



Environment

Submitted to:
Calvert Cliffs 3 Nuclear Project, LLC and
UniStar Nuclear Operating Services, LLC
Baltimore, MD

Submitted by:
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NO_x and VOC Emissions from Construction Activities and Air Conformity Applicability Calvert Cliffs Unit 3 Rev. 1

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1.0 Introduction

Calvert Cliffs 3 Nuclear Project LLC ("CC3") and UniStar Nuclear Operating Services, LLC ("UNO") (Co-Applicants) are proposing to construct and operate a new nuclear power unit on the existing Calvert Cliffs Nuclear Power Plant (CCNPP) site. The new unit will be designated as CCNPP Unit 3 (CC3), and will have a gross electric generation capacity of about 1,710 megawatts.

Pursuant to the General Conformity Requirements under 40 CFR 93.150 et seq, the Nuclear Regulatory Commission (NRC) as the lead federal agency is required to make a conformity determination with regard to the proposed construction and operation of CC3. The General Conformity Rule applies only in locations designated in 40 CFR Part 81 as maintenance or nonattainment areas for any criteria air pollutant. As shown in Figure 1-1, the CC3 project site in Calvert County, Maryland is located within the Washington, DC-MD-VA moderate nonattainment area for the 8-hour ambient ozone standard. As such, construction-related emissions of ozone precursors, i.e., oxides of nitrogen (NO_x) and volatile organic compounds (VOC) from both direct and indirect project-related emissions have been evaluated to determine if annual emissions of these pollutants during the years of construction are above the applicable tonnage thresholds for applicability of General Conformity requirements. The applicable de minimis thresholds are 100 tons per year of NO_x and 50 tons per year of VOC emissions per 40 CFR 93.153.

Note that operation of CC3 will not result in significant generation of NO_x emissions, or significant releases of VOCs. Typical sources of NO_x during operation of CC3 will include vehicle operations (mobile sources) and periodic operation of diesel generators that are used to provide backup power (stationary sources). Potential emissions of NO_x and VOCs from CC3 stationary source operations will also be subject to restrictions imposed under the Certificate of Public Convenience and Necessity (CPCN) issued by Maryland Public Service Commission for CCNPP Unit 3 effective June 26, 2009. The CPCN constitutes the issuance of the Air Quality Minor New Source Review Permit to Construct, and a Major Prevention of Significant Deterioration (PSD) permit that was based on review by the Power Plant Research Program (PPRP) and the Maryland Department of the Environment (MDE). Potential NO_x and VOC emissions from operations will be below de minimis threshold values listed in 40 CFR 93.153(b). Mobile source emissions from operations were estimated by proportioning the worst case year of on-road emission during construction by the ratio of operational employees to the number of construction workers. Permitted emissions from the CC3 stationary sources are 24 tpy of NO_x and 4 tpy of VOC but these emissions are specifically excluded from the requirements for a conformity determination per the exclusion found in 40 CFR 93.153(d) for major new sources subject to PSD.

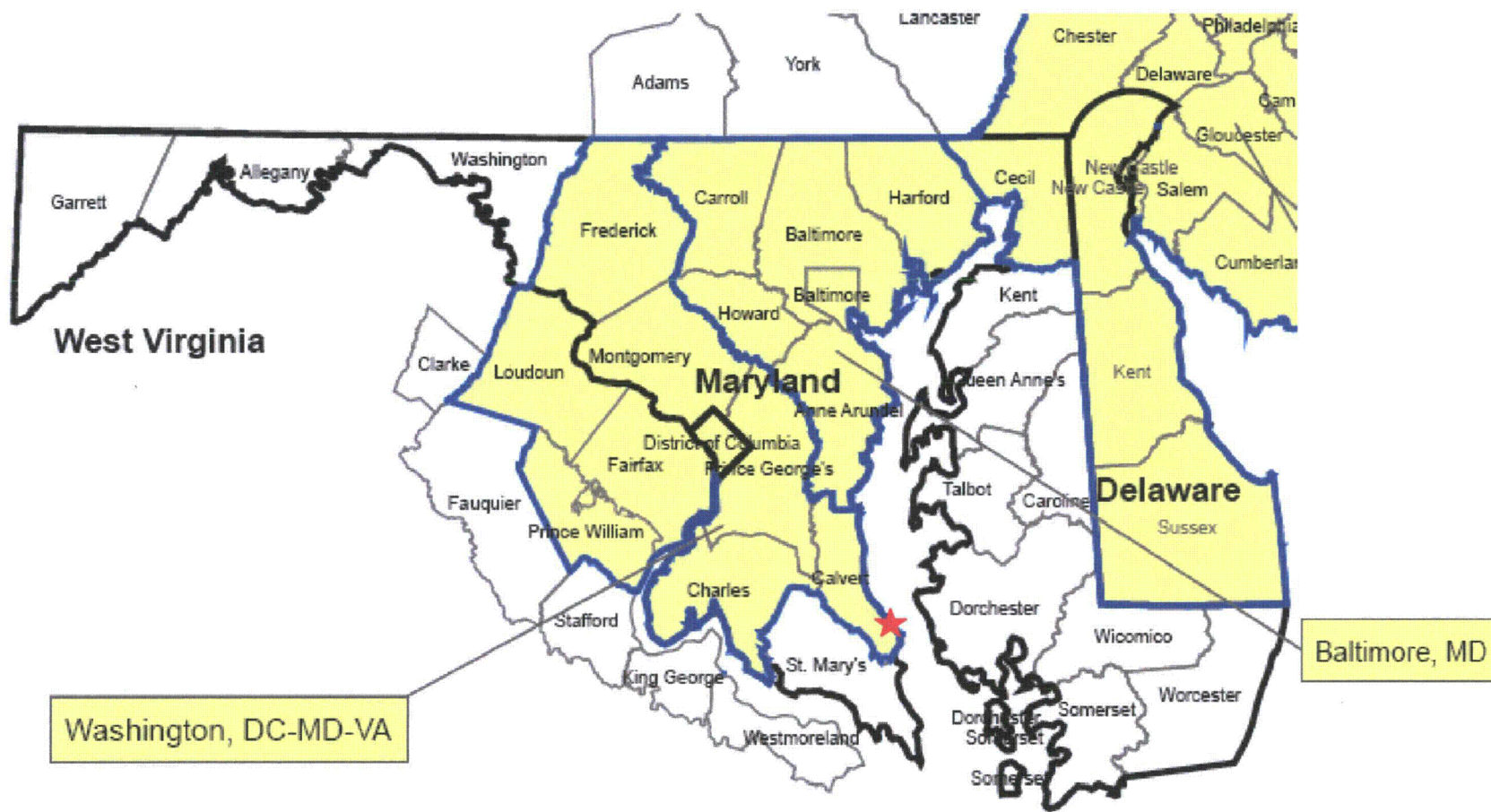
This report documents the NO_x and VOC emissions associated with the construction of CC3 for purposes of determining applicability to the federal Clean Air Act General Conformity Rule. An earlier version of this report was submitted to NRC to satisfy the commitment by CC3 and UNO pursuant to CC-09-0002 (dated October 2, 2009) to provide updated construction emissions by December 11, 2009. Prior to the December 2009 submittal, estimates of construction-related emissions were provided in the CPCN Technical Reports filed with the Maryland Public Service Commission (PSC) in November 2007 and later amended in August 2008. These CPCN reports only evaluated onsite NO_x and VOC emissions related to construction and did not address indirect emissions from activities outside the construction site that are required by EPA in a formal conformity applicability analysis. Indirect activities included in this analysis are employee commuting, commercial deliveries, and emissions from materials delivered by barge to the on-site dock. Moreover, the construction equipment schedule and timeline has been revised since the previous filings.

This document updates the version of this report filed with the NRC in December 2009 to specifically address NRC's request for a more detailed breakout of safety-related construction emissions as defined pursuant to 40 CFR Part 50.10. This request was verbally communicated in a conference call with UniStar and NRC on December 18, 2009.

1.1 Content of the Report

This report consists of four sections and two appendices. Section 2.1 presents the estimated direct and indirect VOC and NO_x emissions from construction of the project. Section 2.2 provides estimates of the indirect emissions associated with CC3 operations. Section 3 describes the methodology for the emission inventory. Technical references are provided in section 4. Appendix A contains the projected construction equipment details and hours of use for each year of construction. Appendix B contains detailed emissions calculations for the direct construction equipment and indirect emissions.

Figure 1-1 Washington, DC-MD-VA and Baltimore, MD 8-hr Ozone Nonattainment Regions



★ Location of CC3

2.0 Emissions Evaluation Approach

The evaluation of the construction and pre-construction emissions is the aggregate of Non-road and On-road emissions associated with the construction of CC3. Non-road emissions are estimated using NONROAD 2008 model and on-road emissions are estimated using MOBILE 6.2 model. AECOM incorporated these two models and applied them mathematically to determine the emissions.

Bechtel North American Power Corporation (Bechtel) is UniStar's current project/construction engineering firm. Bechtel has developed an overall equipment list for construction of CC3 (see Appendix A). This assumption was cross-checked with actual construction schedules from two comparably-sized projects.

In determining the construction emissions as defined in 40 CFR Part 50.2 and Part 50.10, UniStar has developed a "Resource Utilization" approach in consultation with Bechtel. In this approach, construction emission are measured only from the operations associated with Safety –related structures, systems, or components (SSCs) in addition to the onsite activities and are based on the labor distribution throughout the period of construction.

Labor utilization is characterized as being associated with the Nuclear Island, the Turbine Island or the Balance of plant. The assumption is that equipment utilization will be proportional to the predicted labor utilization and that SSC utilization can be defined as that portion of the total devoted to the Nuclear Island. Based upon the schedule, the period of safety-related construction is predicted to be 68 months beginning January 2012. The calculated distribution of resource utilization during that time is distributed as follows:

Table 2-1 Resource Utilization

	2012	2013	2014	2015	2016	2017
Nuclear Island	72.2%	60.5%	58.4%	80.9%	85.1%	100%
Turbine Island	0.10%	13.8%	13.7%	16.1%	14.9%	0%
Balance of Plant	27.7%	25.6%	27.9%	3.0%	0%	0%
	100%	100%	100%	100%	100%	100%

Emissions from equipment associated with safety-related activities are estimated separately from the overall emissions estimate. These are Tables B-1a and B-1b in Appendix B.

3.0 Emissions Estimates

3.1 Construction/Pre-Construction Emissions

Tables 3-1 and 3-2 present the total VOC and NO_x emissions estimates over the construction of the project. These are broken up into separate tables for the two ozone nonattainment regions which are affected. As seen in Figure 1-1, CC3 is located in the Washington DC-MD-VA nonattainment area, but is also close to the Baltimore nonattainment area. Indirect emissions from employee commuting, commercial deliveries and barge deliveries are expected to be generated in both nonattainment areas.

At the request of NRC, Table 3-3 presents a breakout of safety-related construction emissions as defined under 10 CFR Part 50 – Domestic Licensing for Production and Utilization Facilities. The definition of construction under 10 CFR 50.2 reads as follows:

Construction or constructing means, for the purposes of §50.55(e), the analysis, design, manufacture, fabrication, quality assurance, placement, erection, installation, modification, inspection, or testing of a facility or activity which is subject to the regulations in this part and consulting services related to the facility or activity that are safety related.

Additional delineation of construction versus "pre-construction" activities is found under 10 CFR 50.10(a)(1) and (2) under limited work authorization. These are paraphrased below.

- (1) Activities constituting construction are the driving of piles, subsurface preparation, placement of backfill, concrete, or permanent retaining walls within an excavation, installation of foundations, or in-place assembly, erection, fabrication, or testing, which are for: safety-related structures, systems, or components (SSCs)
- (2) Construction does not include: Site exploration, preparation of a site for construction of a facility, including clearing of the site, grading, installation of drainage, erosion and other environmental mitigation measures, and construction of temporary roads and borrow areas; excavation; erection of support buildings building of service facilities

The level of detail to precisely breakout preconstruction and construction activities as defined by NRC is unknown at this time. Emissions reported in Table 3-3 are based on estimated equipment types expected to perform safety-related construction activities as defined in 10 CFR 50. For example groups excluded are direct or indirect emissions from motor vehicles (except concrete trucks), site preparation equipment and dredging equipment. Equipment groups included are earthmoving, compacting, cranes, forklifts, concrete/aggregate equipment, air compressors, manlifts, welding equipment, generating equipment, small capitol equipment and concrete equipment.

The equipment groups included in construction-related activities are shown in Appendix B combined with the non-safety related equipment and also separately. Since the labor (and resource) utilization is not assigned to any specific equipment, a breakdown of emissions by equipment group is not possible. Therefore, the resource utilization of the nuclear island was applied to the total estimated emissions from the safety-related construction equipment for the estimates provided in Table 3-3..

Table 3-1 CC3 Total Construction Emissions within the Washington DC-MD-VA Ozone Nonattainment Area

Year	Off-Road Diesel VOC	Off-Road Gasoline VOC	On-Road Vehicles VOC	Marine VOC	Boiler VOC	VOC (Tons)	Exceeds Conformity Threshold (Yes/No)	Off-Road Diesel NOx	Off-Road Gasoline NOx	On-Road Vehicles NOx	Marine NOx	Boiler NOx	NOx (Tons)	Exceeds Conformity Threshold (Yes/No)
2010	2.6	1.6	3.9	0	0	8.2	No	36.4	0.12	4.0	0	0	40.5	No
2011	9.9	5.2	17.3	0.34	0	32.7	No	138.1	0.5	20.6	6.8	0	166.0	Yes
2012	3.3	1.1	19.9	0.11	0.02	24.4	No	48.1	0.4	24.3	2.1	1.5	76.5	No
2013	9.9	3.8	26.8	0.11	0.05	40.7	No	150.9	1.8	34.4	2.1	4.6	193.8	Yes
2014	12.4	4.8	29.5	0.11	0.05	46.8	No	188.8	2.4	43.1	2.1	4.6	241.0	Yes
2015	12.7	4.8	25.8	0.11	0.05	43.4	No	193.0	2.4	39.8	2.1	4.6	242.0	Yes
2016	11.3	4.6	21.2	0.11	0.03	37.3	No	170.9	2.3	29.3	2.1	3.1	207.8	Yes
2017	6.7	4.5	10.0	0	0	21.2	No	101.3	2.2	14.5	0	0	118.0	Yes
2018	1.3	1.3	3.5	0	0	6.2	No	19.4	0.9	4.1	0	0	24.4	No

Includes activities not defined as construction under 10 CFR 50.

Table 3-2 CC3 Total Construction Emissions within Baltimore Nonattainment Area

Year	Off-Road Diesel VOC	Off-Road Gasoline VOC	On-Road Vehicles VOC	Marine VOC	Boiler VOC	VOC (Tons)	Exceeds Conformity Threshold (Yes/No)	Off-Road Diesel NOx	Off-Road Gasoline NOx	On-Road Vehicles NOx	Marine NOx	Boiler NOx	NOx (Tons)	Exceeds Conformity Threshold (Yes/No)
2010	0	0	0.3	0	0	0.35	No	0	0	0.27	0	0	0.27	No
2011	0	0	1.5	0	0	1.48	No	0	0	1.1	0	0	1.1	No
2012	0	0	2.1	0.35	0	2.49	No	0	0	2.1	6.8	0	8.9	No
2013	0	0	2.7	0.35	0	3.06	No	0	0	2.5	6.8	0	9.3	No
2014	0	0	2.9	0.35	0	3.20	No	0	0	2.4	6.8	0	9.2	No
2015	0	0	2.4	0.35	0	2.71	No	0	0	1.8	6.8	0	8.6	No
2016	0	0	1.8	0.35	0	2.18	No	0	0	1.3	6.8	0	8.2	No
2017	0	0	0.8	0	0	0.82	No	0	0	0.6	0	0	0.6	No
2018	0	0	0.3	0	0	0.27	No	0	0	0.19	0	0	0.19	No

Includes activities not defined as construction under 10 CFR 50.

Table 3-3 CC3 10 CFR 50 Construction Emissions within the Washington DC-MD-VA Ozone Nonattainment Area

Year	Off-Road Diesel VOC	Off-Road Gasoline VOC	On-Road Vehicles VOC	Marine VOC	Boiler VOC	Total VOC (Tons)	10 CFR 50 Construction Resource Utilization	10 CFR 50 Construction Emissions VOC (Tons)	Exceeds Conformity Threshold (Yes/No)
2010	0	0	0	0	0	0	0.0%	0	No
2011	0	0	0	0	0	0	0.0%	0	No
2012	1.5	0.77	0.19	0	0	2.5	72.2%	1.8	No
2013	8.8	3.25	0.37	0	0	12.5	60.5%	7.5	No
2014	11.1	4.25	0.36	0	0	15.7	58.4%	9.2	No
2015	11.4	4.22	0.34	0	0	16.0	80.9%	12.9	No
2016	10.6	4.05	0.31	0	0	14.9	85.1%	12.7	No
2017	6.6	3.92	0	0	0	10.6	100.0%	10.6	No
2018	1.3	1.02	0	0	0	2.35	0.0%	0.00	No

Year	Off-Road Diesel NOx	Off-Road Gasoline NOx	On-Road Vehicles NOx	Marine NOx	Boiler NOx	Total NOx (Tons)	10 CFR 50 Construction Resource Utilization	10 CFR 50 Construction Emissions NOx (Tons)	Exceeds Conformity Threshold (Yes/No)
2010	0	0	0	0	0	0	0.0%	0	No
2011	0	0	0	0	0	0	0.0%	0	No
2012	22.3	0.41	3.1	0	0	25.8	72.2%	18.6	No
2013	132.2	1.83	5.5	0	0	139.5	60.5%	84.4	No
2014	167.1	2.41	4.7	0	0	174.2	58.4%	101.7	Yes
2015	171.3	2.40	4.1	0	0	177.8	80.9%	143.9	Yes
2016	157.7	2.34	3.4	0	0	163.4	85.1%	139.1	Yes
2017	100.1	2.23	0	0	0	102.4	100.0%	102.4	Yes
2018	19.3	0.85	0	0	0	20.2	0.0%	0.00	No

As stated previously, the emissions in Table 3-3 represent the best estimate of "construction" emissions as defined by 10 CFR Part 50 and an estimate of associated resource (labor) utilization. Construction of the reactor and cooling tower are not expected to start in great capacity until the middle of 2012. A detailed plan of construction has not yet been developed in order to specify the start of construction of individual equipment. For example, backfilling and soil compaction are considered construction so the entire group of operating earthmoving and compacting equipment is included in the emissions estimate. Other equipment groups included are compaction, cranes, forklifts, manlifts, welding equipment, concrete equipment, air compressors, pipelaying, cable laying, winches, generation equipment, and small capital equipment. This list is presented in Appendix B, Table B-1b.

Based on the NRC definition of construction and estimated resource utilization by UniStar, Table 3-3 shows that the exceedances of the conformity threshold for NO_x for the years 2014 through 2017. Only non-safety related construction activities are expected to take place in 2010, 2011, and 2018

3.2 Operational Emissions

As noted in Section 1, the operational emissions from CC3 stationary sources required a permit under the PSD program. As such, these emissions are specifically excluded from the requirements for a conformity determination per the exclusion found in 40 CFR 93.153(d).

The only other emissions of NO_x and VOC from CC3 operations are indirect emissions associated with vehicular emissions from employee traffic. As stated in the Phase II traffic study prepared in June 2009 (Reference 10), 363 permanent employees are expected once CC3 begins operations resulting in at most 363 additional round trips. This is very similar to the 379 round trips estimated for the construction workforce in 2018 but well below the estimated number of peak daily round trips during construction of 3,000.

Using similar assumptions as with the construction workforce, emissions from indirect operational employee commuting are expected to be only 1.4 tons/yr of NO_x and 2.0 tons/yr of VOC in the Washington DC nonattainment area and 0.2 tons/yr of NO_x and 0.3 tons/yr of VOC in the Baltimore nonattainment area. These levels are well below the respective applicability thresholds of 100 tons/yr and 50 tons/yr.

4.0 Emission Estimation Methodology

Bechtel North American Power Corporation (Bechtel), UniStar's current project/construction engineering firm, was responsible for developing an estimate of fuel-burning equipment (non-road and on-road) needed to construct the proposed Unit 3. Bechtel provided an equipment schedule with equipment sizes and estimated annual hours of operation and as previously mentioned in Section 2, this list was then used to develop a safety-related construction list of equipment. Emissions calculations based on this equipment along with indirect NO_x and VOC emissions are presented in Appendix B.

4.1 Emissions from Non-Road Equipment

Emissions from non-road equipment (mobile, portable, and stationary fuel-burning equipment) were estimated using EPA's NONROAD2008 model and methodology. Bechtel provided a study of engines with horsepower and annual hours of operation for construction of CC3. Similar to the previously submitted construction emissions from 2008, AECOM developed a spreadsheet-based approach to estimate non-road engine emissions based on the NONROAD model guidance and NONROAD model data files. This allows the emissions estimates to be thoroughly checked and allows transparency to how emissions are developed.

Applicable engine tiers for this analysis are based on the estimated usage dates and the phase-in years for engine size ranges given in Table 1 of Reference 2 for diesel engines and Tables 1 through 7 of Reference 3 for gasoline engines. The applicable SCC codes for equipment were chosen (based on engine duty and fuel type) from the list in Appendix A of Reference 4. This cross reference allowed AECOM to match equipment from Bechtel's list to the NONROAD data files which contain the steady state pollutant emission factors and load factors. Note that this methodology is slightly different than that submitted in 2008, because the NONROAD 2008 data file used here has the transient adjustment factor (TAF) built into the steady state emission factor.

The Equation involved in determining the non-road construction emissions is as follows (from Page 1 of Reference 4):

$$EF_{adj} = EF_{ss} * DF \text{.....Equation 1}$$

EF_{adj} = Final emission factor used in model after adjustments to account for transient operation and deterioration (g/hp-hr)

EF_{ss} = NONROAD 2008 steady state emission factor (g/hp-hr)

DF = Deterioration factor

The deterioration factor (DF) is a function of the technology type and age of the engine.

The NONROAD methodology addresses the effects of deterioration in the engines by multiplying the steady state emission factor for each category of engine by deterioration factor (DF). The following equation (from p 19 of Reference 2 and p 3 of Reference 5) is used to calculate DF as a function of engine age

$$DF = 1 + A * (\text{Age factor})^b \text{ for Age Factor} \leq 1 \text{.....Equation 2}$$

$$DF = 1 + A \text{ for Age Factor} > 1 \text{.....Equation 3}$$

Where Age factor = fraction of median life expended = (cumulative hours * load factor) / median life at full load, in hours.

A = constants for a given pollutant / technology type

$b \leq 1$, for most engines or 0.5 for 2-stroke engines less than 25 Hp

Deterioration is capped at the end of an engine's median life (age factor = 1), under the assumption that an engine deteriorated to a point where any increased deterioration is offset by maintenance. For this analysis, all age factors were set to 1 ("fully deteriorated") in order to simplify the calculations.

Annual non-road emissions were estimated using the following equation from Page 1 of Reference 4

$$E_{Sta} = EF_{adj} * HP * Hours * Load Factor * \frac{Ton}{2000 lb} * \frac{lb}{453.6 g} \quad \text{Equation 4}$$

E_{Sta} = Annual stationary source emissions in tons

EF_{adj} = Final adjusted emission factor (g/hp-hr)

HP = Rated horsepower hp

Hours = Annual operating hours of the equipment

Load Factor = fraction of available rated power

The load factor is an adjustment included in the model to avoid grossly over counting emissions. It is the average fraction of the rated power of an engine that is expected to be actually used in annual operation. This factor takes into account idling, partial load operation, and transient operation. For instance, a 100 hp diesel powered crane has a load factor of 0.43 from the NONROAD data table based on the SCC code. This means that in normal operation, the crane is expected to use an average of 43 hp for every available 100 hp capacity. These factors are based on surveys of equipment users.

One final adjustment that is special to VOC is the conversion from total hydrocarbons (HC). The NONROAD model steady state emission factors are all in terms of HC. This is so the model has a common basis to output emissions in terms of VOC, total organic gasses (TOG), or non-methane hydrocarbons (NMHC). Reference 6 gives the conversion from HC to VOC as 1.053 for diesel engines, 1.034 for 2-stroke gasoline engines, and 0.933 for 4-stroke gasoline engines.

4.2 On-Road Vehicles

Estimation of on-road vehicular emissions was calculated with EPA's MOBILE6.2 Vehicle Emission Modeling Software. MOBILE6.2 is an emission factor model for predicting gram of emissions (VOC, and NO_x) per mile as well as other criteria and air toxic emissions from cars, trucks, and motorcycles. The MOVES model (as a replacement for Mobile 6.2) is currently under development by EPA but has not been finalized at the time of this report.

Mobile 6.2 gives emission rates in terms of grams per vehicle mile traveled. To obtain miles traveled for on-site vehicles, the estimated hours of vehicle use was multiplied by an estimated annual speed in mile/hr. Specific vehicle categories from Mobile6.2 for on-site vehicles are given in Appendix B. For employee commuting, the estimated annual number of construction employees was multiplied by a factor of 1.3 (for estimating carpooling) to get a number of vehicles. This assumption is consistent with the Phase II traffic study prepared in June 2009. Employees are assumed to have a typical daily commute which is constant for 312 working days per calendar year and have vehicles which fall into the LDGV category. The geographic breakdown was assumed to be 10% from St. Mary's County to the south and west (an attainment area for ozone), 25% from the Baltimore nonattainment area to the north, and the rest from the Washington DC-MD-VA ozone nonattainment area. The number of commercial deliveries was determined based on the expected goods to be delivered to the site during construction by truck. For this analysis, commercial deliveries are assumed to be in the HDDV8b category. Thirty percent of the commercial deliveries were assumed to come from the Baltimore nonattainment area with the balance from the Washington DC-MD-VA nonattainment area.

For indirect emissions from employee commuting and commercial deliveries, AECOM assumed a 15 year time span for the vehicle population as a reasonable estimation of typical vehicle ownership. That is, beginning in 2010, the emissions model used a vehicle population mix from model years 1995-2010. This progressively increased by one year until 2018.

Fuel consumption for these vehicles is gasoline and transportation diesel as noted in Appendix B. Emissions from on-road vehicles are estimated using Equation 1.

$$E_{Mob} = VMT * EF * \frac{Ton}{2000 lb} * \frac{lb}{453.6 g} \dots \dots \dots \text{Equation 5}$$

E_{Mob} = On-road vehicle emissions in tons per year

VMT = Vehicle miles travelled in a year

EF = Mobile 6.2 emission factor for on road vehicles in grams/mile.

4.3 Marine Equipment

The current Calvert Cliffs Nuclear Plant has an existing barge dock on-site which UniStar plans to use for receipt of some equipment by delivery. Additionally, UniStar will be dredging some off-shore areas during the CC3 construction period. Emissions from marine equipment used in these activities are included in this emissions inventory. Ancillary on-shore equipment (such as dump trucks or cranes) related to dredging and barge deliveries are accounted for in the non-road category.

US EPA has released a final report in April 2009 describing the methodologies used for the preparation of port-related emission inventory. This report is identified as reference number 8. Equations involved in determining the emissions from the marine sources are:

$$E_{Mar} = EF_{pol} * HP * Hours * Load Factor * \frac{kWh}{1.341 HP-hr} * \frac{Ton}{2000 lb} * \frac{lb}{453.6 g} \dots \dots \dots \text{Equation 6}$$

Where

E_{Mar} = Annual marine emissions in tons

EF_{pol} = Emission factor in (g/kW-hr)

HP = Rated horse power (hp)

Hours = Annual operating hours

Load Factor = Fraction of available operating rated power

Emission factors, load factors, and guidance on typical engine sizes are taken from the referenced port inventory document. All of the marine dredging operations for this project occur during 2011 for barge dock preparation. Deliveries of materials by barge are assumed to begin in 2012 after dredging is completed. The dredging operations are expected to occur from October through December 2011, 10 hours per day, 6 days per week. Dredging is assumed to be performed by crane and dredged materials will be disposed of on-site. Deliveries of materials by barge are expected to originate at Harve de Grace, MD which is in the Baltimore nonattainment area. By ship, the distance is approximately 75 nautical miles (nm) with 18 nm assumed to occur within the state maritime zone boundaries of Calvert County and 57 nm occurring within the maritime zone boundaries of the Baltimore nonattainment area. Transportation emissions from barge deliveries were divided accordingly.

4.4 Boiler

The proposed concrete batch plant will require a small boiler (~ 20 MMBtu/hr) for the winter months to ensure the concrete does not freeze and to maintain consistency in batch preparation. The boiler is assumed to only use distillate oil for fuel. Emission factors for the boiler were taken from EPA's AP-42 document for fuel oil combustion. When operated, the boiler was assumed to operate at maximum capacity.

5.0 References

1. EPA's "MOBILE6.2 Vehicle Emission Modeling Software"
2. EPA's "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling—Compression-Ignition" NR-009c April 2004, EPA420-P-04-009.
3. EPA's "Exhaust Emission Factors for Nonroad Engine Modeling: Spark Ignition" NR-010e December 2005, EPA420-R-05-019.
4. EPA's "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling" NR-005c April 2004, EPA420-P-04-005
5. EPA's "Nonroad Spark-Ignition Engine Emission Deterioration Factors" NR-011c December 2005, EPA420-R-05-023.
6. EPA's "Conversion Factors for Hydrocarbon Emission Components" NR-002c December 2005, EPA420-R-05-015
7. EPA's "NONROAD08 Model (nonroad engines, equipment, and vehicles)"
8. US EPA / ICF International "Current Methodologies in Preparing Mobile Source Port-Related Emission inventories" Final Report April 2009.
9. EPA's AP-42 Compilation of Emission Factors, Section 3.1 Fuel Oil Combustion, 9/98
10. Traffic Impact Study at the Calvert Cliffs Nuclear Power Plant Draft Final Report, KLD Engineering, June 13, 2009 Rev. 1

Appendix A

Construction Schedule

Table A-1 Construction Equipment List / Hours of Operation[illegible]

Table A-1 Construction Equipment List / Hours of Operation[illegible]

Appendix B

Emissions Calculations

Table B-1a Diesel Non-Road Engine Emissions

Equipment category based on NONROAD classification	SCC ¹	Fuel Type	Engine Technology Type	Equipment Horsepower											BSFC ² lb/hp-hr	EFss (g/hp-hr) ²		Load Factor ²	Age Factor ³	CA ⁴		Deterioration factor ⁵		Adjusted EF (g/hp-hr) ⁴	
					2010 hrs	2011 hrs	2012 hrs	2013 hrs	2014 hrs	2015 hrs	2016 hrs	2017 hrs	2018 hrs	HC		NOx	HC			NOx	HC	NOx	HC	NOx	
Earthmoving																									
Sweeper/Scrubber	2270003030	Diesel	T3	85	0	0	156	936	936	936	936	936	858	0.408	0.18	3	0.43	1	0.027	0.008	1.027	1.008	0.185	3.024	
Crawler Tractor	2270002069	Diesel	T3	105	0	0	312	4992	5616	5616	5616	3588	625	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Crawler Tractor	2270002069	Diesel	T3	210	0	0	1404	7332	7800	7488	5304	3588	312	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Crawler Tractor	2270002069	Diesel	T3	307	0	0	1404	7332	7800	7488	3666	1092	0	0.371	0.17	2.61	0.59	1	0.027	0.008	1.027	1.008	0.175	2.631	
Excavator	2270002036	Diesel	T4	30	0	0	312	4056	4056	4056	2496	468	0	0.412	0.13	3	0.59	1	0.027	0.008	1.027	1.008	0.134	3.024	
Excavator	2270002036	Diesel	T3	268	0	0	936	6864	7488	7488	6084	936	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Excavator	2270002036	Diesel	T4	321	0	0	312	4056	4056	3744	2340	156	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520	
Excavator	2270002036	Diesel	T4	404	0	0	312	1872	1872	1872	1248	0	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crawler Tractor	2270002069	Diesel	T4	426	0	0	1310	2246	2246	2246	2246	1872	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520	
Grader	2270002048	Diesel	T3	135	0	0	1248	5865	5990	4992	2995	2995	1248	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	80	0	0	1497	5990	6739	6739	3739	1310	0	0.481	0.42	3.64	0.21	1	0.027	0.008	1.027	1.008	0.431	3.669	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	174	0	0	1684	8049	8049	6739	6739	1872	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054	
Skid Steer Loader	2270002072	Diesel	T4	75	0	0	312	4056	4056	3744	3744	624	0	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	199	0	0	312	5304	5616	5616	5616	312	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054	
Tractor/Loader/Backhoe	2270002066	Diesel	T4	349	0	0	312	4056	4056	3744	3744	312	0	0.433	0.13	2.5	0.21	1	0.027	0.008	1.027	1.008	0.134	2.520	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	224	0	0	312	3900	5616	4524	3744	312	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054	
Off-Highway Truck	2270002051	Diesel	T4	302	0	0	3432	16380	22464	22464	14040	2184	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520	
Off-Highway Tractor	2270002075	Diesel	T3	115	0	0	748	5491	5990	5990	5616	374	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Compaction																									
Plate Compactor	2270002009	Diesel	T4	339	0	0	748	1555	2995	2995	2995	2496	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Plate Compactor	2270002009	Diesel	T3	185	0	0	2246	7488	7488	7488	6364	2745	0	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Cranes																									
Crane	2270002045	Diesel	T4	510	0	0	1497	5990	5990	5990	5990	0	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	340	0	0	1622	9734	9734	9734	9734	4056	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	330	0	0	0	17971	25958	22464	7488	0	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	340	0	0	811	7300	9734	9734	9734	6489	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	340	0	0	0	17035	24336	24336	24336	14601	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	600	0	0	811	4056	9734	9734	9734	6489	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	600	0	0	1662	9734	9734	9734	9734	4056	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	500	0	0	3744	20592	22464	22464	22464	16848	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T3	152	0	0	1747	13104	15724	15724	15724	14851	1747	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	174	0	0	3493	9609	10483	10483	10483	10046	2184	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	215	0	0	3493	13104	31449	47174	48484	21403	2184	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	250	0	0	3493	9609	10483	10483	10483	9609	0	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	250	0	0	873	4368	10483	10483	10483	9172	1310	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Forklift																									
Forklift	2270003020	Diesel	T3	142	0	0	748	9734	13478	13478	13478	13104	5241	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Crane	2270002045	Diesel	T3	290	0	0	624	5616	7488	7488	7488	3744	2184	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Forklift	2270003020	Diesel	T3	89	0	0	748	9734	13478	13478	13478	11232	0	0.412	0.19	3.13	0.59	1	0.027	0.008	1.027	1.008	0.195	3.155	
Forklift	2270003020	Diesel	T3	113	0	0	8424	33696	33696	33696	33696	15912	468	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Forklift	2270003020	Diesel	T3	110	0	0	7956	40248	44928	44928	44928	17784	2808	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Manlift/Scissorlifts																									
Aerial Lift	2270003010	Diesel	T4	28	0	0	0	748	17971	22464	22464	6552	0	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Aerial Lift	2270003010	Diesel	T4	65	0	0	0	374	11980	15724	15724	9360	0	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Aerial Lift	2270003010	Diesel	T4	48	0	0	0	29																	

Equipment category based on NONROAD classification	VOC ⁵ tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC ⁶ tons	Nox tons	Nox tons	Nox tons	Nox tons	Nox tons	Nox tons	Nox tons	Nox tons	Nox tons
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Eartmoving																			
Sweeper/Scrubber	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.02	0.11	0.11	0.11	0.11	0.11	0.11	0.10
Crawler Tractor	0.00	0.00	0.00	0.07	0.08	0.08	0.08	0.05	0.01	0.00	0.00	0.06	0.90	1.01	1.01	1.01	1.01	0.64	0.11
Crawler Tractor	0.00	0.00	0.04	0.21	0.22	0.21	0.15	0.10	0.01	0.00	0.00	0.50	2.63	2.80	2.69	1.91	1.29	0.11	
Crawler Tractor	0.00	0.00	0.05	0.27	0.29	0.27	0.13	0.04	0.00	0.00	0.00	0.74	3.85	4.10	3.93	1.93	0.57	0.00	
Excavator	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.24	0.24	0.24	0.15	0.03	0.00	
Excavator	0.00	0.00	0.03	0.25	0.27	0.27	0.22	0.03	0.00	0.00	0.00	0.43	3.15	3.43	3.43	2.79	0.43	0.00	
Excavator	0.00	0.00	0.01	0.12	0.12	0.11	0.07	0.00	0.00	0.00	0.00	0.16	2.13	2.13	1.97	1.23	0.08	0.00	
Excavator	0.00	0.00	0.01	0.07	0.07	0.07	0.05	0.00	0.00	0.00	0.00	0.21	1.24	1.24	1.24	0.83	0.00	0.00	
Crawler Tractor	0.00	0.00	0.05	0.09	0.09	0.09	0.09	0.07	0.00	0.00	0.00	0.91	1.57	1.57	1.57	1.57	1.31	0.00	
Grader	0.00	0.00	0.02	0.11	0.11	0.09	0.05	0.05	0.02	0.00	0.00	0.29	1.35	1.38	1.15	0.69	0.69	0.29	
Tractor/Loader/Backhoe	0.00	0.00	0.01	0.05	0.06	0.06	0.03	0.01	0.00	0.00	0.00	0.10	0.41	0.46	0.46	0.25	0.09	0.00	
Tractor/Loader/Backhoe	0.00	0.00	0.03	0.15	0.15	0.12	0.12	0.03	0.00	0.00	0.00	0.21	0.99	0.99	0.83	0.83	0.23	0.00	
Skid Steer Loader	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.21	0.21	0.20	0.20	0.03	0.00	
Tractor/Loader/Backhoe	0.00	0.00	0.01	0.11	0.12	0.12	0.12	0.01	0.00	0.00	0.00	0.04	0.75	0.79	0.79	0.79	0.04	0.00	
Tractor/Loader/Backhoe	0.00	0.00	0.00	0.05	0.05	0.04	0.04	0.00	0.00	0.00	0.00	0.06	0.83	0.83	0.76	0.76	0.06	0.00	
Tractor/Loader/Backhoe	0.00	0.00	0.01	0.09	0.13	0.11	0.09	0.01	0.00	0.00	0.00	0.05	0.62	0.89	0.72	0.59	0.05	0.00	
Off-Higway Truck	0.00	0.00	0.09	0.45	0.62	0.62	0.39	0.06	0.00	0.00	0.00	1.70	8.11	11.12	11.12	6.95	1.08	0.00	
Off-Highway Tractor	0.00	0.00	0.01	0.08	0.09	0.09	0.09	0.01	0.00	0.00	0.00	0.15	1.08	1.18	1.18	1.11	0.07	0.00	
Compaction																			
Plate Compactor	0.00	0.00	0.02	0.04	0.07	0.07	0.07	0.06	0.00	0.00	0.00	0.30	0.63	1.21	1.21	1.21	1.01	0.00	
Plate Compactor	0.00	0.00	0.04	0.13	0.13	0.13	0.11	0.05	0.00	0.00	0.00	0.50	1.65</						

Table B-1a Diesel Non-Road Engine Emissions

Winches and Tuggers																								
Other Construction Equipment	2270002081	Diesel	T4	140	0	0	0	0	2246	6739	6177	2246	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520
Generation Equipment																								
Generator	2270006005	Diesel	T3	150	655	2620	4367	15069	15724	15724	15724	14414	5241	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520
Generator	2270006005	Diesel	T3	86	0	0	436	4804	5241	5241	5241	5241	3057	0.408	0.18	3	0.43	1	0.027	0.008	1.027	1.008	0.185	3.024
Generator	2270006005	Diesel	T4	345	0	0	0	4804	5241	5241	5241	5241	3057	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520
Generator	2270006005	Diesel	T4	200	0	0	0	6552	7862	7862	7862	7862	3712	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520
Generator	2270006005	Diesel	T3	143	0	0	2839	12876	13104	13104	13104	13104	6115	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520
Generator	2270006005	Diesel	T3	143	0	0	873	8299	10483	10483	10483	10483	4804	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520
Generator	2270006005	Diesel	T4	14	0	0	8798	52603	81806	83088	23328	37440	20592	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Small Capital Equipment																								
Plate Compactor	2270002009	Diesel	T4	8	0	0	10530	33696	33696	33693	33696	33696	11636	0.408	0.13	4.3	0.43	1	0.027	0.008	1.027	1.008	0.134	4.334
Plate Compactor	2270002009	Diesel	T4	15	0	0	2340	12636	16848	16848	16848	16848	7254	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Plate Compactor	2270002009	Diesel	T4	19	0	0	2808	16380	22464	22464	22464	21762	12870	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Generator	2270006005	Diesel	T4	11	0	0	5850	34866	49842	50544	50544	47502	19656	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Pump	2270006010	Diesel	T4	7	0	0	468	5148	5616	5616	5616	5616	3276	0.408	0.5508	4.3	0.43	1	0.027	0.008	1.027	1.008	0.566	4.334
Pump	2270006010	Diesel	T4	15	0	0	468	5148	5616	5616	5616	5616	3276	0.408	0.438	4.4399	0.43	1	0.027	0.008	1.027	1.008	0.450	4.475
Concrete Saw	2270002039	Diesel	T4	65	0	0	702	7020	8424	8424	8424	8424	3978	0.412	0.13	3	0.59	1	0.027	0.008	1.027	1.008	0.134	3.024
Tamper/Rammer	2270002006	Diesel	T4	3	0	0	2808	14508	22464	22464	22464	19332	9360	0.408	0.13	4.3	0.43	1	0.027	0.008	1.027	1.008	0.134	4.334
Tamper/Rammer	2270002006	Diesel	T4	3	0	0	2808	14508	22464	22464	22464	19332	9360	0.408	0.13	4.3	0.43	1	0.027	0.008	1.027	1.008	0.134	4.334
Pump	2270006010	Diesel	T4	24	0	0	4914	16614	30654	39688	30888	30450	12402	0.408	0.438	4.4399	0.43	1	0.027	0.008	1.027	1.008	0.450	4.475
Concrete Batch Plant																								
Generator	2270002081	Diesel	T4	470	0	0	6240	12480	12480	12480	12480	7280	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520
Tractor/Loader/Backhoe	2270002066	Diesel	T3	80	0	0	6240	12480	12480	12480	12480	7280	0	0.481	0.42	3.64	0.21	1	0.027	0.008	1.027	1.008	0.431	3.669
Site Preparation																								
All Terrain Vehicle/MC	2270001030	Diesel	T4	10	2340	9360	2340	0	0	0	0	0	0	0.408	0.5508	4.3	0.42	1	0.027	0.008	1.027	1.008	0.566	4.334
Tractor/Loader/Backhoe	2270002066	Diesel	T3	124	1560	6240	1560	0	0	0	0	0	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054
Chipper/Stump Grinder	2270004066	Diesel	T4	75	1560	4680	0	0	0	0	0	0	0	0.408	0.1314	3	0.43	1	0.027	0.008	1.027	1.008	0.135	3.024
Plate Compactor	2270002009	Diesel	T3	354	4680	18720	4680	0	0	0	0	0	0	0.367	0.17	2.5	0.43	1	0.027	0.008	1.027	1.008	0.175	2.520
Air Compressor	2270006015	Diesel	T4	55	2340	9360	0	0	0	0	0	0	0	0.408	0.1314	3	0.43	1	0.027	0.008	1.027	1.008	0.135	3.024
Crawler Tractor	2270002069	Diesel	T3	96	1560	6240	0	0	0	0	0	0	0	0.412	0.19	3.13	0.59	1	0.027	0.008	1.027	1.008	0.195	3.155
Crawler Tractor	2270002069	Diesel	T3	145	2340	9360	0	0	0	0	0	0	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631
Crawler Tractor	2270002069	Diesel	T3	308	4680	18720	0	0	0	0	0	0	0	0.371	0.17	2.61	0.59	1	0.027	0.008	1.027	1.008	0.175	2.631
Excavator	2270002036	Diesel	T3	250	4680	18720	0	0	0	0	0	0	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631
Excavator	2270002036	Diesel	T3	380	6240	24960	0	0	0	0	0	0	0	0.371	0.17	2.61	0.59	1	0.027	0.008	1.027	1.008	0.175	2.631
Excavator	2270002036	Diesel	T3	513	4680	18720	0	0	0	0	0	0	0	0.371	0.17	2.61	0.59	1	0.027	0.008	1.027	1.008	0.175	2.631
Excavator	2270002036	Diesel	T3	258	1560	6240	0	0	0	0	0	0	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631
Generator	2270006005	Diesel	T3	80	3120	12480	3120	0	0	0	0	0	0	0.408	0.18	3	0.43	1	0.027	0.008	1.027	1.008	0.185	3.024
Grader	2270002048	Diesel	T3	259	1560	4160	0	0	0	0	0	0	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631
Rubber Tire Loader	2270002060	Diesel	T3	168	2340	6240	0	0	0	0	0	0	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631
Scraper	2270002018	Diesel	T3	181	3120	5200	0	0	0	0	0	0	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631
Tractor/Loader/Backhoe	2270002066	Diesel	T4	75	1560	4160	0	0	0	0	0	0	0	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024
Tractor/Loader/Backhoe	2270002066	Diesel	T3	189	2340	6240	0	0	0	0	0	0	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054
Trencher	2270002030	Diesel	T3	450	1560	0	0	0	0	0	0	0	0	0.371	0.17	2.61	0.59	1	0.027	0.008	1.027	1.008	0.175	2.631
Grinder	2270004066	Diesel	T3	200	780	2080	0	0	0	0	0	0	0	0.367	0.1836	2.5	0.43	1	0.027	0.008	1.027	1.008	0.189	2.520
Off-Highway Truck	2270002051	Diesel	T3	325	2340	9360	4680	0	0	0	0	0	0	0.371	0.17	2.61	0.59	1	0.027	0.008	1.027	1.008	0.175	2.631
Off-Highway Truck	2270002051	Diesel	T3	469	17160	68640	17160	0	0	0	0	0	0	0.371	0.17	2.61								

NOTES:

Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.

Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009.

EFss from NMIM/NONROAD08 have transient adjustment factors built in.

Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.

Age Factor = LF * cumulative hours / median life (where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes).

Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for diesel engines and A is taken from Table A4 from source

Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.

Adjusted EF = EFss * TAF * DF (as stated in Note 2, EFss have TAFs built in)

Note 5: Annual VOC Emissions are calculated using the following calculation (1.053 * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

1.053 is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015.

Note 6: Annual NOx Emissions are calculated using the following calculation (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-1a Diesel Non-Road Engine Emissions

Winches and Tuggers																		
Other Construction Equipment	0.00	0.00	0.00	0.00	0.03	0.09	0.08	0.03	0.00	0.00	0.00	0.00	0.52	1.55	1.42	0.52	0.00	
Generation Equipment																		
Generator	0.01	0.04	0.06	0.21	0.22	0.22	0.22	0.20	0.07	0.12	0.47	0.78	2.70	2.82	2.82	2.82	2.58	0.94
Generator	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.02	0.00	0.00	0.05	0.59	0.65	0.65	0.65	0.65	0.38
Generator	0.00	0.00	0.00	0.11	0.12	0.12	0.12	0.12	0.07	0.00	0.00	0.00	1.98	2.16	2.16	2.16	2.16	1.26
Generator	0.00	0.00	0.00	0.09	0.10	0.10	0.10	0.10	0.05	0.00	0.00	0.00	1.57	1.88	1.88	1.88	1.88	0.89
Generator	0.00	0.00	0.04	0.17	0.17	0.17	0.17	0.17	0.08	0.00	0.00	0.48	2.20	2.24	2.24	2.24	2.24	1.04
Generator	0.00	0.00	0.01	0.11	0.14	0.14	0.14	0.14	0.06	0.00	0.00	0.15	1.42	1.79	1.79	1.79	1.79	0.82
Generator	0.00	0.00	0.01	0.05	0.08	0.08	0.02	0.03	0.02	0.00	0.00	0.26	1.56	2.43	2.47	0.69	1.11	0.61
Small Capital Equipment																		
Plate Compactor	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.00	0.00	0.17	0.55	0.55	0.55	0.55	0.55	0.19
Plate Compactor	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.00	0.00	0.07	0.40	0.54	0.54	0.54	0.54	0.23
Plate Compactor	0.00	0.00	0.00	0.02	0.03	0.03	0.03	0.03	0.02	0.00	0.00	0.11	0.66	0.91	0.91	0.91	0.88	0.52
Generator	0.00	0.00	0.00	0.03	0.04	0.04	0.04	0.03	0.01	0.00	0.00	0.14	0.81	1.16	1.18	1.18	1.11	0.46
Pump	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.07	0.08	0.08	0.08	0.08	0.05
Pump	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.01	0.00	0.00	0.01	0.16	0.18	0.18	0.18	0.18	0.10
Concrete Saw	0.00	0.00	0.00	0.04	0.05	0.05	0.05	0.05	0.02	0.00	0.00	0.09	0.90	1.08	1.08	1.08	1.08	0.51
Tamper/Rammer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	0.14	0.14	0.14	0.12	0.06
Tamper/Rammer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	0.14	0.14	0.14	0.12	0.06
Pump	0.00	0.00	0.03	0.09	0.17	0.21	0.17	0.16	0.07	0.00	0.00	0.25	0.85	1.56	2.02	1.57	1.55	0.63
Concrete Batch Plant																		
Generator	0.00	0.00	0.27	0.54	0.54	0.54	0.31	0.00	0.00	0.00	0.00	4.81	9.61	9.61	9.61	5.61	0.00	0.00
Tractor/Loader/Backhoe	0.00	0.00	0.05	0.10	0.10	0.10	0.06	0.00	0.00	0.00	0.00	0.42	0.85	0.85	0.85	0.49	0.00	0.00
Site Preparation																		
All Terrain Vehicle/MC	0.01	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.19	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Tractor/Loader/Backhoe	0.02	0.08	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.14	0.55	0.14	0.00	0.00	0.00	0.00	0.00	0.00
Chipper/Stump Grinder	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.17	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plate Compactor	0.14	0.58	0.14	0.00	0.00	0.00	0.00	0.00	0.00	1.98	7.92	1.98	0.00	0.00	0.00	0.00	0.00	0.00
Air Compressor	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.18	0.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crawler Tractor	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	1.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crawler Tractor	0.05	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.58	2.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crawler Tractor	0.17	0.69	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.47	9.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator	0.16	0.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	8.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator	0.28	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.06	16.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator	0.29	1.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.11	16.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator	0.05	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	2.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Generator	0.02	0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.36	1.43	0.36	0.00	0.00	0.00	0.00	0.00	0.00
Grader	0.05	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.69	1.84	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rubber Tire Loader	0.05	0.14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	1.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scraper	0.08	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.97	1.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tractor/Loader/Backhoe	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.22	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tractor/Loader/Backhoe	0.05	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trencher	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grinder	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.19	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Off-Higway Truck	0.09	0.36	0.18	0.00	0.00	0.00	0.00	0.00	0.00	1.30	5.20	2.60	0.00	0.00	0.00	0.00	0.00	0.00
Off-Higway Truck	0.96	3.85	0.96	0.00	0.00	0.00	0.00	0.00	0.00	13.77	55.08	13.77	0.00	0.00	0.00	0.00	0.00	0.00
Excavator	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.43	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tractor/Loader/Backhoe	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tractor/Loader/Backhoe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Plate Compactor	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.52	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welder	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Construction Equipment	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.68	0.00	0.00	0.00	0.00	0.00	0.00	0.00
All Terrain Vehicle/MC	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL (Tons)	2.62	9.93	3.29	9.94	12.37	12.67	11.33	6.71	1.34	36.38	138.12	48.12	150.85	188.77	193.03	170.90	101.31	19.44
	0	0	1.33	7.53	9.46	9.64	8.69	4.52	0.40	0.00	0	19.57	113.57	143.57	146.30	130.88	68.53	5.32

Total construction sum
10 CFR 50 construction total

NOTES:
Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.
Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009.
EFss from NMIM/NONROAD08 have transient adjustment factors built in.
Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.
Age Factor = LF * cumulative hours / median life (where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes).
Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for disel engines and A is taken from Table A4 from source
Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.
Adjusted EF = EFss * TAF * DF (as stated in Note 2, EFss have TAFs built in)
Note 5: Annual VOC Emissions are calculated using the following calculation (1.053 * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)
1.053 is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015.
Note 6: Annual NOx Emissions are calculated using the following calculation (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-1b Diesel Non-Road Engine Emissions included in safety-related construction

Equipment category based on NONROAD classification	SCC ¹	Fuel Type	Engine Technology Type	Equipment Horsepower										BSFC ² lb/hp-hr	IEFss(g/hp-hr) ²		Load Factor ²	Age Factor ³	7AP ³		Deterioration factor ³		Adjusted EF (g/hp-hr) ⁴		
					2010 hrs	2011 hrs	2012 hrs	2013 hrs	2014 hrs	2015 hrs	2016 hrs	2017 hrs	2018 hrs		HC	NOx			HC	NOx	HC	NOx	HC	NOx	
Earthmoving																									
Crawler Tractor	2270002069	Diesel	T3	105	0	0	312	4992	5616	5616	5616	3588	625	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Crawler Tractor	2270002069	Diesel	T3	210	0	0	1404	7332	7800	7488	5304	3588	312	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Crawler Tractor	2270002069	Diesel	T3	307	0	0	1404	7332	7800	7488	3666	1092	0	0.371	0.17	2.61	0.59	1	0.027	0.008	1.027	1.008	0.175	2.631	
Excavator	2270002036	Diesel	T4	30	0	0	312	4056	4056	4056	2496	468	0	0.412	0.13	3	0.59	1	0.027	0.008	1.027	1.008	0.134	3.024	
Excavator	2270002036	Diesel	T3	268	0	0	936	6864	7488	7488	6084	936	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Excavator	2270002036	Diesel	T4	321	0	0	312	4056	4056	3744	2340	156	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520	
Excavator	2270002036	Diesel	T4	404	0	0	312	1872	1872	1872	1248	0	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crawler Tractor	2270002069	Diesel	T4	426	0	0	1310	2246	2246	2246	2246	1872	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520	
Grader	2270002048	Diesel	T3	135	0	0	1248	5865	5990	4992	2995	2995	1248	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	80	0	0	1497	5990	6739	6739	3739	1310	0	0.481	0.42	3.64	0.21	1	0.027	0.008	1.027	1.008	0.431	3.669	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	174	0	0	1684	8049	8049	6739	6739	1872	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054	
Skid Steer Loader	2270002072	Diesel	T4	75	0	0	312	4056	4056	3744	3744	624	0	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	199	0	0	312	5304	5616	5616	5616	312	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054	
Tractor/Loader/Backhoe	2270002066	Diesel	T4	349	0	0	312	4056	4056	3744	3744	312	0	0.433	0.13	2.5	0.21	1	0.027	0.008	1.027	1.008	0.134	2.520	
Tractor/Loader/Backhoe	2270002066	Diesel	T3	224	0	0	312	3900	5616	4524	3744	312	0	0.433	0.42	3.03	0.21	1	0.027	0.008	1.027	1.008	0.431	3.054	
Off-Highway Tractor	2270002075	Diesel	T3	115	0	0	748	5491	5990	5990	5616	374	0	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Compaction																									
Plate Compactor	2270002009	Diesel	T4	339	0	0	748	1555	2995	2995	2995	2496	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Plate Compactor	2270002009	Diesel	T3	185	0	0	2246	7488	7488	7488	6364	2745	0	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Cranes																									
Crane	2270002045	Diesel	T4	510	0	0	1497	5990	5990	5990	5990	0	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	340	0	0	1622	9734	9734	9734	9734	4056	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	330	0	0	0	17971	25958	22464	7488	0	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	340	0	0	811	7300	9734	9734	9734	6489	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	340	0	0	0	17035	24336	24336	24336	14601	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	600	0	0	811	4056	9734	9734	9734	6489	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	600	0	0	1662	9734	9734	9734	9734	4056	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T4	500	0	0	3744	20592	22464	22464	22464	16848	0	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520	
Crane	2270002045	Diesel	T3	152	0	0	1747	13104	15724	15724	15724	14851	1747	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	174	0	0	3493	9609	10483	10483	10483	10046	2184	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	215	0	0	3493	13104	31449	47174	48484	21403	2184	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	250	0	0	3493	9609	10483	10483	10483	9609	0	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Crane	2270002045	Diesel	T3	250	0	0	873	4368	10483	10483	10483	9172	1310	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Forklift																									
Forklift	2270003020	Diesel	T3	142	0	0	748	9734	13478	13478	13478	13104	5241	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Crane	2270002045	Diesel	T3	290	0	0	624	5616	7488	7488	7488	3744	2184	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520	
Forklift	2270003020	Diesel	T3	89	0	0	748	9734	13478	13478	13478	11232	0	0.412	0.19	3.13	0.59	1	0.027	0.008	1.027	1.008	0.195	3.155	
Forklift	2270003020	Diesel	T3	113	0	0	8424	33696	33696	33696	33696	15912	468	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Forklift	2270003020	Diesel	T3	110	0	0	7956	40248	44928	44928	44928	17784	2808	0.371	0.19	2.61	0.59	1	0.027	0.008	1.027	1.008	0.195	2.631	
Manlift/Scissorlifts																									
Aerial Lift	2270003010	Diesel	T4	28	0	0	0	748	17971	22464	22464	6552	0	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Aerial Lift	2270003010	Diesel	T4	65	0	0	0	374	11980	15724	15724	9360	0	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Aerial Lift	2270003010	Diesel	T4	48	0	0	0	2995	11232	11232	11232	10670	2246	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Aerial Lift	2270003010	Diesel	T4	48	0	0	0	1497	4492	4492	4492	4492	1123	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Aerial Lift	2270003010	Diesel	T4	78	0	0	0	0	3931	23774	33508	17305	1872	0.481	0.13	3	0.21	1	0.027	0.008	1.027	1.008	0.134	3.024	
Aerial Lift	2270003010	Diesel	T4	70	0	0	748	5616	6739	6739	6739	0	0	0.481	0.										

Table B-1b Diesel Non-Road Engine Emissions Inc

Equipment category based on NONROAD classification	VOC ⁵ tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	NOx ⁶ tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2010	2011	2012	2013	2014	2015	2016	2017	2018
Eartmoving																		
Crawler Tractor	0.00	0.00	0.00	0.07	0.08	0.08	0.08	0.05	0.01	0.00	0.00	0.06	0.90	1.01	1.01	1.01	0.64	0.11
Crawler Tractor	0.00	0.00	0.04	0.21	0.22	0.21	0.15	0.10	0.01	0.00	0.00	0.50	2.63	2.80	2.69	1.91	1.29	0.11
Crawler Tractor	0.00	0.00	0.05	0.27	0.29	0.27	0.13	0.04	0.00	0.00	0.00	0.74	3.85	4.10	3.93	1.93	0.57	0.00
Excavator	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.24	0.24	0.24	0.15	0.03	0.00
Excavator	0.00	0.00	0.03	0.25	0.27	0.27	0.22	0.03	0.00	0.00	0.00	0.43	3.15	3.43	3.43	2.79	0.43	0.00
Excavator	0.00	0.00	0.01	0.12	0.12	0.11	0.07	0.00	0.00	0.00	0.00	0.16	2.13	2.13	1.97	1.23	0.08	0.00
Excavator	0.00	0.00	0.01	0.07	0.07	0.07	0.05	0.00	0.00	0.00	0.00	0.21	1.24	1.24	1.24	0.83	0.00	0.00
Crawler Tractor	0.00	0.00	0.05	0.09	0.09	0.09	0.09	0.07	0.00	0.00	0.00	0.91	1.57	1.57	1.57	1.57	1.31	0.00
Grader	0.00	0.00	0.02	0.11	0.11	0.09	0.05	0.05	0.02	0.00	0.00	0.29	1.35	1.38	1.15	0.69	0.69	0.29
Tractor/Loader/Backhoe	0.00	0.00	0.01	0.05	0.06	0.06	0.03	0.01	0.00	0.00	0.00	0.10	0.41	0.46	0.46	0.25	0.09	0.00
Tractor/Loader/Backhoe	0.00	0.00	0.03	0.15	0.15	0.12	0.12	0.03	0.00	0.00	0.00	0.21	0.99	0.99	0.83	0.83	0.23	0.00
Skid Steer Loader	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.21	0.21	0.20	0.20	0.03	0.00
Tractor/Loader/Backhoe	0.00	0.00	0.01	0.11	0.12	0.12	0.12	0.01	0.00	0.00	0.00	0.04	0.75	0.79	0.79	0.79	0.04	0.00
Tractor/Loader/Backhoe	0.00	0.00	0.00	0.05	0.05	0.04	0.04	0.00	0.00	0.00	0.00	0.06	0.83	0.83	0.76	0.76	0.06	0.00
Tractor/Loader/Backhoe	0.00	0.00	0.01	0.09	0.13	0.11	0.09	0.01	0.00	0.00	0.00	0.05	0.62	0.89	0.72	0.59	0.05	0.00
Off-Highway Tractor	0.00	0.00	0.01	0.08	0.09	0.09	0.09	0.01	0.00	0.00	0.00	0.15	1.08	1.18	1.18	1.11	0.07	0.00
Compaction																		
Plate Compactor	0.00	0.00	0.02	0.04	0.07	0.07	0.07	0.06	0.00	0.00	0.00	0.30	0.63	1.21	1.21	1.21	1.01	0.00
Plate Compactor	0.00	0.00	0.04	0.13	0.13	0.13	0.11	0.05	0.00	0.00	0.00	0.50	1.65	1.65	1.65	1.41	0.61	0.00
Cranes																		
Crane	0.00	0.00	0.05	0.20	0.20	0.20	0.20	0.00	0.00	0.00	0.00	0.91	3.65	3.65	3.65	3.65	0.00	0.00
Crane	0.00	0.00	0.04	0.22	0.22	0.22	0.22	0.09	0.00	0.00	0.00	0.66	3.95	3.95	3.95	3.95	1.65	0.00
Crane	0.00	0.00	0.00	0.40	0.57	0.49	0.16	0.00	0.00	0.00	0.00	0.00	7.08	10.23	8.85	2.95	0.00	0.00
Crane	0.00	0.00	0.02	0.17	0.22	0.22	0.22	0.15	0.00	0.00	0.00	0.33	2.96	3.95	3.95	3.95	2.64	0.00
Crane	0.00	0.00	0.00	0.39	0.55	0.55	0.55	0.33	0.00	0.00	0.00	0.00	6.92	9.88	9.88	9.88	5.93	0.00
Crane	0.00	0.00	0.03	0.16	0.39	0.39	0.39	0.26	0.00	0.00	0.00	0.58	2.91	6.98	6.98	6.98	4.65	0.00
Crane	0.00	0.00	0.07	0.39	0.39	0.39	0.39	0.16	0.00	0.00	0.00	1.19	6.98	6.98	6.98	6.98	2.91	0.00
Crane	0.00	0.00	0.12	0.69	0.75	0.75	0.75	0.56	0.00	0.00	0.00	2.24	12.30	13.42	13.42	13.42	10.06	0.00
Crane	0.00	0.00	0.02	0.18	0.22	0.22	0.22	0.21	0.02	0.00	0.00	0.32	2.38	2.85	2.85	2.85	2.70	0.32
Crane	0.00	0.00	0.06	0.15	0.17	0.17	0.17	0.16	0.04	0.00	0.00	0.73	2.00	2.18	2.18	2.18	2.09	0.45
Crane	0.00	0.00	0.07	0.26	0.62	0.94	0.96	0.42	0.04	0.00	0.00	0.90	3.37	8.08	12.11	12.45	5.50	0.56
Crane	0.00	0.00	0.08	0.22	0.24	0.24	0.24	0.22	0.00	0.00	0.00	1.04	2.87	3.13	3.13	3.13	2.87	0.00
Crane	0.00	0.00	0.02	0.10	0.24	0.24	0.24	0.21	0.03	0.00	0.00	0.26	1.30	3.13	3.13	3.13	2.74	0.39
Forklift																		
Forklift	0.00	0.00	0.01	0.18	0.26	0.26	0.26	0.25	0.10	0.00	0.00	0.18	2.37	3.27	3.27	3.27	3.18	1.27
Crane	0.00	0.00	0.02	0.15	0.20	0.20	0.20	0.10	0.06	0.00	0.00	0.22	1.95	2.59	2.59	2.59	1.30	0.76
Forklift	0.00	0.00	0.01	0.12	0.16	0.16	0.16	0.13	0.00	0.00	0.00	0.14	1.78	2.46	2.46	2.46	2.05	0.00
Forklift	0.00	0.00	0.13	0.51	0.51	0.51	0.51	0.24	0.01	0.00	0.00	1.63	6.51	6.51	6.51	6.51	3.08	0.09
Forklift	0.00	0.00	0.12	0.59	0.66	0.66	0.66	0.26	0.04	0.00	0.00	1.50	7.58	8.46	8.46	8.46	3.35	0.53
Manlift / Scissorlifts																		
Aerial Lift	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.01	0.35	0.44	0.44	0.13	0.00
Aerial Lift	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.02	0.00	0.00	0.00	0.00	0.02	0.55	0.72	0.72	0.43	0.00
Aerial Lift	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.10	0.38	0.38	0.38	0.36	0.08
Aerial Lift	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.05	0.15	0.15	0.15	0.15	0.04
Aerial Lift	0.00	0.00	0.00	0.00	0.01	0.06	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.21	1.30	1.83	0.94	0.10
Aerial Lift	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.04	0.28	0.33	0.33	0.33	0.00	0.00
Aerial Lift	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.04	0.29	0.35	0.35	0.35	0.35	0.00
Aerial Lift	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.03
Aerial Lift	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.05	0.15	0.15	0.15	0.15	0.07
Welding Equipment																		
Welder	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.07	0.27	0.27	0.27	0.27	0.20	0.00
Welder	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.01	0.00	0.00	0.00	0.05	0.37	0.37	0.37	0.37	0.27	0.00
Welder	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.10	0.50	0.50	0.50	0.50	0.38	0.01
Concrete / Aggregate																		
Pump	0.00	0.00	0.00	0.02	0.04	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.33	0.85	0.66	0.24	0.00	0.00
Air Compressors																		
Air Compressor	0.00	0.00	0.08	0.12	0.14	0.14	0.14	0.14	0.06	0.00	0.00	0.90	1.43	1.68	1.68	1.68	1.65	0.73
Air Compressor	0.00	0.00	0.01	0.07	0.10	0.10	0.10	0.10	0.04	0.00	0.00	0.17	0.90	1.29	1.29	1.29	1.22	0.51
Air Compressor	0.00	0.00	0.02	0.21	0.29	0.29	0.29	0.28	0.11	0.00	0.00	0.20	2.66	3.69	3.69	3.69	3.59	1.43
Air Compressor	0.00	0.00	0.02	0.21	0.29	0.29	0.29	0.28	0.11	0.00	0.00	0.20	2.66	3.69	3.69	3.69	3.59	1.43
Air Compressor	0.00	0.00	0.01	0.12	0.16	0.16	0.16	0.16	0.07	0.00	0.00	0.23	2.08	2.77	2.77	2.77	2.77	1.16
Pipelaying / Trenching Equipment																		
Trencher	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.04	0.02	0.00	0.00	0.05	0.00
Class 25 Cable Laying/Pulling Equ.																		
Other Construction Equipment	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.15	0.27	0.27	0.27	0.27	0.04
Other Construction Equipment	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.15	0.27	0.27	0.27	0.27	0.04
Other Construction Equipment	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.15	0.27	0.27	0.27	0.27	0.04

Table B-1b Diesel Non-Road Engine Emissions included in safety-related construction

Winches and Tuggers																								
Other Construction Equipment	2270002081	Diesel	T4	140	0	0	0	0	2246	6739	6177	2246	0	0.371	0.13	2.5	0.59	1	0.027	0.008	1.027	1.008	0.134	2.520
Generation Equipment																								
Generator	2270006005	Diesel	T3	150	655	2620	4367	15069	15724	15724	15724	14414	5241	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520
Generator	2270006005	Diesel	T3	86	0	0	436	4804	5241	5241	5241	5241	3057	0.408	0.18	3	0.43	1	0.027	0.008	1.027	1.008	0.185	3.024
Generator	2270006005	Diesel	T4	345	0	0	0	4804	5241	5241	5241	5241	3057	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520
Generator	2270006005	Diesel	T4	200	0	0	0	6552	7862	7862	7862	7862	3712	0.367	0.13	2.5	0.43	1	0.027	0.008	1.027	1.008	0.134	2.520
Generator	2270006005	Diesel	T3	143	0	0	2839	12876	13104	13104	13104	13104	6115	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520
Generator	2270006005	Diesel	T3	143	0	0	873	8299	10483	10483	10483	10483	4804	0.367	0.18	2.5	0.43	1	0.027	0.008	1.027	1.008	0.185	2.520
Generator	2270006005	Diesel	T4	14	0	0	8798	52603	81806	83088	23328	37440	20592	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Small Capital Equipment																								
Plate Compactor	2270002009	Diesel	T4	8	0	0	10530	33696	33696	33693	33696	33696	11636	0.408	0.13	4.3	0.43	1	0.027	0.008	1.027	1.008	0.134	4.334
Plate Compactor	2270002009	Diesel	T4	15	0	0	2340	12636	16848	16848	16848	16848	7254	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Plate Compactor	2270002009	Diesel	T4	19	0	0	2808	16380	22464	22464	22464	21762	12870	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Generator	2270006005	Diesel	T4	11	0	0	5850	34866	49842	50544	50544	47502	19656	0.408	0.13	4.44	0.43	1	0.027	0.008	1.027	1.008	0.134	4.476
Pump	2270006010	Diesel	T4	7	0	0	468	5148	5616	5616	5616	5616	3276	0.408	0.5508	4.3	0.43	1	0.027	0.008	1.027	1.008	0.566	4.334
Pump	2270006010	Diesel	T4	15	0	0	468	5148	5616	5616	5616	5616	3276	0.408	0.438	4.4399	0.43	1	0.027	0.008	1.027	1.008	0.450	4.475
Concrete Saw	2270002039	Diesel	T4	65	0	0	702	7020	8424	8424	8424	8424	3978	0.412	0.13	3	0.59	1	0.027	0.008	1.027	1.008	0.134	3.024
Tamper/Rammer	2270002006	Diesel	T4	3	0	0	2808	14508	22464	22464	22464	19332	9360	0.408	0.13	4.3	0.43	1	0.027	0.008	1.027	1.008	0.134	4.334
Tamper/Rammer	2270002006	Diesel	T4	3	0	0	2808	14508	22464	22464	22464	19332	9360	0.408	0.13	4.3	0.43	1	0.027	0.008	1.027	1.008	0.134	4.334
Pump	2270006010	Diesel	T4	24	0	0	4914	16614	30654	39688	30888	30450	12402	0.408	0.438	4.4399	0.43	1	0.027	0.008	1.027	1.008	0.450	4.475
TOTAL (Tons)																								

NOTES:

Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.

Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009.

EFss from NMIM/NONROAD08 have transient adjustment factors built in.

Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.

Age Factor = LF * cumulative hours / median life (where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes).

Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for desel engines and A is taken from Table A4 from source

Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.

Adjusted EF = Efss * TAF * DF (as stated in Note 2, EFss have TAFs built in)

Note 5: Annual VOC Emissions are calculated using the following calculation (1.053 * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

1.053 is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015.

Note 6: Annual NOx Emissions are calculated using the following calculation (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-1b Diesel Non-Road Engine Emissions inc

Winches and Tuggers																			
Other Construction Equipment	0.00	0.00	0.00	0.00	0.03	0.09	0.08	0.03	0.00	0.00	0.00	0.00	0.52	1.55	1.42	0.52	0.00		
Generation Equipment																			
Generator	0.01	0.04	0.06	0.21	0.22	0.22	0.22	0.20	0.07	0.12	0.47	0.78	2.70	2.82	2.82	2.82	2.58	0.94	
Generator	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.02	0.00	0.00	0.05	0.59	0.65	0.65	0.65	0.65	0.38	
Generator	0.00	0.00	0.00	0.11	0.12	0.12	0.12	0.12	0.07	0.00	0.00	0.00	1.98	2.16	2.16	2.16	2.16	1.26	
Generator	0.00	0.00	0.00	0.09	0.10	0.10	0.10	0.10	0.05	0.00	0.00	0.00	1.57	1.88	1.88	1.88	1.88	0.89	
Generator	0.00	0.00	0.04	0.17	0.17	0.17	0.17	0.17	0.08	0.00	0.00	0.48	2.20	2.24	2.24	2.24	2.24	1.04	
Generator	0.00	0.00	0.01	0.11	0.14	0.14	0.14	0.14	0.06	0.00	0.00	0.15	1.42	1.79	1.79	1.79	1.79	0.82	
Generator	0.00	0.00	0.01	0.05	0.08	0.08	0.02	0.03	0.02	0.00	0.00	0.26	1.56	2.43	2.47	0.69	1.11	0.61	
Small Capital Equipment																			
Plate Compactor	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.01	0.00	0.00	0.17	0.55	0.55	0.55	0.55	0.55	0.19	
Plate Compactor	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.00	0.00	0.07	0.40	0.54	0.54	0.54	0.54	0.23	
Plate Compactor	0.00	0.00	0.00	0.02	0.03	0.03	0.03	0.03	0.02	0.00	0.00	0.11	0.66	0.91	0.91	0.91	0.88	0.52	
Generator	0.00	0.00	0.00	0.03	0.04	0.04	0.04	0.03	0.01	0.00	0.00	0.14	0.81	1.16	1.18	1.18	1.11	0.46	
Pump	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.07	0.08	0.08	0.08	0.08	0.05	
Pump	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.01	0.00	0.00	0.01	0.16	0.18	0.18	0.18	0.18	0.10	
Concrete Saw	0.00	0.00	0.00	0.04	0.05	0.05	0.05	0.05	0.02	0.00	0.00	0.09	0.90	1.08	1.08	1.08	1.08	0.51	
Tamper/Rammer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	0.14	0.14	0.14	0.12	0.06	
Tamper/Rammer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	0.14	0.14	0.14	0.12	0.06	
Pump	0.00	0.00	0.03	0.09	0.17	0.21	0.17	0.16	0.07	0.00	0.00	0.25	0.85	1.56	2.02	1.57	1.55	0.63	
TOTAL (Tons)	0.01	0.04	1.54	8.84	11.10	11.40	10.56	6.64	1.33	0.12	0.47	22.28	132.17	167.08	171.34	157.73	100.12	19.34	Total construction sum

NOTES:

Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.

Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009.

EFss from NMIM/NONROAD08 have transient adjustment factors built in.

Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.

Age Factor = LF * cumulative hours / median life (where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes).

Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for diesel engines and A is taken from Table A4 from source

Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.

Adjusted EF = EFss * TAF * DF (as stated in Note 2, EFss have TAFs built in)

Note 5: Annual VOC Emissions are calculated using the following calculation (1.053 * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

1.053 is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015.

Note 6: Annual NOx Emissions are calculated using the following calculation (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-2a Gasoline Non-Road Engine Emissions

Equipment category based on NONROAD classification	SCC ¹	Fuel Type	Engine Technology Type	Equipment Horsepower										BSFC ² lb/hp-hr	EFss (g/hp-hr) ²		Load Factor ²	Age Factor ³	"A" ³		Deterioration factor ³		Adjusted EF (g/hp-hr) ⁴	
					2010 hrs	2011 hrs	2012 hrs	2013 hrs	2014 hrs	2015 hrs	2016 hrs	2017 hrs	2018 hrs		HC	NOx			HC	NOx	HC	NOx	HC	NOx
Forklift	2265003020	Gasoline	G4GT252	52	0	0	3369	17596	22464	22464	22464	22089	9734	0.484	0.27	0.69	0.3	1	0.64	0.15	1.640	1.150	0.443	0.79
Aerial Lift	2265003010	Gasoline	G4GT252	75	0	0	0	1497	4492	4492	4492	4492	2995	0.484	0.27	0.69	0.46	1	0.64	0.15	1.640	1.150	0.443	0.79
Plate Compactor	2260002009	Gasoline	G4N2O2	7	0	0	4212	21762	30654	29688	30888	39520	12402	0.74	4.16	2.77	0.55	1	1.095	0	2.095	1.000	9	2.770
Chipper/Stump Grinder	2265004066	Gasoline	L4N1	11	0	0	468	2106	2106	2106	2106	1754	0	0.693	3.91	5.25	0.78	1	1.095	0	2.095	1.000	8	5.250
Lawn Mower	2265004011	Gasoline	G4N1O2	3	0	0	936	5616	5616	5616	5616	5616	3276	0.781	6.51	2.446	0.78	1	1.753	0	2.753	1.000	18	2.446
Cement & Mortar Mixer	2260002042	Gasoline	G4N2O2	13	0	0	936	7020	8424	8424	8424	8424	3978	0.74	4.16	2.77	0.33	1	1.095	0	2.095	1.000	9	2.770
Pump	2265006010	Gasoline	G4GT25	6	0	0	2808	16380	22464	22464	22464	19332	9360	0.605	3.85	8.43	0.69	1	1.095	0	2.095	1.000	8	8.430
Snowblower	2265004036	Gasoline	G4N2O	11	0	0	468	5148	5616	5616	5616	5616	3276	0.94	5.2	3.5	0.35	1	1.095	0	2.095	1.000	11	3.500
Cement & Mortar Mixer	2260002042	Gasoline	G4N2O2	6	0	0	6318	16146	16848	16848	11700	9360	0	0.74	4.16	2.77	0.33	1	1.095	0	2.095	1.000	9	2.770
Cement & Mortar Mixer	2260002042	Gasoline	G4N2O2	8	0	0	6318	16146	16848	16848	11700	9360	0	0.74	4.16	2.77	0.33	1	1.095	0	2.095	1.000	9	2.770
Concrete Equipment	2260002039	Gasoline	G4N1O2	3	0	0	5850	23868	33462	33696	33696	27378	0	0.921	6.13	2.446	0.63	1	1.753	0	2.753	1.000	17	2.446
Chain Saw	2260004021	Gasoline	G2H52	3	11700	35100	0	0	0	0	0	0	0	0.608	47.98	0.91	0.59	1	0.266	0	1.266	1.000	61	0.910
Roller	2265002015	Gasoline	G4N1O2	6	2340	9360	3900	0	0	0	0	0	0	0.781	6.51	2.446	0.62	1	1.095	0	2.095	1.000	14	2.446
Pump	2265006010	Gasoline	G4GT25	4	3120	12480	0	0	0	0	0	0	0	0.605	3.85	8.43	0.69	1	1.753	0	2.753	1.000	11	8.430
TOTAL (Tons)																								

NOTES:

- Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.
- Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009. Except forklift, aerial lift and cement/concrete equipment. EFss from NMIM/NONROAD08 have transient adjustment factors built in. Forklift, aerial lift, and concrete/cement equipment values are from Tables 1-7 of "Exhaust Emission Factors for Nonroad Engine Modeling: Spark-Ignition", December2005, EPA420-R-05R-019
- Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Nonroad Spark-Ignition Engine Emission Deterioration Factors", December 2005, EPA-420-R-05-023.
- Age Factor = LF * cumulative hours / median life (where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes).
- Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for 2-stroke engines =0.5 for 4-stroke engines and A is taken from Tables 1-7 from source
- Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.
- Adjusted EF = Efss * TAF * DF (as stated in Note 2, EFss have TAFs built in)
- Note 5: Annual VOC Emissions are calculated using the following calculation (VOC/HC * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)
- VOC/HR is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015. 0.933 for 4-stoke engines and 1.034 for 2-stroke engines
- Note 6: Annual NOx Emissions are calculated using the following calculation (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-2a Gasoline NorRoad Engine Emissions

Equipment category based on NONROAD classification	VOC ⁵ tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	NOx ⁶ tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2010	2011	2012	2013	2014	2015	2016*	2017	2018
Forklift	0.00	0.00	0.02	0.13	0.16	0.16	0.16	0.16	0.07	0.00	0.00	0.05	0.24	0.31	0.31	0.31	0.30	0.13
Aerial Lift	0.00	0.00	0.00	0.02	0.07	0.07	0.07	0.07	0.05	0.00	0.00	0.00	0.05	0.14	0.14	0.14	0.14	0.09
Plate Compactor	0.00	0.00	0.15	0.75	1.06	1.02	1.07	1.36	0.43	0.00	0.00	0.05	0.26	0.36	0.35	0.36	0.46	0.15
Chipper/Stump Grinder	0.00	0.00	0.03	0.15	0.15	0.15	0.15	0.13	0.00	0.00	0.00	0.02	0.10	0.10	0.10	0.10	0.09	0.00
Lawn Mower	0.00	0.00	0.04	0.24	0.24	0.24	0.24	0.24	0.14	0.00	0.00	0.01	0.04	0.04	0.04	0.04	0.04	0.02
Cement & Mortar Mixer	0.00	0.00	0.04	0.27	0.32	0.32	0.32	0.32	0.15	0.00	0.00	0.01	0.09	0.11	0.11	0.11	0.11	0.05
Pump	0.00	0.00	0.10	0.56	0.77	0.77	0.77	0.66	0.32	0.00	0.00	0.11	0.63	0.86	0.86	0.86	0.74	0.36
Snowblower	0.00	0.00	0.02	0.22	0.24	0.24	0.24	0.24	0.14	0.00	0.00	0.01	0.08	0.08	0.08	0.08	0.08	0.05
Cement & Mortar Mixer	0.00	0.00	0.11	0.29	0.30	0.30	0.21	0.17	0.00	0.00	0.00	0.04	0.10	0.10	0.10	0.07	0.06	0.00
Cement & Mortar Mixer	0.00	0.00	0.15	0.38	0.40	0.40	0.28	0.22	0.00	0.00	0.00	0.05	0.13	0.14	0.14	0.09	0.08	0.00
Concrete Equipment	0.00	0.00	0.19	0.78	1.10	1.11	1.11	0.90	0.00	0.00	0.00	0.03	0.12	0.17	0.17	0.17	0.14	0.00
Chain Saw	1.43	4.30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Roller	0.12	0.49	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.00
Pump	0.09	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TOTAL (Tons)	1.65	5.17	1.05	3.80	4.82	4.79	4.62	4.48	1.30	0.12	0.48	0.41	1.83	2.41	2.40	2.34	2.23	0.85
	0	0	0.02	0.15	0.23	0.23	0.23	0.23	0.12	0.00	0	0.05	0.29	0.44	0.44	0.44	0.44	0.22

Total construction sum
10 CFR 50 construction total

NOTES:

- Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.
- Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009. Except forklift, aerial lift and cement/concrete equipment. EFss from NMIM/NONROAD08 have transient adjustment factors built in. Forklift, aerial lift, and concrete/cement equipment values are from Tables 1-7 of "Exhaust Emission Factors for Nonroad Engine Modeling: Spark-Ignition", December2005, EPA420-R-05R-019
- Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Nonroad Spark-Ignition Engine Emission Deterioration Factors", December 2005, EPA-420-R-05-023.
- Age Factor = LF * cumulative hours / median life {where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes}.
- Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for 2-stroke engines =0.5 for 4-stroke engines and A is taken from Tables 1-7 from source
- Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.
- Adjusted EF = Efss * TAF * DF (as stated in Note 2, EFss have TAFs built in)
- Note 5: Annual VOC Emissions are calculated using the follow (VOC/HC * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)
- VOC/HR is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015. 0.933 for 4-stoke engines and 1.034 for 2-stroke engines
- Note 6: Annual NOx Emissions are calculated using the followi (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-2b Gasoline Non-Road Engine Emissions included in safety-related construction

Equipment category based on NONROAD classification	SCC ¹	Fuel Type	Engine Technology Type	Equipment Horsepower										BSFC ²	EFss (g/hp-hr) ²		Load Factor ²	Age Factor ³	"A" ³		Deterioration factor ³		Adjusted EF (g/hp-hr) ⁴	
					2010 hrs	2011 hrs	2012 hrs	2013 hrs	2014 hrs	2015 hrs	2016 hrs	2017 hrs	2018 hrs	lb/hp-hr	HC	NOx			HC	NOx	HC	NOx	HC	NOx
Forklift	2265003020	Gasoline	G4GT252	52	0	0	3369	17596	22464	22464	22464	22089	9734	0.484	0.27	0.69	0.3	1	0.64	0.15	1.640	1.150	0.443	0.79
Aerial Lift	2265003010	Gasoline	G4GT252	75	0	0	0	1497	4492	4492	4492	4492	2995	0.484	0.27	0.69	0.46	1	0.64	0.15	1.640	1.150	0.443	0.79
Plate Compactor	2260002009	Gasoline	G4N2O2	7	0	0	4212	21762	30654	29688	30888	39520	12402	0.74	4.16	2.77	0.55	1	1.095	0	2.095	1.000	9	2.770
Cement & Mortar Mixer	2260002042	Gasoline	G4N2O2	11	0	0	468	2106	2106	2106	2106	1754	0	0.74	4.16	2.77	0.33	1	1.095	0	2.095	1.000	9	2.770
Cement & Mortar Mixer	2260002042	Gasoline	G4N2O2	13	0	0	936	7020	8424	8424	8424	8424	3978	0.74	4.16	2.77	0.33	1	1.095	0	2.095	1.000	9	2.770
Pump	2265006010	Gasoline	G4GT25	6	0	0	2808	16380	22464	22464	22464	19332	9360	0.605	3.85	8.43	0.69	1	1.095	0	2.095	1.000	8	8.430
Cement & Mortar Mixer	2260002042	Gasoline	G4N2O2	6	0	0	6318	16146	16848	16848	11700	9360	0	0.74	4.16	2.77	0.33	1	1.095	0	2.095	1.000	9	2.770
Cement & Mortar Mixer	2260002042	Gasoline	G4N2O2	8	0	0	6318	16146	16848	16848	11700	9360	0	0.74	4.16	2.77	0.33	1	1.095	0	2.095	1.000	9	2.770
Concrete Equipment	2260002039	Gasoline	G4N1O2	3	0	0	5850	23868	33462	33696	33696	27378	0	0.921	6.13	2.446	0.63	1	1.753	0	2.753	1.000	17	2.446
TOTAL (Tons)																								

NOTES:

- Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.
- Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009. Except forklift, aerial lift and cement/concrete equipment.
- EFss from NMIM/NONROAD08 have transient adjustment factors built in.
- Forklift, aerial lift, and concrete/cement equipment values are from Tables 1-7 of "Exhaust Emission Factors for Nonroad Engine Modeling: Spark-Ignition", December2005, EPA420-R-05R-019
- Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Nonroad Spark-Ignition Engine Emission Deterioration Factors", December 2005, EPA-420-R-05-023.
- Age Factor = LF * cumulative hours / median life (where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes).
- Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for 2-stroke engines =0.5 for 4-stroke engines and A is taken from Tables 1-7 from source
- Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.
- Adjusted EF = Efss * TAF * DF (as stated in Note 2, EFss have TAFs built in)
- Note 5: Annual VOC Emissions are calculated using the following calculation (VOC/HC * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)
- VOC/HR is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015. 0.933 for 4-stoke engines and 1.034 for 2-stroke engines
- Note 6: Annual NOx Emissions are calculated using the following calculation (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-2b Gasoline NorRoad Engine Emissions

Equipment category based on NONROAD classification	VOC ⁵ tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	NOx ⁶ tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2010	2011	2012	2013	2014	2015	2016	2017	2018
Forklift	0.00	0.00	0.02	0.13	0.16	0.16	0.16	0.16	0.07	0.00	0.00	0.05	0.24	0.31	0.31	0.31	0.30	0.13
Aerial Lift	0.00	0.00	0.00	0.02	0.07	0.07	0.07	0.07	0.05	0.00	0.00	0.00	0.05	0.14	0.14	0.14	0.14	0.09
Plate Compactor	0.00	0.00	0.15	0.75	1.06	1.02	1.07	1.36	0.43	0.00	0.00	0.05	0.26	0.36	0.35	0.36	0.46	0.15
Cement & Mortar Mixer	0.00	0.00	0.02	0.07	0.07	0.07	0.07	0.06	0.00	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.00
Cement & Mortar Mixer	0.00	0.00	0.04	0.27	0.32	0.32	0.32	0.32	0.15	0.00	0.00	0.01	0.09	0.11	0.11	0.11	0.11	0.05
Pump	0.00	0.00	0.10	0.56	0.77	0.77	0.77	0.66	0.32	0.00	0.00	0.11	0.63	0.86	0.86	0.86	0.74	0.36
Cement & Mortar Mixer	0.00	0.00	0.11	0.29	0.30	0.30	0.21	0.17	0.00	0.00	0.00	0.04	0.10	0.10	0.10	0.07	0.06	0.00
Cement & Mortar Mixer	0.00	0.00	0.15	0.38	0.40	0.40	0.28	0.22	0.00	0.00	0.00	0.05	0.13	0.14	0.14	0.09	0.08	0.00
Concrete Equipment	0.00	0.00	0.19	0.78	1.10	1.11	1.11	0.90	0.00	0.00	0.00	0.03	0.12	0.17	0.17	0.17	0.14	0.00
TOTAL (Tons)	0.00	0.00	0.77	3.25	4.25	4.22	4.05	3.92	1.02	0.00	0.00	0.34	1.64	2.21	2.20	2.14	2.05	0.78

Total construction sum

NOTES:

- Note 1: SCC code based on Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling", April 2004, EPA-420-P-04-005.
- Note 2: Brake-specific fuel consumption, zero hour steady state emission factor (EFss; g/hp-hr), and load factor are from NMIM/NONROAD08 model factors dated April 5, 2009. Except forklift, aerial lift and cement/concrete equipment. EFss from NMIM/NONROAD08 have transient adjustment factors built in. Forklift, aerial lift, and concrete/cement equipment values are from Tables 1-7 of "Exhaust Emission Factors for Nonroad Engine Modeling: Spark-Ignition", December2005, EPA420-R-05R-019
- Note 3: Age factor and Deterioration factors calculated using Equation 4 from "Nonroad Spark-Ignition Engine Emission Deterioration Factors", December 2005, EPA-420-R-05-023.
- Age Factor = LF * cumulative hours / median life (where Age factor is capped at 1. For this calculation, age factor is assumed to be 1 for simplification purposes).
- Deterioration Factor = 1 + (A * Age Factor^b), where b = 1 for 2-stroke engines =0.5 for 4-stroke engines and A is taken from Tables 1-7 from source
- Note 4: Adjusted Emission Factors for HC and NOx are calculated using Equation 1 from, "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling - Compression-Ignition", April 2004, EPA-420-P-04-009.
- Adjusted EF = EFss * TAF * DF (as stated in Note 2, EFss have TAFs built in)
- Note 5: Annual VOC Emissions are calculated using the follow (VOC/HC * Adj. HC emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)
- VOC/HR is the ratio of VOC to HC from "Conversion Factors for Hydrocarbon Components", December 2005, EPA-420-P-05-015. 0.933 for 4-stoke engines and 1.034 for 2-stroke engines
- Note 6: Annual NOx Emissions are calculated using the followi (Adj. NOx emission factor (g/hp-hr) * horsepower * hours operated * load factor) / (2000 lb/ton * 453.6 g/lb)

Table B-3a On-Road Vehicle Emissions 2010

Vehicle Classification	Fuel Type	Vehicle Class	SCC	2010 Total operated	Avg.	Vehicular Miles Trav	Mobile 6.2 EFs (g/ml) ¹		2010 Emissions (tons) ²	
				hrs	mph	VMT	VOC	NOx	VOC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	0	30.0	0	0.737	0.568	0.00	0.00
Light Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	1404	20.0	28,080	0.785	0.731	0.02	0.02
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	0	20.0	0	0.785	0.731	0.00	0.00
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	0	20.0	0	1.421	1.375	0.00	0.00
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	0	20.0	0	1.421	1.375	0.00	0.00
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	0	20.0	0	1.363	1.07	0.00	0.00
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	0	20.0	0	1.421	1.375	0.00	0.00
Trucks - Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	15.0	0	0.411	7.776	0.00	0.00
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	0	15.0	0	0.168	2.664	0.00	0.00
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.324	5.169	0.00	0.00
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	0	15.0	0	0.168	2.664	0.00	0.00
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	0	15.0	0	0.168	2.664	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.493	9.388	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.493	9.388	0.00	0.00
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	0	15.0	0	0.168	2.664	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.493	9.388	0.00	0.00
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	0	15.0	0	0.402	6.444	0.00	0.00
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	0	2.0	0	0.252	4.043	0.00	0.00
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	936	20.0	18,720	2.587	2.725	0.05	0.06
Diesel Commercial Bus	Diesel	HDDBT	2230075	0	35.0	0	0.29	13.105	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	20.0	0	2.587	2.725	0.00	0.00
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.587	2.725	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	20.0	0	0.18	2.831	0.00	0.00
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.493	9.388	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.493	9.388	0.00	0.00
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.324	5.169	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	10.0	0	0.493	9.388	0.00	0.00
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	2340	25.0	58,500	0.18	2.831	0.01	0.18
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	2340	20.0	46,800	0.411	7.776	0.02	0.40
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	1560	25.0	39,000	0.18	2.831	0.01	0.12
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	11700	30.0	351,000	2.587	2.725	1.00	1.05
Summary of 2010 Onroad Emissions										
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-Distance miles	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/ml) ¹		2010 Emissions (tons) ²	
							VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	275	40.0	3432000	0.737	0.568	2.79	2.15
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	0	100.0	0	0.493	9.388	0.00	0.00
DC NA Area onroad vehicle total (direct & indirect)									3.91	3.99
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	69	20.0	430560	0.737	0.568	0.35	0.27
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	0	50.0	0	0.493	9.388	0.00	0.00
Baltimore NA Area onroad vehicle total									0.35	0.27

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation (VMT (miles) * Emission factor (g/ml)) / (2000 lb/ton * 453.6 g/lb)

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2010 Onroad Emissions			2010 Emissions (tons)	
			VOC	NOx
Total Onroad DC NA Area Emissions (Report in Table 3-1)			3.91	3.99
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)			0.35	0.27
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)			0.00	0.00

Table B-3b On-Road Vehicle Emissions 2011

Vehicle Classification	Fuel Type	Vehicle Class	SCC	2011 Total operated hrs	Avg. Speed mph	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/ml)		2011 Emissions (tons)	
							VOC	NOx	VOC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	0	30.0	0	0.743	0.571	0.00	0.00
Light Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	5616	20.0	112,320	0.827	0.715	0.10	0.09
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	0	20.0	0	0.827	0.715	0.00	0.00
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	0	20.0	0	1.488	1.182	0.00	0.00
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	0	20.0	0	1.488	1.182	0.00	0.00
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	0	20.0	0	1.488	1.182	0.00	0.00
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	0	20.0	0	1.488	1.182	0.00	0.00
Trucks - Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	15.0	0	0.39	6.593	0.00	0.00
Heavy-Duty Diesel Vehicle 2B	Diesel	HDDV2b	2230071	0	15.0	0	0.156	2.238	0.00	0.00
Heavy-Duty Diesel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.304	4.409	0.00	0.00
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	0	15.0	0	0.156	2.238	0.00	0.00
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	0	15.0	0	0.156	2.238	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.467	8.081	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.467	8.081	0.00	0.00
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	0	15.0	0	0.156	2.238	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.467	8.081	0.00	0.00
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	0	15.0	0	0.376	5.501	0.00	0.00
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	0	2.0	0	0.241	3.562	0.00	0.00
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	7488	20.0	149,760	2.595	2.727	0.43	0.45
Diesel Commercial Bus	Diesel	HDDBT	2230075	0	35.0	0	0.278	11.752	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	20.0	0	2.595	2.727	0.00	0.00
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.595	2.727	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	20.0	0	0.168	2.329	0.00	0.00
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.467	8.081	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.467	8.081	0.00	0.00
Heavy-Duty Diesel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.304	4.409	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	10.0	0	0.467	8.081	0.00	0.00
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	9360	25.0	234,000	0.168	2.329	0.04	0.60
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	9360	20.0	187,200	0.39	6.593	0.08	1.36
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	6240	25.0	156,000	0.168	2.329	0.03	0.40
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	46800	30.0	1,404,000	2.595	2.727	4.02	4.22
Dredging Equipment										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	18000	30.0	540,000	0.39	6.593	0.23	3.92
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	4320	45.0	194,400	1.488	1.182	0.32	0.25
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	4320	45.0	194,400	0.827	0.715	0.18	0.15
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	720	30.0	21,600	0.168	2.329	0.00	0.06

Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-trip Distance miles	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/ml) ¹		2010 Emissions (tons) ²	
							VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	1161	40.0	14489280	0.743	0.571	11.87	9.12
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	0	100.0	0	0.168	2.329	0.00	0.00
DC NA Area onroad vehicle total (direct & indirect)									17.30	20.63

Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	290	20.0	1809600	0.743	0.571	1.48	1.14
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	0	50.0	0	0.168	2.329	0.00	0.00
Baltimore NA Area onroad vehicle total									1.48	1.14

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation (VMT (miles) * Emission factor (g/ml)) / (2000 lb/ton * 453.6 g/lb)

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2011 Onroad Emissions			2011 Emissions (tons)	
			VOC	NOx
Total Onroad DC NA Area Emissions (Report in Table 3-1)			17.30	20.63
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)			1.48	1.14
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)			0.00	0.00

Table B-3c On-Road Vehicle Emissions 2012

Description	Fuel Type	Vehicle Class	SCC	2012 Total operated	Avg.	Vehicular Miles Trav	Mobile 6.2 EFs (g/ml)		2012 Emissions (tons)	
				hrs	mph	VMT	HC	NOx	HC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	811	30.0	24,330	0.612	0.47	0.02	0.01
Light Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	8892	20.0	177,840	0.666	0.611	0.13	0.12
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	3900	20.0	78,000	0.666	0.611	0.06	0.05
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	3432	20.0	68,640	1.243	1.234	0.09	0.09
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	2184	20.0	43,680	1.243	1.234	0.06	0.06
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	2340	20.0	46,800	1.187	0.961	0.06	0.05
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	2808	20.0	56,160	1.243	1.234	0.08	0.08
Trucks - Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	9546	15.0	143,190	0.36	5.588	0.06	0.88
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	1872	15.0	28,080	0.146	1.874	0.00	0.06
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	1123	15.0	16,845	0.282	3.754	0.01	0.07
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	1871	15.0	28,065	0.146	1.874	0.00	0.06
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	1497	15.0	22,455	0.146	1.874	0.00	0.05
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	2106	15.0	31,590	0.429	6.98	0.01	0.24
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	2106	15.0	31,590	0.429	6.98	0.01	0.24
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	1885	15.0	28,275	0.146	1.874	0.00	0.06
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	2246	15.0	33,690	0.429	6.98	0.02	0.26
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	2808	15.0	42,120	0.349	4.705	0.02	0.22
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072		2.0	0	0.232	3.132	0.00	0.00
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	9672	20.0	193,440	2.595	2.727	0.55	0.58
Diesel Commercial Bus	Diesel	HDDBT	2230075		35.0	0	0.264	10.469	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	5928	20.0	118,560	2.595	2.727	0.34	0.36
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	561	30.0	16,830	2.595	2.727	0.05	0.05
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	62	20.0	1,240	0.155	1.871	0.00	0.00
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	624	15.0	9,360	0.429	6.98	0.00	0.07
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	1560	15.0	23,400	0.429	6.98	0.01	0.18
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.282	3.754	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	37440	10.0	374,400	0.429	6.98	0.18	2.88
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	2340	25.0	58,500	0.155	1.871	0.01	0.12
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	2340	20.0	46,800	0.36	5.588	0.02	0.29
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	1560	25.0	39,000	0.155	1.871	0.01	0.08
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	11700	30.0	351,000	2.595	2.727	1.00	1.06
Summary of 2012 Onroad Emissions										
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-Distance miles	Vehicular Miles Trav. VMT	Mobile 6.2 EFs (g/ml) ¹		2010 Emissions (tons) ²	
							VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	2008	40.0	25059840	0.612	0.47	16.91	12.98
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	3930	100.0	393000	0.429	6.98	0.19	3.02
DC NA Area onroad vehicle total (direct & indirect)									19.90	24.28
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	502	20.0	3132480	0.612	0.47	2.11	1.62
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	1179	50.0	58950	0.429	6.98	0.03	0.45
Baltimore NA Area onroad vehicle total									2.14	2.08

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2012 Onroad Emissions		
	2012 Emissions (tons)	
	VOC	NOx
Total Onroad DC NA Area Emissions (Report in Table 3-1)	19.90	24.28
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)	2.14	2.08
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)	0.19	3.13

Table B-3d On-Road Vehicle Emissions 2013

Description	Fuel Type	Vehicle Class	SCC	2013 Total operated	Average Speed	Vehicular Miles Trav	Criteria Pollutants EFs (g/ml) ¹		2013 Emissions (tons)	
				hrs	mph	VMT	HC	NOx	HC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	1,497	30.0	44,910	0.563	0.428	0.03	0.02
Light-Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	9360	20.0	187,200	0.624	0.554	0.13	0.11
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	14040	20.0	280,800	0.624	0.554	0.19	0.17
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	14664	20.0	293,280	1.175	1.158	0.38	0.37
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	10296	20.0	205,920	1.175	1.158	0.27	0.26
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	3744	20.0	74,880	1.12	0.9	0.09	0.07
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	7956	20.0	159,120	1.175	1.158	0.21	0.20
Trucks-Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	15724	15.0	235,860	0.345	4.764	0.09	1.24
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	7862	15.0	117,930	-0.14	1.601	0.02	0.21
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	6177	15.0	92,655	0.268	3.237	0.03	0.33
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	7113	15.0	106,695	0.14	1.601	0.02	0.19
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	7113	15.0	106,695	0.14	1.601	0.02	0.19
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	7020	15.0	105,300	0.41	6.028	0.05	0.70
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	7020	15.0	105,300	0.41	6.028	0.05	0.70
Heavy-Duty Diesel Vehicle 2B	Diesel	LDDT12	2230060	4492	15.0	67,380	0.14	1.601	0.01	0.12
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	6240	15.0	93,600	0.41	6.028	0.04	0.62
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	12324	15.0	184,860	0.331	4.054	0.07	0.83
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	1684	2.0	3,368	0.225	2.792	0.00	0.01
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	35888	20.0	717,760	2.595	2.727	2.05	2.16
Diesel Commercial Bus	Diesel	HDDBT	2230075		35.0	0	0.258	9.26	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	16692	20.0	333,840	2.595	2.727	0.95	1.00
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	1591	30.0	47,730	2.595	2.727	0.14	0.14
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	374	20.0	7,480	0.148	1.556	0.00	0.01
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	936	15.0	14,040	0.41	6.028	0.01	0.09
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	3900	15.0	58,500	0.41	6.028	0.03	0.39
Heavy-Duty Diesel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.268	3.237	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	74880	10.0	748,800	0.41	6.028	0.34	4.98
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.148	1.556	0.00	0.00
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	20.0	0	0.345	4.764	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.148	1.556	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.595	2.727	0.00	0.00
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-Distance miles	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/ml) ¹		2010 Emissions (tons) ²	
							VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	2769	40.0	34557120	0.563	0.428	21.45	16.30
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	4400	100.0	440000	0.41	6.028	0.20	2.92
									26.84	34.35
DC NA Area onroad vehicle total (direct & indirect)										
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	692	20.0	4318080	0.563	0.428	2.68	2.04
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	1320	50.0	66000	0.41	6.028	0.03	0.44
									2.71	2.48
Baltimore NA Area onroad vehicle total										

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2013 Onroad Emissions			
		2013 Emissions (tons)	
		VOC	NOx
Total Onroad DC NA Area Emissions (Report in Table 3-1)		26.84	34.35
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)		2.71	2.48
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)		0.37	5.46

Table B-3e On-Road Vehicle Emissions 2014

Description	Fuel Type	Vehicle Class	SCC	2014 Total operated	Average Speed	Vehicular Miles/Trav.	Criteria Pollutants EFs (g/mi)		2014 Emissions (tons)	
				hrs	mph	VMT	HC	NOx	HC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	1,497	30.0	44,910	0.52	0.391	0.03	0.02
Light-Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	9360	20.0	187,200	0.590	0.507	0.12	0.10
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	14976	20.0	299,520	0.590	0.507	0.19	0.17
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	14976	20.0	299,520	1.113	1.092	0.37	0.36
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	11232	20.0	224,640	1.113	1.092	0.28	0.27
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	3744	20.0	74,880	1.06	0.848	0.09	0.07
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	9360	20.0	187,200	1.113	1.092	0.23	0.23
Trucks - Heavy-Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	15724	15.0	235,860	0.332	3.998	0.09	1.04
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	11232	15.0	168,480	0.133	1.384	0.02	0.26
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	8985	15.0	134,775	0.254	2.774	0.04	0.41
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	11232	15.0	168,480	0.133	1.384	0.02	0.26
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	8985	15.0	134,775	0.133	1.384	0.02	0.21
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8424	15.0	126,360	0.392	5.122	0.05	0.71
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8424	15.0	126,360	0.392	5.122	0.05	0.71
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	4492	15.0	67,380	0.133	1.384	0.01	0.10
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8985	15.0	134,775	0.392	5.122	0.06	0.76
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	12048	15.0	180,720	0.312	3.454	0.06	0.69
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	4492	2.0	8,984	0.213	2.491	0.00	0.02
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	53352	20.0	1,067,040	2.595	2.727	3.05	3.21
Diesel Commercial Bus	Diesel	HDDBT	2230075	28080	35.0	982,800	0.253	8.118	0.27	8.79
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	18720	20.0	374,400	2.595	2.727	1.07	1.13
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	2246	30.0	67,380	2.595	2.727	0.19	0.20
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	374	20.0	7,480	0.142	1.309	0.00	0.01
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	936	15.0	14,040	0.392	5.122	0.01	0.08
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	4212	15.0	63,180	0.392	5.122	0.03	0.36
Heavy-Duty Diesel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.254	2.774	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	74880	10.0	748,800	0.392	5.122	0.32	4.23
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.142	1.309	0.00	0.00
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	20.0	0	0.332	3.998	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.142	1.309	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.595	2.727	0.00	0.00
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round- Distance	Vehicular Miles/Trav.	Mobile 6.2 EFs (g/mi)		2010 Emissions (tons) ³	
					miles		VMT	VOC	NOx	VOC
Employee Commute/Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	3167	40.0	39524160	0.52	0.391	22.66	17.04
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	2940	100.0	294000	0.392	5.122	0.13	1.66
DC NA Area onroad vehicle total (direct & indirect)									29.47	43.09
Employee Commute/Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	792	20.0	4942080	0.52	0.391	2.83	2.13
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	882	50.0	44100	0.392	5.122	0.02	0.25
Baltimore NA Area onroad vehicle total									2.85	2.38

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2014 Onroad Emissions		
	2014 Emissions (tons)	
	VOC	NOx
Total Onroad DC NA Area Emissions (Reported in Table 3-1)	29.47	43.09
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)	2.85	2.38
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)	0.36	4.66

Table B-3f On-Road Vehicle Emissions 2015

Description	Fuel Type	Vehicle Class	SCC	2015 Total operated	Average Speed	Vehicular Miles Trav	Criteria Pollutants EFs (g/ml) ¹		2015 Emissions (tons)	
				hrs	mph	VMT	HC	NOx	HC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	1,497	30.0	44,910	0.483	0.359	0.02	0.02
Light Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	9360	20.0	187,200	0.561	0.468	0.12	0.10
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	16848	20.0	336,960	0.561	0.468	0.21	0.17
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	14976	20.0	299,520	1.056	1.033	0.35	0.34
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	11232	20.0	224,640	1.056	1.033	0.26	0.26
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	3744	20.0	74,880	1.004	0.802	0.08	0.07
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	9360	20.0	187,200	1.056	1.033	0.22	0.21
Trucks -Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	15724	15.0	235,860	0.316	3.425	0.08	0.89
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	11232	15.0	168,480	0.128	1.188	0.02	0.22
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	8985	15.0	134,775	0.241	2.397	0.04	0.36
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	11232	15.0	168,480	0.128	1.188	0.02	0.22
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	8985	15.0	134,775	0.128	1.188	0.02	0.18
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8424	15.0	126,360	0.37	4.455	0.05	0.62
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8424	15.0	126,360	0.37	4.455	0.05	0.62
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	4922	15.0	73,830	0.128	1.188	0.01	0.10
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8985	15.0	134,775	0.37	4.455	0.05	0.66
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	12048	15.0	180,720	0.297	2.983	0.06	0.59
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	4492	2.0	8,984	0.204	2.183	0.00	0.02
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	56160	20.0	1,123,200	2.595	2.727	3.21	3.38
Diesel Commercial Bus	Diesel	HDDBT	2230075	40524	35.0	1,418,340	0.25	7.082	0.39	11.07
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	18720	20.0	374,400	2.595	2.727	1.07	1.13
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	2246	30.0	67,380	2.595	2.727	0.19	0.20
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	374	20.0	7,480	0.137	1.095	0.00	0.01
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.37	4.455	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	5616	15.0	84,240	0.37	4.455	0.03	0.41
Heavy-Duty Diesel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.241	2.397	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	74880	10.0	748,800	0.37	4.455	0.31	3.68
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.137	1.095	0.00	0.00
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	20.0	0	0.316	3.425	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.137	1.095	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.595	2.727	0.00	0.00
Summary of 2015 Onroad Emissions										
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-Distance miles	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/ml) ¹		2010 Emissions (tons) ²	
							VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	2838	40.0	35418240	0.483	0.359	18.86	14.02
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	500	100.0	50000	0.37	4.455	0.02	0.25
DC NA Area onroad vehicle total (direct & indirect)									25.76	39.78
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	710	20.0	4430400	0.483	0.359	2.36	1.75
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	150	50.0	7500	0.37	4.455	0.00	0.04
Baltimore NA Area onroad vehicle total									2.36	1.79

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2015 Onroad Emissions		
	2015 Emissions (tons)	
	VOC	NOx
Total Onroad DC NA Area Emissions(Report in Table 3-1)	25.76	39.78
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)	2.36	1.79
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)	0.34	4.09

Table B-3g On-Road Vehicle Emissions 2016

Description	Fuel Type	Vehicle Class	SCC	2016 Total operated	Average Speed	Vehicular Miles Trav	Criteria Pollutants EFs (g/ml) ¹		2016 Emissions (tons)	
				hrs	mph	VMT	HC	NOx	HC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	1,497	30.0	44,910	0.453	0.33	0.02	0.02
Light Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	9360	20.0	187,200	0.536	0.431	0.11	0.09
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	18720	20.0	374,400	0.536	0.431	0.22	0.18
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	14976	20.0	299,520	0.997	0.97	0.33	0.32
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	11232	20.0	224,640	0.997	0.97	0.25	0.24
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	3744	20.0	74,880	0.947	0.752	0.08	0.06
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	7800	20.0	156,000	0.997	0.97	0.17	0.17
Trucks -Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	15537	15.0	233,055	0.308	2.973	0.08	0.76
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	11232	15.0	168,480	0.124	1.019	0.02	0.19
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	8985	15.0	134,775	0.232	2.073	0.03	0.31
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	11232	15.0	168,480	0.124	1.019	0.02	0.19
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	8985	15.0	134,775	0.124	1.019	0.02	0.15
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8424	15.0	126,360	0.359	3.942	0.05	0.55
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8424	15.0	126,360	0.359	3.942	0.05	0.55
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	4922	15.0	73,830	0.124	1.019	0.01	0.08
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8985	15.0	134,775	0.359	3.942	0.05	0.59
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	12048	15.0	180,720	0.286	2.587	0.06	0.52
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	2620	2.0	5,240	0.198	1.957	0.00	0.01
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	56160	20.0	1,123,200	2.595	2.727	3.21	3.38
Diesel Commercial Bus	Diesel	HDDBT	2230075	23712	35.0	829,920	0.247	6.117	0.23	5.60
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	18720	20.0	374,400	2.595	2.727	1.07	1.13
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	2246	30.0	67,380	2.595	2.727	0.19	0.20
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	374	20.0	7,480	0.133	0.927	0.00	0.01
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.359	3.942	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	1482	15.0	22,230	0.359	3.942	0.01	0.10
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.232	2.073	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	74880	10.0	748,800	0.359	3.942	0.30	3.25
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.133	0.927	0.00	0.00
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	20.0	0	0.308	2.973	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.133	0.927	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.595	2.727	0.00	0.00
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-Distance	Vehicular Miles Trav	Mobile 6.2 EFs (g/ml) ¹		2010 Emissions (tons) ²	
					miles	VMT	VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	2352	40.0	29352960	0.453	0.33	14.66	10.68
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	70	100.0	7000	0.359	3.942	0.00	0.03
DC NA Area onroad vehicle total (direct & indirect)									21.25	29.33
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	588	20.0	3669120	0.453	0.33	1.83	1.33
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	21	50.0	1050	0.359	3.942	0.00	0.00
Baltimore NA Area onroad vehicle total									1.83	1.34

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2016 Onroad Emissions			
		2016 Emissions (tons)	
		VOC	NOx
Total Onroad DC NA Area Emissions(Report in Table 3-1)		21.25	29.33
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)		1.83	1.34
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)		0.31	3.35

Table B-3h On-Road Vehicle Emissions 2017

Description	Fuel Type	Vehicle Class	SCC	2017 Total operated	Average Speed	Vehicular Miles Trav	Criteria Pollutants EFs (g/mi) ¹		2017 Emissions (tons)	
				hrs	mph	VMT	HC	NOx	HC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	1,497	30.0	44,910	0.428	0.306	0.02	0.02
Light Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	9360	20.0	187,200	0.514	0.404	0.11	0.08
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	17940	20.0	358,800	0.514	0.404	0.20	0.16
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	14976	20.0	299,520	0.946	0.92	0.31	0.30
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	6864	20.0	137,280	0.946	0.92	0.14	0.14
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	3744	20.0	74,880	0.896	0.712	0.07	0.06
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	4992	20.0	99,840	0.946	0.92	0.10	0.10
Trucks -Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	10296	15.0	154,440	0.301	2.578	0.05	0.44
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	11044	15.0	165,660	0.121	0.891	0.02	0.16
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	7300	15.0	109,500	0.225	1.817	0.03	0.22
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	7862	15.0	117,930	0.121	0.891	0.02	0.12
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	5616	15.0	84,240	0.121	0.891	0.01	0.08
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	8424	15.0	126,360	0.349	3.401	0.05	0.47
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	5616	15.0	84,240	0.349	3.401	0.03	0.32
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	4922	15.0	73,830	0.121	0.891	0.01	0.07
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	7826	15.0	117,390	0.349	3.401	0.05	0.44
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	14976	15.0	224,640	0.278	2.261	0.07	0.56
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	748	2.0	1,496	0.193	1.757	0.00	0.00
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	26208	20.0	524,160	2.595	2.727	1.50	1.58
Diesel Commercial Bus	Diesel	HDDBT	2230075	19344	35.0	677,040	0.24	5.21	0.18	3.89
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	6240	20.0	124,800	2.595	2.727	0.36	0.38
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	2246	30.0	67,380	2.595	2.727	0.19	0.20
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	374	20.0	7,480	0.131	0.794	0.00	0.01
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.349	3.401	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.349	3.401	0.00	0.00
Heavy-Duty Diesel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.225	1.817	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	10.0	0	0.349	3.401	0.00	0.00
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.131	0.794	0.00	0.00
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	20.0	0	0.301	2.578	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.131	0.794	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.595	2.727	0.00	0.00
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-Distance miles	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/mi) ¹		2010 Emissions (tons) ²	
							VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	1108	40.0	13827840	0.428	0.306	6.52	4.66
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	0	100.0	0	0.349	3.401	0.00	0.00
DC NA Area onroad vehicle total (direct & indirect)									10.05	14.46
Employee Comimute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	277	20.0	1728480	0.428	0.306	0.82	0.58
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	0	50.0	0	0.349	3.401	0.00	0.00
Baltimore NA Area onroad vehicle total									0.82	0.58

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2017 Onroad Emissions		
	2017 Emissions (tons)	
	VOC	NOx
Total Onroad DC NA Area Emissions (Report in Table 3-1)	10.05	14.46
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)	0.82	0.58
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)	0.00	0.00

Table B-31 On-Road Vehicle Emissions 2018

Description	Fuel Type	Vehicle Class	SCC	2018 operating hrs	Average Speed mph	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/mi) ¹		2018 Emissions (tons)	
							HC	NOx	HC	NOx
Automotive										
Light-Duty Gasoline Vehicle	Gasoline	LDGV	2201011	1,372	30.0	41,160	0.407	0.285	0.02	0.01
Light Duty										
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	8580	20.0	171,600	0.494	0.381	0.09	0.07
Light-Duty Gasoline Truck 2	Gasoline	LDGT2	2201020	7800	20.0	156,000	0.494	0.381	0.08	0.07
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	7488	20.0	149,760	0.891	0.866	0.15	0.14
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	0	20.0	0	0.891	0.866	0.00	0.00
Light-Duty Gasoline Truck 3	Gasoline	LDGT3	2201040	3432	20.0	68,640	0.843	0.669	0.06	0.05
Light-Duty Gasoline Truck 4	Gasoline	LDGT4	2201040	2184	20.0	43,680	0.891	0.866	0.04	0.04
Trucks -Heavy Duty										
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	5990	15.0	89,850	0.295	2.183	0.03	0.22
Heavy-Duty Deisel Vehicle 2B	Diesel	HDDV2b	2230071	4492	15.0	67,380	0.115	0.754	0.01	0.06
Heavy-Duty Diesel Vehicle 6	Diesel	HDDV6	2230073	1872	15.0	28,080	0.217	1.577	0.01	0.05
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	3556	15.0	53,340	0.115	0.754	0.01	0.04
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	1497	15.0	22,455	0.115	0.754	0.00	0.02
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	3978	15.0	59,670	0.341	2.843	0.02	0.19
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	1872	15.0	28,080	0.341	2.843	0.01	0.09
Heavy-Duty Deisel Vehicle 2B	Diesel	LDDT12	2230060	1872	15.0	28,080	0.115	0.754	0.00	0.02
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	2620	15.0	39,300	0.341	2.843	0.01	0.12
Heavy-Duty Diesel Vehicle 7	Diesel	HDDV7	2230073	2808	15.0	42,120	0.268	1.968	0.01	0.09
Trailers										
Heavy-Duty Diesel Vehicle 5	Diesel	HDDV5	2230072	0	2.0	0	0.181	1.533	0.00	0.00
Personnel Carrier										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	12792	20.0	255,840	2.595	2.727	0.73	0.77
Diesel Commercial Bus	Diesel	HDDBT	2230075	2808	35.0	98,280	0.236	4.41	0.03	0.48
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	20.0	0	2.595	2.727	0.00	0.00
Emergency Vehicles										
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	842	30.0	25,260	2.595	2.727	0.07	0.08
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	218	20.0	4,360	0.127	0.682	0.00	0.00
Concrete / Aggregate										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.341	2.843	0.00	0.00
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	15.0	0	0.341	2.843	0.00	0.00
Heavy-Duty Deisel Vehicle 6	Diesel	HDDV6	2230073	0	15.0	0	0.217	1.577	0.00	0.00
Concrete Batch Plant										
Heavy-Duty Diesel Vehicle 8B	Diesel	HDDV8b	2230074	0	10.0	0	0.341	2.843	0.00	0.00
Site Preparation										
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.127	0.682	0.00	0.00
Heavy-Duty Diesel Vehicle 8A	Diesel	HDDV8a	2230074	0	20.0	0	0.295	2.183	0.00	0.00
Heavy-Duty Diesel Vehicle 3	Diesel	HDDV3	2230072	0	25.0	0	0.127	0.682	0.00	0.00
Light-Duty Diesel Truck 1 and 2	Diesel	LDDT12	2230060	0	30.0	0	2.595	2.727	0.00	0.00
Description	Fuel Type	Vehicle Class	SCC	Number of Vehicles ³	Round-Distance miles	Vehicular Miles Trav VMT	Mobile 6.2 EFs (g/mi) ¹		2010 Emissions (tons) ²	
							VOC	NOx	VOC	NOx
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in DC NA Area	Gasoline	LDGV	2201011	379	40.0	4729920	0.407	0.285	2.12	1.49
Heavy-Duty Diesel Vehicle 8B in DC NA Area	Diesel	HDDV8b	2230074	0	100.0	0	0.341	2.843	0.00	0.00
DC NA Area onroad vehicle total (direct & indirect)									3.52	4.09
Employee Commute/ Delivery										
Light-Duty Gasoline Vehicle in Balt. NA Area	Gasoline	LDGV	2201011	95	20.0	592800	0.407	0.285	0.27	0.19
Heavy-Duty Diesel Vehicle 8B in Balt. NA Area	Diesel	HDDV8b	2230074	0	50.0	0	0.341	2.843	0.00	0.00
Baltimore NA Area onroad vehicle total									0.27	0.19

Notes

Note 1: U.S. Environmental Protection Agency "Mobile Source Emission Factor Model". Values generated by simulating the model at the project conditions

Note 2: Annual Emissions are calculated using the following calculation

Note 3: Number of vehicles is daily vehicles for employee commuting and annual number of trips for commercial deliveries

Summary of 2018 Onroad Emissions			
		2018 Emissions (tons)	
		VOC	NOx
Total Onroad DC NA Area Emissions (Report in Table 3-1)		3.52	4.09
Baltimore Onroad NA Area Emissions (Reported in Table 3-2)		0.27	0.19
Onroad DC NA Area Construction Emissions (Reported in Table 3-3)		0.00	0.00

Table B-4 Marine Engine Emissions

Description	Fuel Type	Equipment Horsepower hp							Load Factor ¹	Emission Factor (g/kW-hr) ²		Correction Factor ³		VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons
			2011 hrs	2012 hrs	2013 hrs	2014 hrs	2015 hrs	2016 hrs		HC (voc)	NOx	HC	NOx	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016
Barge - in DC-MD-VA nonattainment area	Diesel	2400	0	135	135	135	135	135	0.79	0.50	9.8	1.00	1.00	0.00	0.11	0.11	0.11	0.11	0.11	0.00	2.06	2.06	2.06	2.06	2.06
Barge Auxiliary - in DC-MD-VA NA area	Diesel	205	0	135	135	135	135	135	0.56	0.27	6.8	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09	0.09	0.09
TugBoat - for degding activity	Diesel	1200	720	0	0	0	0	0	0.79	0.50	9.8	1.00	1.00	0.28	0.00	0.00	0.00	0.00	0.00	5.50	0.00	0.00	0.00	0.00	0.00
TugBoat Auxiliary - for dredging activity	Diesel	100	720	0	0	0	0	0	0.56	0.27	6.8	1.00	1.00	0.01	0.00	0.00	0.00	0.00	0.00	0.23	0.00	0.00	0.00	0.00	0.00
18' Boat - for dredging activity	Gasoline	225	720	0	0	0	0	0	0.79	0.50	9.8	1.00	1.00	0.05	0.00	0.00	0.00	0.00	0.00	1.03	0.00	0.00	0.00	0.00	0.00
										TOTAL DC area(Tons)				0.34	0.11	0.11	0.11	0.11	0.11	6.75	2.15	2.15	2.15	2.15	2.15

Description	Fuel Type	Equipment Horsepower hp							Load Factor ¹	Emission Factor (g/kW-hr) ²		Correction Factor ³		VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	VOC tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons	NOx tons
			2011 hrs	2012 hrs	2013 hrs	2014 hrs	2015 hrs	2016 hrs		HC (voc)	NOx	HC	NOx	2011	2012	2013	2014	2015	2016	2011	2012	2013	2014	2015	2016
Barge - in Baltimore nonattainment area	Diesel	2400	0	430	430	430	430	430	0.79	0.50	9.8	1.00	1.00	0.00	0.34	0.34	0.34	0.34	0.34	0.00	6.57	6.57	6.57	6.57	6.57
Barge Auxiliary - in Baltimore NA area	Diesel	205	0	430	430	430	430	430	0.56	0.27	6.8	1.00	1.00	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.28	0.28	0.28	0.28	0.28
										TOTAL Baltimore area(Tons)				0.00	0.35	0.35	0.35	0.35	0.35	0.00	6.84	6.84	6.84	6.84	6.84

NOTES:

Note 1: EPA Load Factors for Harbor Crafts from Table 3-3 of "USEPA Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report" April 2009

Note 2: Harbor Craft Emission Factors from Table 3-8 of "USEPA Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report" April 2009

Note 3: Harbor Craft Fuel Correction Factors from Offroad Diesel Fuel from Table 3-9 of "USEPA Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report" April 2009

Note 4: Annual Emissions are calculated using the following equation from Section 3.0 Harbor Craft of "USEPA Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories Final Report" April 2009
(Emission factor (g/kW-hr) * horsepower * hours operated * load factor*correction factor) / (1.341 hp-hr/kWh*2000 lb/ton * 453.59 g/lb)

Table B-5 Boiler Emissions

	2010 hrs	2011 hrs	2012 hrs	2013 hrs	2014 hrs	2015 hrs	2016 hrs	2017 hrs	2018 hrs
Concrete Batch Plant									
Auxiliary Oil-fired Boiler	0	0	1040	3120	3120	3120	2080	0	0
NOx emissions (tons)	0	0	1.54	4.62	4.62	4.62	3.08	0	0
VOC emissions (tons)	0	0	0.02	0.05	0.05	0.05	0.03	0	0

Boiler Heat Input Rating 20 MMBtu/hr (assumed)
 Typical Distillate Oil HHV 0.135 MMBtu/gallon

NOx emission factor 20 lb/1,000 gallons AP-42 Section 1.3 9/98, Table 1.3-1
 VOC emission factor 0.2 lb/1,000 gallons AP-42 Section 1.3 9/98, Table 1.3-3