from the SM-1 site, USANCA would transition the SM-1 Reactor Possession Permit Number SM1-1-09 to a Reactor Decommissioning Permit following ARO approval of a Decommissioning Plan (DP). USACE proposes to complete the decommissioning and demolition of SM-1 to a standard that allows for release of the SM-1 site for unrestricted use and terminate the ARO Reactor Decommissioning Permit (also referred to as the “Proposed Action”). The proposed decommissioning of SM-1 would occur over an approximately 5-year period from 2020 to 2025. Upon completion of the Proposed Action, the restored site would be returned to Fort Belvoir for future use.

Under USACE’s Deactivated Nuclear Power Plant Program, decommissioning a nuclear reactor is required within 60 years of its deactivation to be consistent with US Nuclear Regulatory Commission (NRC) regulations (as adopted by the ARP in AR 50-7). The deactivated and defueled SM-1 Reactor Facility has been in a safe storage (SAFSTOR) condition and subject to regular inspection and monitoring for more than 46 years. Accordingly, the purpose of the
Proposed Action is to safely remove, transport, and dispose of all materials and equipment (M&E) and structures associated with the SM-1 Reactor Facility such that residual radioactivity levels meet the applicable criteria for unrestricted use. This action will eliminate any minor on-going direct or indirect emissions inherent in maintaining the present building and facilities.

The Proposed Action is needed to complete the decommissioning of the SM-1 Reactor Facility with the regulatory authority granted to DOD under the Atomic Energy Act (AEA). Additionally, implementing the Proposed Action would result in a cost savings to USACE as maintenance of the site would no longer be required. USACE maintenance of the SM-1 Reactor Facility is costly and not sustainable over the long-term. Further, the Proposed Action allows USACE to meet mission objectives to decommission their nuclear reactors and terminate their possession permit. In its current state, the SM-1 site will not support the military mission on Fort Belvoir, now or in the future.

USACE evaluated the potential direct, indirect, and cumulative physical, environmental, socioeconomic, and cultural effects of implementing the Proposed Action and reasonable alternatives to that scenario in an Environmental Assessment (EA), prepared in accordance with the National Environmental Policy Act of 1969, as amended (NEPA; Title 42, United States Code [USC] Part 4321 et seq.); the NEPA-implementing regulations of the Council on Environmental Quality (CEQ) (40 CFR Parts 1500–1508); and the Army's NEPA regulations (32 CFR Part 651, Environmental Analysis of Army Actions). The EA is incorporated herein by reference. Each alternative is briefly discussed below.

- **No Action Alternative.** Continue to maintain SM-1 in a SAFSTOR condition with regular inspections and monitoring.
- **Proposed Action Alternative.** Complete the decommissioning and demolition of the SM-1 to a standard that allows for release of the site for unrestricted use and termination of the ARO Reactor Decommissioning Permit.

Pursuant to the NAAQS, Fairfax County is designated by the USEPA as a marginal non-attainment area for the 2008 8-hour ozone (O₃) NAAQS. Fairfax County is located in the ozone transport region where de minimis levels of volatile organic compounds (VOCs) and oxides of nitrogen [NOₓ] (ozone precursors) are 50 and 100 tons per year (tpy), respectively (40 CFR § 93.153). Fairfax County is currently in attainment for all other criteria pollutants (i.e., carbon monoxide [CO], sulfur dioxide [SO₂], particulate matter 2.5 micrometers or less in diameter [PM₂.₅], PM₁₀, nitrogen dioxide [NO₂], and lead [Pb]) (USEPA, 2019). Further information regarding Fairfax County’s attainment status is provided in the EA.

The Proposed Action is subject to the General Conformity Rule because Fort Belvoir is within a nonattainment area and the Proposed Action Alternative would result in air pollutant emissions. All emissions generated by the Proposed Action Alternative would be temporary (i.e., only occurring during construction) and no new emissions sources would be created. Temporary activities under the Proposed Action Alternative that would generate pollutant emissions include, but are not limited to:

- Handling and transport of excavated and imported materials (i.e., soil and concrete) during construction;
- Operation of heavy-duty, diesel-powered trucks and equipment at the site during demolition;
- Operation of heavy-duty, diesel-powered trucks traveling to and from the site to dispose of or deliver materials during demolition;

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1 Under the No Action Alternative, there would be no demolition of buildings or structures at the SM-1 site and existing conditions would continue for the foreseeable future. Therefore, implementation of the No Action Alternative would not result in any changes to existing air quality. Fort Belvoir’s contribution to regional air quality would not change. Current ambient air quality trends and regional emissions would continue.
• Operation of workers’ commuter vehicles traveling to and from the SM-1 site;
• Storage of excavated and imported materials in stockpiles;
• Use of unpaved areas/roads; and
• Site preparation activities (e.g., clearing, grubbing, tree removal).

In general, activities in the Proposed Action Alternative would have a temporary, less-than-significant impact on air quality. Projected Proposed Action Alternative emissions of applicable nonattainment criteria pollutants would be *de minimis*, as shown in **Table 1**. Detailed emission calculations, assumptions, and estimates for the Proposed Action Alternative are provided as **Attachment 1** to this RONA.

**Table 1. Projected Proposed Action Alternative VOC and NOₓ Emissions Compared to Applicable *De Minimis* Levels**

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>VOCs</td>
<td>0.24</td>
<td>0.43</td>
<td>0.50</td>
<td>0.67</td>
<td>0.27</td>
<td>50</td>
</tr>
<tr>
<td>NOₓ</td>
<td>2.39</td>
<td>6.48</td>
<td>6.73</td>
<td>7.69</td>
<td>1.74</td>
<td>100</td>
</tr>
</tbody>
</table>

*Note: tpy = tons per year*

Activities in the Proposed Action Alternative would comply with applicable regulatory requirements and incorporate appropriate Best Management Practices (BMPs) (as identified in the EA) to further minimize anticipated, less-than-significant adverse effects.

In summary, despite Fort Belvoir’s location in a nonattainment area, the USACE is exempt from preparing a Conformity Determination because emissions would not exceed designated *de minimis* levels for criteria pollutants. The Proposed Action would have no significant impacts on regional air quality. Additional details regarding the Proposed Action’s impacts on air quality are provided in the EA. Detailed calculations are also provided as **Attachment 1** to this RONA.

**Affected Air Basins:** Fairfax County, VA

**Date RONA prepared:** 18 September 2019

**Proposed Action Exemption**

The Proposed Action is located within a nonattainment area; therefore, the Proposed Action is not exempt from the General Conformity Rule. However, per 40 CFR § 93.153(c), the Proposed Action qualifies as an action where emissions do not exceed designated *de minimis* levels for criteria pollutants and therefore, is consistent with one of the USEPA’s exemption categories. The activities could result in temporary, less-than-significant impacts on air quality, but are not expected to change designation of the area with respect to NAAQS. Therefore, the Proposed Action is exempt from a formal Conformity Determination.

**Attainment Area Status and Emission Evaluation Conclusion**

Fairfax County is in a nonattainment area for 8-hour ozone. However, per 40 CFR § 93.153(c), the Proposed Action qualifies as an action where emissions do not exceed designated *de minimis* levels for criteria pollutants and
therefore, is consistent with one of the USEPA’s exemption categories. The projected emissions under the Proposed Action Alternative would be temporary and substantially less than the established *de minimis* emission thresholds (see Table 1). Generally, impacts on air quality from the Proposed Action Alternative would be temporary and less-than-significant. Moreover, the activities would comply with applicable regulatory requirements and appropriate BMPs would be incorporated. Therefore, there would be no significant effects to air quality and a change in the designation of the area with respect to NAAQS would not be expected. USACE concludes that further formal Conformity Determination procedures are not required, resulting in this RONA.

**RONA Approval**

To the best of my knowledge, the information presented in this Record of Non-Applicability is correct and accurate and I concur with the finding that the Proposed Action does not require a formal Conformity Determination.

03 April 2020

DATE

Brenda M. Barber, P. E

Brenda M. Barber, P.E.

USACE Project Manager
Attachment 1: Air Quality Analysis Calculations
### Projected Emissions for CY 2021

**SM-1**

**Construction Year 1**

<table>
<thead>
<tr>
<th>Emission Source</th>
<th>Projected Emissions (tons per year)</th>
<th>CY 2021 (metric tons per year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Equipment Operation</td>
<td>2.34E+00 2.4E+00 2.3E+00 0.24E+00</td>
<td>2.34E+00 2.4E+00 2.3E+00 0.24E+00</td>
</tr>
<tr>
<td>POV - Construction Worker Commuting</td>
<td>2.48E-03 2.7E-04 2.4E-04 0.5E+00</td>
<td>2.48E-03 2.7E-04 2.4E-04 0.5E+00</td>
</tr>
<tr>
<td>Site Preparation - Fugitive Emissions</td>
<td>- - - 0.0E+00</td>
<td>- - - 0.0E+00</td>
</tr>
<tr>
<td>Rock/Soil Export - Fugitive Emissions</td>
<td>- - - 0.0E+00</td>
<td>- - - 0.0E+00</td>
</tr>
<tr>
<td>Concrete Export - Fugitive Emissions</td>
<td>- - - 0.0E+00</td>
<td>- - - 0.0E+00</td>
</tr>
<tr>
<td>Total</td>
<td>2.54 2.79 2.40 0.11</td>
<td>2.54 2.79 2.40 0.11</td>
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### Projected Emissions for CY 2022

**SM-1**

**Construction Year 2**

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<th>Emission Source</th>
<th>Projected Emissions (tons per year)</th>
<th>CY 2022 (metric tons per year)</th>
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<td>Construction Equipment Operation</td>
<td>2.21E+00 6.4E+00 5.0E-01 0.43E-01</td>
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<td>POV - Construction Worker Commuting</td>
<td>4.60E-03 4.2E-04 4.2E-04 0.0E+00</td>
<td>4.60E-03 4.2E-04 4.2E-04 0.0E+00</td>
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<tr>
<td>Rock/Soil Export - Fugitive Emissions</td>
<td>- - - 0.0E+00</td>
<td>- - - 0.0E+00</td>
</tr>
<tr>
<td>Concrete Export - Fugitive Emissions</td>
<td>- - - 0.0E+00</td>
<td>- - - 0.0E+00</td>
</tr>
<tr>
<td>Total</td>
<td>2.22 6.48 0.43 0.37</td>
<td>2.22 6.48 0.43 0.37</td>
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### Projected Emissions for CY 2023

**SM-1**

**Construction Year 3**

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<th>Projected Emissions (tons per year)</th>
<th>CY 2023 (metric tons per year)</th>
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</thead>
<tbody>
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<td>Construction Equipment Operation</td>
<td>2.48E+00 7.6E+00 6.7E-01 0.59E-01</td>
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</tr>
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<td>POV - Construction Worker Commuting</td>
<td>4.32E-03 3.6E-04 3.6E-04 0.0E+00</td>
<td>4.32E-03 3.6E-04 3.6E-04 0.0E+00</td>
</tr>
<tr>
<td>Rock/Soil Export - Fugitive Emissions</td>
<td>- - - 1.3E-03</td>
<td>- - - 1.3E-03</td>
</tr>
<tr>
<td>Concrete Export - Fugitive Emissions</td>
<td>- - - -</td>
<td>- - - -</td>
</tr>
<tr>
<td>Total</td>
<td>2.48 7.61 0.50 0.44</td>
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### Projected Emissions for CY 2024

**SM-1**

**Construction Year 4**

<table>
<thead>
<tr>
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<th>Projected Emissions (tons per year)</th>
<th>CY 2024 (metric tons per year)</th>
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</thead>
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<tr>
<td>Construction Equipment Operation</td>
<td>3.15E+00 7.8E+00 6.4E-01 0.56E-01</td>
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<td>POV - Construction Worker Commuting</td>
<td>4.07E-03 3.9E-04 3.9E-04 0.0E+00</td>
<td>4.07E-03 3.9E-04 3.9E-04 0.0E+00</td>
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<tr>
<td>Rock/Soil Export - Fugitive Emissions</td>
<td>- - - 1.4E-03</td>
<td>- - - 1.4E-03</td>
</tr>
<tr>
<td>Concrete Export - Fugitive Emissions</td>
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<td>- - - -</td>
</tr>
<tr>
<td>Total</td>
<td>3.17 7.89 0.56 0.57</td>
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</table>

### Projected Emissions for CY 2025

**SM-1**

**Construction Year 5**

<table>
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<th>Emission Source</th>
<th>Projected Emissions (tons per year)</th>
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<td>Construction Equipment Operation</td>
<td>1.11E+00 1.7E+00 1.2E-01 0.27E-01</td>
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<td>POV - Construction Worker Commuting</td>
<td>3.72E-04 2.8E-05 2.8E-05 0.0E+00</td>
<td>3.72E-04 2.8E-05 2.8E-05 0.0E+00</td>
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<tr>
<td>Rock/Soil Export and Import - Fugitive Emissions</td>
<td>- - -</td>
<td>- - -</td>
</tr>
<tr>
<td>Concrete Export - Fugitive Emissions</td>
<td>- - - -</td>
<td>- - - -</td>
</tr>
<tr>
<td>Total</td>
<td>1.11 1.74 0.27 0.23</td>
<td>1.11 1.74 0.27 0.23</td>
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</table>
**Construction Equipment Projected Hours of Operation**

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<tr>
<th>Equipment</th>
<th>Type</th>
<th>Average Rated HP</th>
<th>No. of Units</th>
<th>Days per Year</th>
<th>Hours per Year</th>
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<tbody>
<tr>
<td>Asphalt paver</td>
<td>Diesel Pavers</td>
<td>130</td>
<td>1</td>
<td>21</td>
<td>0</td>
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<tr>
<td>Asphalt roller</td>
<td>Diesel Rollers</td>
<td>130</td>
<td>1</td>
<td>21</td>
<td>0</td>
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<tr>
<td>Grader</td>
<td>Diesel Grader</td>
<td>150</td>
<td>1</td>
<td>10</td>
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</tr>
<tr>
<td>Chain saws</td>
<td>2 Stroke Chain Saws &gt;6 HP</td>
<td>10</td>
<td>2</td>
<td>10</td>
<td>0</td>
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<tr>
<td>Crane 25 ton</td>
<td>Diesel Cranes</td>
<td>130</td>
<td>1</td>
<td>7</td>
<td>50</td>
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<tr>
<td>Crane 350 ton</td>
<td>Diesel Cranes</td>
<td>450</td>
<td>2</td>
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<td>Dewatering pump, 4-in.</td>
<td>Diesel Pumps</td>
<td>50</td>
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<td>Dozer</td>
<td>Diesel Crawler Tractor/Dozer</td>
<td>200</td>
<td>1</td>
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<td>0</td>
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<td>Dozer</td>
<td>Diesel Crawler Tractor/Dozer</td>
<td>75</td>
<td>1</td>
<td>19</td>
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<td>Brush Chipper</td>
<td>Diesel Chippers/Stump Grinders</td>
<td>130</td>
<td>1</td>
<td>10</td>
<td>0</td>
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<td>Excavator</td>
<td>Diesel Excavators</td>
<td>130</td>
<td>1</td>
<td>0</td>
<td>367</td>
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<td>Backhoe</td>
<td>Diesel Tractors/Loaders/Backhoes</td>
<td>50</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Loader, skid steer</td>
<td>Diesel Skid Steer Loaders</td>
<td>30</td>
<td>1</td>
<td>0</td>
<td>100</td>
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<tr>
<td>Forklift</td>
<td>Diesel Forklift</td>
<td>50</td>
<td>1</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Roller, compactor</td>
<td>Diesel Rollers</td>
<td>80</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Dump Truck, 20 cy (soils)</td>
<td>Diesel Dumpers/Tenders</td>
<td>500</td>
<td>1</td>
<td>0.28</td>
<td>0</td>
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<tr>
<td>Waste Haul Truck, 20 cy (debris)</td>
<td>Diesel Highway Truck</td>
<td>500</td>
<td>1</td>
<td>0</td>
<td>8</td>
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<tr>
<td>Dump Truck, 8 cy</td>
<td>Diesel Dumpers/Tenders</td>
<td>220</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Pickup Truck</td>
<td>Diesel Off-highway Trucks</td>
<td>400</td>
<td>4</td>
<td>100</td>
<td>200</td>
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<tr>
<td>Pressure Washer</td>
<td>Diesel Pressure Washers</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>25</td>
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</tbody>
</table>

**Assumptions:**

Field construction is projected to start in mid-2021 and be completed by early 2025.

Estimated hours of construction per working day: 8

Estimated hours for pickup truck per working day: 4  
Assume pickup trucks are used for the transport of tools and workers for half of the working day. Assume pickup trucks are "off" when not in use and do not idle.

Estimated equipment, average rated HP, and number of units were provided by this Proposed Project's design team.

For a conservative estimate, equipment fuel was assumed to be diesel.
### Truck Trip Tables:

#### Anticipated Truck Trips and Material Quantity Transported

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Grubbing and Clearing Debris</td>
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<td>20</td>
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<td>Other Demolition Materials (piping,</td>
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<td>Excavated Soil</td>
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<td>4473</td>
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<td>TOTAL EXPORT TRUCKLOADS</td>
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</tbody>
</table>

**Assumptions:**

- Estimated typical hours of construction per day: 8 hours.
- Estimated a total of 30 tons of grubbing and clearing debris during site preparation.
- Estimated 80 tons of trees and plantings would be imported.

Exported materials are estimated to be in 20 cy waste containers on dump trucks. Clean soil is estimated to be imported in a 20 cy dump truck that is able to hold approximately 14 cy of soil per trip.

Estimated from Waste Transportation Assessment Final Redline 12-11-18 are in tables 1-1 to 4-4 below. ([WRLINGTON\Wakening\2C4\Project\ENV\60332981\SM-1_Decont\000-Work\930-979-other working documents\Task 9\405-Env\NEPA\Background Info\SM-1 Docs\DP and Related Docs).)

### Table 1-1, Building Debris Waste Volume Estimate

<table>
<thead>
<tr>
<th>Area</th>
<th>Material Type</th>
<th>Waste Volume (Cubic Yards)</th>
<th>Waste Containers</th>
<th>Waste Contents</th>
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<td>Unrestricted Area</td>
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The total volume of backfill soil required for restoration is assumed equal to the waste soil volume from Table 1-3 (7,610 CY) and two-thirds of the concrete waste volume from Table 1-2 (87 CY).

The average commercial dump truck holds up to 14 CY. Therefore, it is possible that restoration of the SM-1 site may require trucking 400 to 500 loads of clean soil through the 300 Area to the SM-1 site. Site restoration activities are expected to take place over a period of approximately 6 months with backfill soil deliveries for at least half of that time. Therefore, during a three-month peak site restoration period, as many as 8 to 10 trucks may be delivering soil to the site per day.
| Equipment                  | Type                      | Average Rated HP | Loading Factors | Emission Factors (lb/1000 HP-hr) | CO₂e | CO | NOx | VOC | PM₁₀ | PM₂.5 | PM₁₀ | SOx | CO₂e |
|---------------------------|---------------------------|------------------|----------------|-----------------------------------|------|----|-----|-----|------|-------|------|-----|-----|------|
| Asphalt paver             | Diesel Pavers             | 130              | 59%            | 4.76                              | 10.72| 0.9 | 0.88| 0.84| 0.84 | 0.84  | 0.84 | 0.84 | 0.84 | 0.84 | 94.05|
| Asphalt roller             | Diesel Rollers            | 130              | 59%            | 5.76                              | 11.09| 1.01| 0.99| 0.97| 0.96 | 0.96  | 0.96 | 0.96 | 0.96 | 0.96 | 93.85|
| Grader                    | Diesel Graders            | 150              | 59%            | 3.33                              | 10.05| 0.75| 0.68| 0.66| 0.82 | 1195  | 2.95E-01| 8.89E-01| 6.64E-02| 6.52E-02| 6.84E-02| 7.28E-02| 106.72|
| Chain saws                | 2 Stroke Chain Saws >6 HP | 10               | 70%            | 778.31                            | 2.12 | 165.53| 21.52| 19.80| 0.31 | 1541  | 5.48E+00| 1.48E-02| 1.19E-00| 1.51E-01| 1.38E-01| 1.27E-03| 10.79 |
| Crane 25 ton              | Diesel Cranes             | 130              | 43%            | 3.02                              | 12.06| 0.84| 0.84| 0.82| 0.82 | 0.82  | 0.82 | 0.82 | 0.82 | 0.82 | 66.28|
| Crane 350 ton             | Diesel Cranes             | 450              | 43%            | 3.02                              | 12.06| 0.84| 0.84| 0.82| 0.82 | 0.82  | 0.82 | 0.82 | 0.82 | 0.82 | 229.45|
| Dewatering pump, 4-in.    | Diesel Pumps              | 50               | 43%            | 6.92                              | 14.09| 1.76| 1.37| 1.32| 0.88 | 1261  | 1.49E-01| 3.03E-01| 3.78E-02| 2.95E-02| 2.84E-02| 1.89E-02| 27.12 |
| Dozer                     | Diesel Crawler Tractor/Doozer | 200          | 59%            | 4.50                              | 11.09| 0.77| 0.73| 0.71| 0.84 | 1199  | 5.31E-01| 1.31E+00| 9.08E-02| 8.61E-02| 8.38E-02| 9.91E-02| 141.48|
| Dozer                     | Diesel Crawler Tractor/Doozer | 75           | 59%            | 4.50                              | 11.09| 0.77| 0.73| 0.71| 0.84 | 1199  | 1.99E-01| 4.91E-01| 3.41E-02| 3.23E-02| 3.14E-02| 3.72E-02| 53.08 |
| Brush Chipper             | Diesel Chipper/Blump Grinders | 130           | 43%            | 5.87                              | 13.89| 1.39| 1.08| 1.08| 0.84 | 1226  | 3.17E-01| 7.85E-01| 7.77E-02| 6.04E-02| 6.93E-02| 4.70E-02| 68.12 |
| Excavator                 | Diesel Excavators         | 130              | 59%            | 3.75                              | 10.03| 0.75| 0.71| 0.68| 0.84 | 1204  | 2.88E-01| 7.89E-01| 5.75E-02| 5.45E-02| 5.22E-02| 6.44E-02| 92.32 |
| Backhoe                   | Diesel Tractors/Loaders/Backhoe | 50           | 21%            | 14.64                            | 15.61| 3.42| 2.36| 2.27| 1.01 | 1473  | 1.54E-01| 1.64E-01| 1.54E-02| 2.38E-02| 4.06E-02| 15.46 |
| Loader, skid steer        | Diesel Skid Steer Loaders | 30               | 21%            | 19.59                            | 16.01| 4.85| 3.11| 3.02| 1.06 | 1533  | 1.23E-01| 1.01E-01| 3.02E-02| 1.96E-02| 1.90E-02| 6.88E-02| 9.66 |
| Forklift                  | Diesel Forklifts          | 50               | 59%            | 6.50                              | 9.97 | 0.90| 0.90| 0.88| 0.88 | 1275  | 1.92E-01| 2.94E-01| 2.66E-02| 2.66E-02| 2.60E-02| 2.60E-02| 37.61 |
| Roller, compactor         | Diesel Rollers            | 80               | 59%            | 5.78                              | 11.09| 1.01| 0.99| 0.97| 0.86 | 1244  | 2.73E-01| 5.23E-01| 4.77E-02| 4.67E-02| 4.58E-02| 4.08E-02| 58.70 |
| Dump Truck, 20 cy (soils) | Diesel Dumpers/Tenders    | 500              | 21%            | 18.74                            | 16.43| 5.01| 3.11| 3.00| 1.04 | 1513  | 1.97E+00| 1.73E+00| 5.26E-01| 3.27E-01| 3.15E-01| 1.09E-01| 158.84|
| Waste haul truck, 20 cy (debris) | Diesel Dumpers/Tenders | 500     | 21%            | 18.74                            | 16.43| 5.01| 3.11| 3.00| 1.04 | 1513  | 1.97E+00| 1.73E+00| 5.26E-01| 3.27E-01| 3.15E-01| 1.09E-01| 158.84|
| Dump Truck, 8 cy          | Diesel Dumpers/Tenders    | 220              | 21%            | 18.74                            | 16.43| 5.01| 3.11| 3.00| 1.04 | 1513  | 8.66E-01| 7.59E-01| 2.31E-01| 1.44E-01| 1.39E-01| 4.80E-02| 69.89 |
| Pickup Truck              | Diesel Off-Highway Trucks | 400             | 59%            | 3.66                              | 11.27| 0.64| 0.57| 0.55| 0.82 | 1192  | 6.64E-01| 1.26E+00| 1.51E-01| 1.35E-01| 1.30E-01| 1.94E-01| 281.40|
| Pressure Washer           | Diesel Pressure Washers   | 10               | 43%            | 0.53                              | 14.18| 1.83| 1.12| 1.1 | 0.88 | 1232  | 2.72E-02| 5.10E-02| 7.87E-03| 4.85E-03| 4.73E-03| 3.70E-03| 5.30  |

1. Average horsepower ratings were obtained from Proposed Project's design team.
2. Loading factors and emission factors from USAFCEE Air Emissions Guide For Air Force Mobile Sources, July 2016, Section 4 and 5.
3. Emission Factors (lbs/hr) = (Average Rated HP X Loading Factors X Emission Factors (lbs./1000 HP-hr)) / 1000
4. ND = No Data available
### Projected Emissions for CY 2022
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<th>Equipment Type</th>
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<th>VOC</th>
<th>PM₂·₅</th>
<th>PM₁₀</th>
<th>SO₂</th>
<th>CO₂</th>
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### Projected Emissions for CY 2023
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### Projected Emissions for CY 2024
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<td>523,002.58</td>
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<tr>
<td>Total Emissions (lb, yr)</td>
<td>12.08</td>
<td>24.32</td>
<td>0.36</td>
<td>0.28</td>
<td>0.27</td>
<td>0.37</td>
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### Projected Emissions for CY 2025
#### Construction Equipment

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<th>PM₁₀</th>
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</tr>
<tr>
<td>2022 (2017)</td>
<td>light-duty diesel trucks</td>
<td>5</td>
<td>261</td>
<td>40</td>
<td>0.60E-04</td>
<td>1.17E-02</td>
<td>1.23E-03</td>
<td>1.54E-05</td>
</tr>
<tr>
<td></td>
<td>light-duty gas passenger</td>
<td>20</td>
<td>261</td>
<td>40</td>
<td>6.46E-04</td>
<td>8.57E-03</td>
<td>7.62E-03</td>
<td>4.41E-06</td>
</tr>
<tr>
<td></td>
<td>Total 2022 POV Emission (lbs/year)</td>
<td></td>
<td></td>
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<tr>
<td>2023 (2018)</td>
<td>light-duty diesel trucks</td>
<td>5</td>
<td>261</td>
<td>40</td>
<td>6.72E-04</td>
<td>1.08E-02</td>
<td>1.66E-03</td>
<td>1.54E-05</td>
</tr>
<tr>
<td></td>
<td>light-duty gas passenger</td>
<td>20</td>
<td>261</td>
<td>40</td>
<td>1.40E-04</td>
<td>6.59E-03</td>
<td>6.59E-04</td>
<td>4.41E-06</td>
</tr>
<tr>
<td></td>
<td>Total 2023 POV Emission (lbs/year)</td>
<td></td>
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</tr>
<tr>
<td>2024 (2019)</td>
<td>light-duty diesel trucks</td>
<td>5</td>
<td>261</td>
<td>40</td>
<td>5.11E-04</td>
<td>1.02E-02</td>
<td>9.46E-03</td>
<td>1.54E-05</td>
</tr>
<tr>
<td></td>
<td>light-duty gas passenger</td>
<td>20</td>
<td>261</td>
<td>40</td>
<td>5.70E-04</td>
<td>7.62E-03</td>
<td>5.68E-03</td>
<td>4.41E-06</td>
</tr>
<tr>
<td></td>
<td>Total 2024 POV Emission (lbs/year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2025 (2020)</td>
<td>light-duty diesel trucks</td>
<td>1</td>
<td>261</td>
<td>40</td>
<td>6.40E-04</td>
<td>9.54E-03</td>
<td>6.30E-04</td>
<td>1.54E-05</td>
</tr>
<tr>
<td></td>
<td>light-duty gas passenger</td>
<td>5</td>
<td>65.25</td>
<td>40</td>
<td>6.88E-04</td>
<td>7.24E-03</td>
<td>4.83E-04</td>
<td>4.41E-06</td>
</tr>
<tr>
<td></td>
<td>Total 2025 POV Emission (lbs/year)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Working days/year = 261**

g to lbs conversion = 453.592

**Assumptions:**
To provide conservative estimates, it was assumed no POVs would be new models. Therefore, emission factors from 5-years prior were used.
Assumed an estimated 25 vehicles (5 diesel trucks and 20 gasoline passenger) would commute to the work site each working day, except in 2025 when the number of required workers decreases.
Assumed workers commute to site 5 days/week for 261 days/year. Assume the workers commute every working day in 2022-2024. Based on predicted construction start and end dates, assume they commute for six months in 2021 and three months in 2025.
Assumed workers are traveling from home locations that are local and an estimated 20 miles away.
Emission factors are from the 2016 and 2018 USAFCEE Air Emissions Guide For Air Force Mobile Sources | Section 5, July 2016 and Section 5, August 2018. Emission factors provided in grams/mile were divided by the conversion factor for pounds/mile.
Fugitive Dust Emissions (Site Preparation)
SM-1

CY 2021

<table>
<thead>
<tr>
<th>Description:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Square feet of land disturbed:</td>
<td>156,800</td>
</tr>
<tr>
<td>Total acres of land disturbed:</td>
<td>3.6</td>
</tr>
<tr>
<td>Assumed number of 8-hr days:</td>
<td>29</td>
</tr>
<tr>
<td>Assumed equivalent acres/day:</td>
<td>0.124</td>
</tr>
</tbody>
</table>

**Equation for Fugitive Dust Emissions (PM$_{10}$)**

$E_{PM_{10}} (lb./yr.) = 20 \text{ lb/acre-day} \times \text{Total Acres Disturbed} \times \text{Number of 8-Hour Days}$

**Calculation**

$E_{PM_{10}} (lb./yr.) = 20 \times 3.6 \text{ acres} \times 29 \text{ days}$

$E_{PM_{10}} = 2087.78 \text{ lb./yr.}$

$1.04E+00 \text{ tpy}$

**Assumptions:**

\(^1\)Emission factors and methodology from USAFCEE *Air Emissions Guide For Air Force Transitory Sources* (Section 4, August 2018).

**Note:** Assume PM= PM$_{10}$=PM$_{2.5}$
Input Parameters:
- Soil moved during exporting = 30 cy
- Soil moved during exporting = 49 tons
- Mean wind speed = 9.0 mph (Wilmington, DE)
- Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
- Material moisture content = 14 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from rock/soil handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)

\[
EF = k \left( \frac{0.0032}{U/5} \right)^{1.3} \left( \frac{M}{2} \right)^{1.4}
\]

Where:
- EF = emission factor, lbs./ton
- U = mean wind speed, miles/hr. (mph)
- M = material moisture content (%)

Therefore, total emissions from rock/soil handling and storage =

\[
EF \times \text{tons/yr. of rock/soil loading/unloading}
\]

- 0.02 lbs./yr. 8.10E-06 tons/yr. PM E1
- 0.01 lbs./yr. 3.83E-06 tons/yr. PM10 E1
- 0.00 lbs./yr. 5.80E-07 tons/yr. PM2.5 E1

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from rock/soil handling and storage =

uncontrolled emissions * 0.1

- 8.10E-06 tons/yr. PM E2
- 3.83E-06 tons/yr. PM10 E2
- 5.80E-07 tons/yr. PM2.5 E2

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)

\[
EF = \left[ k\left(\frac{s}{12}\right)^a \left(\frac{W}{3}\right)^b \right] \left(\frac{365-p}{365}\right)
\]

Where:
- k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM10) and 0.15 lb./VMT (PM2.5)
- s = material silt content (%)
- W = Weight of the vehicle (tons) = 40 tons
- p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
- a = 0.7 for PM, 0.90 for PM10, and 0.9 for PM2.5 (Table 13.2.2-2, Page 13.2.2-5)
- b = 0.45 for PM, PM10, and PM2.5 (Table 13.2.2-2, Page 13.2.2-5)
- VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
- VMT = \( \frac{((\text{cy/year of excavated soil})/\text{(truck load)}) \times \text{average distance traveled each way}}{120 \text{ miles/round trip} \times 11\% \text{ miles/unpaved roads}} \)

Therefore, total emissions from driving dump trucks on unpaved areas =

\[
EF \times \text{VMT}
\]

- 12 lbs./yr. 5.87E-03 tons/yr. PM
- 3 lbs./yr. 1.58E-03 tons/yr. PM10
- 0 lbs./yr. 1.58E-04 tons/yr. PM2.5
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =
uncontrolled emissions * 0.1

<table>
<thead>
<tr>
<th>PM</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.87E-04 tons/yr.</td>
<td>PM</td>
</tr>
<tr>
<td>1.58E-04 tons/yr.</td>
<td>PM_{10}</td>
</tr>
<tr>
<td>1.58E-05 tons/yr.</td>
<td>PM_{2.5}</td>
</tr>
</tbody>
</table>

Total annual fugitive emissions from soil removal (tons/yr.) =
= E1 + E2

<table>
<thead>
<tr>
<th>PM</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.87E-04 tons/yr.</td>
<td>PM</td>
</tr>
<tr>
<td>1.59E-04 tons/yr.</td>
<td>PM_{10}</td>
</tr>
<tr>
<td>1.59E-05 tons/yr.</td>
<td>PM_{2.5}</td>
</tr>
</tbody>
</table>
Fugitive Dust Emissions - Rock/Soil Export in CY 2022
SM-1

Input Parameters:
- Soil moved during exporting = - cy
- Soil moved during exporting = - tons (1.62 tons/cy)
- Mean wind speed = 9.0 mph (Wilmington, DE)
- Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
- Material moisture content = 14 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from rock/soil handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)

\[
EF = k (0.0032) \left( \frac{U}{5} \right)^{1.3} \left( \frac{M}{2} \right)^{1.4}
\]

where:
- EF = emission factor, lbs./ton
- U = mean wind speed, miles/hr. (mph)
- M = material moisture content (%)

Therefore, total emissions from rock/soil handling and storage =

\[
EF * \text{tons/yr. of rock/soil loading/unloading}
\]

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from rock/soil handling and storage =

uncontrolled emissions * 0.1

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)

\[
EF = \left[ k \left( \frac{s}{12} \right)^{a} \left( \frac{W}{3} \right)^{b} \right] \left( \frac{365-p}{365} \right)
\]

where:
- k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM_{10}) and 0.15 lb./VMT (PM_{2.5})
- s = material silt content (%)
- W = Weight of the vehicle (tons) = 40 tons
- p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
- a = 0.7 for PM, 0.90 for PM_{10}, and 0.9 for PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
- b = 0.45 for PM, PM_{10}, and PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
- VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
- VMT = \((\text{cy/year of excavated soil} / \text{truck load}) \times \text{average distance traveled each way})
- VMT = \((0 \text{ cy/yr.}) / (20 \text{ cy/truck}) \times (120 \text{ miles/round trip} \times 1\% \text{ miles/unpaved roads})
- VMT = 0 \text{ VMT/yr.}

Therefore, total emissions from driving dump trucks on unpaved areas =

\[
EF * \text{VMT}
\]
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =

\[
\text{uncontrolled emissions} \times 0.1
\]

\[
\begin{align*}
0.00\text{E}+00 \text{ tons/yr.} & \quad \text{PM} & \quad E2 \\
0.00\text{E}+00 \text{ tons/yr.} & \quad \text{PM}_{10} & \quad E2 \\
0.00\text{E}+00 \text{ tons/yr.} & \quad \text{PM}_{2.5} & \quad E2
\end{align*}
\]

Total annual fugitive emissions from soil removal (tons/yr.) =

\[
= E1 + E2
\]

\[
\begin{align*}
0.00\text{E}+00 \text{ tons/yr.} & \quad \text{PM} \\
0.00\text{E}+00 \text{ tons/yr.} & \quad \text{PM}_{10} \\
0.00\text{E}+00 \text{ tons/yr.} & \quad \text{PM}_{2.5}
\end{align*}
\]
### Fugitive Dust Emissions - Rock/Soil Export in CY 2023

**SM-1**

**Input Parameters:**
- Soil moved during exporting = 2,337 cy
- Soil moved during exporting = 3,785 tons (1.62 tons/cy)
- Mean wind speed = 9.0 mph (Wilmington, DE)
- Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
- Material moisture content = 14 (Mean, Table 13.2.4, Page 13.2.4-2)

**Emissions from rock/soil handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)**

<table>
<thead>
<tr>
<th>EF</th>
<th>PM</th>
<th>PM10</th>
<th>PM2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.34E-04</td>
<td>0.0032</td>
<td>U/5</td>
<td>M/2</td>
</tr>
</tbody>
</table>

where:
- EF = emission factor, lbs./ton
- U = mean wind speed, miles/hr. (mph)
- M = material moisture content (%)

Therefore, total emissions from rock/soil handling and storage = EF * tons/yr. of rock/soil loading/unloading

- 1.26 lbs./yr. 6.31E-04 tons/yr. PM E1
- 0.60 lbs./yr. 2.99E-04 tons/yr. PM10 E1
- 0.09 lbs./yr. 4.52E-05 tons/yr. PM2.5 E1

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from rock/soil handling and storage = uncontrolled emissions * 0.1

- 6.31E-05 tons/yr. PM E2
- 2.99E-05 tons/yr. PM10 E2
- 4.52E-06 tons/yr. PM2.5 E2

**Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)**

<table>
<thead>
<tr>
<th>EF</th>
<th>PM</th>
<th>PM10</th>
<th>PM2.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.52 lbs./VMT/truck</td>
<td>4.9</td>
<td>1.5</td>
<td>0.15</td>
</tr>
<tr>
<td>1.76 lbs./VMT/truck</td>
<td>0.7 for PM, 0.90 for PM10, and 0.9 for PM2.5</td>
<td>Table 13.2.2-2, Page 13.2.2-5</td>
<td></td>
</tr>
<tr>
<td>0.18 lbs./VMT/truck</td>
<td>0.45 for PM, PM10, and PM2.5</td>
<td>Table 13.2.2-2, Page 13.2.2-5</td>
<td></td>
</tr>
</tbody>
</table>

where:
- k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM10) and 0.15 lb./VMT (PM2.5)
- s = material silt content (%)
- W = Weight of the vehicle (tons) = 40 tons
- p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
- a = 0.7 for PM, 0.90 for PM10, and 0.9 for PM2.5 (Table 13.2.2-2, Page 13.2.2-5)
- b = 0.45 for PM, PM10, and PM2.5 (Table 13.2.2-2, Page 13.2.2-5)
- VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
- VMT = ((cy/year of excavated soil)/(truck load))*(average distance traveled each way)
- VMT = ((2,337 cy/yr.) / (20 cy/truck))*(120 miles/round trip*1% miles/unpaved roads)
- VMT = 140.22 VMT/yr.

Therefore, total emissions from driving dump trucks on unpaved areas = EF *VMT

- 914 lbs./yr. 4.57E-01 tons/yr. PM E1
- 247 lbs./yr. 1.23E-01 tons/yr. PM10 E1
- 25 lbs./yr. 1.23E-02 tons/yr. PM2.5 E1
Assume fugitive dust from unpaved roads is controlled using water sprays. Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from driving dump trucks on unpaved areas = 

\[
\text{uncontrolled emissions} \times 0.1 \\
4.57E-02 \text{ tons/yr. PM E2} \\
1.23E-02 \text{ tons/yr. PM}_{10} E2 \\
1.23E-03 \text{ tons/yr. PM}_{2.5} E2
\]

Total annual fugitive emissions from soil removal (tons/yr.) = 

\[
=E1+E2 \\
4.58E-02 \text{ tons/yr. PM} \\
1.24E-02 \text{ tons/yr. PM}_{10} \\
1.24E-03 \text{ tons/yr. PM}_{2.5}
\]
Fugitive Dust Emissions - Rock/Soil Export in CY 2024
SM-1

Input Parameters:
Soil moved during exporting = 4,673 cy
Soil moved during exporting = 7,571 tons (1.62 tons/cy)
Mean wind speed = 9.0 mph (Wilmington, DE)
Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content = 14 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from rock/soil handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)
EF = k (0.0032) [U/5]^{1.3} / (M/2)^{1.4}]

\[
\begin{align*}
&3.34E-04 \text{ lbs./ton PM} \\
&1.58E-04 \text{ lbs./ton PM}_{10} \\
&2.39E-05 \text{ lbs./ton PM}_{2.5}
\end{align*}
\]

where:
EF = emission factor, lbs./ton
U = mean wind speed, miles/hr. (mph)
M = material moisture content (%)

Therefore, total emissions from rock/soil handling and storage =
EF * tons/yr. of rock/soil loading/unloading

\[
\begin{align*}
&2.52 \text{ lbs./yr.} \\
&1.19 \text{ lbs./yr.} \\
&0.18 \text{ lbs./yr.}
\end{align*}
\]

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from rock/soil handling and storage =
uncontrolled emissions * 0.1

\[
\begin{align*}
&1.26E-03 \text{ tons/yr. PM} \ E1 \\
&5.97E-04 \text{ tons/yr. PM}_{10} \ E1 \\
&9.04E-05 \text{ tons/yr. PM}_{2.5} \ E1
\end{align*}
\]

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)
EF = [k(s/12)^a (W/3)^b ((365-p)/365)]

\[
\begin{align*}
&6.52 \text{ lbs./VMT/truck PM} \\
&1.76 \text{ lbs./VMT/truck PM}_{10} \\
&0.18 \text{ lbs./VMT/truck PM}_{2.5}
\end{align*}
\]

where:
k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM) and 0.15 lb./VMT (PM)
s = material silt content (%)
W = Weight of the vehicle (tons) = 40 tons
p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
a = 0.7 for PM, 0.90 for PM, and 0.9 for PM (Table 13.2.2-2, Page 13.2.2-5)
b = 0.45 for PM, PM, and PM (Table 13.2.2-2, Page 13.2.2-5)
VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
VMT = ((cy/year of excavated soil)/(truck load)) * (average distance traveled each way)
VMT = ((4,673 cy/yr.) / (20 cy/truck)) * (120 miles/round trip * 1% miles/unpaved roads)
VMT = 280.38 VMT/yr.

Therefore, total emissions from driving dump trucks on unpaved areas =
EF * VMT

\[
\begin{align*}
&1.827 \text{ lbs./yr.} \\
&493 \text{ lbs./yr.} \\
&49 \text{ lbs./yr.}
\end{align*}
\]
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =

\[
\text{uncontrolled emissions} \times 0.1
\]

\[
\begin{array}{ccc}
9.14 \times 10^{-2} \text{ tons/yr.} & \text{PM} & \text{E2} \\
2.47 \times 10^{-2} \text{ tons/yr.} & \text{PM}_{10} & \text{E2} \\
2.48 \times 10^{-3} \text{ tons/yr.} & \text{PM}_{2.5} & \text{E2}
\end{array}
\]

Total annual fugitive emissions from soil removal (tons/yr.) =

\[
= E_1 + E_2
\]

\[
\begin{array}{ccc}
9.15 \times 10^{-2} \text{ tons/yr.} & \text{PM} \\
2.47 \times 10^{-2} \text{ tons/yr.} & \text{PM}_{10} \\
2.48 \times 10^{-3} \text{ tons/yr.} & \text{PM}_{2.5}
\end{array}
\]
Fugitive Dust Emissions - Rock/Soil Import in CY 2025
SM-1

Input Parameters:
Soil moved during importing = 7,077 cy
Soil moved during importing = 11,465 tons (1.62 tons/cy)
Mean wind speed = 9.0 mph (Wilmington, DE)
Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content = 14 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from rock/soil handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)

\[
EF = k \left( \frac{0.0032}{U^3} \right) \frac{1}{(M/2)^{1.4}} \]

\[
3.34 \times 10^{-4} \text{ lbs./ton PM} \\
1.58 \times 10^{-4} \text{ lbs./ton PM}_{10} \\
2.39 \times 10^{-5} \text{ lbs./ton PM}_{2.5}
\]

where:

\(EF\) = emission factor, lbs./ton
\(U\) = mean wind speed, miles/hr. (mph)
\(M\) = material moisture content (%)

Therefore, total emissions from rock/soil handling and storage =

\[
EF \times \text{tons/yr. of rock/soil loading/unloading}
\]

\[
3.82 \text{ lbs./yr.} \\
1.81 \text{ lbs./yr.} \\
0.27 \text{ lbs./yr.}
\]

\[
1.91 \times 10^0 \text{ tons/yr. PM E1} \\
9.04 \times 10^{-1} \text{ tons/yr. PM}_{10} \\
1.37 \times 10^{-1} \text{ tons/yr. PM}_{2.5}
\]

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from rock/soil handling and storage =

\[
\text{uncontrolled emissions} \times 0.1
\]

\[
1.91 \times 10^0 \text{ tons/yr. PM E2} \\
9.04 \times 10^{-1} \text{ tons/yr. PM}_{10} \\
1.37 \times 10^{-1} \text{ tons/yr. PM}_{2.5}
\]

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)

\[
EF = \left[ k \left( \frac{s}{12} \right)^a \left( \frac{W}{3} \right)^b \right] \left( \frac{365-p}{365} \right)
\]

\[
6.52 \text{ lbs./VMT/truck PM} \\
1.76 \text{ lbs./VMT/truck PM}_{10} \\
0.18 \text{ lbs./VMT/truck PM}_{2.5}
\]

where:

\(k\) = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM\(_{10}\)) and 0.15 lb./VMT (PM\(_{2.5}\))
\(s\) = material silt content (%)
\(W\) = Weight of the vehicle (tons) = 40 tons
\(p\) = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
\(a\) = 0.7 for PM, 0.90 for PM\(_{10}\), and 0.9 for PM\(_{2.5}\) (Table 13.2.2-2, Page 13.2.2-5)
\(b\) = 0.45 for PM, PM\(_{10}\), and PM\(_{2.5}\) (Table 13.2.2-2, Page 13.2.2-5)

VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads

\[
VMT = \left( \frac{(\text{cy/year of excavated soil})(\text{truck load})}{(\text{average distance traveled each way}} \right) \times (120 \text{ miles/round trip} \times 0.01 \text{ miles/road})
\]

VMT = 606.6 VMT/yr.

Therefore, total emissions from driving dump trucks on unpaved areas =

\[
\text{EF} \times \text{VMT}
\]

\[
3.954 \text{ lbs./yr.} \\
1.067 \text{ lbs./yr.} \\
107 \text{ lbs./yr.}
\]

\[
1.98 \times 10^1 \text{ tons/yr. PM} \\
5.34 \times 10^{-1} \text{ tons/yr. PM}_{10} \\
5.34 \times 10^{-2} \text{ tons/yr. PM}_{2.5}
\]
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =

\[
\text{uncontrolled emissions } \times 0.1 \\
1.98\times10^{-1} \text{ tons/yr. PM} \quad \text{E2} \\
5.34\times10^{-2} \text{ tons/yr. PM}_{10} \quad \text{E2} \\
5.34\times10^{-3} \text{ tons/yr. PM}_{2.5} \quad \text{E2}
\]

Total annual fugitive emissions from soil removal and imported backfill (tons/yr.) =

\[
=E1+E2 \\
1.98\times10^{-1} \text{ tons/yr. PM} \\
5.35\times10^{-2} \text{ tons/yr. PM}_{10} \\
5.35\times10^{-3} \text{ tons/yr. PM}_{2.5}
\]
Fugitive Dust Emissions - Concrete Export CY 2021
SM-1

Input Parameters:
Concrete moved during export = - cy
Concrete moved during export = - tons (1.62 tons/cy)
Mean wind speed = 9.0 mph (Wilmington, DE)
Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content = 0.2 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from concrete handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)
EF = k (0.0032) \[ \left( \frac{U}{5} \right)^{1.3} / \left( \frac{M}{2} \right)^{1.4} \]

where:
EF = emission factor, lbs./ton
U = mean wind speed, miles/hr. (mph)
M = material moisture content (%)

Therefore, total emissions from concrete handling and storage =
EF \times \text{tons/yr. of concrete loading/unloading}

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from concrete handling and storage =
uncontrolled emissions \times 0.1

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)
EF = \left[ k \left( \frac{s}{12} \right)^a \left( \frac{W}{3} \right)^b \left( \frac{365-p}{365} \right) \right]

where:
k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM_{10}), and 0.15 lb./VMT (PM_{2.5})
s = material silt content (%)
W = Weight of the vehicle (tons) = 40 tons
p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
a = 0.7 for PM, 0.90 for PM_{10}, and 0.9 for PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
b = 0.45 for PM, PM_{10}, and PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
VMT = ((cy/yr. of concrete/truck load) \times \text{(average distance traveled each way)})
VMT = ((0 cy/yr.) / (20 cy/truck) \times (120 miles/round trip)) \times 1% miles/unpaved roads
VMT = 0 VMT/yr.

Therefore, total emissions from driving dump trucks on unpaved areas =
EF \times \text{VMT}
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =

\[
\text{uncontrolled emissions} \times 0.1
\]

<table>
<thead>
<tr>
<th>Emissions</th>
<th>PM</th>
<th>E2</th>
<th>PM10</th>
<th>E2</th>
<th>PM2.5</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00E+00 tons/yr.</td>
<td>PM</td>
<td>E2</td>
<td>PM10</td>
<td>E2</td>
<td>PM2.5</td>
<td>E2</td>
</tr>
</tbody>
</table>

Total annual fugitive emissions from concrete demolition and import (tons/yr.) =

\[
=E1+E2
\]

<table>
<thead>
<tr>
<th>Emissions</th>
<th>PM</th>
<th>E2</th>
<th>PM10</th>
<th>E2</th>
<th>PM2.5</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00E+00 tons/yr.</td>
<td>PM</td>
<td>E2</td>
<td>PM10</td>
<td>E2</td>
<td>PM2.5</td>
<td>E2</td>
</tr>
</tbody>
</table>


Fugitive Dust Emissions - Concrete Export in CY 2022
SM-1

Input Parameters:
Concrete moved during export = - cy
Concrete moved during export = - tons
Mean wind speed = 9.0 mph (Wilmington, DE)
Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content = 0.2 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from concrete handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)
EF = k (0.0032) [U/5]^{1.3} / [(M/2)^{1.4}]

<table>
<thead>
<tr>
<th>EF</th>
<th>lbs./ton PM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.28E-01</td>
<td>1.3</td>
<td>E1</td>
</tr>
<tr>
<td>6.04E-02</td>
<td>1.0</td>
<td>E1</td>
</tr>
<tr>
<td>9.15E-03</td>
<td>0.7</td>
<td>E1</td>
</tr>
</tbody>
</table>

where:
EF = emission factor, lbs./ton
U = mean wind speed, miles/hr. (mph)
M = material moisture content (%)

Therefore, total emissions from concrete handling and storage =
EF * tons/yr. of concrete loading/unloading

<table>
<thead>
<tr>
<th>EF</th>
<th>lbs./yr.</th>
<th>PM</th>
<th>E1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM</td>
</tr>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM_{10}</td>
</tr>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM_{2.5}</td>
</tr>
</tbody>
</table>

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from concrete handling and storage =
uncontrolled emissions * 0.1

<table>
<thead>
<tr>
<th>EF</th>
<th>lbs./yr.</th>
<th>PM</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM</td>
</tr>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM_{10}</td>
</tr>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM_{2.5}</td>
</tr>
</tbody>
</table>

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)
EF = [(k(s/12)^a (W/3)^b) / 365] PM

<table>
<thead>
<tr>
<th>EF</th>
<th>lbs./VMT/truck</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.52</td>
<td>1.76</td>
<td>PE</td>
</tr>
<tr>
<td>0.18</td>
<td></td>
<td>P_{2.5}</td>
</tr>
</tbody>
</table>

where:
k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM_{10}) and 0.15 lb./VMT (PM_{2.5})
s = material silt content (%)
W = Weight of the vehicle (tons) = 40 tons
p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
a = 0.7 for PM, 0.90 for PM_{10}, and 0.9 for PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
b = 0.45 for PM, PM_{10}, and PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
VMT = ((cy/yr. of concrete/truck load) * (average distance traveled each way))
VMT = ((0 cy/yr.) / (20 cy/truck)) * (120 miles/round trip * 1% miles/ unpaved roads) + 0 VMT/yr.

Therefore, total emissions from driving dump trucks on unpaved areas =
EF * VMT

<table>
<thead>
<tr>
<th>EF</th>
<th>lbs./yr.</th>
<th>PM</th>
<th>E3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM</td>
</tr>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM_{10}</td>
</tr>
<tr>
<td>0.00E+00</td>
<td>0.000E+00</td>
<td>0</td>
<td>PM_{2.5}</td>
</tr>
</tbody>
</table>

E-27
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =
uncontrolled emissions * 0.1

\[
\begin{array}{ccc}
0.00E+00 & \text{tons/yr.} & \text{PM E2} \\
0.00E+00 & \text{tons/yr.} & \text{PM}_{10} E2 \\
0.00E+00 & \text{tons/yr.} & \text{PM}_{2.5} E2 \\
\end{array}
\]

Total annual fugitive emissions from concrete demolition (tons/yr.) =

\[
= E1 + E2
\]

\[
\begin{array}{ccc}
0.00E+00 & \text{tons/yr.} & \text{PM} \\
0.00E+00 & \text{tons/yr.} & \text{PM}_{10} \\
0.00E+00 & \text{tons/yr.} & \text{PM}_{2.5} \\
\end{array}
\]
Fugitive Dust Emissions - Concrete Export in CY 2023
SM-1

Input Parameters:
Concrete moved during export = 1,280 cy
Concrete moved during export = 2,074 tons (1.62 tons/cy)
Mean wind speed = 9.0 mph (Wilmington, DE)
Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content = 0.2 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from concrete handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)

\[ EF = k \left( \frac{0.0032}{U/5} \right) \left( \frac{0.1}{M/2} \right) \]

where:
EF = emission factor, lbs./ton
U = mean wind speed, miles/hr. (mph)
M = material moisture content (%)

Therefore, total emissions from concrete handling and storage =

\[ EF \times \text{tons/yr. of concrete loading/unloading} \]

264.83 lbs./yr. 1.32E-01 tons/yr. PM E1
125.26 lbs./yr. 6.26E-02 tons/yr. PM\textsubscript{10} E1
18.97 lbs./yr. 9.48E-03 tons/yr. PM\textsubscript{2.5} E1

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from concrete handling and storage =

uncontrolled emissions * 0.1

1.32E-02 tons/yr. PM E2
6.26E-03 tons/yr. PM\textsubscript{10} E2
9.48E-04 tons/yr. PM\textsubscript{2.5} E2

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)

\[ EF = \left[ k \left( \frac{s}{12} \right)^a \frac{W}{3} \right] \left( \frac{365-p}{365} \right) \]

where:
k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM\textsubscript{10}) and 0.15 lb./VMT (PM\textsubscript{2.5})
s = material silt content (%)
W = Weight of the vehicle (tons) = 40 tons
p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
a = 0.7 for PM, 0.90 for PM\textsubscript{10}, and 0.9 for PM\textsubscript{2.5} (Table 13.2.2-2, Page 13.2.2-5)
b = 0.45 for PM, PM\textsubscript{10}, and PM\textsubscript{2.5} (Table 13.2.2-2, Page 13.2.2-5)
VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
VMT = \((cy/yr. \times \text{of concrete/(truck load)})\times(\text{average distance traveled each way})
VMT = ((1,280 cy/yr.) / (20 cy/truck))\times(120 miles/round trip\times1% miles/unpaved roads)
VMT = 76.8 VMT/yr.

Therefore, total emissions from driving dump trucks on unpaved areas =

\[ EF \times \text{VMT} \]

501 lbs./yr. 2.50E-01 tons/yr. PM
135 lbs./yr. 6.76E-02 tons/yr. PM\textsubscript{10}
14 lbs./yr. 6.76E-03 tons/yr. PM\textsubscript{2.5}

E-29
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =

\[
\text{uncontrolled emissions} \times 0.1
\]

\[
\begin{array}{lll}
2.50E-02 \text{ tons/yr.} & \text{PM} & \text{E2} \\
6.76E-03 \text{ tons/yr.} & \text{PM}_{10} & \text{E2} \\
6.76E-04 \text{ tons/yr.} & \text{PM}_{2.5} & \text{E2}
\end{array}
\]

Total annual fugitive emissions from concrete demolition (tons/yr.) =

\[
=E1+E2
\]

\[
\begin{array}{lll}
3.83E-02 \text{ tons/yr.} & \text{PM} \\
1.30E-02 \text{ tons/yr.} & \text{PM}_{10} \\
1.62E-03 \text{ tons/yr.} & \text{PM}_{2.5}
\end{array}
\]
Fugitive Dust Emissions - Concrete Export in CY 2024
SM-1

Input Parameters:
Concrete moved during export = 1,280 cy
Concrete moved during export = 2,074 tons (1.62 tons/cy)
Mean wind speed = 9.0 mph (Wilmington, DE)
Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content = 0.2 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from concrete handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)
\[
EF = k(0.0032)\left[U/5\right]^{1.3} / (M/2)^{1.4}
\]

where:
EF = emission factor, lbs./ton
U = mean wind speed, miles/hr. (mph)
M = material moisture content (%)

Therefore, total emissions from concrete handling and storage =
\[
EF \times \text{tons/yr. of concrete loading/unloading}
\]

<table>
<thead>
<tr>
<th>Material</th>
<th>EF (lbs./ton)</th>
<th>PM</th>
<th>E1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>1.28E-01</td>
<td>PM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.04E-02</td>
<td>PM10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.15E-03</td>
<td>PM2.5</td>
<td></td>
</tr>
</tbody>
</table>

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from concrete handling and storage =
\[
\text{uncontrolled emissions} \times 0.1
\]

<table>
<thead>
<tr>
<th>Material</th>
<th>EF (tons/yr.)</th>
<th>PM</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>1.32E-02</td>
<td>PM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6.26E-03</td>
<td>PM10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.48E-04</td>
<td>PM2.5</td>
<td></td>
</tr>
</tbody>
</table>

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)
\[
EF = [k(s/12)^a(W/3)^b(365-p)/365]
\]

where:
k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM10) and 0.15 lb./VMT (PM2.5)
s = material silt content (%)
W = Weight of the vehicle (tons) = 40 tons
p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
a = 0.7 for PM, 0.90 for PM10, and 0.9 for PM2.5 (Table 13.2.2-2, Page 13.2.2-5)
b = 0.45 for PM, PM10, and PM2.5 (Table 13.2.2-2, Page 13.2.2-5)
VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads

VMT = (1,280 cy/yr.) / (20 cy/truck)*(120 miles/round trip*1% miles/unpaved roads)

Therefore, total emissions from driving dump trucks on unpaved areas =
\[
EF \times \text{VMT}
\]

<table>
<thead>
<tr>
<th>Material</th>
<th>EF (lbs./yr.)</th>
<th>PM</th>
<th>E1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concrete</td>
<td>501</td>
<td>2.50E-01</td>
<td>PM</td>
</tr>
<tr>
<td></td>
<td>135</td>
<td>6.76E-02</td>
<td>PM10</td>
</tr>
<tr>
<td></td>
<td>14</td>
<td>6.76E-03</td>
<td>PM2.5</td>
</tr>
</tbody>
</table>
Fugitive Dust Emissions - Concrete Export in CY 2024 (Continued)

SM-1

Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =

\[
\text{uncontrolled emissions} \times 0.1
\]

\[
\begin{array}{ccc}
2.50E-02 \text{ tons/yr.} & \text{PM} & \text{E2} \\
6.76E-03 \text{ tons/yr.} & \text{PM}_{10} & \text{E2} \\
6.76E-04 \text{ tons/yr.} & \text{PM}_{2.5} & \text{E2} \\
\end{array}
\]

Total annual fugitive emissions from concrete export (tons/yr.) =

\[
\text{E1+}\text{E2}
\]

\[
\begin{array}{ccc}
3.83E-02 \text{ tons/yr.} & \text{PM} & \\
1.30E-02 \text{ tons/yr.} & \text{PM}_{10} & \\
1.62E-03 \text{ tons/yr.} & \text{PM}_{2.5} & \\
\end{array}
\]
Fugitive Dust Emissions - Concrete Export in CY 2025
SM-1

Input Parameters:
Concrete moved during export = - cy
Concrete moved during export = - tons (1.62 tons/cy)
Mean wind speed = 9.0 mph (Wilmington, DE)
Material silt content = 6.4 (Mean, Table 13.2.2-1, Page 13.2.2-3)
Material moisture content = 0.2 (Mean, Table 13.2.4, Page 13.2.4-2)

Emissions from concrete handling and storage piles (USEPA AP-42, Eq. 1, Section 13.2.4, January 1995)
EF = k (0.0032) [U/5]^{1/3} / (M/2)^{1/4}

1.28E-01 lbs./ton PM
6.04E-02 lbs./ton PM_{10}
9.15E-03 lbs./ton PM_{2.5}

Therefore, total emissions from concrete handling and storage =
EF * tons/yr. of concrete loading/unloading
- lbs./yr. 0.000 tons/yr. PM E1
- lbs./yr. 0.000 tons/yr. PM_{10} E1
- lbs./yr. 0.0000 tons/yr. PM_{2.5} E1

Assume fugitive dust from stockpiles is controlled using water sprays.
Assume 90% control efficiency from water spray.

Therefore, actual controlled emissions from concrete handling and storage =
uncontrolled emissions * 0.1
0.00E+00 tons/yr. PM E2
0.00E+00 tons/yr. PM_{10} E2
0.00E+00 tons/yr. PM_{2.5} E2

Emissions from driving dump trucks on unpaved areas (USEPA AP-42, Eqs. 1a and 2, Section 13.2.2, November 2006)
EF = [k(s/12)^{a} (W/3)^{b}][1/(365-p)/365]

6.52 lbs./VMT/truck PM
1.76 lbs./VMT/truck PM_{10}
0.18 lbs./VMT/truck PM_{2.5}

where:
k = particle size multiplier = 4.9 lb./VMT (PM), 1.5 lb./VMT (PM_{10}) and 0.15 lb./VMT (PM_{2.5})
s = material silt content (%)
W = Weight of the vehicle (tons) = 40 tons
p = Number of days when precipitation was greater than 0.01 inches = 130 (Figure 13.2.2-1)
a = 0.7 for PM, 0.90 for PM_{10}, and 0.9 for PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
b = 0.45 for PM, PM_{10}, and PM_{2.5} (Table 13.2.2-2, Page 13.2.2-5)
VMT = vehicle miles travelled by loaded & unloaded trucks on unpaved roads
VMT = ((cy/yr. of concrete/(truck load))*(average distance traveled each way))
VMT = ((0 cy/yr.) / (20 cy/truck))*(120 miles/round trip*1% miles/unpaved roads)
VMT = 0 VMT/yr.

Therefore, total emissions from driving dump trucks on unpaved areas =
EF * VMT
- lbs./yr. 0.00E+00 tons/yr. PM
- lbs./yr. 0.00E+00 tons/yr. PM_{10}
- lbs./yr. 0.00E+00 tons/yr. PM_{2.5}
Assume fugitive dust from unpaved roads is controlled using water sprays.
Assume 90% control efficiency from water spray

Therefore, actual controlled emissions from driving dump trucks on unpaved areas =
uncontrolled emissions * 0.1

<table>
<thead>
<tr>
<th>Emission Type</th>
<th>PM</th>
<th>PM$_{10}$</th>
<th>PM$_{2.5}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tons/yr.</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
<td>0.00E+00</td>
</tr>
</tbody>
</table>

Total annual fugitive emissions from concrete export (tons/yr.) =
=E1+E2

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