The Detroit Edison Company
One Energy Plaza, Detroit, MI 48226-1279

DTE Energy
Detroit Edison

10 CFR 51.45
10 CFR 52.77

June 21, 2012
NRC3-12-0015

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555-0001

References: 1) Fermi 3
Docket No. 52-033
2) Letter from Bruce Olson (USNRC) to Jack M. Davis (Detroit Edison), "Request for Additional Information Letter No. 75 Related to the U.S. Nuclear Regulatory Commission's Air Conformity Requirements Associated with the Fermi, Unit 3 Combined License Application," dated May 7, 2012

Subject: Detroit Edison Company Response to NRC Request for Additional Information Letter No. 75

In Reference 2, the NRC requested additional information to support the review of certain portions of the Fermi 3 Combined License Application (COLA). As discussed with the NRC Fermi 3 Environmental Project Manager, the response to the RAI of Reference 2 is to be provided no later than June 22nd, 2012. The response to the Request for Additional Information (RAI) in Reference 2, concerning air conformity requirements, is provided as Attachment 1 to this letter.

If you have any questions, or need additional information, please contact me at (313) 235-3341.

I state under penalty of perjury that the foregoing is true and correct. Executed on the 21st day of June 2012.

Sincerely,

Peter W. Smith, Director
Nuclear Development – Licensing and Engineering
Detroit Edison Company

D095
NRO

Attachment: 1) Response to RAI Letter No. 75 (Question No. EIS 2.9)

cc: Bruce Olson, NRC Fermi 3 Environmental Project Manager
Jerry Hale, NRC Fermi 3 Project Manager (w/o attachments)
Adrian Muniz, NRC Fermi 3 Project Manager (w/o attachments)
Michael Eudy, NRC Fermi 3 Project Manager (w/o attachments)
Fermi 2 Resident Inspector (w/o attachments)
NRC Region III Regional Administrator (w/o attachments)
NRC Region II Regional Administrator (w/o attachments)
Supervisor, Electric Operators, Michigan Public Service Commission (w/o attachments)
Michigan Department of Natural Resources and Environment
Radiological Protection Section (w/o attachments)

Attachment 1

NRC3-12-0015

Response to RAI Letter No. 75

RAI Question No. EIS 2.9
(eRAI Tracking No. 6356)

(15 pages)

NRC RAI EIS 2.9

This request for additional information (RAI) refers to the Conformity Applicability Analysis contained in Attachment 1 to Detroit Edison Company (Detroit Edison) letter NRC3-11-0008 (ML110670232) dated March 4, 2011, and the response to an air quality question contained in Attachment 2 to Detroit Edison letter NRC-11-0023 (ML11192A190), dated July 7, 2011.

a) *The emissions inventory used to develop the U.S. Nuclear Regulatory Commission (NRC)-authorized construction emissions presented in NRC3-11-0008 include emissions from a Switchback Locomotive engine. Using the information contained in the Detroit Edison emissions inventory, the staff estimates that the total NOx emissions from this engine are 45.3 tons per year for the years 2013, 2014, and 2015. This one engine represents, on average, approximately 40 percent of the total NOx emissions from preconstruction and NRC-authorized construction activities during the years 2013 through 2015.*

   i. *Please explain how this engine will be used; for example, will it be used to transport materials to the site or around the site?*

   ii. *What is the basis for assuming 300 hours of engine operation per month?*

   iii. *The NOx emission factor used for the Switchback Locomotive engine emission calculation is 8.60 g/hp-hr which corresponds to the Tier 0 emission factors for line-haul operation presented in Table 1 of EPA-420-F-09-025, "Emission Factors for Locomotives" (April 2009). However, it appears that the duty cycle for this locomotive may more appropriately approximate low power cycle operation in a switchyard. In this case, the Tier 0 NOx emission factor of 12.60 g/hp-hr for switchyard operation presented in Table 2 of EPA- 420-F-09-025 may be more appropriate. Please justify the selection of 8.60 g/hp-hr for estimating Switchback Locomotive engine NOx emissions.*

   iv. *Has consideration been given to using alternative forms of transportation that would result in lower NOx emissions?*

b) *The staff made the following assumptions about the operation of the Marine Engines-Aggregate Barge Deliveries in order to reproduce the annual Marine Engine NOx emissions presented in Appendix A.1, "Construction Emissions Combustion Source Summary," of Detroit Edison's emissions inventory:*

   — *20 days/month of operation during the 1st year of engine operation (Oct 2012 – Sep 2013)*
   — *8 days/month of operation during the 2nd and 3rd years of engine operation (Oct 2013 – Sep 2015)*
   — *4 days/month of operation during the 4th year of engine operation (Oct 2015 – Mar 2016)*

   The assumptions listed above conflict with the following information in Detroit Edison's emissions inventory:

— *The construction schedule provided in Appendix A.0 (pg A.0-1) which shows that the Pushboat for the Aggregate Transport Barge is not scheduled to operate in March 2016*
— *Note 2 of Appendix A.1.3 (pg A.1.3-2) which states the aggregate transport barge is scheduled to operate 20 days per month in 2012, 8 days per month in 2013 and 2014, and 4 days per month in 2015 and 2016.*

Please confirm the assumptions used to generate the annual Marine Engine NOx emissions presented in Appendix A.1 of the emissions inventory.

c) *Please describe how the emissions inventory presented in NRC3-11-0008 accounts for emissions from commercial and construction deliveries during plant preconstruction and NRC-authorized construction.*

d) *Detroit Edison's response provided in NRC3-11-0023 states, in part, that the building of the cooling tower and intake structure are preconstruction activities. COL/ESP ISG-4, "Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations," [ML082970729] states the facility design determines whether the cooling towers and intake structures, and their related components, are within the scope of NRC-authorized construction activities.*

In accordance with the guidance provided in COL/ESP-ISG-4, please demonstrate that the plant cooling tower and intake structure are not within the scope of NRC authorized construction activities because they do not have a safety function.

e) *Detroit Edison's response provided in NRC3-11-0023 quotes COL/ESP-ISG-4 as stating that the estimates of the impact breakdown between preconstruction and construction activities do not need to be detailed in order to inform the decision making process under NEPA. However, Section 3.2, "Emission Calculations," of EPA's General Conformity Training Module http://www.epa.gov/air/genconform/training/files/General_Conformity_Training_Manual.pdf) states that the degree of detail in the CAA emissions analysis for determining if the emissions are below the de minimis levels depends upon how close the total emissions are to the de minimis levels. Table 3 of Enclosure 1 to NRC3-11-0008 shows that the estimated maximum annual NOx emissions from the NRC-authorized construction of Fermi 3 is 91.7 tons, which is close to the de minimis level of 100 tons/yr. The EPA General Conformity Training Module states a more detailed study is called for if the total emissions are close to the de minimis levels.*

Detroit Edison's response provided in NRC3-11-0023 also states the 18-month duration for site preparation activities (April 2011 – September 2012) would be almost entirely preconstruction activities. However, the air emissions analysis provided in NRC3-11-0008 assumes that 70% of the combustion source emissions and 50 percent of the fugitive source emissions result from NRC-authorized construction activities, regardless of whether the activities occurred during the 18-month preconstruction period or the subsequent 44-month NRC-authorized construction period.

Please provide a more detailed study of the emissions resulting from NRC-authorized construction activities, based on the most recent construction equipment schedule and timeline. Indicate on the timeline when NRC-authorized construction activities are assumed to begin. Justify why the emissions resulting from NRC-authorized construction activities should not be based on the percent of overall resources or the amount and type of equipment that would be used each year to perform NRC-authorized construction activities.

Response

The original combined response to RAIs AQ2.7-1 and AQ4.4.1-1 was submitted to the NRC in Detroit Edison letter NRC3-09-0017 (ML093650121), dated December 23, 2009. In a telephone conversation on April 16, 2010, the NRC requested that Detroit Edison revise the construction and operation emission estimates to include related emissions occurring beyond the site, but within the non-attainment or maintenance zone. A revised emissions estimate was provided in Detroit Edison letter NRC3-10-0025 (ML102000562), dated July 9, 2010. At that time, the revised calculation package was also made available for the NRC's review. Clarification of the number of construction worker vehicle trips used as the basis for the analysis of offsite emissions was provided in Detroit Edison letter NRC3-10-0048 (ML103120123), dated October 29, 2010. The revised calculation package was submitted in Detroit Edison letter NRC3-11-0008 (ML110670232), dated March 4, 2011. The response to RAI EIS 2.9 below; 1) replaces the locomotive emission factor with a more efficient engine that will be used during the project, 2) clarifies the operation of the marine engines for aggregate barge deliveries, and 3) provides an updated emission inventory using monthly percentages, not project-wide percentages, for site preparation and construction activities within the NRC's jurisdictional authority.

For clarity, each part of the above question is repeated below (in italics) followed by the associated response.

a. *The emissions inventory used to develop the U.S. Nuclear Regulatory Commission (NRC)-authorized construction emissions presented in NRC3-11-0008 include emissions from a Switchback Locomotive engine. Using the information contained in the Detroit Edison emissions inventory, the staff estimates that the total NOx emissions from this engine are 45.3 tons per year for the years 2013, 2014, and 2015. This one engine represents, on average, approximately 40 percent of the total NOx emissions from preconstruction and NRC-authorized construction activities during the years 2013 through 2015.*

i. Please explain how this engine will be used; for example, will it be used to transport materials to the site or around the site?

ii. What is the basis for assuming 300 hours of engine operation per month?

iii. The NOx emission factor used for the Switchback Locomotive engine emission calculation is 8.60 g/hp-hr which corresponds to the Tier 0 emission factors for line-haul operation presented in Table 1 of EPA-420-F-09-025, "Emission Factors for Locomotives" (April 2009). However, it appears that the duty cycle for this locomotive may more appropriately approximate low power cycle operation in a switchyard. In this

case, the Tier 0 NOx emission factor of 12.60 g/hp-hr for switchyard operation presented in Table 2 of EPA-420-F-09-025 may be more appropriate. Please justify the selection of 8.60 g/hp-hr for estimating Switchback Locomotive engine NOx emissions.

iv. Has consideration been given to using alternative forms of transportation that would result in lower NOx emissions?

Response to Part a:

The responses for the questions regarding the locomotive are provided below in items i) through iv):

i) During the months 19 through 60 of the construction schedule for Fermi 3, the diesel fueled locomotive is intended to be used for transporting materials to the Fermi site via nearby rail lines.

ii) The emissions inventory for the locomotive assumes that the locomotive engine will operate 10 hours per day every day (30 days) per month, resulting in the 300 hours of engine operation per month. The locomotive will be used to transport materials such as plant components to the site. Preliminary construction planning identifies the preference for a locomotive of this type and the breadth of delivery scope is potentially large. Given that the locomotive will be used to make deliveries and will not be operating to move equipment on site, assuming operation for 10 hours per day for every day is conservative.

iii) The emissions inventory provided in Detroit Edison's letter NRC-11-0008 used Tier 0 line-haul emission factors for the locomotive, as provided in Table 1 of EPA-420-F-09-025. Footnote 1 in Appendix A.1.4, "Locomotive Engines-Emission Calculations," indicated that the locomotive engine rating of 3,000 HP was based on a General Motors' Electro-Motive Division SD40-2 diesel-electric locomotive. The Federal Register, Vol. 73, No. 126 issued Monday, June 30, 2008, clarified the definition of a switch locomotive as a locomotive with a total engine rating below 2,300 HP, and dropped the requirement that it be designed or used primarily for short distance operation. Therefore, given its size and the fact the locomotive will be used to deliver materials to the site such as components (and not short distances around the site), the line-haul NO_x emission factor of 8.6 g/hp-hr is valid.

However, as is discussed below in the response to Part e, below, the emission inventory for the construction of Fermi 3 is being revised using pre-construction/construction percentages. As part of this revision, a new locomotive emission factor is being used reflective of a more efficient locomotive engine that will be used during construction. The revised emission inventory uses a locomotive currently available that has an engine rating of 2,100 HP and is equipped with a Tier 3 engine. This new engine size means the locomotive will now be subject to Tier 3 emission standards for switch locomotives found in Table 2 of 40 CFR 1033.101, "Exhaust Emission Standards", except that the

locomotive supplier indicates that NO_x will be less than 3.0 g/hp-hr (more than 2 g/hp-hr below the Tier 3 standard).

iv) As described above in the response to subparagraph iii, Detroit Edison is using a more efficient and cleaner emitting locomotive engine that will result in significant reductions in NO_x emissions. As previously discussed, preliminary construction planning indicates a potentially broad scope of material deliveries by rail. As these plans are developed there may be opportunities to use other alternative forms of transportation to further reduce emissions.

b. *The staff made the following assumptions about the operation of the Marine Engines-Aggregate Barge Deliveries in order to reproduce the annual Marine Engine NOx emissions presented in Appendix A.1, "Construction Emissions Combustion Source Summary," of Detroit Edison's emissions inventory:*

- *20 days/month of operation during the 1st year of engine operation (Oct 2012 – Sep 2013)*
- *8 days/month of operation during the 2nd and 3rd years of engine operation (Oct 2013 – Sep 2015)*
- *4 days/month of operation during the 4th year of engine operation (Oct 2015 – Mar 2016)*

The assumptions listed above conflict with the following information in Detroit Edison's emissions inventory:

- *The construction schedule provided in Appendix A.0 (pg A.0-1) which shows that the Pushboat for the Aggregate Transport Barge is not scheduled to operate In March 2016*
- *Note 2 of Appendix A.1.3 (pg A.1.3-2) which states the aggregate transport barge is scheduled to operate 20 days per month in 2012, 8 days per month in 2013 and 2014, and 4 days per month in 2015 and 2016.*

Please confirm the assumptions used to generate the annual Marine Engine NO_x emissions presented in Appendix A.1 of the emissions inventory.

Response to Part b:

The emission inventory provided in Detroit Edison's letter NRC-11-0008 assumes that the marine engines for the aggregate barge deliveries will operate according to the following schedule:

- 20 days per month of operation during the first year of engine operation (October 2012 – September 2013)
- 8 days per month of operation during the second and third years of operation (October 2013 – September 2015)
- 4 days per month of operation during the fourth year of engine operation (October 2015 – March 2016)

Enclosed with this response is a revised Technical Memorandum which revises Note 2 of Appendix A.1.3 (p. A.1.3-2) to clarify the operation of the marine engine for the aggregate barge deliveries used in the emission estimate. The construction schedule provided in Appendix A.0 (p. A.0-1) has also been revised to clarify that the "Pushboat for Aggregate Transport Barge" will operate in March 2016.

c. *Please describe how the emissions inventory presented in NRC3-11-0008 accounts for emissions from commercial and construction deliveries during plant preconstruction and NRC-authorized construction.*

Response to Part c:

During the construction of Fermi 3, deliveries of materials will occur during pre-construction and construction activities within the NRC's jurisdictional authority. Percentages for construction and pre-construction activities assigned to deliveries are consistent with the response to Part e, below. In general, commercial and construction deliveries are characterized in the emission inventory from operation of the following engines:

- The locomotive that delivers materials such as plant components to the Fermi site.
- Marine engines that propel the barge containing aggregate materials for the concrete batch plant.
- On-road engines that propel vehicles such as the flatbed truck, water trucks, dump trucks, and fuel/maintenance trucks that deliver materials to, as well as around the Fermi site.

Deliveries and the distance traveled for each material delivery were estimated based on information available from preliminary construction scheduling. This estimate is conservative since it assumes that deliveries from the locomotive and on-road vehicles will occur continuously throughout the 10 hour shift each day for the 30 days each month, and marine engines for aggregate barge deliveries will operate 10 hours each shift each day they are in operation. This is a conservative assumption as the locomotive will be used to make deliveries to the site and not to move equipment around the site.

d. *Detroit Edison's response provided in NRC3-11-0023 states, in part, that the building of the cooling tower and intake structure are preconstruction activities. COL/ESPISG-4, "Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations," [ML082970729] states the facility design determines whether the cooling towers and intake structures, and their related components, are within the scope of NRC-authorized construction activities.*

In accordance with the guidance provided in COL/ESP-ISG-4, please demonstrate that the plant cooling tower and intake structure are not within the scope of NRC-authorized construction activities because they do not have a safety function.

Response to Part d:

The NRC Interim Staff Guidance on the Definition of Construction and on Limited Work Authorizations provides examples to help delineate between construction and pre-construction activities. Specifically regarding the Circulating Water System (CIRC), the ISG states the following (discussion from the ISG is in italics):

> ***Circulating Water System***
> *As a general matter, the NRC staff considers the circulating water system (CWS), on a system level, to be within the scope of construction because 10 CFR 50.10(a)(1)(iv) includes equipment that can cause a reactor trip. Although the system and active equipment such as pumps and valves can cause a plant trip, an applicant could exclude certain portions of the CWS from construction as discussed below.*
>
> ***Buried Circulating Water System Piping up to the Turbine Building***
> *Depending on the plant design, it is possible for an applicant to demonstrate that plausible failures (leakage) associated with the CWS piping (intake and discharge) would not result in a reactor trip. It is reasonable to exclude the piping from the scope of construction for certain designs, given that the reactor trip or safety system actuation criterion is the only reason to consider it within scope. This finding remains consistent with the NRC's decision to use the maintenance rule and related guidance to define the scope of SSCs within the definition of construction. RG 1.160 provides the following guidance for systems to include under this criterion:*
>
> *(1) SSCs whose failure has caused a reactor scram or actuation of a safety-related system at their site*
> *(2) SSCs whose failure has caused a reactor scram or actuation of a safety-related system at a site with a similar configuration*
> *(3) SSCs identified in the licensee's analysis (e.g., final safety analysis report (FSAR), individual plant evaluation) whose failure would cause a reactor scram or the actuation of a safety-related system*
>
> *A review of the licensee event reports for currently operating reactors did not identify occurrences of piping failures in the CWS up to the turbine building that resulted in plant scrams or safety system actuations. The turbine building demarcation may be important, since the piping within the building could, depending on plant design, cause internal plant flooding or safety system actuations, or prevent other SSCs from fulfilling their safety-related functions. Applicants need to perform design-specific reviews to ensure that piping failures in the CWS up to the turbine building are not identified in other analyses (e.g., FSAR, probabilistic risk assessment) as being a plausible initiating event for a reactor scram or safety system actuation. Therefore, CWS piping could be considered preconstruction in certain circumstances.*
>
> ***Circulating Water Intake Structure***
> *Depending on the plant design, it is possible for an applicant to demonstrate; similar to CWS piping up to the turbine building, that the plant intake structure does not have a safety function (e.g., some plant intakes only provide makeup to the CWS). This*

conclusion would not apply to related SSCs, such as pumps, travelling screens, or other active components associated with the CWS, because there are many examples of plant transients and safety system actuations that have loss of circulating water flow as an initiating event. To expand the preconstruction activities beyond the intake structure, applicants will need to perform design-specific reviews to ensure that a loss of CWS flow caused by pump failures or screen blockage is not a plausible initiating event for a reactor scram or safety system actuation. Therefore, the facility design will determine whether intake structures and related components are within the scope of construction.

Cooling Towers
Depending on the plant design, it is possible for an applicant to demonstrate, similar to that for intake structures, that cooling tower structures do not have a safety function. This conclusion may not apply to related SSCs, such as pumps associated with the CWS, because there are examples of plant transients and safety system actuations that have loss of circulating water flow as an initiating event. To expand the preconstruction activities beyond the cooling tower structure, applicants will need to perform design-specific reviews to ensure that a loss of circulating water system flow caused by loss of pumps or other components is not a plausible initiating event for a reactor scram or safety system actuation. Therefore, the facility design will determine whether cooling towers and related components are within the scope of construction.

Detroit Edison has identified the Intake Structure as a pre-construction activity. This conclusion is not being expanded beyond the Intake Structure to the components within the structure. The Intake Structure houses the Backup Fire Protection Pumps and the Station Water pumps that provide makeup water to the Natural Draft Cooling Tower (NDCT) Basin, the Plant Service Water System (PSWS) Basin and the Demineralized Water Supply. The Intake Structure only provides makeup to the Circulating Water System and does not provide Circulating Water. Thus, a failure of the Intake Structure would not cause a loss of Circulating Water. Based on industry and Fermi site experience, collapse of the Intake Structure is not considered a plausible failure mode. In addition, failure of the Intake Structure is not identified in the safety analysis in the DCD as a failure or initiating event that could cause a reactor scram or a safety system actuation. Therefore, no plausible failure of the Intake Structure will result in a reactor scram or safety system actuation.

Detroit Edison has also identified the NDCT as a pre-construction activity. This conclusion is not being expanded beyond the NDCT structure to the CIRC components. The NDCT could only cause a loss of Circulating Water if the tower were to collapse. Based on industry and Fermi site experience, collapse of the NDCT is not considered a plausible failure mode. In addition, failure of the NDCT structure is not identified in the safety analysis in the DCD as a failure or initiating event that could cause a reactor scram or a safety system actuation. Therefore, no plausible failure of the NDCT will result in a reactor scram or safety system actuation.

e. *Detroit Edison's response provided in NRC3-11-0023 quotes COL/ESP-ISG-4 as stating that the estimates of the impact breakdown between preconstruction and construction activities do not need to be detailed in order to inform the decision-making process under NEPA. However, Section 3.2, "Emission Calculations," of EPA's General Conformity Training Module*

(http://www.epa.gov/air/genconform/training/files/General_Conformity_Training_Manual.pdf) states that the degree of detail in the CAA emissions analysis for determining if the emissions are below the de minimis levels depends upon how close the total emissions are to the de minimis levels. Table 3 of Enclosure 1 to NRC3-11-0008 shows that the estimated maximum annual NOx emissions from the NRC-authorized construction of Fermi 3 is 91.7 tons, which is close to the de minimis level of 100 tons/yr. The EPA General Conformity Training Module states a more detailed study is called for if the total emissions are close to the de minimis levels.

Detroit Edison's response provided in NRC3-11-0023 also states the 18-month duration for site preparation activities (April 2011 – September 2012) would be almost entirely preconstruction activities. However, the air emissions analysis provided in NRC3-11-0008 assumes that 70% of the combustion source emissions and 50 percent of the fugitive source emissions result from NRC-authorized construction activities, regardless of whether the activities occurred during the 18-month preconstruction period or the subsequent 44-month NRC-authorized construction period.

Please provide a more detailed study of the emissions resulting from NRC-authorized construction activities, based on the most recent construction equipment schedule and timeline. Indicate on the timeline when NRC-authorized construction activities are assumed to begin. Justify why the emissions resulting from NRC-authorized construction activities should not be based on the percent of overall resources or the amount and type of equipment that would be used each year to perform NRC-authorized construction activities.

Response to Part e:

The emissions inventory provided in Detroit Edison's letter NRC-11-0008 assumed 70 percent of the total combustion source emissions and 50 percent of the total fugitive source emissions were within the NRC's jurisdictional authority. These percentages for combustion source and fugitive source activities were assumed for all site preparation and construction activities. This response provides a revised emissions inventory, which is enclosed with this letter, that 1) replaces the locomotive emission factor with a more efficient engine expected to be used during construction (summarized in response to Part a, above), 2) clarifies the operation of the marine engines for aggregate barge deliveries (summarized in response to part b above), and 3) provides an updated emissions inventory using monthly percentages, and not project-wide percentages, for site preparation and construction activities within the NRC's jurisdictional authority. The following paragraphs provide a summary of the methodology for revising the emissions inventory with monthly percentages for site preparation and construction activities authorized by the NRC.

Emissions estimates are developed based on equipment types that will perform site preparation and construction activities within the NRC's jurisdictional authority. Monthly percentages for construction/pre-construction activities were developed for site preparation and construction activities that could produce fugitive dust emissions and air emissions from combustion engines. These monthly percentages were developed based on preliminary construction planning for major structures, the equipment list provided in Appendix 0 of the enclosed technical memorandum with subject "Response to Fermi 3 ER RAIs AQ2.7-1 and AQ4.4.1-1 Construction

and Operation Related to Emissions Rev. 5", and the total amount of concrete estimated to be used to construct Fermi 3. The schedule of construction for major structures was based on the documents "DOE NP2010 Construction Schedule Evaluation," Revision 2, dated September 24, 2004, which addressed ESBWR construction, and preliminary project planning by Detroit Edison.

During site preparation (initial 18 months) most activities are considered pre-construction with the exception of the construction for the concrete diaphragm wall around the excavation. The plan is not to remove the wall, thus, this would be considered an activity under NRC jurisdiction. Tables 1 and 2, below, provide the percentages that were used to develop the maximum annual emissions resulting from combustion source equipment and fugitive dust activities during site preparation (initial 18 months) within the NRC's jurisdictional authority.

Table 1
Combustion Source Emission Percentages During Site Preparation
(Initial 18 Months)

Year	Month(s)	On-Road Vehicles	Worker Vehicles	Non-Road Vehicles	Marine Engines	Locomotive Engines
1	April	0%	0%	0%	0%	0%
1	May-December	30%	10%	10%	0%	0%
2	January-March	15%	10%	10%	0%	0%
2	April-September	0%	0%	0%	0%	0%

Notes:
1) The percentages shown in the table indicate the portion of emissions for each combustion source equipment type that are within the NRC's jurisdictional authority.
2) The portion of emissions that are not within NRC's jurisdictional authority are considered pre-construction emissions.

Table 2
Fugitive Source Emission Percentages During Site Preparation

Year	Month(s)	Pre-Construction	Construction
1	April	100%	0%
1	May-December	70%	30%
2	January-March	85%	15%
2	April-September	100%	0%

Notes:
1) The portion of emissions that are not within NRC's jurisdictional authority are considered pre-construction emissions. Bulldozing, grading, blasting, and construction area wind erosion are considered pre-construction activities.
2) Fugitive activities that are considered within the NRC's jurisdictional authority include atmospheric transfers, concrete production, active pile wind erosion, paved roads, and unpaved roads.

The subsequent 44 months of the schedule include activities both within NRC's jurisdictional authority and not within NRC jurisdictional authority. Table 3, below, provides the percentages that were used to develop the maximum annual emissions resulting from combustion source equipment and fugitive dust activities during construction (subsequent 44 months) within the NRC's jurisdictional authority.

Table 3
Combustion Source and Fugitive Emission Percentages
During Construction (Subsequent 44 Months)

Time Period	Pre-Construction	Construction
Year 2, Month 10 – Year 3, Month 5	0%	100%
Year 3, Month 6 – Year 4, Month 11	25%	75%
Year 4, Month 12 – Year 5, Month 6	30%	70%
Year 5, Month 6 – Completion	0%	100%

Notes:
1) The portion of emissions that are not within NRC's jurisdictional authority are considered pre-construction emissions.
2) The pre-construction and construction percentages apply to all emissions resulting from combustion source equipment summarized in Appendix A.1.
3) The pre-construction and construction percentages apply to all activities in Appendix A.2 that produce fugitive emissions.

As shown in the enclosed technical memorandum, and as seen in previous responses related to conformity, the NOx emissions are limiting with respect to the *de minimis* level of 100 tons/yr. Thus, the following discussion focuses on the NOx emissions. Emissions for other conformity related pollutants are detailed in the enclosed technical memorandum. The total combustion emissions for NOx and total fugitive emissions for $PM_{2.5}$ are shown, respectively, in Tables 4 and 5, below.

Table 4
Total Combustion Source Emissions

	2011	2012	2013	2014	2015	2016
			NOx			
On-Road Vehicles	1.2364	2.5469	5.6174	4.2320	2.6053	0.2028
Worker Vehicles	0.8865	2.8560	18.4518	12.6411	4.2890	1.6539
Non-Road Engines	74.2232	60.0727	53.8819	57.6918	37.8281	5.2646
Marine Engines	46.8018	22.3221	7.6982	3.6227	3.1698	0.4528
Locomotive Engines	0	2.7657	11.0627	11.0627	11.0627	2.7657
Total Annual Emissions (tons)	**123.15**	**90.56**	**96.71**	**89.25**	**58.95**	**10.34**

Table 5
Total Fugitive Source Emissions

	2011	2012	2013	2014	2015	2016
			PM 2.5			
Atmospheric Transfers	0.0001	0.0016	0.0016	0.0016	0.0011	0.0000
Bulldozing	0.1024	0.1106	0.0737	0.0000	0.0000	0.0123
Grading	2.05	0.5491	0.3660	0.3660	0.0915	0.2668
Blasting	0.0000	0.0576	0.0000	0.0000	0.0000	0.0000
Concrete Production	0.1090	1.3076	1.3076	1.3076	0.8717	0.0000
Active Pile Wind Erosion	0.0742	0.8908	0.8908	0.8908	0.5939	0.0000
Construction Area Wind Erosion	3.95	5.27	5.27	5.27	5.2725	2.1969
Paved Roads	0.5493	1.8763	13.1147	9.7624	3.5722	1.4882
Unpaved Roads	12.63	23.58	44.99	32.78	21.8596	1.9348
Total Annual Emissions (tons)	**19.47**	**33.65**	**66.02**	**50.39**	**32.26**	**5.90**

As shown in Table 3, construction activities begin in earnest in 2013; i.e., 2011 and 2012 are devoted almost entirely to site development activities. As shown in Table 4, the total combustion NOx emissions are less than the *de minimis* level of 100 tons/yr; without crediting any reduction due to pre-construction activities. This provides confidence that the combustion emissions under NRC jurisdiction will not exceed the *de minimis* levels of 100 tons/yr.

Using the total construction emissions from Tables 4 and 5, above, the percentages of construction activities that are within the NRC's jurisdiction authority in Tables 1 through 3, above, and applying the same 75 percent utilization factor used in prior analyses for equipment which is not likely to operate continuously over the full 10-hour shift, the estimated maximum annual emission resulting from construction activities within the NRC's jurisdictional authority were calculated. The resultant combustion source emissions for NOx and $PM_{2.5}$, and the fugitive source emissions for $PM_{2.5}$ related to construction activities are shown in Tables 6 and 7, respectively. For $PM_{2.5}$ the sum of fugitive source and combustion source $PM_{2.5}$ emissions for each year of the project are to be compared to the conformity *de minimis* levels. Table 8 shows the total $PM_{2.5}$ emissions resulting from fugitive sources and combustion sources (from the enclosed technical memorandum).

Table 6
Combustion Source Emissions Related to Construction

	2011	2012	2013	2014	2015	2016
			NOx			
On-Road Vehicles	0.351	1.513	4.834	3.157	2.067	0.203
Worker Vehicles	0.079	0.785	15.761	9.428	3.646	1.654
Non-Road Engines	6.982	17.954	46.340	43.012	29.947	5.265
Marine Engines	0	2.264	6.717	2.702	2.626	0.453
Locomotive Engines	0	2.766	9.449	8.251	9.403	2.766
Total Annual Emissions (tons)	**7.41**	**25.28**	**83.10**	**66.55**	**47.69**	**10.34**
			$PM_{2.5}$			
On-Road Vehicles	0.008	0.0346	0.1116	0.0698	0.0439	0.0043
Worker Vehicles	0.0012	0.0134	0.2937	0.1901	0.0793	0.0388
Non-Road Engines	0.41	1.11	2.95	2.71	1.97	0.3822
Marine Engines	0	0.0628	0.1864	0.075	0.0729	0.0126
Locomotive Engines	0	0.0922	0.31	0.28	0.31	0.0922
Total Annual Emissions (tons)	**0.42**	**1.31**	**3.85**	**3.32**	**2.48**	**0.53**

Table 7
Fugitive Source Emissions Related to Construction

	2011	2012	2013	2014	2015	2016
			PM 2.5			
Atmospheric Transfers	0.0000	0.0005	0.0014	0.0012	0.0008	0.0000
Bulldozing	0.0000	0.0246	0.0655	0.0000	0.0000	0.0123
Grading	0.00	0.0915	0.3127	0.2730	0.0641	0.2668
Blasting	0.0000	0.0576	0.0000	0.0000	0.0000	0.0000
Concrete Production	0.0327	0.3759	1.1169	0.9753	0.6756	0.0000
Active Pile Wind Erosion	0.0223	0.2561	0.7609	0.6644	0.4603	0.0000
Construction Area Wind Erosion	0.0000	1.3181	4.5036	3.9324	4.4816	2.1969
Paved Roads	0.1465	0.5352	11.2021	7.2811	3.0363	1.4882
Unpaved Roads	3.44	12.47	39.24	24.46	17.1931	1.9348
Total Annual Emissions (tons)	**3.64**	**15.13**	**57.20**	**37.58**	**25.91**	**5.90**

Table 8
Fugitive and Combustion Source $PM_{2.5}$ Emissions Related to Construction

	2011	2012	2013	2014	2015	2016
			PM 2.5			
Fugitive Source Emissions	3.64	15.13	57.20	37.58	25.91	5.90
Combustion Source Emissions	0.42	1.31	3.85	3.32	2.48	0.53
Total Annual $PM_{2.5}$ Emissions (tons)	4.06	16.44	61.05	40.90	28.39	6.43

As shown in Tables 6 and 8 emissions of NOx and $PM_{2.5}$ from construction activities do not exceed the conformity applicability thresholds provided in 40 CFR 51, Subpart W. As such, a conformity determination is not required due to the revisions to the emissions inventory for the construction phase of the project. Furthermore as shown in Tables 6 and 8, the estimated emissions are not close to the *de minimis* levels.

Proposed COLA Revision

None

Enclosure 1 of Attachment 1

NRC3-12-0015

Response to RAI Letter No. 75

RAI Question No. EIS 2.9
(eRAI Tracking No. 6356)

Black and Veatch Technical Memorandum
Record No. BVDE2-2010-0054, Revision 5, Dated June 20, 2012

(113 pages)

BLACK & VEATCH
Building a world of difference.

TECHNICAL MEMORANDUM

Detroit Edison Company
Fermi 3 COL Application Phase II

B&V Project: 163696
B&V File: 15.1000
B&V Record No.: BVDE2-2010-0054
June 20, 2012

Response to Fermi 3 ER RAIs AQ2.7-1 and AQ4.4.1-1
Construction and Operation Related Emissions Rev. 5

To: Detroit Edison Company

From: Bryce Weinand, Black & Veatch Corporation

Purpose

DTE submitted the original combined response to the NRC addressing RAIs AQ2.7-1 and AQ4.4.1-1 (conformity analysis and CO_2 emissions during construction and operation, respectively) in Detroit Edison letter NRC3-09-0017 (ML093650121), dated December 23, 2009. On January 15, 2010, the NRC requested that additional detail be provided for review. Black & Veatch subsequently submitted a technical memorandum to provide the additional detail necessary to support review of the response on February 25, 2010. In a telephone conversation on April 16, 2010, the NRC requested that Detroit Edison revise the construction and operation emission estimates of conformity-related pollutants to include related emissions occurring offsite and into the surrounding non-attainment/maintenance area. The revision of the emissions estimate of conformity-related pollutants for offsite construction and operation activities was provided in Detroit Edison letter NRC3-10-0025 (ML102000562), dated July 9, 2010. At that time, the revised calculation package was also made available for the NRC's review. Detroit Edison letter NRC3-10-0048 (ML103120123), dated October 29, 2010, clarified the number of construction worker vehicle trips used as the basis for the analysis of offsite emissions. At that time, the revised calculation package was also made available for the NRC's review. Revision 4 of the technical memorandum also removed the 75 percent utilization factor for worker vehicles included in the combustion source emissions estimate and for atmospheric transfers, blasting, concrete production, active pile erosion, construction area erosion, and paved roads construction activities in the fugitive source emissions estimate summary, to provide a more realistic, conservative evaluation of these emission sources. Revision 4 of the calculation package was submitted in Detroit Edison letter NRC3-11-0008 (ML110670232), dated March 4, 2011. This revision of the technical memorandum for the response to RAI EIS 2.9 1) replaces the locomotive emission factor with a more efficient engine that will be used during the project, 2) clarifies the operation of the marine engines for aggregate barge deliveries, and 3) provides an updated emission inventory using monthly percentages, not project-wide percentages, for site preparation and construction activities within the NRC's jurisdictional authority. Revision bars are provided for the updates occurring to the text of the report only, and not for the changes to some of the tables located in Appendices A and B.

Background

The Fermi 3 project will be located in Monroe County, Michigan. Monroe County is currently only designated as a non-attainment area for the $PM_{2.5}$ standards. On June 29, 2009, the Michigan Department of Environmental Quality's (MDEQ) petition to redesignate Monroe County as an attainment area for the 8-hour ozone standard was accepted by the U.S. Environmental Protection Agency (USEPA). As a result, Monroe County is now considered a maintenance area for the 8-hour ozone standard.

40 CFR 51, Subpart W requires that a federal action undergo a general conformity determination for non-attainment or maintenance areas where the emissions of the affected criteria pollutant or its precursor(s) would equal or exceed emission thresholds set forth in the regulation. Since Monroe County is a non-attainment area for $PM_{2.5}$ and a maintenance area for 8-hour ozone (outside an ozone transport region), a general conformity determination is required only if the project-related emissions of the non-attainment and maintenance area pollutants or their precursors (i.e., $PM_{2.5}$, NO_x, SO_2, or VOC) equal or exceed the 100 tons/year conformity determination threshold on a pollutant-by-pollutant basis. The paragraphs that follow discuss estimates of direct and pre-cursor emissions for $PM_{2.5}$ and ozone expected to result from the construction and operation of Fermi 3. This estimate is also known as the conformity applicability analysis. Since the activities associated with construction and operation will not occur simultaneously, the emissions from each of the phases are analyzed separately in the conformity applicability analysis to determine if 40 CFR 51, Subpart W is triggered and a general conformity determination is required for either phase.

Due to the similar nature of RAI AQ4.4.1-1, estimated emissions of CO_2 from the construction phase are also included in this memorandum.

Emissions Estimates

Construction

Various types of site preparation and construction activities and their associated equipment will emit $PM_{2.5}$, NO_x, SO_2, VOC, and CO_2 during Fermi 3 construction activities. The following analysis evaluates the emissions within the NRC's jurisdictional authority associated with construction of Fermi 3 and demonstrates that annual emissions of $PM_{2.5}$, NO_x, SO_2, and VOC would not exceed the 100 tons/year conformity determination thresholds for ozone and $PM_{2.5}$ (and their precursors). Therefore, a general conformity determination would not be required for construction of Fermi 3.

Generally emissions of $PM_{2.5}$, NO_x, SO_2, VOC, and CO_2 during construction activities are expected from one of two processes: 1) combustion of fuels in engines which propel or otherwise operate mobile equipment, 2) fugitive dust activities which entrain particles into the air through the disturbance or movement of materials.

Mobile engines (both on-road and non-road) include such things such as:

- Construction workers traveling through the non-attainment/maintenance area to the Fermi site.
- Trucks delivering construction materials to areas on the Fermi site.
- Operation of heavy equipment such as cranes, bulldozers, and scrapers.
- Use of support vehicles to transport materials around the site.
- Operation of marine and locomotive engines for material deliveries.
- Operation of other miscellaneous mobile fossil-fuel combustion sources such as generators necessary for construction of Fermi 3.

Activities creating fugitive dust emissions (in the form of direct $PM_{2.5}$ emissions) include such things as:

- Ground clearing, grading, and excavation.

- Bulk handling of materials such as spoils, backfill, and aggregate.
- Wind erosion.
- On-site concrete batch plant.
- Entrainment from the movement of vehicle tires over paved and non-paved surfaces.

ER, Subsection 4.4.1.3, Dust, provides a discussion of the State of Michigan Administrative Code R 336.1372, Fugitive Dust Control Program, which contains provisions to control fugitive dust emissions. The construction practices for dust control during construction of Fermi 3 will be consistent with the state requirements to control fugitive dust.

In order to estimate emissions from the above activities, a preliminary monthly construction schedule and equipment list was developed for the Fermi 3 project. The construction schedule assumes construction commences in April 2011 and lasts 62 months (18 months of site preparation activities and 44 months of construction activities). Emissions were estimated based on the preliminary construction schedule and equipment list, provided in Appendix A, along with the following assumptions:

- 10-hours/day, 7 days/week construction schedule.
- Construction workers arriving daily throughout the construction timeframe.
- Construction workers traveling through the non-attainment/maintenance area to the Fermi site.
- Operation of a single on-site concrete batch plant.
- Barge delivery of aggregate for use in concrete batch plant.
- Transport and handling of aggregate from barge area to concrete batch plant.
- Transport of materials, such as plant components, to the site by a locomotive.
- Outdoor storage of materials for use in concrete batch plant.
- Vehicle miles traveled were derived using an average vehicle speed (differs for different equipment) and a 10-hour work day.
- Construction equipment whose emissions are based on hours of operation have been applied a 75 percent utilization factor assuming that all equipment does not operate continuously over the full 10-hour shift.

Emissions estimates from the various construction activities discussed above were derived using the following USEPA-provided emission factor databases: MOBILE6.2 for on-road vehicle emissions, NONROAD2008 for non-road mobile equipment and vehicle emissions, and AP-42 for fugitive dust emissions. Table 1 lists the input parameters used to execute MOBILE6.2. Table 2 lists the input parameters that were used to run the NONROAD2008 model. By-Model-Year output containing average emission factors for the State of Michigan from NONROAD2008 are displayed in Appendix A.1.2. USEPA's Tier standards were also used to develop emissions estimates for marine and locomotive engines subject to emission limits by regulation. The estimate of total emissions from site preparation and construction activities (regardless of jurisdiction) described above are provided in Table 3.

The emission estimates from construction of Fermi 3 to be compared to the conformity determination thresholds are only those activities under the NRC's jurisdictional authority (activities controlled by the NRC under the Atomic Energy Act). Emissions estimates were developed based on equipment types that will perform site preparation and construction activities within the NRC's jurisdictional authority. Monthly percentages for construction/pre-construction

activities were developed for site preparation and construction activities that could produce fugitive dust emissions and air emissions from combustion engines.

These monthly percentages were developed based on preliminary construction planning for major structures, the equipment list provided in Appendix 0, and the total amount of concrete estimated to be used to construct Fermi 3. The schedule of construction for major structures was based on the documents "DOE NP2010 Construction Schedule Evaluation," Revision 2, dated September 24, 2004, which addressed ESBWR construction, and preliminary project planning by Detroit Edison.

During site preparation (initial 18 months) most activities are considered pre-construction with the exception of the construction for the concrete diaphragm wall around the excavation. The plan is not to remove the wall, thus, this would be considered an activity under NRC jurisdiction. Tables 4 and 5 below provide the percentages that were used to develop the maximum annual emissions resulting from combustion source equipment and fugitive dust activities during site preparation within the NRC's jurisdictional authority.

The subsequent 44 months of the schedule include activities both within NRC's jurisdictional authority and not within NRC jurisdictional authority. Table 6 below provides the percentages that were used to develop the maximum annual emissions resulting from combustion source equipment and fugitive dust activities during construction within the NRC's jurisdictional authority.

Using the total construction emissions from Table 3, the percentages of construction activities that are within the NRC's jurisdictional authority in Tables 4, 5, and 6, and applying the 75 percent utilization factor for equipment which is not likely to operate continuously over the full 10-hour shift, the estimated maximum annual emission resulting from construction activities within the NRC's jurisdictional authority are provided in Table 7. As shown in Table 7, emissions from the construction phase of the project (i.e., the NRC jurisdictional activities) do not exceed the conformity applicability thresholds provided in 40 CFR 51, Subpart W. As such, a conformity determination is not required for the construction phase of the project. Furthermore, as shown in Table 7, the estimated emissions are not close to the *de minimis* levels. Detailed emission calculations of Fermi 3 construction activities, including assumptions used, are provided in Appendix A, Construction Emissions.

Operation

Stationary and mobile sources (both combustion and non-combustion) proposed for the operation of Fermi 3 will emit $PM_{2.5}$, NO_X, SO_2, and VOC. The following evaluates the emissions from stationary and mobile sources associated with operation of Fermi 3, and demonstrates that annual emissions of $PM_{2.5}$, NO_x, SO_2, and VOC would not exceed the 100 tons/year conformity determination thresholds for ozone and $PM_{2.5}$ (and their precursors). Therefore, a general conformity determination would not be required for operation of Fermi 3. CO_2 emissions from the operation of Fermi 3 were provided in RAI Response 5.8.1-1.

Stationary Sources

During the operation of Fermi 3, two standby diesel generators (SDG), two ancillary diesel generators (ADG), two diesel-driven fire pumps, an auxiliary boiler, a natural draft cooling tower (NDCT), and a 4-cell mechanical draft cooling tower (MDCT) will emit $PM_{2.5}$, NO_X, SO_2, and VOC. The total estimated annual emissions of $PM_{2.5}$, SO_2, NO_x, and VOC from the operation of the full

complement of stationary sources discussed above are displayed in Table 8. Detailed emission calculations of Fermi 3 operation activities, including assumptions used, are provided in Appendix B, Operation Emissions.

Mobile Sources

Various types of mobile vehicles will emit $PM_{2.5}$, NO_x, SO_2, and VOC during Fermi 3 operational activities. The expected mobile vehicle activities include worker arrivals and dismissals, deliveries of materials and fuel, and disposal of wastes. Additional emissions will come from the operation of heavy equipment and support vehicles on the Fermi site.

The annual emissions estimates associated with the operation of Fermi 3 are based on the following assumptions:

- Certain data for Fermi 3, such as the number and frequency of worker vehicles arriving at the site, mobile vehicle fuel usage, and total annual shipments/exports of fuels, materials, and wastes, are the same as those historically recorded for Fermi 2.
- Estimates of emissions from worker vehicles use a split of 50 percent passenger cars and 50 percent light-duty trucks.
- Distance workers travel through the non-attainment/maintenance area to the Fermi site.
- Distance delivery vehicles travel through the non-attainment/maintenance area is based on the maximum distance from the Fermi site to the non-attainment/maintenance area boundary.

In order to estimate emissions from the types of mobile equipment and activities discussed above for the operation of Fermi 3, $PM_{2.5}$, NO_x, SO_2, and VOC emission factors were obtained from the USEPA MOBILE6.2 model. Table 9 lists the input parameters used to execute MOBILE6.2. The total estimated annual emissions of $PM_{2.5}$, NO_x, SO_2, and VOC from the operation of mobile sources discussed above are displayed in Table 8. As shown in Table 8, emissions from the operational phase of the project do not exceed the conformity applicability thresholds provided in 40 CFR 51, Subpart W. As such, a conformity determination is not required for the operational phase of the project. Detailed emission calculations of Fermi 3 operation activities, including assumptions used, are provided in Appendix B, Operation Emissions.

Table 1 MOBILE6.2 Input Parameters for Construction Emissions	
Input Parameter	**Value**
Calendar Year	2011-2016
Evaluation Month – Winter	1 – January
Min/Max Temp, °F – Winter	18, 31
Fuel RVP, psi – Winter	7.0
Evaluation Month – Summer	7 – July
Min/Max Temp, °F – Summer	64, 83
Fuel RVP, psi – Summer	12.3
Diesel Sulfur Content, ppm – Winter/Summer	15

Table 2
NONROAD2008 Input Parameters for Construction Emissions

Input Parameter	Value
Calendar Year	2011-2016
Evaluation Period	Annual
Min/Max Temp, °F	39.9, 58.4
Average Temp, °F	49.2
Fuel RVP, psi	7.0
Oxygen Weight, %	2.44
Gas Sulfur, %	0.003
Diesel Sulfur, %	0.0015
Marine Diesel Sulfur, %	0.0435
Altitude of Region	Low
ETOH Blend, % Mkt	75.1
ETOH Vol, %	9.3

Table 3
Estimated Maximum Annual Emissions of $PM_{2.5}$, NO_x, SO_2, VOC, and CO_2 from Site Preparation and Construction Activities for Fermi 3 (tons/year)

	$PM_{2.5}$	NO_x	SO_2	VOC	CO_2
Combustion Source Equipment	5.84 (2011)	123.15 (2011)	0.36 (2013)	53.44 (2011)	26,231 (2013)
Fugitive Dust Activities	66.02 (2013)	--	--	--	--
Total Estimated Emissions	71.86	123.15	0.36	53.44	26,231

Notes:
1) Detailed emission calculations of Fermi 3 construction activities, including assumptions used, are provided in Appendix A, Construction Emissions.
2) The year the maximum emission occurs is provided in parentheses under the emission value for each pollutant.

Table 4
Combustion Source Emission Percentages for Site Preparation (Initial 18 Months) Activities Within NRC's Jurisdictional Authority

Year	Month(s)	On-Road Vehicles	Worker Vehicles	Non-Road Vehicles	Marine Engines	Locomotive Engines
1	April	0%	0%	0%	0%	0%
1	May-December	30%	10%	10%	0%	0%
2	January-March	15%	10%	10%	0%	0%
2	April-September	0%	0%	0%	0%	0%

Notes:
1) The percentages shown in the table indicate the portion of emissions for each combustion source equipment type that are within the NRC's jurisdictional authority.
2) The portion of emissions that are not within NRC's jurisdictional authority are considered pre-construction emissions.

Table 5
Fugitive Source Emission Percentages for Site Preparation (Initial 18 Months) Activities Within NRC's Jurisdictional Authority

Year	Month(s)	Pre-Construction	Construction
1	April	100%	0%
1	May-December	70%	30%
2	January-March	85%	15%
2	April-September	100%	0%

Notes:
1) The portion of emissions that are not within NRC's jurisdictional authority are considered pre-construction emissions. Bulldozing, grading, blasting, and construction area wind erosion are considered pre-construction activities.
2) Fugitive activities that are considered within the NRC's jurisdictional authority include atmospheric transfers, concrete production, active pile wind erosion, paved roads, and unpaved roads.

Table 6
Combustion Source and Fugitive Emission Percentages for Construction (Subsequent 44 Months) Activities Within NRC's Jurisdictional Authority

Time Period	Pre-Construction	Construction
Year 2, Month 10 – Year 3, Month 5	0%	100%
Year 3, Month 6 – Year 4, Month 11	25%	75%
Year 4, Month 12 – Year 5, Month 6	30%	70%
Year 5, Month 6 – Completion	0%	100%

Notes:
1) The portion of emissions that are not within NRC's jurisdictional authority are considered pre-construction emissions.
2) The pre-construction and construction percentages apply to all emissions resulting from combustion source equipment summarized in Appendix A.1.
3) The pre-construction and construction percentages apply to all activities in Appendix A.2 that produce fugitive emissions.

Table 7
Estimated Maximum Annual Emissions of $PM_{2.5}$, NO_x, SO_2, VOC, and CO_2 From Site Preparation and Construction Activities for Fermi 3 Within NRC's Jurisdictional Authority (tons/year)

	$PM_{2.5}$	NO_x	SO_2	VOC	CO_2
Combustion Source Equipment	3.85 (2013)	83.10 (2013)	0.31 (2013)	36.10 (2013)	22,508 (2013)
Fugitive Dust Activities	57.20 (2013)	--	--	--	--
Total Estimated Emissions	61.05	83.10	0.31	36.10	22,508
Conformance Applicability Threshold for Maintenance and Non-Attainment Areas	100	100	100	100	NA
Exceedance of Threshold for Construction	No	No	No	No	NA

Notes:
1) Detailed emission calculations of Fermi 3 construction activities, including assumptions used, are provided in Appendix A, Construction Emissions.
2) The year the maximum emission occurs is provided in parentheses under the emission value for each pollutant.

Table 8
Estimated Maximum Annual Emissions of $PM_{2.5}$, NO_x, SO_2, and VOC from Stationary and Mobile Sources During Operation of Fermi 3 (tons/year)

	$PM_{2.5}$	NO_x	SO_2	VOC
SDGs	0.27	2.90	0.01	0.78
ADGs	0.00	0.02	0.00	0.01
Auxiliary Boiler	0.58	6.91	0.07	0.07
Diesel Driven Fire Pumps	0.00	0.08	0.03	0.08
NDCT	6.63	--	--	--
MDCT	1.84	--	--	--
Worker Vehicles	0.18	5.63	0.13	6.47
On-site Heavy Equipment and Support Vehicles	0.01	0.19	0.00	0.17
Delivery of Materials and Disposal of Wastes	0.00	0.18	0.00	0.03
Total Estimated Emissions	9.51	15.9	0.24	7.61
Conformance Applicability Threshold for Maintenance and Non-Attainment Areas	100	100	100	100
Exceedance of Threshold for Operations	No	No	No	No

Notes:
1) Detailed emission calculations of Fermi 3 operation activities, including assumptions used, are provided in Appendix B, Operation Emissions.
2) CO_2 emissions from the operation of Fermi 3 were provided in RAI Response 5.8.1-1.

Table 9 MOBILE6.2 Input Parameters for Operation Emissions	
Input Parameter	**Value**
Calendar Year	2020
Evaluation Month – Summer	7 – July
Min/Max Temp, °F	64, 83
Fuel RVP, psi	7.0
Diesel Sulfur Content, ppm	15
Fuel Program	2 N

Bryce Weinand, Preparer

Brian O'Neal, Verifier

Jay Reeder, Verifier

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Enclosure[s]

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Appendix A
Construction Emissions

Appendix A.0
Input Data - Construction Schedule

Construction Schedule

Appendix A.0

Equip ID	EQUIPMENT	2011 APR	2011 MAY	2011 JUN	2011 JUL	2011 AUG	2011 SEP	2011 OCT	2011 NOV	2011 DEC	2012 JAN	2012 FEB	2012 MAR	2012 APR	2012 MAY	2012 JUN	2012 JUL	2012 AUG	2012 SEP	2012 OCT	2012 NOV	2012 DEC
	On-Road Engines																					
5	Dump Truck 6cyd highway use (F-650)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2
10	Fuel/maintance truck (F550) diesel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	Flatbed truck (F550) diesel	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
12	3/4 ton Pickup (F250) gas	2	2	4	4	4	7	7	7	7	7	7	7	5	5	5	5	5	5	5	5	5
13	Water Truck (F750 240 HP)	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		2	2	2
14	Concrete trucks		1	3	3	4	4	2	2	2	2	2	2							8	8	8
15	Dump Trucks 30cyd Haul in Fill Material and Aggregate Delivery									2	2	2	2	2	2	2	2	2	2	20	20	20
35	Yard Truck																			1	1	1
	Non-Road Engines																					
1	Trackhoe Cat 320 Track	2	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4
2	Loader-Frontend	4	4	5	5	4	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3
3	Bulldozer Cat /D9	2	2	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2	2
4-a	Scraper Cat 651-Tractor Engine	4	4	4	4	2	1	1														
4-b	Scraper Cat 651-Scraper Engine	4	4	4	4	2	1	1														
6	Dump Truck non-highway use	2	2	4	4	4	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5
7	Riding roller compactor		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
8	Crane RT 60T	1	2	3	3	3	3	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1
9	Grader 200hp 14'	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	1	1	1
16	Extended Boom Forklift	2	2	5	5	5	5	5	5	5	5	5	5	2	2	2	2	2	2	2	2	2
17	Skid Steer	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
18	Crane (Manitowac 1015)			2	2	2	2	2	2	2	2	2	2									
19	Crane Manitowac 8000			4	4	4	4	4	4	4	4	4	4									
20	Generator 15kw Diesel			2	2	2	2	2	2	2	2	2	2									
21	Mud Seperator Pump Caterpillar© C-15 Tier III Diesel (450hp)			2	2	2	2	2	2	2	2	2	2									
21	Diesel power generator -Caterpillar© C-15 Tier III Diesel (450hp			1	1	1	1	1	1	1	1	1	1									
22	Light Plants 7Kw			4	4	4	4	4	4	4	4	4	4							10	10	10
23	Sump Pump 6" Portable Water Pumps			1	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4	4	4	4
25	Dragline-Crane (Manitowac 222)			1	1	1	1	1	1	1	1	1	1									
27	Welder/Generator 10KW			3	3	3	3	3	3	3	3	3	3									
28	Compressor 185 CFM			1	1	1	1	1	1	1	1	1	1									
30	Forklift (3000lb capacity)																					
31	Forklift (10000lb capacity)																					
32	Forklift (35000lb capacity)																					
33	Air Compressors 750CFM																			2	2	2
34	Portable welders/Generator																					
36	Crane RT 20T																			1	1	1
37	Crane RT 100T																			1	1	1
38-a	Crane RT 150T-Carrier Engine																			1	1	1
38-b	Crane RT 150T-Superstructure Engine																			1	1	1
39	Manitowac 21000 (crane)																					
40	JLG manlifts 50hp diesel																					
41	Gators ATV																			2	2	2
43	Air Compressors 1600CFM																			4	4	4
48	18" Booster Pump			3	3	3	3	3	3	3	3	3	3									
49	14" Booster Pump			1	1	1	1	1	1	1	1	1	1									
	Marine Engines																					
24	18" Dredger			1	1	1	1	1	1	1	1	1	1									
26	1 80' Pushboat-for Dredging Barge			1	1	1	1	1	1	1	1	1	1									
26	1 80' Pushboat-for Aggregate Transport Barge																			1	1	1
44	14" Dredger			1	1	1	1	1	1	1	1	1	1									
45	12" Dredger			1	1	1	1	1	1	1	1	1	1									
46	10" Dredger			1	1	1	1	1	1	1	1	1	1									
47	6" 815 Mudcat			1	1	1	1	1	1	1	1	1	1									
50	Dredge Tenders			5	5	5	5	5	5	5	5	5	5									
	Locomotive Engines																					
42	1 Locomotive																			1	1	1

Equip ID	EQUIPMENT	2013 JAN	2013 FEB	2013 MAR	2013 APR	2013 MAY	2013 JUN	2013 JUL	2013 AUG	2013 SEP	2013 OCT	2013 NOV	2013 DEC	2014 JAN	2014 FEB	2014 MAR	2014 APR	2014 MAY	2014 JUN	2014 JUL	2014 AUG	2014 SEP	2014 OCT	2014 NOV	2014 DEC
	On-Road Engines																								
5	Dump Truck 6cyd highway use (F-650)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
10	Fuel/maintance truck (F550) diesel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	Flatbed truck (F550) diesel	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
12	3/4 ton Pickup (F250) gas	5	5	5	8	8	8	8	8	8	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
13	Water Truck (F750 240 HP)	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	Concrete trucks	8	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
15	Dump Trucks 30cyd Haul in Fill Material and Aggregate Delivery	22	22	22	8	8	8	8	8	8	8	8	8	8	8	4	4	4	4	4	4	4	4	4	4
35	Yard Truck	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	Non-Road Engines																								
1	Trackhoe Cat 320 Track	4	4	4	3	3	3	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	Loader-Frontend	4	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	Bulldozer Cat /D9	2	2	2	2	2	2	2	2	2															
4-a	Scraper Cat 651-Tractor Engine																								
4-b	Scraper Cat 651-Scraper Engine																								
6	Dump Truck non-highway use	5	5	5	2	2	2	2	2																
7	Riding roller compactor	4	4	4	2	2	2	2	2	2	2	2	2	2	2	2									
8	Crane RT 60T	1	1	1	2	2	2	2	2	2	2	2	2	2	2	4	4	4	4	4	4	4	4	4	4
9	Grader 200hp 14'	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
16	Extended Boom Forklift	2	2	2	4	4	4	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
17	Skid Steer	2	2	2	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
18	Crane (Manitowac 1015)																								
19	Crane Manitowac 8000																								
20	Generator 15kw Diesel																								
21	Mud Seperator Pump Caterpillar© C-15 Tier III Diesel (450hp)																								
21	Diesel power generator -Caterpillar© C-15 Tier III Diesel (450hp																								
22	Light Plants 7Kw	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
23	Sump Pump 6" Portable Water Pumps	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4									
25	Dragline-Crane (Manitowac 222)																								
27	Welder/Generator 10KW																								
28	Compressor 185 CFM																								
30	Forklift (3000lb capacity)							2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
31	Forklift (10000lb capacity)							2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
32	Forklift (35000lb capacity)									2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
33	Air Compressors 750CFM	2	2	2	2	2	2	2	2	2	2	2	2	2	2	6	6	6	6	6	6	6	6	6	6
34	Portable welders/Generator										6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
36	Crane RT 20T	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
37	Crane RT 100T	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4	4	4	4	4
38-a	Crane RT 150T-Carrier Engine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4	4	4	4	4
38-b	Crane RT 150T-Superstructure Engine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4	4	4	4	4
39	Manitowac 21000 (crane)										1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
40	JLG manlifts 50hp diesel										5	5	5	5	5	10	10	10	10	10	10	10	20	20	20
41	Gators ATV	2	2	2	2	6	6	6	6	6	6	6	6	6	8	8	8	8	8	10	10	10	10	10	12
43	Air Compressors 1600CFM	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
48	18" Booster Pump																								
49	14" Booster Pump																								
	Marine Engines																								
24	18" Dredger																								
26	1 80' Pushboat-for Dredging Barge																								
26	1 80' Pushboat-for Aggregate Transport Barge	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
44	14" Dredger																								
45	12" Dredger																								
46	10" Dredger																								
47	6" 815 Mudcat																								
50	Dredge Tenders																								
	Locomotive Engines																								
42	1 Locomotive	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Equip ID	EQUIPMENT	2015 JAN	2015 FEB	2015 MAR	2015 APR	2015 MAY	2015 JUN	2015 JUL	2015 AUG	2015 SEP	2015 OCT	2015 NOV	2015 DEC	2016 JAN	2016 FEB	2016 MAR	2016 APR	2016 MAY
	On-Road Engines																	
5	Dump Truck 6cyd highway use (F-650)	2	2	2	2	2	2	2										
10	Fuel/maintance truck (F550) diesel	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	Flatbed truck (F550) diesel	4	4	4	4	4	4	2	2	2	2	2	2	2	2	2		
12	3/4 ton Pickup (F250) gas	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	6	6
13	Water Truck (F750 240 HP)	1	1	1	1	1	1	1										
14	Concrete trucks	20	20	20	20	20	20	20	20									
15	Dump Trucks 30cyd Haul in Fill Material and Aggregate Delivery	4	4	4	4	4	2	2	2	2	2	2	2	2	2			
35	Yard Truck	2	2	2	2	2	2	2	2	2	2	2	2	2	2			
	Non-Road Engines																	
1	Trackhoe Cat 320 Track	1	1	1	1	1	1	1								1	1	1
2	Loader-Frontend	2	2	2	2	2	1	1								1	1	1
3	Bulldozer Cat /D9															1	1	1
4-a	Scraper Cat 651-Tractor Engine															1	1	1
4-b	Scraper Cat 651-Scraper Engine															1	1	1
6	Dump Truck non-highway use															1	1	1
7	Riding roller compactor																	
8	Crane RT 60T	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2		
9	Grader 200hp 14'	1	1	1														
16	Extended Boom Forklift	6	6	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3
17	Skid Steer	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
18	Crane (Manitowac 1015)																	
19	Crane Manitowac 8000																	
20	Generator 15kw Diesel																	
21	Mud Seperator Pump Caterpillar© C-15 Tier III Diesel (450hp)																	
21	Diesel power generator -Caterpillar© C-15 Tier III Diesel (450hp																	
22	Light Plants 7Kw	10	10	10	10	10	10											
23	Sump Pump 6" Portable Water Pumps																	
25	Dragline-Crane (Manitowac 222)																	
27	Welder/Generator 10KW																	
28	Compressor 185 CFM																	
30	Forklift (3000lb capacity)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
31	Forklift (10000lb capacity)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1
32	Forklift (35000lb capacity)	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
33	Air Compressors 750CFM	6	6	6	6	6	6	6										
34	Portable welders/Generator	6	6	6	2	2	2	2	2	2	2	2	2	2	2	2		
36	Crane RT 20T	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
37	Crane RT 100T	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2		
38-a	Crane RT 150T-Carrier Engine	4	4	4	4	4	4	4	4	1	1	1	1	1	1	1		
38-b	Crane RT 150T-Superstructure Engine	4	4	4	4	4	4	4	4	1	1	1	1	1	1	1		
39	Manitowac 21000 (crane)	1	1	1	1	1	1	1	1									
40	JLG manlifts 50hp diesel	20	20	20	20	20	20	20	20	10	10	10	10	10	10	10		
41	Gators ATV	12	12	12	12	12	12	12	8	8	8	8	4	4	4	4		
43	Air Compressors 1600CFM	4	4	4	4	4	4	4	4									
48	18" Booster Pump																	
49	14" Booster Pump																	
	Marine Engines																	
24	18" Dredger																	
26	1 80' Pushboat-for Dredging Barge																	
26	1 80' Pushboat-for Aggregate Transport Barge	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
44	14" Dredger																	
45	12" Dredger																	
46	10" Dredger																	
47	6" 815 Mudcat																	
50	Dredge Tenders																	
	Locomotive Engines																	
42	1 Locomotive	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		

Appendix A.1
Construction Emissions from Combustion Sources

Total Combustion Source Emissions

Total Combustion Source Emissions

Appendix A.1

	2011	2012	2013	2014	2015	2016
			VOC			
On-Road Vehicles	0.2021	0.3385	0.6330	0.6147	0.4867	0.1038
Worker Vehicles	1.3166	4.1778	27.3444	19.0180	6.5522	2.5771
Non-Road Engines	5.1191	4.3360	4.2172	5.1860	3.8991	0.5977
Marine Engines	46.8018	22.3221	7.6982	3.6227	3.1698	0.4528
Locomotive Engines	0	0.5531	2.2125	2.2125	2.2125	0.5531
Total Annual Emissions (tons)	**53.44**	**31.73**	**42.11**	**30.65**	**16.32**	**4.28**
			$PM_{2.5}$			
On-Road Vehicles	0.0281	0.0576	0.1297	0.0935	0.0554	0.0043
Worker Vehicles	0.0139	0.0487	0.3439	0.2549	0.0932	0.0388
Non-Road Engines	4.3975	3.8223	3.4443	3.6318	2.4637	0.3822
Marine Engines	1.4008	0.6632	0.2136	0.1005	0.0880	0.0126
Locomotive Engines	0	0.0922	0.3688	0.3688	0.3688	0.0922
Total Annual Emissions (tons)	**5.84**	**4.68**	**4.50**	**4.45**	**3.07**	**0.53**
			NO_X			
On-Road Vehicles	1.2364	2.5469	5.6174	4.2320	2.6053	0.2028
Worker Vehicles	0.8865	2.8560	18.4518	12.6411	4.2890	1.6539
Non-Road Engines	74.2232	60.0727	53.8819	57.6918	37.8281	5.2646
Marine Engines	46.8018	22.3221	7.6982	3.6227	3.1698	0.4528
Locomotive Engines	0	2.7657	11.0627	11.0627	11.0627	2.7657
Total Annual Emissions (tons)	**123.15**	**90.56**	**96.71**	**89.25**	**58.95**	**10.34**
			CO_2			
On-Road Vehicles	319.64	730.15	1802.35	1611.63	1158.88	120.27
Worker Vehicles	541.11	1894.84	13383.61	9964.58	3646.39	1519.67
Non-Road Engines	9671.65	9149.27	8460.31	9276.26	6753.41	1317.60
Marine Engines	4398.60	2087.41	687.81	323.68	283.22	40.46
Locomotive Engines	0	474.33	1897.30	1897.30	1897.30	474.33
Total Annual Emissions (tons)	**14930.99**	**14336.00**	**26231.38**	**23073.45**	**13739.19**	**3472.33**
			SO_2			
On-Road Vehicles	0.0035	0.0076	0.0181	0.0164	0.0122	0.0016
Worker Vehicles	0.0100	0.0350	0.2469	0.1838	0.0673	0.0280
Non-Road Engines	0.0870	0.0799	0.0724	0.0782	0.0555	0.0102
Marine Engines	0.0419	0.0199	0.0065	0.0031	0.0027	0.0004
Locomotive Engines	0	0.0045	0.0181	0.0181	0.0181	0.0045
Total Annual Emissions (tons)	**0.1424**	**0.1468**	**0.3621**	**0.2996**	**0.1558**	**0.0448**

Notes:

1. Estimated emissions for all combustion sources except worker vehicles are based on a 75 percent utilization factor assuming that all equipment does not operate continuously over a full 10 hour shift.

Combustion Source Emissions within NRC's Jurisdictional Authority

Combustion Source Emissions within NRC's Jurisdictional Authority

Appendix A.1

	2011	2012	2013	2014	2015	2016
VOC						
On-Road Vehicles	0.0577	0.1466	0.5387	0.4585	0.4005	0.1038
Worker Vehicles	0.1170	1.1489	23.3567	14.1843	5.5693	2.5771
Non-Road Engines	0.48	1.29	3.60	3.87	3.13	0.5977
Marine Engines	0.00	2.26	6.72	2.70	2.63	0.4528
Locomotive Engines	0.00	0.5531	1.89	1.65	1.88	0.5531
Total Annual Emissions (tons)	**0.66**	**5.40**	**36.10**	**22.86**	**13.61**	**4.28**
$PM_{2.5}$						
On-Road Vehicles	0.0080	0.0346	0.1116	0.0698	0.0439	0.0043
Worker Vehicles	0.0012	0.0134	0.2937	0.1901	0.0793	0.0388
Non-Road Engines	0.41	1.11	2.95	2.71	1.97	0.3822
Marine Engines	0	0.0628	0.1864	0.0750	0.0729	0.0126
Locomotive Engines	0	0.0922	0.31	0.28	0.31	0.0922
Total Annual Emissions (tons)	**0.42**	**1.31**	**3.85**	**3.32**	**2.48**	**0.53**
NO_X						
On-Road Vehicles	0.351	1.513	4.834	3.157	2.067	0.203
Worker Vehicles	0.079	0.785	15.761	9.428	3.646	1.654
Non-Road Engines	6.982	17.954	46.340	43.012	29.947	5.265
Marine Engines	0	2.264	6.717	2.702	2.626	0.453
Locomotive Engines	0	2.766	9.449	8.251	9.403	2.766
Total Annual Emissions (tons)	**7.41**	**25.28**	**83.10**	**66.55**	**47.69**	**10.34**
CO_2						
On-Road Vehicles	90.91	418.07	1549.31	1202.13	923.56	120.27
Worker Vehicles	48.10	521.08	11431.83	7431.92	3099.43	1519.67
Non-Road Engines	904.84	2702.89	7306.35	6916.16	5374.23	1317.60
Marine Engines	0.00	202.30	600.15	241.41	234.67	40.46
Locomotive Engines	0	474.33	1620.61	1415.07	1612.71	474.33
Total Annual Emissions (tons)	**1043.85**	**4318.66**	**22508.25**	**17206.69**	**11244.60**	**3472.33**
SO_2						
On-Road Vehicles	0.0010	0.0041	0.0156	0.0123	0.0098	0.0016
Worker Vehicles	0.0009	0.0096	0.2109	0.1371	0.0572	0.0280
Non-Road Engines	0.0081	0.0236	0.0625	0.0583	0.0442	0.0102
Marine Engines	0.0000	0.0019	0.0057	0.0023	0.0022	0.0004
Locomotive Engines	0	0.0045	0.0154	0.0135	0.0153	0.0045
Total Annual Emissions (tons)	**0.0100**	**0.0438**	**0.3101**	**0.2234**	**0.1287**	**0.0448**

Notes:

1. Estimated emissions for all combustion sources except worker vehicles are based on a 75 percent utilization factor assuming that all equipment does not operate continuously over a full 10 hour shift.
2. The table above represents the best estimate of site preparation and construction emissions from combustion sources assumed to cover only those activities under the NRC's jurisdictional authority.

Appendix A.1.1
On-Road Vehicles

On-Road
Construction Vehicle Emission Factors

On-Road Construction Vehicle-Emission Factors

Appendix A.1.1

			Winter-2011					Winter-2012				
	Winter Emission Factors		**Emission Factors[2] (g/mi)**					**Emission Factors[2] (g/mi)**				
Equip ID	**Vehicle**	**Vehicle Classification[1]**	**VOC**	**PM2.5**	**NOx**	**CO2**	**SO2**	**VOC**	**PM2.5**	**NOx**	**CO2**	**SO2**
5	Dump Truck 6cyd highway use (F-650)	HDDV	0.3810	0.1491	6.36	1416.80	0.0132	0.3520	0.1261	5.48	1415.50	0.0132
10	Fuel/maintence truck (F550) diesel	HDDV	0.3810	0.1491	6.36	1416.80	0.0132	0.3520	0.1261	5.48	1415.50	0.0132
11	Flatbed truck (F550) diesel	HDDV	0.3810	0.1491	6.36	1416.80	0.0132	0.3520	0.1261	5.48	1415.50	0.0132
12	3/4 ton Pickup (F250) gas	LDGT	0.9900	0.0114	0.9760	514.30	0.0095	0.8810	0.0114	0.9050	514.80	0.0095
13	Water Truck (F750 240 HP)	HDDV	0.3810	0.1491	6.36	1416.80	0.0132	0.3520	0.1261	5.48	1415.50	0.0132
14	Concrete trucks	HDDV	0.3810	0.1491	6.36	1416.80	0.0132	0.3520	0.1261	5.48	1415.50	0.0132
15	Dump Trucks 30cyd Haul in Fill Material and Aggregate Delivery	HDDV	0.3810	0.1491	6.36	1416.80	0.0132	0.3520	0.1261	5.48	1415.50	0.0132
35	Yard Truck	HDDV	0.3810	0.1491	6.36	1416.80	0.0132	0.3520	0.1261	5.48	1415.50	0.0132

			Summer-2011					Summer-2012				
	Summer Emission Factors		**Emission Factors[2] (g/mi)**					**Emission Factors[2] (g/mi)**				
Equip ID	**Vehicle**	**Vehicle Classification[1]**	**VOC**	**PM2.5**	**NOx**	**CO2**	**SO2**	**VOC**	**PM2.5**	**NOx**	**CO2**	**SO2**
5	Dump Truck 6cyd highway use (F-650)	HDDV	0.3710	0.1395	5.91	1416.20	0.0132	0.3450	0.1183	5.10	1415.00	0.0132
10	Fuel/maintence truck (F550) diesel	HDDV	0.3710	0.1395	5.91	1416.20	0.0132	0.3450	0.1183	5.10	1415.00	0.0132
11	Flatbed truck (F550) diesel	HDDV	0.3710	0.1395	5.91	1416.20	0.0132	0.3450	0.1183	5.10	1415.00	0.0132
12	3/4 ton Pickup (F250) gas	LDGT	1.43	0.0114	0.7660	514.70	0.0095	1.31	0.0114	0.7140	515.10	0.0095
13	Water Truck (F750 240 HP)	HDDV	0.3710	0.1395	5.91	1416.20	0.0132	0.3450	0.1183	5.10	1415.00	0.0132
14	Concrete trucks	HDDV	0.3710	0.1395	5.91	1416.20	0.0132	0.3450	0.1183	5.10	1415.00	0.0132
15	Dump Trucks 30cyd Haul in Fill Material and Aggregate Delivery	HDDV	0.3710	0.1395	5.91	1416.20	0.0132	0.3450	0.1183	5.10	1415.00	0.0132
35	Yard Truck	HDDV	0.3710	0.1395	5.91	1416.20	0.0132	0.3450	0.1183	5.10	1415.00	0.0132

			Annual-2011					Annual-2012				
	Annual Emission Factors		**Emission Factors[3] (g/mi)**					**Emission Factors[3] (g/mi)**				
Equip ID	**Vehicle**	**Vehicle Classification[1]**	**VOC**	**PM2.5**	**NOx**	**CO2**	**SO2**	**VOC**	**PM2.5**	**NOx**	**CO2**	**SO2**
5	Dump Truck 6cyd highway use (F-650)	HDDV	0.3760	0.1443	6.14	1416.50	0.0132	0.3485	0.1222	5.29	1415.25	0.0132
10	Fuel/maintence truck (F550) diesel	HDDV	0.3760	0.1443	6.14	1416.50	0.0132	0.3485	0.1222	5.29	1415.25	0.0132
11	Flatbed truck (F550) diesel	HDDV	0.3760	0.1443	6.14	1416.50	0.0132	0.3485	0.1222	5.29	1415.25	0.0132
12	3/4 ton Pickup (F250) gas	LDGT	1.21	0.0114	0.8710	514.50	0.0095	1.10	0.0114	0.8095	514.95	0.0095
13	Water Truck (F750 240 HP)	HDDV	0.3760	0.1443	6.14	1416.50	0.0132	0.3485	0.1222	5.29	1415.25	0.0132
14	Concrete trucks	HDDV	0.3760	0.1443	6.14	1416.50	0.0132	0.3485	0.1222	5.29	1415.25	0.0132
15	Dump Trucks 30cyd Haul in Fill Material and Aggregate Delivery	HDDV	0.3760	0.1443	6.14	1416.50	0.0132	0.3485	0.1222	5.29	1415.25	0.0132
35	Yard Truck	HDDV	0.3760	0.1443	6.14	1416.50	0.0132	0.3485	0.1222	5.29	1415.25	0.0132

Notes:

1. The vehicle classification for each mobile vehicle was obtained from Table 3 "Complete MOBILE6 Vehicle Classifications" in Appendix B of USEPA, "User's Guide to MOBILE6.1 and MOBILE6.2," EPA420-R-03-010, August 2003.
2. January (Winter) and July (Summer) emission factors for the light duty gasoline truck (LDGT) and heavy duty diesel vehicles (HDDV) were obtained from USEPA's MOBILE6.2 model.
3. The annual emission factor is an average emission factor derived from the Winter and Summer emission factors.

On-Road Construction Vehicle-Emission Factors (Continued)

Appendix A.1.1

Winter-2013					Winter-2014					Winter-2015					Winter-2016				
Emission Factors[2] (g/mi)					Emission Factors[2] (g/mi)					Emission Factors[2] (g/mi)					Emission Factors[2] (g/mi)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.3370	0.1100	4.74	1414.30	0.0132	0.3210	0.0899	4.04	1413.50	0.0132	0.3040	0.0750	3.51	1412.60	0.0132	0.2950	0.0670	3.09	1412.10	0.0132
0.3370	0.1100	4.74	1414.30	0.0132	0.3210	0.0899	4.04	1413.50	0.0132	0.3040	0.0750	3.51	1412.60	0.0132	0.2950	0.0670	3.09	1412.10	0.0132
0.3370	0.1100	4.74	1414.30	0.0132	0.3210	0.0899	4.04	1413.50	0.0132	0.3040	0.0750	3.51	1412.60	0.0132	0.2950	0.0670	3.09	1412.10	0.0132
0.8190	0.0114	0.8290	515.20	0.0115	0.7710	0.0113	0.7640	515.40	0.0095	0.7340	0.0113	0.7110	515.50	0.0095	0.6910	0.0113	0.6570	515.70	0.0095
0.3370	0.1100	4.74	1414.30	0.0132	0.3210	0.0899	4.04	1413.50	0.0132	0.3040	0.0750	3.51	1412.60	0.0132	0.2950	0.0670	3.09	1412.10	0.0132
0.3370	0.1100	4.74	1414.30	0.0132	0.3210	0.0899	4.04	1413.50	0.0132	0.3040	0.0750	3.51	1412.60	0.0132	0.2950	0.0670	3.09	1412.10	0.0132
0.3370	0.1100	4.74	1414.30	0.0132	0.3210	0.0899	4.04	1413.50	0.0132	0.3040	0.0750	3.51	1412.60	0.0132	0.2950	0.0670	3.09	1412.10	0.0132
0.3370	0.1100	4.74	1414.30	0.0132	0.3210	0.0899	4.04	1413.50	0.0132	0.3040	0.0750	3.51	1412.60	0.0132	0.2950	0.0670	3.09	1412.10	0.0132

Summer-2013					Summer-2014					Summer-2015					Summer-2016				
Emission Factors[2] (g/mi)					Emission Factors[2] (g/mi)					Emission Factors[2] (g/mi)					Emission Factors[2] (g/mi)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.3300	0.1034	4.41	1413.90	0.0132	0.3150	0.0849	3.77	1413.10	0.0132	0.3000	0.0712	3.28	1412.30	0.0132	0.2910	0.0638	2.89	1411.90	0.0132
0.3300	0.1034	4.41	1413.90	0.0132	0.3150	0.0849	3.77	1413.10	0.0132	0.3000	0.0712	3.28	1412.30	0.0132	0.2910	0.0638	2.89	1411.90	0.0132
0.3300	0.1034	4.41	1413.90	0.0132	0.3150	0.0849	3.77	1413.10	0.0132	0.3000	0.0712	3.28	1412.30	0.0132	0.2910	0.0638	2.89	1411.90	0.0132
1.23	0.0114	0.6580	515.50	0.0095	1.16	0.0113	0.6100	515.70	0.0095	1.09	0.0113	0.5710	515.80	0.0095	1.04	0.0113	0.5330	516.00	0.0095
0.3300	0.1034	4.41	1413.90	0.0132	0.3150	0.0849	3.77	1413.10	0.0132	0.3000	0.0712	3.28	1412.30	0.0132	0.2910	0.0638	2.89	1411.90	0.0132
0.3300	0.1034	4.41	1413.90	0.0132	0.3150	0.0849	3.77	1413.10	0.0132	0.3000	0.0712	3.28	1412.30	0.0132	0.2910	0.0638	2.89	1411.90	0.0132
0.3300	0.1034	4.41	1413.90	0.0132	0.3150	0.0849	3.77	1413.10	0.0132	0.3000	0.0712	3.28	1412.30	0.0132	0.2910	0.0638	2.89	1411.90	0.0132
0.3300	0.1034	4.41	1413.90	0.0132	0.3150	0.0849	3.77	1413.10	0.0132	0.3000	0.0712	3.28	1412.30	0.0132	0.2910	0.0638	2.89	1411.90	0.0132

Annual-2013					Annual-2014					Annual-2015					Annual-2016				
Emission Factors[3] (g/mi)					Emission Factors[3] (g/mi)					Emission Factors[3] (g/mi)					Emission Factors[3] (g/mi)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.3335	0.1067	4.57	1414.10	0.0132	0.3180	0.0874	3.90	1413.30	0.0132	0.3020	0.0731	3.39	1412.45	0.0132	0.2930	0.0654	2.99	1412.00	0.0132
0.3335	0.1067	4.57	1414.10	0.0132	0.3180	0.0874	3.90	1413.30	0.0132	0.3020	0.0731	3.39	1412.45	0.0132	0.2930	0.0654	2.99	1412.00	0.0132
0.3335	0.1067	4.57	1414.10	0.0132	0.3180	0.0874	3.90	1413.30	0.0132	0.3020	0.0731	3.39	1412.45	0.0132	0.2930	0.0654	2.99	1412.00	0.0132
1.02	0.0114	0.7435	515.35	0.0105	0.9630	0.0113	0.6870	515.55	0.0095	0.9130	0.0113	0.6410	515.65	0.0095	0.8635	0.0113	0.5950	515.85	0.0095
0.3335	0.1067	4.57	1414.10	0.0132	0.3180	0.0874	3.90	1413.30	0.0132	0.3020	0.0731	3.39	1412.45	0.0132	0.2930	0.0654	2.99	1412.00	0.0132
0.3335	0.1067	4.57	1414.10	0.0132	0.3180	0.0874	3.90	1413.30	0.0132	0.3020	0.0731	3.39	1412.45	0.0132	0.2930	0.0654	2.99	1412.00	0.0132
0.3335	0.1067	4.57	1414.10	0.0132	0.3180	0.0874	3.90	1413.30	0.0132	0.3020	0.0731	3.39	1412.45	0.0132	0.2930	0.0654	2.99	1412.00	0.0132
0.3335	0.1067	4.57	1414.10	0.0132	0.3180	0.0874	3.90	1413.30	0.0132	0.3020	0.0731	3.39	1412.45	0.0132	0.2930	0.0654	2.99	1412.00	0.0132

On-Road
Construction Vehicle Emission Calculations

On-Road Construction Vehicles-Emission Calculations

Appendix A.1.1

				2011 April					2011 May				
				Estimated Emissions[3] (ton/month)					Estimated Emissions[3] (ton/month)				
Equip ID	Vehicle	Average Speed[1] (mph)	Hours of Operation[2] (hours/month)	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
5	Dump Truck 6cyd highway use (F-650)	10	300	0.0012	0.0005	0.0203	4.68	0.0000	0.0012	0.0005	0.0203	4.68	4.37E-05
10	Fuel/maintence truck (F550) diesel	10	300	0.0012	0.0005	0.0203	4.68	0.0000	0.0012	0.0005	0.0203	4.68	4.37E-05
11	Flatbed truck (F550) diesel	10	300	0.0012	0.0005	0.0203	4.68	0.0000	0.0025	0.0010	0.0406	9.37	8.73E-05
12	3/4 ton Pickup (F250) gas	10	300	0.0080	0.0001	0.0058	3.40	0.0001	0.0080	7.54E-05	0.0058	3.40	6.28E-05
13	Water Truck (F750 240 HP)	10	300	0.0012	0.0005	0.0203	4.68	0.0000	0.0025	0.0010	0.0406	9.37	8.73E-05
14	Concrete trucks	10	300	0	0	0	0	0	0.0012	0.0005	0.0203	4.68	4.37E-05
15	Dump Trucks 30cyd Haul in Fill Material and Aggregate Delivery	10	300	0	0	0	0	0	0	0	0	0	0
35	Yard Truck	10	300	0	0	0	0	0	0	0	0	0	0
		Total Monthly Emissons		0.0130	0.0020	0.0869	22.14	0.0002	0.0167	0.0034	0.1478	36.19	0.0004

Notes:

1. It is assumed that the average vehicle speed for each onroad mobile vehcile will be 10 mph.
2. Hours of Operation is based on a schedule of 10 hours per day and 30 days per month
3. Monthly estimated emissions are based on the scheduled use of the equipment for each month, emission factors from USEPA's MOBILE6.2 model, average vehicle speed, and hours of operation per month.

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2011 June Estimated Emissions[3] (ton/month)					2011 July Estimated Emissions[3] (ton/month)					2011 August Estimated Emissions[3] (ton/month)					2011 September Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05	1.24E-03	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05
0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05
0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05
0.0160	0.0002	0.0115	6.81	0.0001	0.0160	0.0002	0.0115	6.81	0.0001	0.0160	0.0002	0.0115	6.81	0.0001	0.0280	0.0003	0.0202	11.91	0.0002
0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05
0.0037	0.0014	0.0609	14.05	0.0001	0.0037	0.0014	0.0609	14.05	0.0001	0.0050	0.0019	0.0812	18.74	0.0002	0.0050	0.0019	0.0812	18.74	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0272	0.0044	0.1941	48.96	0.0005	0.0272	0.0044	0.1941	48.96	0.0005	0.0285	0.0049	0.2144	53.65	0.0006	0.0405	0.0050	0.2231	58.75	0.0007

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2011 October Estimated Emissions[3] (ton/month)					2011 November Estimated Emissions[3] (ton/month)					2011 December Estimated Emissions[3] (ton/month)					2012 January Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05
0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0005	0.0203	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05
0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0.0280	0.0003	0.0202	11.91	0.0002	0.0280	0.0003	0.0202	11.91	0.0002	0.0280	0.0003	0.0202	11.91	0.0002	0.0254	0.0003	0.0187	11.92	0.0002
0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37E+00	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0	0	0	0	0	0	0	0	0	0	0.0025	0.0010	0.0406	9.37	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0380	0.0041	0.1825	49.38	0.0006	0.0380	0.0041	0.182493	49.38	0.0006	0.0405	0.0050	0.2231	58.75	0.0007	0.0369	0.0043	0.1937	58.72	0.0007

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2012 February Estimated Emissions[3] (ton/month)					2012 March Estimated Emissions[3] (ton/month)					2012 April Estimated Emissions[3] (ton/month)					2012 May Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05
0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0.0254	0.0003	0.0187	11.92	0.0002	0.0254	0.0003	0.0187	11.92	0.0002	0.0181	0.0002	0.0134	8.51	0.0002	0.0181	0.0002	0.0134	8.51	0.0002
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0000	0.0000	0	0	0	0	0.0000	0.0000	0	0
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0	0.0000	0.0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0369	0.0043	0.1937	58.72	0.0007	0.0369	0.0043	0.1937	58.72	0.0007	0.0273	0.0034	0.1533	45.96	0.0005	0.0273	0.0034	0.1533	45.96	0.0005

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2012 June Estimated Emissions[3] (ton/month)					2012 July Estimated Emissions[3] (ton/month)					2012 August Estimated Emissions[3] (ton/month)					2012 September Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05
0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0.0181	0.0002	0.0134	8.51	0.0002	0.0181	0.0002	0.0134	8.51	0.0002	0.0181	0.0002	0.0134	8.51	0.0002	0.0181	0.0002	0.0134	8.51	0.0002
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.002305	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0273	0.0034	0.1533	45.96	0.0005	0.0273	0.0034	0.1533	45.96	0.0005	0.0273	0.0034	0.1533	45.96	0.0005	0.0250	0.0026	0.1184	36.60	0.0004

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2012 October Estimated Emissions[3] (ton/month)					2012 November Estimated Emissions[3] (ton/month)					2012 December Estimated Emissions[3] (ton/month)					2013 January Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05
0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05
0.0181	0.0002	0.0134	8.51	0.0002	0.0181	0.0002	0.0134	8.51	0.0002	0.0181	0.0002	0.0134	8.51	0.0002	0.0169	0.0002	0.0123	8.52	0.0002
0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0023	0.0008	0.0350	9.36	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05
0.0092	0.0032	0.1400	37.44	0.0003	0.0092	0.0032	0.1400	37.44	0.0003	0.0092	0.0032	0.1400	37.44	0.0003	0.0088	0.0028	0.1210	37.41	0.0003
0.0230	0.0081	0.3499	93.60	0.0009	0.0230	0.0081	0.3499	93.60	0.0009	0.0230	0.0081	0.3499	93.60	0.0009	0.0243	0.0078	0.3328	102.88	0.0010
0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0012	0.0004	0.0175	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05
0.0596	0.0147	0.6432	177.00	0.0017	0.0596	0.0147	0.6432	177.00	0.0017	0.0596	0.0147	0.6432	177.00	0.0017	0.0588	0.0136	0.5871	186.22	0.0018

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2013 February Estimated Emissions[3] (ton/month)					2013 March Estimated Emissions[3] (ton/month)					2013 April Estimated Emissions[3] (ton/month)					2013 May Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05
0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05
0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0044	0.0014	0.0605	18.71	0.0002	0.0044	0.0014	0.0605	18.71	0.0002
0.0169	0.0002	0.0123	8.52	0.0002	0.0169	0.0002	0.0123	8.52	0.0002	0.0271	0.0003	0.0197	13.63	0.0003	0.0271	0.0003	0.0197	13.63	0.0003
0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05
0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009
0.0243	0.0078	0.3328	102.88	0.0010	0.0243	0.0078	0.3328	102.88	0.0010	0.0088	0.0028	0.1210	37.41	0.0003	0.0088	0.0028	0.1210	37.41	0.0003
0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05
0.0721	0.0178	0.7687	242.34	0.0024	0.0721	0.0178	0.7687	242.34	0.0024	0.0690	0.0137	0.5945	191.33	0.0019	0.0690	0.0137	0.5945	191.33	0.0019

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2013 June Estimated Emissions[3] (ton/month)					2013 July Estimated Emissions[3] (ton/month)					2013 August Estimated Emissions[3] (ton/month)					2013 September Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05
0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05
0.0044	0.0014	0.0605	18.71	0.0002	0.0044	0.0014	0.0605	18.71	0.0002	0.0044	0.0014	0.0605	18.71	0.0002	0.0044	0.0014	0.0605	18.71	0.0002
0.0271	0.0003	0.0197	13.63	0.0003	0.0271	0.0003	0.0197	13.63	0.0003	0.0271	0.0003	0.0197	13.63	0.0003	0.0271	0.0003	0.0197	13.63	0.0003
0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05
0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009
0.0088	0.0028	0.1210	37.41	0.0003	0.0088	0.0028	0.1210	37.41	0.0003	0.0088	0.0028	0.1210	37.41	0.0003	0.0088	0.0028	0.1210	37.41	0.0003
0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05
0.0690	0.0137	0.5945	191.33	0.0019	0.0690	0.0137	0.5945	191.33	0.0019	0.0690	0.0137	0.5945	191.33	0.0019	0.0690	0.0137	0.5945	191.33	0.0019

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2013 October Estimated Emissions[3] (ton/month)					2013 November Estimated Emissions[3] (ton/month)					2013 December Estimated Emissions[3] (ton/month)					2014 January Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05
0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05
0.0044	0.0014	0.0605	18.71	0.0002	0.0044	0.0014	0.0605	18.71	0.0002	0.0044	0.0014	0.0605	18.71	0.0002	0.0042	0.0012	0.0516	18.69	0.0002
0.0338	0.0004	0.0246	17.04	0.0003	0.0338	0.0004	0.0246	17.04	0.0003	0.0338	0.0004	0.0246	17.04	0.0003	0.0318	0.0004	0.0227	17.05	0.0003
0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0004	0.0151	4.68	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05
0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009	0.0221	0.0071	0.3026	93.53	0.0009	0.0210	0.0058	0.2582	93.47	0.0009
0.0088	0.0028	0.1210	37.41	0.0003	0.0088	0.0028	0.1210	37.41	0.0003	0.0088	0.0028	0.1210	37.41	0.0003	0.0084	0.0023	0.1033	37.39	0.0003
0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0022	0.0007	0.0303	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05
0.0757	0.0138	0.5994	194.74	0.0020	0.0757	0.0138	0.5994	194.74	0.0020	0.0757	0.0138	0.5994	194.74	0.0020	0.0718	0.0114	0.5132	194.65	0.0020

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2014 February Estimated Emissions[3] (ton/month)					2014 March Estimated Emissions[3] (ton/month)					2014 April Estimated Emissions[3] (ton/month)					2014 May Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05
0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05
0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002
0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003
0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05
0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009
0.0084	0.0023	0.1033	37.39	0.0003	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002
0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05
0.0718	0.0114	0.5132	194.65	0.0020	0.0676	0.0102	0.4616	175.95	0.0018	0.0676	0.0102	0.4616	175.95	0.0018	0.0676	0.0102	0.4616	175.95	0.0018

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2014 June Estimated Emissions[3] (ton/month)					2014 July Estimated Emissions[3] (ton/month)					2014 August Estimated Emissions[3] (ton/month)					2014 September Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05
0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05
0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002
0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003
0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05
0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009
0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002
0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05
0.0676	0.0102	0.4616	175.95	0.0018	0.0676	0.0102	0.4616	175.95	0.0018	0.0676	0.0102	0.4616	175.95	0.0018	0.0676	0.0102	0.4616	175.95	0.0018

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2014 October Estimated Emissions[3] (ton/month)					2014 November Estimated Emissions[3] (ton/month)					2014 December Estimated Emissions[3] (ton/month)					2015 January Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05
0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05
0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0040	0.0010	0.0449	18.68	0.0002
0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003	0.0318	0.0004	0.0227	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003
0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0011	0.0003	0.0129	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05
0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009	0.0210	0.0058	0.2582	93.47	0.0009	0.0200	0.0048	0.2243	93.42	0.0009
0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0042	0.0012	0.0516	18.69	0.0002	0.0040	0.0010	0.0449	18.68	0.0002
0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0021	0.0006	0.0258	9.35	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05
0.0676	0.0102	0.4616	175.95	0.0018	0.0676	0.0102	0.4616	175.95	0.0018	0.0676	0.0102	0.4616	175.95	0.0018	0.0641	0.0086	0.4026	175.86	0.0018

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2015 February Estimated Emissions[3] (ton/month)					2015 March Estimated Emissions[3] (ton/month)					2015 April Estimated Emissions[3] (ton/month)					2015 May Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05
0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05
0.0040	0.0010	0.0449	18.68	0.0002	0.0040	0.0010	0.0449	18.68	0.0002	0.0040	0.0010	0.0449	18.68	0.0002	0.0040	0.0010	0.0449	18.68	0.0002
0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003
0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05
0.0200	0.0048	0.2243	93.42	0.0009	0.0200	0.0048	0.2243	93.42	0.0009	0.0200	0.0048	0.2243	93.42	0.0009	0.0200	0.0048	0.2243	93.42	0.0009
0.0040	0.0010	0.0449	18.68	0.0002	0.0040	0.0010	0.0449	18.68	0.0002	0.0040	0.0010	0.0449	18.68	0.0002	0.0040	0.0010	0.0449	18.68	0.0002
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05
0.0641	0.0086	0.4026	175.86	0.0018	0.0641	0.0086	0.4026	175.86	0.0018	0.0641	0.0086	0.4026	175.86	0.0018	0.0641	0.0086	0.4026	175.86	0.0018

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2015 June Estimated Emissions[3] (ton/month)					2015 July Estimated Emissions[3] (ton/month)					2015 August Estimated Emissions[3] (ton/month)					2015 September Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0	0	0	0	0	0	0	0	0	0
0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05
0.0040	0.0010	0.0449	18.68	0.0002	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05
0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003
0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0	0	0	0.00	0	0	0	0	0	0
0.0200	0.0048	0.2243	93.42	0.0009	0.0200	0.0048	0.2243	93.42	0.0009	0.0200	0.0048	0.2243	93.42	0.0009	0	0	0	0	0
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05
0.0622	0.0081	0.3801	166.52	0.0017	0.0602	0.0076	0.3577	157.18	0.0016	0.0572	0.0069	0.3241	143.17	0.0015	0.0372	0.0021	0.0997	49.75	0.0006

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2015 October Estimated Emissions[3] (ton/month)					2015 November Estimated Emissions[3] (ton/month)					2015 December Estimated Emissions[3] (ton/month)					2016 January Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0112	4.67	4.37E-05	0.0010	0.0002	0.0099	4.67	4.37E-05
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0019	0.0004	0.0198	9.34	8.73E-05
0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003	0.0302	0.0004	0.0212	17.05	0.0003	0.0286	0.0004	0.0197	17.06	0.0003
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0019	0.0004	0.0198	9.34	8.73E-05
0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0020	0.0005	0.0224	9.34	8.73E-05	0.0019	0.0004	0.0198	9.34	8.73E-05
0.0372	0.0021	0.0997	49.75	0.0006	0.0372	0.0021	0.0997	49.75	0.0006	0.0372	0.0021	0.0997	49.75	0.0006	0.0353	0.0019	0.0888	49.74	0.0006

On-Road Construction Vehicles-Emission Calculations (Continued)

Appendix A.1.1

2016 February Estimated Emissions[3] (ton/month)					2016 March Estimated Emissions[3] (ton/month)					2016 April Estimated Emissions[3] (ton/month)					2016 May Estimated Emissions[3] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0010	0.0002	0.0099	4.67	4.37E-05	0.0010	0.0002	0.0099	4.67	4.37E-05	0.0010	0.0002	0.0099	4.67	4.37E-05	0.0010	0.0002	0.0099	4.67	4.37E-05
0.0019	0.0004	0.0198	9.34	8.73E-05	0.0019	0.0004	0.0198	9.34	8.73E-05	0	0	0	0	0	0	0	0	0	0
0.0286	0.0004	0.0197	17.06	0.0003	0.0286	0.0004	0.0197	17.06	0.0003	0.0171	0.0002	0.0118	10.24	0.0002	0.0171	0.0002	0.0118	10.24	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0019	0.0004	0.0198	9.34	8.73E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0019	0.0004	0.0198	9.34	8.73E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0353	0.0019	0.0888	49.74	0.0006	0.0315	0.0010	0.0493	31.07	0.0004	0.0181	0.0004	0.0217	14.90	0.0002	0.0181	0.0004	0.0217	14.90	0.0002

Passenger Vehicle Emission Factors and Estimated Emissions

Passenger Vehicle Emission Factors and Estimated Emissions

Appendix A.1.1

Annual Emission Factors	2011 Emission Factors[1] (g/mi)					2012 Emission Factors[1] (g/mi)					2013 Emission Factors[1] (g/mi)				
	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
Winter Emission Factors															
Passenger Cars	0.6580	0.0113	0.6260	368.10	0.0068	0.5980	0.0113	0.5670	368.10	0.0068	0.5530	0.0113	0.5150	368.10	0.0068
Light-Duty Gasoline Trucks	0.9900	0.0114	0.9760	514.30	0.0095	0.8810	0.0114	0.9050	514.80	0.0095	0.8190	0.0114	0.8290	515.20	0.0095
Summer Emission Factors															
Passenger Cars	1.22	0.0113	0.5240	368.10	0.0068	1.10	0.0113	0.4760	368.10	0.0068	1.01	0.0113	0.4340	368.10	0.0068
Light-Duty Gasoline Trucks	1.43	0.0114	0.7660	514.70	0.0095	1.31	0.0114	0.7140	515.10	0.0095	1.23	0.0114	0.6580	515.50	0.0095
Annual Emission Factors[2]															
Passenger Cars	0.9365	0.0113	0.5750	368.10	0.0068	0.85	0.0113	0.5215	368.10	0.0068	0.7820	0.0113	0.4745	368.10	0.0068
Light-Duty Gasoline Trucks	1.21	0.0114	0.8710	514.50	0.0095	1.10	0.0114	0.8095	514.95	0.0095	1.02	0.0114	0.7435	515.35	0.0095

Notes:

1. Emission Factors for Passenger Car (LDGV) and Light-Duty Gasoline Truck (LDGT All) were obtained from MOBILE6.2 model.
2. The annual emission factor is an average emission factor derived from the January and July emission factors.

Annual Estimated Emissions			2011 Estimated Emissions (ton/month)					2012 Estimated Emissions (ton/month)					2013 Estimated Emissions (ton/month)				
Vehicle Type	Miles/Trip[3]	Days/Month[4]	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
Passenger Cars	57.22	30	0.0638	0.0008	0.0392	25.08	0.0005	0.1521	0.0020	0.0933	65.82	0.0012	0.9872	0.0143	0.5990	464.70	0.0086
Light-Duty Gasoline Trucks	57.22	30	0.0825	0.0008	0.0593	35.05	0.0006	0.1961	0.0020	0.1448	92.08	0.0017	1.2915	0.0144	0.9386	650.60	0.0120
Total Monthly Emissions from Worker Vehicles			0.1463	0.0015	0.0985	60.12	0.0011	0.3482	0.0041	0.2380	157.90	0.0029	2.2787	0.0287	1.5376	1115.30	0.0206
			Trips/Day[1][2]			36		Trips/Day[1][2]			94.5		Trips/Day[1][2]			667.17	

Notes:

1. The trips per day are based on monthly project estimates for the expected distribution of workers averaged over each year of the construction schedule accounting for carpooling. The carpooling rate of 0.72 vehicles/employee is from The Mannik & Smith Group, Inc., "Traffic Study: Fermi Nuclear Power Plant Unit 3 Expansion," Section 3.4.2, November 2009.
2. It is assumed that the fleet of worker vehicles will be 50% passenger cars and 50% light-duty gasoline trucks.
3. Total miles/trip is based on the average roundtrip commuting distance indicated in Table 4.4-4(A) of the response to RAI TR4.8.3-2 modified to account for vehicles traveling only within the non-attainment/maintenance area.
4. It is assumed that each month contains 30 days.

Passenger Vehicle Emission Factors and Estimated Emissions (Continued)

Appendix A.1.1

2014					2015					2016				
Emission Factors[1] (g/mi)					Emission Factors[1] (g/mi)					Emission Factors[1] (g/mi)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.5140	0.0113	0.4700	368.10	0.0068	0.4820	0.0113	0.4310	368.10	0.0068	0.4560	0.0113	0.3960	368.10	0.0068
0.7710	0.0113	0.7640	515.40	0.0095	0.7340	0.0113	0.7110	515.50	0.0095	0.6910	0.0113	0.6570	515.70	0.0095
0.9330	0.0113	0.3980	368.10	0.0068	0.8680	0.0113	0.3660	368.10	0.0068	0.8150	0.0112	0.3380	368.10	0.0068
1.16	0.0113	0.6100	515.70	0.0095	1.09	0.0113	0.5710	515.80	0.0095	1.04	0.0113	0.5330	516.00	0.0095
0.7235	0.0113	0.4340	368.10	0.0068	0.6750	0.0113	0.3985	368.10	0.0068	0.6355	0.0113	0.3670	368.10	0.0068
0.9630	0.0113	0.6870	515.55	0.0095	0.9130	0.0113	0.6410	515.65	0.0095	0.8635	0.0113	0.5950	515.85	0.0095

2014					2015					2016				
Estimated Emissions (ton/month)					Estimated Emissions (ton/month)					Estimated Emissions (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.6799	0.0106	0.4078	345.91	0.0064	0.2321	0.0039	0.1370	126.57	0.0023	0.2185	0.0039	0.1262	126.57	0.0023
0.9049	0.0106	0.6456	484.47	0.0089	0.3139	0.0039	0.2204	177.30	0.0033	0.2969	0.0039	0.2046	177.37	0.0033
1.5848	0.0212	1.0534	830.38	0.0153	0.5460	0.0078	0.3574	303.87	0.0056	0.5154	0.0078	0.3308	303.93	0.0056
Trips/Day[1][2]			496.62		Trips/Day[1][2]			181.71		Trips/Day[1][2]			181.71	

Appendix A.1.2
Non-Road Engines

Non-Road
Emission Factors

Non-Road Engines-Emission Factors

Appendix A.1.2

Equip ID	Equipment	SCC Code[1]	Engine Rating[2] (hp)	Load Factor[3]	2011 Emission Factors[4] (g/bhp-hr)					2012 Emission Factors[4] (g/bhp-hr)					2013 Emission Factors[4] (g/bhp-hr)				
					VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
1	Trackhoe Cat 320 Track	2270002036	143	0.59	0.2723	0.3209	3.32	536.01	0.0049	0.2451	0.2900	2.96	536.09	0.0047	0.2198	0.2587	2.64	536.17	0.0045
2	Loader-Frontend	2270002060	393	0.59	0.2451	0.2422	4.27	536.09	0.0048	0.2303	0.2213	3.96	536.13	0.0047	0.2180	0.2022	3.67	536.17	0.0046
3	Bulldozer Cat /D9	2270002069	464	0.59	0.2160	0.2132	3.84	536.18	0.0048	0.2039	0.1944	3.52	536.21	0.0047	0.1931	0.1767	3.21	536.25	0.0046
4-a	Scraper Cat 651-Tractor Engine	2270002018	526	0.59	0.2183	0.2160	3.89	536.17	0.0048	0.2064	0.1968	3.57	536.21	0.0047	0.1958	0.1789	3.26	536.24	0.0046
4-b	Scraper Cat 651-Scraper Engine	2270002018	303	0.59	0.2183	0.2160	3.89	536.17	0.0048	0.2064	0.1968	3.57	536.21	0.0047	0.1958	0.1789	3.26	536.24	0.0046
6	Dump Truck non-highway use	2270002051	598	0.59	0.1791	0.1914	2.97	536.29	0.0047	0.1724	0.1704	2.63	536.31	0.0046	0.1662	0.1487	2.33	536.33	0.0044
7	Riding roller compactor	2270002015	173	0.59	0.3087	0.3240	3.83	535.90	0.0049	0.2843	0.2960	3.47	535.97	0.0048	0.2615	0.2687	3.13	536.04	0.0046
8	Crane RT 60T	2270002045	200	0.43	0.2664	0.1646	3.71	530.24	0.0047	0.2473	0.1466	3.35	530.29	0.0046	0.2294	0.1290	3.02	530.35	0.0045
9	Grader 200hp 14'	2270002048	183	0.59	0.2476	0.2080	3.16	536.08	0.0048	0.2266	0.1849	2.84	536.14	0.0046	0.2074	0.1626	2.55	536.20	0.0044
16	Extended Boom Forklift	2270002060	125	0.59	0.3087	0.3241	3.82	535.90	0.0049	0.2843	0.2960	3.46	535.97	0.0048	0.2615	0.2687	3.13	536.04	0.0046
17	Skid Steer	2270002072	75	0.21	1.62	1.12	6.39	691.08	0.0064	1.51	1.06	6.14	691.42	0.0064	1.41	0.9963	5.91	691.73	0.0063
18	Crane (Manitowac 1015)	2270002045	600	0.43	0.2609	0.1915	4.57	530.25	0.0048	0.2385	0.1712	4.22	530.32	0.0047	0.2247	0.1558	3.92	530.36	0.0046
19	Crane (Manitowac 8000)	2270002045	213	0.43	0.2664	0.1646	3.71	530.24	0.0047	0.2473	0.1466	3.35	530.29	0.0046	0.2294	0.1290	3.02	530.35	0.0045
20	Generator 15kw Diesel	2270006005	20	0.43	0.9378	0.5609	5.88	587.53	0.0054	0.8775	0.5302	5.70	587.71	0.0054	0.8200	0.5012	5.53	587.89	0.0054
21	Diesel power generator -Caterpillar© C-15 Tier III Diesel (450hp)	2270006005	469	0.43	0.4027	0.2643	5.32	529.82	0.0048	0.3747	0.2398	5.06	529.91	0.0047	0.3502	0.2192	4.80	529.98	0.0047
21	Mud Seperator Pump Caterpillar© C-15 Tier III Diesel (450hp)	2270006010	469	0.43	0.4041	0.2739	5.33	529.82	0.0048	0.3759	0.2487	5.07	529.90	0.0047	0.3513	0.2276	4.81	529.98	0.0047
22	Light Plants 7Kw	2270002027	8	0.43	0.7841	0.5527	5.34	587.99	0.0054	0.7432	0.5185	5.12	588.12	0.0054	0.7086	0.4905	4.94	588.22	0.0054
23	Sump Pump 6" Portable Water Pumps	2270006010	80	0.43	0.6733	0.5747	5.59	588.33	0.0054	0.6341	0.5396	5.34	588.45	0.0053	0.5975	0.5071	5.10	588.56	0.0052
25	Dragline-Crane (Manitowac 222)	2270002045	230	0.43	0.2664	0.1646	3.71	530.24	0.0047	0.2473	0.1466	3.35	530.29	0.0046	0.2294	0.1290	3.02	530.35	0.0045
27	Welder/Generator 10KW	2270006025	19	0.21	2.08	1.12	6.50	689.69	0.0063	1.91	1.04	6.28	690.20	0.0063	1.75	0.9687	6.07	690.68	0.0063
28	Compressor 185 CFM	2270006015	61	0.43	0.4526	0.4026	4.75	589.00	0.0054	0.4179	0.3796	4.54	589.10	0.0054	0.3820	0.3439	4.34	589.21	0.0053
30	Forklift (3000lb capacity)	2270003020	56	0.59	0.2694	0.3028	3.51	595.34	0.0055	0.2325	0.2757	3.27	595.45	0.0055	0.2041	0.2236	3.16	595.54	0.0052
31	Forklift (10000lb capacity)	2270003020	92.5	0.59	0.2769	0.5073	3.60	595.32	0.0055	0.2286	0.4371	3.07	595.46	0.0052	0.1994	0.3490	2.68	595.55	0.0049
32	Forklift (35000lb capacity)	2270003020	164	0.59	0.2288	0.3435	2.88	536.14	0.0049	0.2045	0.2901	2.52	536.21	0.0046	0.1848	0.2324	2.20	536.27	0.0044
33	Air Compressors 750CFM	2270006015	300	0.43	0.2887	0.1806	4.04	530.17	0.0048	0.2694	0.1632	3.72	530.23	0.0046	0.2520	0.1469	3.41	530.28	0.0045
34	Portable welders/Generator	2270006025	63.4	0.21	1.49	1.05	6.10	691.49	0.0064	1.39	0.9945	5.88	691.78	0.0064	1.30	0.9311	5.68	692.05	0.0063
36	Crane RT 20T	2270002045	130	0.43	0.3031	0.2383	4.00	530.12	0.0049	0.2801	0.2172	3.63	530.19	0.0047	0.2587	0.1963	3.28	530.26	0.0046
37	Crane RT 100T	2270002045	275	0.43	0.2664	0.1646	3.71	530.24	0.0047	0.2473	0.1466	3.35	530.29	0.0046	0.2294	0.1290	3.02	530.35	0.0045
38-a	Crane RT 150T-Carrier Engine	2270002045	516	0.43	0.2609	0.1915	4.57	530.25	0.0048	0.2385	0.1712	4.22	530.32	0.0047	0.2247	0.1558	3.92	530.36	0.0046
38-b	Crane RT 150T-Superstructure Engine	2270002045	177	0.43	0.2664	0.1646	3.71	530.24	0.0047	0.2473	0.1466	3.35	530.29	0.0046	0.2294	0.1290	3.02	530.35	0.0045
39	Manitowac 21000 (crane)	2270002045	600	0.43	0.2609	0.1915	4.57	530.25	0.0048	0.2385	0.1712	4.22	530.32	0.0047	0.2247	0.1558	3.92	530.36	0.0046
40	JLG manlifts 50hp diesel	2270003010	49	0.21	2.31	1.12	6.26	688.99	0.0063	2.17	1.07	6.15	689.44	0.0063	2.02	1.01	5.96	689.89	0.0062
41	Gators ATV	2270001060	20.8	0.21	2.52	1.30	7.11	688.38	0.0063	2.38	1.24	6.93	688.80	0.0063	2.24	1.18	6.75	689.21	0.0063
43	Air Compressors 1600CFM	2270006015	540	0.43	0.3244	0.2335	4.90	530.06	0.0048	0.3003	0.2129	4.59	530.13	0.0047	0.2778	0.1934	4.30	530.20	0.0046
48	18" Booster Pump (3)	2270006010	1140	0.43	0.4041	0.2739	5.33	529.82	0.0048	0.3759	0.2487	5.07	529.90	0.0047	0.3513	0.2276	4.81	529.98	0.0047
49	14" Booster Pump	2270006010	443	0.43	0.4041	0.2739	5.33	529.82	0.0048	0.3759	0.2487	5.07	529.90	0.0047	0.3513	0.2276	4.81	529.98	0.0047

Notes:

1. Source Classification Codes (SCC) from Appendix B of USEPA's, "User's Guide for the Final NONROAD2005 Model," EPA-420-R-05-013, December 2005.
2. The engine rating for each piece of equipment was obtained from manufacturer specification sheets.
3. Load factors from Appendix A of USEPA, "Median Life, Annual Activity, and Load Factors Values for Nonroad Engine Emissions Modeling," EPA420-P-04-005, April 2004.
4. Annual Emission Factors obtained from USEPA's NONROAD2008a Model (available at http://www.epa.gov/oms/nonrdmdl.htm).

Non-Road Engines-Emission Factors (Continued)

Appendix A.1.2

2014					2015					2016				
Emission Factors[4] (g/bhp-hr)					Emission Factors[4] (g/bhp-hr)					Emission Factors[4] (g/bhp-hr)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.1974	0.2261	2.19	536.23	0.0044	0.1833	0.1891	1.82	536.28	0.0042	0.1712	0.1516	1.49	536.31	0.0041
0.2071	0.1844	3.32	536.20	0.0045	0.1975	0.1679	2.99	536.23	0.0044	0.1888	0.1522	2.68	536.26	0.0044
0.1843	0.1606	2.86	536.27	0.0045	0.1768	0.1452	2.53	536.30	0.0044	0.1702	0.1306	2.22	536.32	0.0043
0.1866	0.1627	2.91	536.27	0.0045	0.1788	0.1474	2.58	536.29	0.0044	0.1720	0.1328	2.27	536.31	0.0043
0.1866	0.1627	2.91	536.27	0.0045	0.1788	0.1474	2.58	536.29	0.0044	0.1720	0.1328	2.27	536.31	0.0043
0.1606	0.1250	1.95	536.34	0.0042	0.1555	0.1009	1.63	536.36	0.0040	0.1509	0.0771	1.33	536.37	0.0039
0.2404	0.2436	2.74	536.10	0.0045	0.2209	0.2192	2.38	536.16	0.0044	0.2029	0.1955	2.04	536.22	0.0043
0.2130	0.1137	2.63	530.40	0.0044	0.1979	0.0996	2.27	530.44	0.0042	0.1843	0.0865	1.95	530.48	0.0041
0.1903	0.1407	2.15	536.25	0.0043	0.1787	0.1177	1.82	536.29	0.0041	0.1687	0.0949	1.52	536.32	0.0040
0.2403	0.2436	2.74	536.10	0.0045	0.2208	0.2192	2.38	536.16	0.0044	0.2029	0.1955	2.04	536.22	0.0043
1.31	0.9361	5.71	692.02	0.0062	1.22	0.8776	5.51	692.29	0.0061	1.14	0.8206	5.33	692.55	0.0060
0.2130	0.1417	3.56	530.40	0.0045	0.2028	0.1287	3.21	530.43	0.0044	0.1937	0.1165	2.89	530.46	0.0043
0.2130	0.1137	2.63	530.40	0.0044	0.1979	0.0996	2.27	530.44	0.0042	0.1843	0.0865	1.95	530.48	0.0041
0.7653	0.4732	5.36	588.05	0.0054	0.7138	0.4463	5.20	588.21	0.0054	0.6658	0.4210	5.06	588.35	0.0054
0.3290	0.2024	4.50	530.05	0.0046	0.3092	0.1868	4.20	530.11	0.0045	0.2905	0.1720	3.92	530.16	0.0045
0.3301	0.2103	4.50	530.04	0.0046	0.3102	0.1942	4.21	530.10	0.0045	0.2914	0.1789	3.92	530.16	0.0045
0.6783	0.4652	4.79	588.31	0.0054	0.6516	0.4415	4.65	588.40	0.0054	0.6327	0.4161	4.55	588.45	0.0054
0.5630	0.4769	4.80	588.66	0.0052	0.5301	0.4478	4.52	588.76	0.0051	0.4985	0.4195	4.25	588.86	0.0050
0.2130	0.1137	2.63	530.40	0.0044	0.1979	0.0996	2.27	530.44	0.0042	0.1843	0.0865	1.95	530.48	0.0041
1.60	0.8960	5.87	691.15	0.0064	1.45	0.8253	5.68	691.59	0.0064	1.32	0.7570	5.50	692.01	0.0064
0.3489	0.3097	4.16	589.31	0.0052	0.3182	0.2768	3.98	589.41	0.0050	0.2897	0.2451	3.82	589.49	0.0049
0.1821	0.1743	3.08	595.61	0.0049	0.1667	0.1304	3.05	595.65	0.0046	0.1549	0.0891	3.03	595.69	0.0043
0.1766	0.2570	2.06	595.62	0.0046	0.1605	0.1653	1.52	595.67	0.0043	0.1483	0.0806	1.04	595.71	0.0041
0.1695	0.1726	1.72	536.32	0.0041	0.1568	0.1123	1.28	536.36	0.0039	0.1469	0.0566	0.8974	536.39	0.0037
0.2567	0.1749	3.94	530.27	0.0045	0.2373	0.1574	3.61	530.32	0.0045	0.2079	0.1030	2.34	530.41	0.0042
1.22	0.8722	5.50	692.31	0.0062	1.13	0.8154	5.32	692.56	0.0061	1.05	0.7605	5.15	692.80	0.0060
0.2387	0.1769	2.86	530.32	0.0045	0.2202	0.1585	2.48	530.38	0.0044	0.2032	0.1408	2.14	530.43	0.0042
0.2130	0.1137	2.63	530.40	0.0044	0.1979	0.0996	2.27	530.44	0.0042	0.1843	0.0865	1.95	530.48	0.0041
0.2130	0.1417	3.56	530.40	0.0045	0.2028	0.1287	3.21	530.43	0.0044	0.1937	0.1165	2.89	530.46	0.0043
0.2130	0.1137	2.63	530.40	0.0044	0.1979	0.0996	2.27	530.44	0.0042	0.1843	0.0865	1.95	530.48	0.0041
0.2130	0.1417	3.56	530.40	0.0045	0.2028	0.1287	3.21	530.43	0.0044	0.1937	0.1165	2.89	530.46	0.0043
1.87	0.9480	5.77	690.33	0.0062	1.73	0.8886	5.59	690.76	0.0061	1.60	0.8315	5.42	691.16	0.0060
2.11	1.12	6.57	689.60	0.0063	1.99	1.06	6.41	689.99	0.0063	1.86	1.01	6.24	690.36	0.0063
0.2567	0.1749	3.94	530.27	0.0045	0.2373	0.1574	3.61	530.32	0.0045	0.2234	0.1430	3.30	530.37	0.0044
0.3301	0.2103	4.50	530.04	0.0046	0.3102	0.1942	4.21	530.10	0.0045	0.2914	0.1789	3.92	530.16	0.0045
0.3301	0.2103	4.50	530.04	0.0046	0.3102	0.1942	4.21	530.10	0.0045	0.2914	0.1789	3.92	530.16	0.0045

Non-Road
Emission Calculations

Non-Road Engines-Estimated Emission Calculations

Appendix A.1.2

Hours of Operation[1] (Hrs/Month): 300

Equip ID	Equipment	SCC Classification[2]	HP Rating[3]	Load Factor[4]	2011 April Estimated Emissions[5] (ton/month) VOC	PM2.5	NOx	CO2	SO2	2011 May Estimated Emissions[5] (ton/month) VOC	PM2.5	NOx	CO2	SO2
1	Trackhoe Cat 320 Track	2270002036	143	0.59	0.0152	0.0179	0.1855	29.91	0.0003	0.0152	0.0179	0.1855	29.91	0.0003
2	Loader-Frontend	2270002060	393	0.59	0.0752	0.0743	1.31	164.42	0.0015	0.0752	0.0743	1.31	164.42	0.0015
3	Bulldozer Cat /D9	2270002069	464	0.59	0.0391	0.0386	0.6958	97.08	0.0009	0.0391	0.0386	0.6958	97.08	0.0009
4-a	Scraper Cat 651-Tractor Engine	2270002018	526	0.59	0.0896	0.0887	1.60	220.10	0.0020	0.0896	0.0887	1.60	220.10	0.0020
4-b	Scraper Cat 651-Scraper Engine	2270002018	303	0.59	0.0516	0.0511	0.9192	126.79	0.0011	0.0516	0.0511	0.9192	126.79	0.0011
6	Dump Truck non-highway use	2270002051	598	0.59	0.0418	0.0447	0.6941	125.14	0.0011	0.0418	0.0447	0.6941	125.14	0.0011
7	Riding roller compactor	2270002015	173	0.59	0	0	0	0	0	0.0417	0.0437	0.5165	72.35	0.0007
8	Crane RT 60T	2270002045	200	0.43	0.0076	0.0047	0.1055	15.08	0.0001	0.0152	0.0094	0.2110	30.16	0.0003
9	Grader 200hp 14'	2270002048	183	0.59	0.0088	0.0074	0.1128	19.14	0.0002	0.0088	0.0074	0.1128	19.14	0.0002
16	Extended Boom Forklift	2270002060	125	0.59	0.0151	0.0158	0.1866	26.14	0.0002	0.0151	0.0158	0.1866	26.14	0.0002
17	Skid Steer	2270002072	75	0.21	0.0169	0.0117	0.0665	7.20	0.0001	0.0169	0.0117	0.0665	7.20	0.0001
18	Crane (Manitowac 1015)	2270002045	600	0.43	0	0	0	0	0	0	0	0	0	0
19	Crane (Manitowac 8000)	2270002045	213	0.43	0	0	0	0	0	0	0	0	0	0
20	Generator 15kw Diesel	2270006005	20	0.43	0	0	0	0	0	0	0	0	0	0
21	Diesel power generator - Caterpillar© C-15 Tier III Diesel (450hp)	2270006005	469	0.43	0	0	0	0	0	0	0	0	0	0
21	Mud Seperator Pump Caterpillar© C-15 Tier III Diesel (450hp)	2270006010	469	0.43	0	0	0	0	0	0	0	0	0	0
22	Light Plants 7Kw	2270002027	8	0.43	0	0	0	0	0	0	0	0	0	0
23	Sump Pump 6" Portable Water Pumps	2270006010	80	0.43	0	0	0	0	0	0	0	0	0	0
25	Dragline-Crane (Manitowac 222)	2270002045	230	0.43	0	0	0	0	0	0	0	0	0	0
27	Welder/Generator 10KW	2270006025	19	0.21	0	0	0	0	0	0	0	0	0	0
28	Compressor 185 CFM	2270006015	61	0.43	0	0	0	0	0	0	0	0	0	0
30	Forklift (3000lb capacity)	2270003020	56	0.59	0	0	0	0	0	0	0	0	0	0
31	Forklift (10000lb capacity)	2270003020	92.5	0.59	0	0	0	0	0	0	0	0	0	0
32	Forklift (35000lb capacity)	2270003020	164	0.59	0	0	0	0	0	0	0	0	0	0
33	Air Compressors 750CFM	2270006015	300	0.43	0	0	0	0	0	0	0	0	0	0
34	Portable welders/Generator	2270006025	63.4	0.21	0	0	0	0	0	0	0	0	0	0
36	Crane RT 20T	2270002045	130	0.43	0	0	0	0	0	0	0	0	0	0
37	Crane RT 100T	2270002045	275	0.43	0	0	0	0	0	0	0	0	0	0
38-a	Crane RT 150T-Carrier Engine	2270002045	516	0.43	0	0	0	0	0	0	0	0	0	0
38-b	Crane RT 150T-Superstructure Engine	2270002045	177	0.43	0	0	0	0	0	0	0	0	0	0
39	Manitowac 21000 (crane)	2270002045	600	0.43	0	0	0	0	0	0	0	0	0	0
40	JLG manlifts 50hp diesel	2270003010	49	0.21	0	0	0	0	0	0	0	0	0	0
41	Gators ATV	2270001060	20.8	0.21	0	0	0	0	0	0	0	0	0	0
43	Air Compressors 1600CFM	2270006015	540	0.43	0	0	0	0	0	0	0	0	0	0
48	18" Booster Pump (3)	2270006010	1140	0.43	0	0	0	0	0	0	0	0	0	0
49	14" Booster Pump	2270006010	443	0.43	0	0	0	0	0	0	0	0	0	0
			Monthly Sum		0.3609	0.3548	5.87	831.01	0.0075	0.4102	0.4032	6.49	918.44	0.0083

Notes:

1. Hours of Operation is based on a schedule of 10 hours per day and 30 days per month.
2. Source Classification Codes (SCC) from Appendix B of USEPA's, "User's Guide for the Final NONROAD2005 Model," EPA-420-R-05-013, December 2005.
3. The engine rating for each piece of equipment was obtained from manufacturer specification sheets.
4. Load factors from Appendix A of USEPA, "Median Life, Annual Activity, and Load Factors Values for Nonroad Engine Emissions Modeling," EPA420-P-04-005, April 2004.
5. Monthly estimated emissions are based on the scheduled use of the equipment for each month, emission factors from USEPA's NONROAD2008 model, engine rating, load factor, and hours of operation per month.

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2011					2011					2011					2011				
June					July					August					September				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0380	0.0448	0.4638	74.77	0.0007	0.0380	0.0448	0.4638	74.77	0.0007	0.0380	0.0448	0.4638	74.77	0.0007	0.0380	0.0448	0.4638	74.77	0.0007
0.0940	0.0929	1.64	205.53	0.0018	0.0940	0.0929	1.64	205.53	0.0018	0.0752	0.0743	1.31	164.42	0.0015	0.0752	0.0743	1.31	164.42	0.0015
0.0587	0.0579	1.04	145.62	0.0013	0.0587	0.0579	1.04	145.62	0.0013	0.0587	0.0579	1.04	145.62	0.0013	0.0587	0.0579	1.04	145.62	0.0013
0.0896	0.0887	1.60	220.10	0.0020	0.0896	0.0887	1.60	220.10	0.0020	0.0448	0.0443	0.7978	110.05	0.0010	0.0224	0.0222	0.3989	55.03	0.0005
0.0516	0.0511	0.9192	126.79	0.0011	0.0516	0.0511	0.9192	126.79	0.0011	0.0258	0.0255	0.4596	63.39	0.0006	0.0129	0.0128	0.2298	31.70	0.0003
0.0836	0.0893	1.39	250.29	0.0022	0.0836	0.0893	1.39	250.29	0.0022	0.0836	0.0893	1.39	250.29	0.0022	0.0836	0.0893	1.39	250.29	0.0022
0.0417	0.0437	0.5165	72.35	0.0007	0.0417	0.0437	0.5165	72.35	0.0007	0.0417	0.0437	0.5165	72.35	0.0007	0.0417	0.0437	0.5165	72.35	0.0007
0.0227	0.0140	0.3165	45.24	0.0004	0.0227	0.0140	0.3165	45.24	0.0004	0.0227	0.0140	0.3165	45.24	0.0004	0.0227	0.0140	0.3165	45.24	0.0004
0.0088	0.0074	0.1128	19.14	0.0002	0.0088	0.0074	0.1128	19.14	0.0002	0.0088	0.0074	0.1128	19.14	0.0002	0.0088	0.0074	0.1128	19.14	0.0002
0.0376	0.0395	0.4664	65.35	0.0006	0.0376	0.0395	0.4664	65.35	0.0006	0.0376	0.0395	0.4664	65.35	0.0006	0.0376	0.0395	0.4664	65.35	0.0006
0.0169	0.0117	0.0665	7.20	0.0001	0.0169	0.0117	0.0665	7.20	0.0001	0.0169	0.0117	0.0665	7.20	0.0001	0.0169	0.0117	0.0665	7.20	0.0001
0.0445	0.0327	0.7801	90.48	0.0008	0.0445	0.0327	0.7801	90.48	0.0008	0.0445	0.0327	0.7801	90.48	0.0008	0.0445	0.0327	0.7801	90.48	0.0008
0.0323	0.0199	0.4495	64.24	0.0006	0.0323	0.0199	0.4495	64.24	0.0006	0.0323	0.0199	0.4495	64.24	0.0006	0.0323	0.0199	0.4495	64.24	0.0006
0.0053	0.0032	0.0335	3.34	0.0000	0.0053	0.0032	0.0335	3.34	0.0000	0.0053	0.0032	0.0335	3.34	0.0000	0.0053	0.0032	0.0335	3.34	0.0000
0.0537	0.0353	0.7098	70.67	0.0006	0.0537	0.0353	0.7098	70.67	0.0006	0.0537	0.0353	0.7098	70.67	0.0006	0.0537	0.0353	0.7098	70.67	0.0006
0.0269	0.0183	0.3554	35.33	0.0003	0.0269	0.0183	0.3554	35.33	0.0003	0.0269	0.0183	0.3554	35.33	0.0003	0.0269	0.0183	0.3554	35.33	0.0003
0.0036	0.0025	0.0243	2.68	0.0000	0.0036	0.0025	0.0243	2.68	0.0000	0.0036	0.0025	0.0243	2.68	0.0000	0.0036	0.0025	0.0243	2.68	0.0000
0.0077	0.0065	0.0636	6.69	0.0001	0.0077	0.0065	0.0636	6.69	0.0001	0.0077	0.0065	0.0636	6.69	0.0001	0.0077	0.0065	0.0636	6.69	0.0001
0.0087	0.0054	0.1213	17.34	0.0002	0.0087	0.0054	0.1213	17.34	0.0002	0.0087	0.0054	0.1213	17.34	0.0002	0.0087	0.0054	0.1213	17.34	0.0002
0.0082	0.0044	0.0257	2.73	0.0000	0.0082	0.0044	0.0257	2.73	0.0000	0.0082	0.0044	0.0257	2.73	0.0000	0.0082	0.0044	0.0257	2.73	0.0000
0.0039	0.0035	0.0412	5.11	0.0000	0.0039	0.0035	0.0412	5.11	0.0000	0.0039	0.0035	0.0412	5.11	0.0000	0.0039	0.0035	0.0412	5.11	0.0000
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1965	0.1332	2.59	257.66	0.0023	0.1965	0.1332	2.59	257.66	0.0023	0.1965	0.1332	2.59	257.66	0.0023	0.1965	0.1332	2.59	257.66	0.0023
0.0255	0.0173	0.3357	33.38	0.0003	0.0255	0.0173	0.3357	33.38	0.0003	0.0255	0.0173	0.3357	33.38	0.0003	0.0255	0.0173	0.3357	33.38	0.0003
0.9601	0.8231	14.06	1822.04	0.0164	0.9601	0.8231	14.06	1822.04	0.0164	0.8707	0.7347	12.47	1607.48	0.0145	0.8354	0.6998	11.84	1520.76	0.0137

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2011					2011					2011					2012				
October					November					December					January				
Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0380	0.0448	0.4638	74.77	0.0007	0.0380	0.0448	0.4638	74.77	0.0007	0.0380	0.0448	0.4638	74.77	0.0007	0.0342	0.0405	0.4133	74.79	0.0007
0.0752	0.0743	1.31	164.42	0.0015	0.0752	0.0743	1.31	164.42	0.0015	0.0752	0.0743	1.31	164.42	0.0015	0.0706	0.0679	1.21	164.44	0.0014
0.0587	0.0579	1.04	145.62	0.0013	0.0587	0.0579	1.04	145.62	0.0013	0.0587	0.0579	1.04	145.62	0.0013	0.0554	0.0528	0.9554	145.63	0.0013
0.0224	0.0222	0.3989	55.03	0.0005	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0
0.0129	0.0128	0.2298	31.70	0.0003	0	0	0	0.00	0	0	0	0	0	0	0	0	0	0	0
0.0836	0.0893	1.39	250.29	0.0022	0.0836	0.0893	1.39	250.29	0.0022	0.0836	0.0893	1.39	250.29	0.0022	0.0805	0.0795	1.23	250.30	0.0021
0.0417	0.0437	0.5165	72.35	0.0007	0.0417	0.0437	0.5165	72.35	0.0007	0.0417	0.0437	0.5165	72.35	0.0007	0.0384	0.0400	0.4679	72.36	0.0006
0.0227	0.0140	0.3165	45.24	0.0004	0.0227	0.0140	0.3165	45.24	0.0004	0.0152	0.0094	0.2110	30.16	0.0003	0.0141	0.0083	0.1908	30.16	0.0003
0.0088	0.0074	0.1128	19.14	0.0002	0.0088	0.0074	0.1128	19.14	0.0002	0.0088	0.0074	0.1128	19.14	0.0002	0.0081	0.0066	0.1013	19.14	0.0002
0.0376	0.0395	0.4664	65.35	0.0006	0.0376	0.0395	0.4664	65.35	0.0006	0.0376	0.0395	0.4664	65.35	0.0006	0.0347	0.0361	0.4225	65.36	0.0006
0.0169	0.0117	0.0665	7.20	0.0001	0.0169	0.0117	0.0665	7.20	0.0001	0.0169	0.0117	0.0665	7.20	6.62E-05	0.0157	0.0110	0.0640	7.20	6.62E-05
0.0445	0.0327	0.7801	90.48	0.0008	0.0445	0.0327	0.7801	90.48	0.0008	0.0445	0.0327	0.7801	90.48	0.0008	0.0407	0.0292	0.7201	90.49	0.0008
0.0323	0.0199	0.4495	64.24	0.0006	0.0323	0.0199	0.4495	64.24	0.0006	0.0323	0.0199	0.4495	64.24	0.0006	0.0300	0.0178	0.4064	64.25	0.0006
0.0053	0.0032	0.0335	3.34	0.0000	0.0053	0.0032	0.0335	3.34	3.07E-05	0.0053	0.0032	0.0335	3.34	3.07E-05	0.0050	0.0030	0.0324	3.34	3.07E-05
0.0537	0.0353	0.7098	70.67	0.0006	0.0537	0.0353	0.7098	70.67	0.0006	0.0537	0.0353	0.7098	70.67	0.0006	0.0500	0.0320	0.6747	70.68	0.0006
0.0269	0.0183	0.3554	35.33	0.0003	0.0269	0.0183	0.3554	35.33	0.0003	0.0269	0.0183	0.3554	35.33	0.0003	0.0251	0.0166	0.3378	35.34	0.0003
0.0036	0.0025	0.0243	2.68	0.0000	0.0036	0.0025	0.0243	2.68	2.46E-05	0.0036	0.0025	0.0243	2.68	2.46E-05	0.0034	0.0024	0.0233	2.68	2.46E-05
0.0077	0.0065	0.0636	6.69	0.0001	0.0077	0.0065	0.0636	6.69	0.0001	0.0077	0.0065	0.0636	6.69	6.15E-05	0.0072	0.0061	0.0607	6.69	6.06E-05
0.0087	0.0054	0.1213	17.34	0.0002	0.0087	0.0054	0.1213	17.34	0.0002	0.0087	0.0054	0.1213	17.34	0.0002	0.0081	0.0048	0.1097	17.34	0.0002
0.0082	0.0044	0.0257	2.73	2.51E-05	0.0082	0.0044	0.0257	2.73	2.51E-05	0.0082	0.0044	0.0257	2.73	2.51E-05	0.0076	0.0041	0.0249	2.73	2.51E-05
0.0039	0.0035	0.0412	5.11	4.70E-05	0.0039	0.0035	0.0412	5.11	4.70E-05	0.0039	0.0035	0.0412	5.11	4.70E-05	0.0036	0.0033	0.0394	5.11	4.70E-05
0	0	0	0	0	0	0.	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1965	0.1332	2.59	257.66	0.0023	0.1965	0.1332	2.59	257.66	0.0023	0.1965	0.1332	2.59	257.66	0.0023	0.1828	0.1210	2.46	257.70	0.0023
0.0255	0.0173	0.3357	33.38	0.0003	0.0255	0.0173	0.3357	33.38	0.0003	0.0255	0.0173	0.3357	33.38	0.0003	0.0237	0.0157	0.3191	33.38	0.0003
0.8354	0.6998	11.84	1520.76	0.0137	0.8001	0.6648	11.22	1434.04	0.0129	0.7925	0.6601	11.11	1418.96	0.0128	0.7387	0.5986	10.27	1419.12	0.0125

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2012					2012					2012					2012				
February					March					April					May				
Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0342	0.0405	0.4133	74.79	0.0007	0.0342	0.0405	0.4133	74.79	0.0007	0.0342	0.0405	0.4133	74.79	0.0007	0.0342	0.0405	0.4133	74.79	0.0007
0.0706	0.0679	1.21	164.44	0.0014	0.0706	0.0679	1.21	164.44	0.0014	0.0530	0.0509	0.9108	123.33	0.0011	0.0530	0.0509	0.9108	123.33	0.0011
0.0554	0.0528	0.9554	145.63	0.0013	0.0554	0.0528	0.9554	145.63	0.0013	0.0369	0.0352	0.6369	97.09	0.0008	0.0369	0.0352	0.6369	97.09	0.0008
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0805	0.0795	1.23	250.30	0.0021	0.0805	0.0795	1.23	250.30	0.0021	0.1006	0.0994	1.54	312.87	0.0027	0.1006	0.0994	1.54	312.87	0.0027
0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006
0.0141	0.0083	0.1908	30.16	0.0003	0.0141	0.0083	0.1908	30.16	0.0003	0.0070	0.0042	0.0954	15.08	0.0001	0.0070	0.0042	0.0954	15.08	0.0001
0.0081	0.0066	0.1013	19.14	0.0002	0.0081	0.0066	0.1013	19.14	0.0002	0.0162	0.0132	0.2026	38.29	0.0003	0.0162	0.0132	0.2026	38.29	0.0003
0.0347	0.0361	0.4225	65.36	0.0006	0.0347	0.0361	0.4225	65.36	0.0006	0.0139	0.0144	0.1690	26.14	0.0002	0.0139	0.0144	0.1690	26.14	0.0002
0.0157	0.0110	0.0640	7.20	6.62E-05	0.0157	0.0110	0.0640	7.20	6.62E-05	0.0157	0.0110	0.0640	7.20	6.62E-05	0.0157	0.0110	0.0640	7.20	6.62E-05
0.0407	0.0292	0.7201	90.49	0.0008	0.0407	0.0292	0.7201	90.49	0.0008	0	0	0	0	0	0	0	0	0	0
0.0300	0.0178	0.4064	64.25	0.0006	0.0300	0.0178	0.4064	64.25	0.0006	0	0	0	0	0	0	0	0	0	0
0.0050	0.0030	0.0324	3.34	3.07E-05	0.0050	0.0030	0.0324	3.34	3.07E-05	0	0	0	0	0	0	0	0	0	0
0.0500	0.0320	0.6747	70.68	0.0006	0.0500	0.0320	0.6747	70.68	0.0006	0	0	0	0	0	0	0	0	0	0
0.0251	0.0166	0.3378	35.34	0.0003	0.0251	0.0166	0.3378	35.34	0.0003	0	0	0	0	0	0	0	0	0	0
0.0034	0.0024	0.0233	2.68	2.46E-05	0.0034	0.0024	0.0233	2.68	2.46E-05	0	0	0	0	0	0	0	0	0	0
0.0072	0.0061	0.0607	6.69	6.06E-05	0.0072	0.0061	0.0607	6.69	6.06E-05	0.0289	0.0246	0.2430	26.78	0.0002	0.0289	0.0246	0.2430	26.78	0.0002
0.0081	0.0048	0.1097	17.34	0.0002	0.0081	0.0048	0.1097	17.34	0.0002	0	0	0	0	0	0	0	0	0	0
0.0076	0.0041	0.0249	2.73	2.51E-05	0.0076	0.0041	0.0249	2.73	2.51E-05	0	0	0	0	0	0	0	0	0	0
0.0036	0.0033	0.0394	5.11	4.70E-05	0.0036	0.0033	0.0394	5.11	4.70E-05	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1828	0.1210	2.46	257.70	0.0023	0.1828	0.1210	2.46	257.70	0.0023	0	0	0	0	0	0	0	0	0	0
0.0237	0.0157	0.3191	33.38	0.0003	0.0237	0.0157	0.3191	33.38	0.0003	0	0	0	0	0	0	0	0	0	0
0.7387	0.5986	10.27	1419.12	0.0125	0.7387	0.5986	10.27	1419.12	0.0125	0.3447	0.3334	4.74	793.93	0.0069	0.3447	0.3334	4.74	793.93	0.0069

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2012					2012					2012					2012				
June					July					August					September				
Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0342	0.0405	0.4133	74.79	0.0007	0.0342	0.0405	0.4133	74.79	0.0007	0.0342	0.0405	0.4133	74.79	0.0007	0.0342	0.0405	0.4133	74.79	0.0007
0.0530	0.0509	0.9108	123.33	0.0011	0.0530	0.0509	0.9108	123.33	0.0011	0.0530	0.0509	0.9108	123.33	0.0011	0.0530	0.0509	0.9108	123.33	0.0011
0.0369	0.0352	0.6369	97.09	0.0008	0.0369	0.0352	0.6369	97.09	0.0008	0.0369	0.0352	0.6369	97.09	0.0008	0.0369	0.0352	0.6369	97.09	0.0008
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1006	0.0994	1.54	312.87	0.0027	0.1006	0.0994	1.54	312.87	0.0027	0.1006	0.0994	1.54	312.87	0.0027	0.1006	0.0994	1.54	312.87	0.0027
0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006
0.0070	0.0042	0.0954	15.08	0.0001	0.0070	0.0042	0.0954	15.08	0.0001	0.0070	0.0042	0.0954	15.08	0.0001	0.0070	0.0042	0.0954	15.08	0.0001
0.0162	0.0132	0.2026	38.29	0.0003	0.0162	0.0132	0.2026	38.29	0.0003	0.0162	0.0132	0.2026	38.29	0.0003	0.0162	0.0132	0.2026	38.29	0.0003
0.0139	0.0144	0.1690	26.14	0.0002	0.0139	0.0144	0.1690	26.14	0.0002	0.0139	0.0144	0.1690	26.14	0.0002	0.0139	0.0144	0.1690	26.14	0.0002
0.0157	0.0110	0.0640	7.20	6.62E-05	0.0157	0.0110	0.0640	7.20	6.62E-05	0.0157	0.0110	0.0640	7.20	0.0001	0.0157	0.0110	0.0640	7.20	6.62E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0289	0.0246	0.2430	26.78	0.0002	0.0289	0.0246	0.2430	26.78	0.0002	0.0289	0.0246	0.2430	26.78	0.0002	0.0289	0.0246	0.2430	26.78	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.3447	0.3334	4.74	793.93	0.0069	0.3447	0.3334	4.74	793.93	0.0069	0.3447	0.3334	4.74	793.93	0.0069	0.3447	0.3334	4.74	793.93	0.0069

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2012					2012					2012					2013				
October					November					December					January				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0274	0.0324	0.3307	59.83	0.0005	0.0274	0.0324	0.3307	59.83	0.0005	0.0274	0.0324	0.3307	59.83	0.0005	0.0245	0.0289	0.2941	59.84	0.0005
0.0530	0.0509	0.9108	123.33	0.0011	0.0530	0.0509	0.9108	123.33	0.0011	0.0530	0.0509	0.9108	123.33	0.0011	0.0669	0.0620	1.13	164.45	0.0014
0.0369	0.0352	0.6369	97.09	0.0008	0.0369	0.0352	0.6369	97.09	0.0008	0.0369	0.0352	0.6369	97.09	0.0008	0.0350	0.0320	0.5820	97.09	0.0008
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1006	0.0994	1.54	312.87	0.0027	0.1006	0.0994	1.54	312.87	0.0027	0.1006	0.0994	1.54	312.87	0.0027	0.0970	0.0868	1.36	312.88	0.0026
0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006	0.0384	0.0400	0.4679	72.36	0.0006	0.0353	0.0363	0.4229	72.37	0.0006
0.0070	0.0042	0.0954	15.08	0.0001	0.0070	0.0042	0.0954	15.08	0.0001	0.0070	0.0042	0.0954	15.08	0.0001	0.0065	0.0037	0.0859	15.08	0.0001
0.0081	0.0066	0.1013	19.14	0.0002	0.0081	0.0066	0.1013	19.14	0.0002	0.0081	0.0066	0.1013	19.14	0.0002	0.0074	0.0058	0.0909	19.15	0.0002
0.0139	0.0144	0.1690	26.14	0.0002	0.0139	0.0144	0.1690	26.14	0.0002	0.0139	0.0144	0.1690	26.14	0.0002	0.0128	0.0131	0.1527	26.15	0.0002
0.0157	0.0110	0.0640	7.20	6.62E-05	0.0157	0.0110	0.0640	7.20	0.0001	0.0157	0.0110	0.0640	7.20	6.62E-05	0.0147	0.0104	0.0616	7.21	6.53E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0085	0.0059	0.0583	6.69	6.15E-05	0.0085	0.0059	0.0583	6.69	6.15E-05	0.0085	0.0059	0.0583	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05
0.0289	0.0246	0.2430	26.78	0.0002	0.0289	0.0246	0.2430	26.78	0.0002	0.0289	0.0246	0.2430	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0230	0.0139	0.3170	45.24	0.0004	0.0230	0.0139	0.3170	45.24	0.0004	0.0230	0.0139	0.3170	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0052	0.0040	0.0670	9.80	8.76E-05	0.0052	0.0040	0.0670	9.80	8.76E-05	0.0052	0.0040	0.0670	9.80	8.76E-05	0.0048	0.0036	0.0605	9.80	8.52E-05
0.0097	0.0057	0.1312	20.74	0.0002	0.0097	0.0057	0.1312	20.74	0.0002	0.0097	0.0057	0.1312	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002
0.0175	0.0126	0.3096	38.91	0.0003	0.0175	0.0126	0.3096	38.91	0.0003	0.0175	0.0126	0.3096	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003
0.0062	0.0037	0.0844	13.35	0.0001	0.0062	0.0037	0.0844	13.35	0.0001	0.0062	0.0037	0.0844	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0069	0.0036	0.0200	1.99	1.83E-05	0.0069	0.0036	0.0200	1.99	1.83E-05	0.0069	0.0036	0.0200	1.99	1.83E-05	0.0065	0.0034	0.0195	1.99	1.83E-05
0.0922	0.0654	1.41	162.83	0.0014	0.0922	0.0654	1.41	162.83	0.0014	0.0922	0.0654	1.41	162.83	0.0014	0.0853	0.0594	1.32	162.85	0.0014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0000	0.0000	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.4989	0.4335	6.95	1059.37	0.0092	0.4989	0.4335	6.95	1059.37	0.0092	0.4989	0.4335	6.95	1059.37	0.0092	0.4846	0.4062	6.64	1100.58	0.0093

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2013					2013					2013					2013				
February					March					April					May				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0245	0.0289	0.2941	59.84	0.0005	0.0245	0.0289	0.2941	59.84	0.0005	0.0184	0.0217	0.2206	44.88	0.0004	0.0184	0.0217	0.2206	44.88	0.0004
0.0669	0.0620	1.13	164.45	0.0014	0.0669	0.0620	1.13	164.45	0.0014	0.0669	0.0620	1.13	164.45	0.0014	0.0669	0.0620	1.13	164.45	0.0014
0.0350	0.0320	0.5820	97.09	0.0008	0.0350	0.0320	0.5820	97.09	0.0008	0.0350	0.0320	0.5820	97.09	0.0008	0.0350	0.0320	0.5820	97.09	0.0008
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0970	0.0868	1.36	312.88	0.0026	0.0970	0.0868	1.36	312.88	0.0026	0.0388	0.0347	0.5433	125.15	0.0010	0.0388	0.0347	0.5433	125.15	0.0010
0.0353	0.0363	0.4229	72.37	0.0006	0.0353	0.0363	0.4229	72.37	0.0006	0.0177	0.0181	0.2115	36.19	0.0003	0.0177	0.0181	0.2115	36.19	0.0003
0.0065	0.0037	0.0859	15.08	0.0001	0.0065	0.0037	0.0859	15.08	0.0001	0.0130	0.0073	0.1718	30.17	0.0003	0.0130	0.0073	0.1718	30.17	0.0003
0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002
0.0128	0.0131	0.1527	26.15	0.0002	0.0128	0.0131	0.1527	26.15	0.0002	0.0255	0.0262	0.3055	52.29	0.0005	0.0255	0.0262	0.3055	52.29	0.0005
0.0147	0.0104	0.0616	7.21	6.53E-05	0.0147	0.0104	0.0616	7.21	6.53E-05	0.0293	0.0208	0.1232	14.41	0.0001	0.0293	0.0208	0.1232	14.41	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05
0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05
0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002
0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003
0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0065	0.0034	0.0195	1.99	1.83E-05	0.0065	0.0034	0.0195	1.99	1.83E-05	0.0065	0.0034	0.0195	1.99	1.83E-05	0.0194	0.0102	0.0585	5.97	5.49E-05
0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.4846	0.4062	6.64	1100.58	0.0093	0.4846	0.4062	6.64	1100.58	0.0093	0.4365	0.3560	5.84	910.14	0.0078	0.4495	0.3628	5.88	914.12	0.0078

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2013					2013					2013					2013				
June					July					August					September				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0184	0.0217	0.2206	44.88	0.0004	0.0184	0.0217	0.2206	44.88	0.0004	0.0184	0.0217	0.2206	44.88	0.0004	0.0184	0.0217	0.2206	44.88	0.0004
0.0669	0.0620	1.13	164.45	0.0014	0.0669	0.0620	1.13	164.45	0.0014	0.0669	0.0620	1.13	164.45	0.0014	0.0669	0.0620	1.13	164.45	0.0014
0.0350	0.0320	0.5820	97.09	0.0008	0.0350	0.0320	0.5820	97.09	0.0008	0.0350	0.0320	0.5820	97.09	0.0008	0.0350	0.0320	0.5820	97.09	0.0008
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0388	0.0347	0.5433	125.15	0.0010	0.0388	0.0347	0.5433	125.15	0.0010	0.0388	0.0347	0.5433	125.15	0.0010	0	0	0	0	0
0.0177	0.0181	0.2115	36.19	0.0003	0.0177	0.0181	0.2115	36.19	0.0003	0.0177	0.0181	0.2115	36.19	0.0003	0.0177	0.0181	0.2115	36.19	0.0003
0.0130	0.0073	0.1718	30.17	0.0003	0.0130	0.0073	0.1718	30.17	0.0003	0.0130	0.0073	0.1718	30.17	0.0003	0.0130	0.0073	0.1718	30.17	0.0003
0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002
0.0255	0.0262	0.3055	52.29	0.0005	0.0510	0.0524	0.6110	104.59	0.0009	0.0510	0.0524	0.6110	104.59	0.0009	0.0510	0.0524	0.6110	104.59	0.0009
0.0293	0.0208	0.1232	14.41	0.0001	0.0293	0.0208	0.1232	14.41	0.0001	0.0293	0.0208	0.1232	14.41	0.0001	0.0293	0.0208	0.1232	14.41	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05
0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0.0045	0.0049	0.0690	13.01	0.0001	0.0045	0.0049	0.0690	13.01	0.0001	0.0045	0.0049	0.0690	13.01	0.0001
0	0	0	0	0	0.0072	0.0126	0.0968	21.50	0.0002	0.0072	0.0126	0.0968	21.50	0.0002	0.0072	0.0126	0.0968	21.50	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0118	0.0149	0.1409	34.32	0.0003
0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05
0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002
0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003
0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0194	0.0102	0.0585	5.97	5.49E-05	0.0194	0.0102	0.0585	5.97	5.49E-05	0.0194	0.0102	0.0585	5.97	5.49E-05	0.0194	0.0102	0.0585	5.97	5.49E-05
0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.4495	0.3628	5.88	914.12	0.0078	0.4867	0.4065	6.35	1000.92	0.0086	0.4867	0.4065	6.35	1000.92	0.0086	0.4597	0.3866	5.94	910.09	0.0078

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2013					2013					2013					2014				
October					November					December					January				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0061	0.0072	0.0735	14.96	0.0001	0.0061	0.0072	0.0735	14.96	0.0001	0.0061	0.0072	0.0735	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001
0.0334	0.0310	0.5632	82.22	0.0007	0.0334	0.0310	0.5632	82.22	0.0007	0.0334	0.0310	0.5632	82.22	0.0007	0.0318	0.0283	0.5094	82.23	0.0007
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0177	0.0181	0.2115	36.19	0.0003	0.0177	0.0181	0.2115	36.19	0.0003	0.0177	0.0181	0.2115	36.19	0.0003	0.0162	0.0164	0.1850	36.19	0.0003
0.0130	0.0073	0.1718	30.17	0.0003	0.0130	0.0073	0.1718	30.17	0.0003	0.0130	0.0073	0.1718	30.17	0.0003	0.0121	0.0065	0.1494	30.17	0.0002
0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002	0.0074	0.0058	0.0909	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002
0.0510	0.0524	0.6110	104.59	0.0009	0.0510	0.0524	0.6110	104.59	0.0009	0.0510	0.0524	0.6110	104.59	0.0009	0.0469	0.0475	0.5344	104.60	0.0009
0.0293	0.0208	0.1232	14.41	0.0001	0.0293	0.0208	0.1232	14.41	0.0001	0.0293	0.0208	0.1232	14.41	0.0001	0.0274	0.0195	0.1189	14.42	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05	0.0081	0.0056	0.0562	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05
0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002	0.0272	0.0231	0.2321	26.78	0.0002	0.0256	0.0217	0.2186	26.79	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0045	0.0049	0.0690	13.01	0.0001	0.0045	0.0049	0.0690	13.01	0.0001	0.0045	0.0049	0.0690	13.01	0.0001	0.0040	0.0038	0.0674	13.02	0.0001
0.0072	0.0126	0.0968	21.50	0.0002	0.0072	0.0126	0.0968	21.50	0.0002	0.0072	0.0126	0.0968	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002
0.0118	0.0149	0.1409	34.32	0.0003	0.0118	0.0149	0.1409	34.32	0.0003	0.0118	0.0149	0.1409	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003
0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004	0.0215	0.0125	0.2912	45.24	0.0004	0.0219	0.0149	0.3364	45.24	0.0004
0.0344	0.0246	0.1501	18.28	0.0002	0.0344	0.0246	0.1501	18.28	0.0002	0.0344	0.0246	0.1501	18.28	0.0002	0.0321	0.0230	0.1452	18.29	0.0002
0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05	0.0048	0.0036	0.0605	9.80	8.52E-05	0.0044	0.0033	0.0529	9.80	8.28E-05
0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002	0.0090	0.0050	0.1181	20.74	0.0002	0.0083	0.0044	0.1027	20.74	0.0002
0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003	0.0165	0.0114	0.2874	38.91	0.0003	0.0156	0.0104	0.2608	38.92	0.0003
0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001	0.0058	0.0032	0.0760	13.35	0.0001	0.0054	0.0029	0.0661	13.35	0.0001
0.0192	0.0133	0.3342	45.25	0.0004	0.0192	0.0133	0.3342	45.25	0.0004	0.0192	0.0133	0.3342	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004
0.0343	0.0172	0.1014	11.74	0.0001	0.0343	0.0172	0.1014	11.74	0.0001	0.0343	0.0172	0.1014	11.74	0.0001	0.0318	0.0161	0.0982	11.75	0.0001
0.0194	0.0102	0.0585	5.97	5.49E-05	0.0194	0.0102	0.0585	5.97	5.49E-05	0.0194	0.0102	0.0585	5.97	5.49E-05	0.0183	0.0097	0.0570	5.98	5.49E-05
0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014	0.0853	0.0594	1.32	162.85	0.0014	0.0789	0.0537	1.21	162.87	0.0014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.4669	0.3642	5.24	776.12	0.0067	0.4669	0.3642	5.24	776.12	0.0067	0.4669	0.3642	5.24	776.12	0.0067	0.4361	0.3313	4.79	776.22	0.0065

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2014					2014					2014					2014				
February					March					April					May				
Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001
0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0162	0.0164	0.1850	36.19	0.0003	0.0162	0.0164	0.1850	36.19	0.0003	0	0	0	0	0	0	0	0	0	0
0.0121	0.0065	0.1494	30.17	0.0002	0.0242	0.0129	0.2989	60.34	0.0005	0.0242	0.0129	0.2989	60.34	0.0005	0.0242	0.0129	0.2989	60.34	0.0005
0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002
0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009
0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05
0.0256	0.0217	0.2186	26.79	0.0002	0.0256	0.0217	0.2186	26.79	0.0002	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001
0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002
0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003
0.0219	0.0149	0.3364	45.24	0.0004	0.0657	0.0448	1.01	135.72	0.0012	0.0657	0.0448	1.01	135.72	0.0012	0.0657	0.0448	1.01	135.72	0.0012
0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002
0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05
0.0083	0.0044	0.1027	20.74	0.0002	0.0333	0.0178	0.4110	82.96	0.0007	0.0333	0.0178	0.4110	82.96	0.0007	0.0333	0.0178	0.4110	82.96	0.0007
0.0156	0.0104	0.2608	38.92	0.0003	0.0625	0.0416	1.04	155.67	0.0013	0.0625	0.0416	1.04	155.67	0.0013	0.0625	0.0416	1.04	155.67	0.0013
0.0054	0.0029	0.0661	13.35	0.0001	0.0214	0.0114	0.2645	53.40	0.0004	0.0214	0.0114	0.2645	53.40	0.0004	0.0214	0.0114	0.2645	53.40	0.0004
0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004
0.0318	0.0161	0.0982	11.75	0.0001	0.0636	0.0323	0.1965	23.49	0.0002	0.0636	0.0323	0.1965	23.49	0.0002	0.0636	0.0323	0.1965	23.49	0.0002
0.0244	0.0129	0.0760	7.97	7.32E-05	0.0244	0.0129	0.0760	7.97	7.32E-05	0.0244	0.0129	0.0760	7.97	7.32E-05	0.0244	0.0129	0.0760	7.97	7.32E-05
0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.4422	0.3345	4.81	778.21	0.0066	0.6179	0.4401	7.02	1129.63	0.0095	0.5761	0.4019	6.62	1066.65	0.0090	0.5761	0.4019	6.62	1066.65	0.0090

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2014					2014					2014					2014				
June					July					August					September				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001
0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0242	0.0129	0.2989	60.34	0.0005	0.0242	0.0129	0.2989	60.34	0.0005	0.0242	0.0129	0.2989	60.34	0.0005	0.0242	0.0129	0.2989	60.34	0.0005
0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002
0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009
0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001
0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002
0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003
0.0657	0.0448	1.01	135.72	0.0012	0.0657	0.0448	1.01	135.72	0.0012	0.0657	0.0448	1.01	135.72	0.0012	0.0657	0.0448	1.01	135.72	0.0012
0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002
0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05
0.0333	0.0178	0.4110	82.96	0.0007	0.0333	0.0178	0.4110	82.96	0.0007	0.0333	0.0178	0.4110	82.96	0.0007	0.0333	0.0178	0.4110	82.96	0.0007
0.0625	0.0416	1.04	155.67	0.0013	0.0625	0.0416	1.04	155.67	0.0013	0.0625	0.0416	1.04	155.67	0.0013	0.0625	0.0416	1.04	155.67	0.0013
0.0214	0.0114	0.2645	53.40	0.0004	0.0214	0.0114	0.2645	53.40	0.0004	0.0214	0.0114	0.2645	53.40	0.0004	0.0214	0.0114	0.2645	53.40	0.0004
0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004
0.0636	0.0323	0.1965	23.49	0.0002	0.0636	0.0323	0.1965	23.49	0.0002	0.0636	0.0323	0.1965	23.49	0.0002	0.0636	0.0323	0.1965	23.49	0.0002
0.0244	0.0129	0.0760	7.97	7.32E-05	0.0305	0.0162	0.0950	9.96	9.16E-05	0.0305	0.0162	0.0950	9.96	9.16E-05	0.0305	0.0162	0.0950	9.96	9.16E-05
0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5761	0.4019	6.62	1066.65	0.0090	0.5822	0.4051	6.64	1068.64	0.0090	0.5822	0.4051	6.64	1068.64	0.0090	0.5822	0.4051	6.64	1068.64	0.0090

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2014					2014					2014					2015				
October					November					December					January				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001	0.0055	0.0063	0.0611	14.96	0.0001	0.0051	0.0053	0.0509	14.96	0.0001
0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007	0.0318	0.0283	0.5094	82.23	0.0007	0.0303	0.0257	0.4584	82.23	0.0007
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0242	0.0129	0.2989	60.34	0.0005	0.0242	0.0129	0.2989	60.34	0.0005	0.0242	0.0129	0.2989	60.34	0.0005	0.0225	0.0113	0.2584	60.34	0.0005
0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002	0.0068	0.0050	0.0769	19.15	0.0002	0.0064	0.0042	0.0651	19.15	0.0001
0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009	0.0469	0.0475	0.5344	104.60	0.0009	0.0323	0.0321	0.3475	78.46	0.0006
0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001	0.0274	0.0195	0.1189	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05	0.0077	0.0053	0.0544	6.69	6.15E-05	0.0074	0.0050	0.0529	6.69	6.15E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001	0.0040	0.0038	0.0674	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001
0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002	0.0064	0.0093	0.0744	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002
0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003	0.0108	0.0110	0.1099	34.32	0.0003	0.0100	0.0072	0.0819	34.32	0.0002
0.0657	0.0448	1.01	135.72	0.0012	0.0657	0.0448	1.01	135.72	0.0012	0.0657	0.0448	1.01	135.72	0.0012	0.0607	0.0403	0.9232	135.74	0.0011
0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002	0.0321	0.0230	0.1452	18.29	0.0002	0.0300	0.0215	0.1405	18.30	0.0002
0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05	0.0044	0.0033	0.0529	9.80	8.28E-05	0.0041	0.0029	0.0459	9.80	8.06E-05
0.0333	0.0178	0.4110	82.96	0.0007	0.0333	0.0178	0.4110	82.96	0.0007	0.0333	0.0178	0.4110	82.96	0.0007	0.0310	0.0156	0.3552	82.97	0.0007
0.0625	0.0416	1.04	155.67	0.0013	0.0625	0.0416	1.04	155.67	0.0013	0.0625	0.0416	1.04	155.67	0.0013	0.0595	0.0378	0.9429	155.68	0.0013
0.0214	0.0114	0.2645	53.40	0.0004	0.0214	0.0114	0.2645	53.40	0.0004	0.0214	0.0114	0.2645	53.40	0.0004	0.0199	0.0100	0.2286	53.40	0.0004
0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004	0.0182	0.0121	0.3033	45.25	0.0004	0.0173	0.0110	0.2741	45.26	0.0004
0.1273	0.0645	0.3929	46.98	0.0004	0.1273	0.0645	0.3929	46.98	0.0004	0.1273	0.0645	0.3929	46.98	0.0004	0.1177	0.0605	0.3807	47.01	0.0004
0.0305	0.0162	0.0950	9.96	9.16E-05	0.0305	0.0162	0.0950	9.96	9.16E-05	0.0366	0.0194	0.1140	11.95	0.0001	0.0344	0.0184	0.1111	11.96	0.0001
0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014	0.0789	0.0537	1.21	162.87	0.0014	0.0729	0.0483	1.11	162.89	0.0014
0	0	0	0.0000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.6458	0.4374	6.83	1092.14	0.0092	0.6458	0.4374	6.83	1092.14	0.0092	0.6519	0.4406	6.85	1094.13	0.0092	0.5965	0.3843	6.06	1068.11	0.0088

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2015					2015					2015					2015				
February					March					April					May				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0051	0.0053	0.0509	14.96	0.0001	0.0051	0.0053	0.0509	14.96	0.0001	0.0051	0.0053	0.0509	14.96	0.0001	0.0051	0.0053	0.0509	14.96	0.0001
0.0303	0.0257	0.4584	82.23	0.0007	0.0303	0.0257	0.4584	82.23	0.0007	0.0303	0.0257	0.4584	82.23	0.0007	0.0303	0.0257	0.4584	82.23	0.0007
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0225	0.0113	0.2584	60.34	0.0005	0.0225	0.0113	0.2584	60.34	0.0005	0.0225	0.0113	0.2584	60.34	0.0005	0.0225	0.0113	0.2584	60.34	0.0005
0.0064	0.0042	0.0651	19.15	0.0001	0.0064	0.0042	0.0651	19.15	0.0001	0	0	0	0	0	0	0	0	0	0
0.0323	0.0321	0.3475	78.46	0.0006	0.0215	0.0214	0.2317	52.31	0.0004	0.0162	0.0160	0.1738	39.23	0.0003	0.0162	0.0160	0.1738	39.23	0.0003
0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0074	0.0050	0.0529	6.69	6.15E-05	0.0074	0.0050	0.0529	6.69	6.15E-05	0.0074	0.0050	0.0529	6.69	6.15E-05	0.0074	0.0050	0.0529	6.69	6.15E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001
0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002
0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002
0.0607	0.0403	0.9232	135.74	0.0011	0.0607	0.0403	0.9232	135.74	0.0011	0.0607	0.0403	0.9232	135.74	0.0011	0.0607	0.0403	0.9232	135.74	0.0011
0.0300	0.0215	0.1405	18.30	0.0002	0.0300	0.0215	0.1405	18.30	0.0002	0.0100	0.0072	0.0468	6.10	5.36E-05	0.0100	0.0072	0.0468	6.10	5.36E-05
0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	0.0001
0.0310	0.0156	0.3552	82.97	0.0007	0.0310	0.0156	0.3552	82.97	0.0007	0.0310	0.0156	0.3552	82.97	0.0007	0.0310	0.0156	0.3552	82.97	0.0007
0.0595	0.0378	0.9429	155.68	0.0013	0.0595	0.0378	0.9429	155.68	0.0013	0.0595	0.0378	0.9429	155.68	0.0013	0.0595	0.0378	0.9429	155.68	0.0013
0.0199	0.0100	0.2286	53.40	0.0004	0.0199	0.0100	0.2286	53.40	0.0004	0.0199	0.0100	0.2286	53.40	0.0004	0.0199	0.0100	0.2286	53.40	0.0004
0.0173	0.0110	0.2741	45.26	0.0004	0.0173	0.0110	0.2741	45.26	0.0004	0.0173	0.0110	0.2741	45.26	0.0004	0.0173	0.0110	0.2741	45.26	0.0004
0.1177	0.0605	0.3807	47.01	0.0004	0.1177	0.0605	0.3807	47.01	0.0004	0.1177	0.0605	0.3807	47.01	0.0004	0.1177	0.0605	0.3807	47.01	0.0004
0.0344	0.0184	0.1111	11.96	0.0001	0.0344	0.0184	0.1111	11.96	0.0001	0.0344	0.0184	0.1111	11.96	0.0001	0.0344	0.0184	0.1111	11.96	0.0001
0.0729	0.0483	1.11	162.89	0.0014	0.0729	0.0483	1.11	162.89	0.0014	0.0729	0.0483	1.11	162.89	0.0014	0.0729	0.0483	1.11	162.89	0.0014
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5965	0.3843	6.06	1068.11	0.0088	0.5857	0.3736	5.95	1041.96	0.0086	0.5540	0.3497	5.73	997.54	0.0082	0.5540	0.3497	5.73	997.54	0.0082

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2015					2015					2015					2015				
June					July					August					September				
Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)					Estimated Emissions[5] (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0.0051	0.0053	0.0509	14.96	0.0001	0.0051	0.0053	0.0509	14.96	0.0001	0	0	0	0	0	0	0	0	0	0
0.0151	0.0129	0.2292	41.12	0.0003	0.0151	0.0129	0.2292	41.12	0.0003	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0225	0.0113	0.2584	60.34	0.0005	0.0225	0.0113	0.2584	60.34	0.0005	0.0225	0.0113	0.2584	60.34	0.0005	0.0113	0.0057	0.1292	30.17	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0162	0.0160	0.1738	39.23	0.0003	0.0162	0.0160	0.1738	39.23	0.0003	0.0162	0.0160	0.1738	39.23	0.0003	0.0162	0.0160	0.1738	39.23	0.0003
0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0074	0.0050	0.0529	6.69	6.15E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001
0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002
0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002
0.0607	0.0403	0.9232	135.74	0.0011	0.0607	0.0403	0.9232	135.74	0.0011	0	0	0	0	0	0	0	0	0	0
0.0100	0.0072	0.0468	6.10	5.36E-05	0.0100	0.0072	0.0468	6.10	5.36E-05	0.0100	0.0072	0.0468	6.10	5.36E-05	0.0100	0.0072	0.0468	6.10	5.36E-05
0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	8.06E-05
0.0310	0.0156	0.3552	82.97	0.0007	0.0310	0.0156	0.3552	82.97	0.0007	0.0310	0.0156	0.3552	82.97	0.0007	0.0155	0.0078	0.1776	41.49	0.0003
0.0595	0.0378	0.9429	155.68	0.0013	0.0595	0.0378	0.9429	155.68	0.0013	0.0595	0.0378	0.9429	155.68	0.0013	0.0149	0.0094	0.2357	38.92	0.0003
0.0199	0.0100	0.2286	53.40	0.0004	0.0199	0.0100	0.2286	53.40	0.0004	0.0199	0.0100	0.2286	53.40	0.0004	0.0050	0.0025	0.0572	13.35	0.0001
0.0173	0.0110	0.2741	45.26	0.0004	0.0173	0.0110	0.2741	45.26	0.0004	0.0173	0.0110	0.2741	45.26	0.0004	0	0	0	0	0
0.1177	0.0605	0.3807	47.01	0.0004	0.1177	0.0605	0.3807	47.01	0.0004	0.1177	0.0605	0.3807	47.01	0.0004	0.0589	0.0302	0.1903	23.51	0.0002
0.0344	0.0184	0.1111	11.96	0.0001	0.0344	0.0184	0.1111	11.96	0.0001	0.0229	0.0123	0.0740	7.97	7.33E-05	0.0229	0.0123	0.0740	7.97	7.33E-05
0.0729	0.0483	1.11	162.89	0.0014	0.0729	0.0483	1.11	162.89	0.0014	0.0729	0.0483	1.11	162.89	0.0014	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.5389	0.3368	5.50	956.42	0.0079	0.5314	0.3318	5.45	949.73	0.0078	0.4390	0.2672	4.21	753.92	0.0062	0.2036	0.1284	1.45	293.80	0.0024

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2015					2015					2015					2016				
October					November					December					January				
Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0113	0.0057	0.1292	30.17	0.0002	0.0113	0.0057	0.1292	30.17	0.0002	0.0113	0.0057	0.1292	30.17	0.0002	0.0105	0.0049	0.1106	30.17	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0162	0.0160	0.1738	39.23	0.0003	0.0162	0.0160	0.1738	39.23	0.0003	0.0162	0.0160	0.1738	39.23	0.0003	0.0148	0.0143	0.1493	39.23	0.0003
0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001	0.0255	0.0183	0.1149	14.42	0.0001	0.0237	0.0171	0.1110	14.43	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001	0.0036	0.0028	0.0666	13.02	0.0001	0.0034	0.0019	0.0661	13.02	0.0001
0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002	0.0058	0.0060	0.0548	21.50	0.0002	0.0054	0.0029	0.0376	21.50	0.0001
0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002	0.0100	0.0072	0.0819	34.32	0.0002	0.0094	0.0036	0.0574	34.33	0.0002
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0100	0.0072	0.0468	6.10	5.36E-05	0.0100	0.0072	0.0468	6.10	5.36E-05	0.0100	0.0072	0.0468	6.10	5.36E-05	0.0093	0.0067	0.0453	6.10	5.29E-05
0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	8.06E-05	0.0041	0.0029	0.0459	9.80	8.06E-05	0.0038	0.0026	0.0395	9.81	7.85E-05
0.0155	0.0078	0.1776	41.49	0.0003	0.0155	0.0078	0.1776	41.49	0.0003	0.0155	0.0078	0.1776	41.49	0.0003	0.0144	0.0068	0.1521	41.49	0.0003
0.0149	0.0094	0.2357	38.92	0.0003	0.0149	0.0094	0.2357	38.92	0.0003	0.0149	0.0094	0.2357	38.92	0.0003	0.0142	0.0086	0.2119	38.92	0.0003
0.0050	0.0025	0.0572	13.35	0.0001	0.0050	0.0025	0.0572	13.35	0.0001	0.0050	0.0025	0.0572	13.35	0.0001	0.0046	0.0022	0.0490	13.35	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0589	0.0302	0.1903	23.51	0.0002	0.0589	0.0302	0.1903	23.51	0.0002	0.0589	0.0302	0.1903	23.51	0.0002	0.0543	0.0283	0.1845	23.52	0.0002
0.0229	0.0123	0.0740	7.97	7.33E-05	0.0229	0.0123	0.0740	7.97	7.33E-05	0.0115	0.0061	0.0370	3.99	3.66E-05	0.0108	0.0058	0.0361	3.99	3.67E-05
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.2036	0.1284	1.45	293.80	0.0024	0.2036	0.1284	1.45	293.80	0.0024	0.1921	0.1222	1.41	289.82	0.0023	0.1785	0.1057	1.25	289.86	0.0023

Non-Road Engines-Estimated Emission Calculations (Continued)

Appendix A.1.2

2016					2016					2016					2016				
February					March					April					May				
Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)					Estimated Emissions(5) (ton/month)				
VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2	VOC	PM2.5	NOx	CO2	SO2
0	0	0	0	0	0.0048	0.0042	0.0416	14.96	0.0001	0.0048	0.0042	0.0416	14.96	0.0001	0.0048	0.0042	0.0416	14.96	0.0001
0	0	0	0	0	0.0145	0.0117	0.2052	41.12	0.0003	0.0145	0.0117	0.2052	41.12	0.0003	0.0145	0.0117	0.2052	41.12	0.0003
0	0	0	0	0	0.0154	0.0118	0.2011	48.55	0.0004	0.0154	0.0118	0.2011	48.55	0.0004	0.0154	0.0118	0.2011	48.55	0.0004
0	0	0	0	0	0.0177	0.0136	0.2331	55.04	0.0004	0.0177	0.0136	0.2331	55.04	0.0004	0.0177	0.0136	0.2331	55.04	0.0004
0	0	0	0	0	0.0102	0.0078	0.1343	31.71	0.0003	0.0102	0.0078	0.1343	31.71	0.0003	0.0102	0.0078	0.1343	31.71	0.0003
0	0	0	0	0	0.0176	0.0090	0.1552	62.58	0.0005	0.0176	0.0090	0.1552	62.58	0.0005	0.0176	0.0090	0.1552	62.58	0.0005
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0105	0.0049	0.1106	30.17	0.0002	0.0105	0.0049	0.1106	30.17	0.0002	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0148	0.0143	0.1493	39.23	0.0003	0.0148	0.0143	0.1493	39.23	0.0003	0.0148	0.0143	0.1493	39.23	0.0003	0.0148	0.0143	0.1493	39.23	0.0003
0.0237	0.0171	0.1110	14.43	0.0001	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0034	0.0019	0.0661	13.02	9.44E-05	0.0034	0.0019	0.0661	13.02	9.44E-05	0.0034	0.0019	0.0661	13.02	9.44E-05	0.0034	0.0019	0.0661	13.02	9.44E-05
0.0054	0.0029	0.0376	21.50	0.0001	0.0027	0.0015	0.0188	10.75	7.4E-05	0.0027	0.0015	0.0188	10.75	7.4E-05	0.0027	0.0015	0.0188	10.75	7.40E-05
0.0094	0.0036	0.0574	34.33	0.0002	0.0094	0.0036	0.0574	34.33	0.0002	0.0047	0.0018	0.0287	17.16	0.0001	0.0047	0.0018	0.0287	17.16	0.0001
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0093	0.0067	0.0453	6.10	5.29E-05	0.0093	0.0067	0.0453	6.10	5.29E-05	0	0	0	0	0	0	0	0	0	0
0.0038	0.0026	0.0395	9.81	7.85E-05	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0144	0.0068	0.1521	41.49	0.0003	0.0144	0.0068	0.1521	41.49	0.0003	0	0	0	0	0	0	0	0	0	0
0.0142	0.0086	0.2119	38.92	0.0003	0.0142	0.0086	0.2119	38.92	0.0003	0	0	0	0	0	0	0	0	0	0
0.0046	0.0022	0.0490	13.35	0.0001	0.0046	0.0022	0.0490	13.35	0.0001	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.0543	0.0283	0.1845	23.52	0.0002	0.0543	0.0283	0.1845	23.52	0.0002	0	0	0	0	0	0	0	0	0	0
0.0108	0.0058	0.0361	3.99	3.67E-05	0.0108	0.0058	0.0361	3.99	3.67E-05	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.1785	0.1057	1.25	289.86	0.0023	0.2285	0.1427	2.05	508.83	0.0040	0.1057	0.0777	1.23	334.13	0.0026	0.1057	0.0777	1.23	334.13	0.0026

Appendix A.1.3
Marine Engines

Marine Engines-Dredging Activities

Appendix A.1.3

							Emission Factors (g/bhp-hr)					Estimated Emissions (tons/month)				
Equip ID	Vehicle	Engine Rating[1] (HP)	Engine Rating (kW)	Units	Fuel Burn Rate[1] (gallon/hour)	Hours of Operation[2][3][4] (Hours/Month)	VOC[5][6]	PM2.5[5][7]	NOx[5][6]	CO2[8]	SO2[9][10]	VOC	PM2.5	NOx	CO2	SO2
24	18" Dredger-Propulsion Engine	1280	954	1	64.70	300	5.37	0.1490	5.37	22.20	0.0137	2.27	0.0631	2.27	215.45	0.0021
24	18" Dredger-Auxiliary Engine	475	354	1	22.60	300	5.37	0.1490	5.37	22.20	0.0048	0.8435	0.0234	0.8435	75.26	0.0007
44	14" Dredger	715	533	1	36.80	300	5.37	0.1490	5.37	22.20	0.0078	1.27	0.0352	1.27	122.54	0.0012
45	12" Dredger	440	328	1	21.70	300	5.37	0.1490	5.37	22.20	0.0046	0.7814	0.0217	0.7814	72.26	0.0007
46	10" Dredger	475	354	1	21.70	300	5.37	0.1490	5.37	22.20	0.0046	0.8435	0.0234	0.8435	72.26	0.0007
47	6" 815 Mudcat	185	138	1	10.10	300	5.37	0.2240	5.37	22.20	0.0021	0.3285	0.0137	0.3285	33.63	0.0003
50	Dredge Tenders	120	89	5	6.70	300	5.37	0.2240	5.37	22.20	0.0014	1.07	0.0444	1.07	111.56	0.0011
26	1 80' Pushboat-for Dredging Barge	850	634	2	40.50	150	5.37	0.1490	5.37	22.20	0.0086	1.51	0.0419	1.51	134.87	0.0013
											Total Monthly Emissions	8.91	0.2668	8.91	837.83	0.0080

Notes:

1. The engine rating and fuel burn rate for each marine vehicle was obtained from manufacturer specification sheets for marine engines.
2. Dredging activities are scheduled to take place during months June 2011 through March 2012.
3. Hours of operation for the dredging equipment and dredge tenders is based on a schedule of 10 hours per day and 30 days per month.
4. Hours of operation for the pushboat for the dredging barge is based on a schedule of 5 hours per day and 30 days per month.
5. Emission Factors for VOC, PM2.5, and NOx are from Table A-1 "Primary Tier 2 Exhaust Emission Standards," provided in 40 CFR 94.8.
6. The emission limits for NOx and VOC's are combined in 40 CFR 94.8. Using the emission limit individually for each pollutant provides a maximum bounding value.
7. Emission factor for PM2.5 is conservatively assumed to be the same as the emission factor for PM listed in 40 CFR 94.8.
8. Carbon Dioxide (CO2) Emission Factor is in pounds of CO2 per gallon of diesel fuel burned as provided in USEPA, "Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel," EPA420-F-05-001, February 2005.
9. Sulfur Dioxide (SO2) Emission Factor is in units of pounds/hour (lb/hr)
10. Sulfur content of diesel fuel oil is 15 ppmw.

Marine Engines-Aggregate Barge Deliveries

Appendix A.1.3

							Emission Factors (g/bhp-hr)					Estimated Emissions (tons/month)				
Year	Vehicle	Engine Rating[1] (HP)	Units	Schedule of Delivery[2] (Days/Month)	Fuel Burn Rate[1] (gallon/hour)	Operation per Delivery[3] (Hours per Day)	VOC[4][5]	PM2.5[4][6]	NOx[4][5]	CO2[7]	SO2[8][9]	VOC	PM2.5	NOx	CO2	SO2
1	1 80' Pushboat-for Aggregate Transport Barge	850	2	20	40.5	5	5.37	0.1490	5.37	22.20	0.0086	1.01	0.0279	1.01	89.91	0.0009
2 and 3	1 80' Pushboat-for Aggregate Transport Barge	850	2	8	40.5	5	5.37	0.1490	5.37	22.20	0.0086	0.4025	0.0112	0.4025	35.96	0.0003
4	1 80' Pushboat-for Aggregate Transport Barge	850	2	4	40.5	5	5.37	0.1490	5.37	22.20	0.0086	0.2013	0.0056	0.2013	17.98	0.0002

Notes:

1. The engine rating and fuel burn rate for the pushboat for aggregate transport barge was obtained from the manufacturer specification sheet for the marine engine.
2. The schedule of delivery for the pushboat for the aggregate transport barge is assumed to vary depending on the year of construction. It is estimated that the pushboat will operate 20 days/month during the 1st year of engine operation (October 2012 through September 2013), 8 days/month during the 2nd and 3rd years of engine operation (October 2013 through September 2015), and 4 days/month during the 4th year of engine operation (October 2015 through March 2016).
3. Hours of operation for the pushboat for the aggregate transport barge is based on a schedule of 5 hours per day and 30 days per month.
4. Emission Factors for VOC, PM2.5, and NOx are from Table A-1 "Primary Tier 2 Exhaust Emission Standards," provided in 40 CFR 94.8.
5. The emission limits for NOx and VOC's are combined in 40 CFR 94.8. Using the emission limit individually for each pollutant provides a maximum bounding value.
6. Emission factor for PM2.5 is conservatively assumed to be the same as the emission factor for PM listed in 40 CFR 94.8.
7. Carbon Dioxide (CO2) Emission Factor is in pounds of CO2 per gallon of diesel fuel burned as provided in USEPA, "Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel," EPA420-F-05-001, February 2005.
8. Sulfur Dioxide (SO2) Emission Factor is in units of pounds/hour (lb/hr)
9. Sulfur content of diesel fuel oil is 15 ppmw.

Appendix A.1.4
Locomotive Engines

Locomotive Engines-Emission Calculations

Appendix A.1.4

						Emission Factors (g/hp-hr)					Estimated Emissions (tons/month)				
Equip ID	Engine	Engine Rating[1] (HP)	Number of Units	Hours of Operation[2][3] (Hours/Month)	Load Factor[4]	VOC[5][6]	PM2.5[5][7]	NOx[8]	CO2[9][10][11]	SO2[13][14]	VOC	PM2.5	NOx	CO2[12]	SO2
42	Switch Locomotive	2100	1	300	0.59	0.6000	0.1000	3.000	0.0511	0.0227	0.2458	0.0410	1.23	210.81	0.0020

Notes:

1. The engine rating is for any locomotive with Tier III engines similar to the National Railway Equipment Co.'s (NREC) N-ViroMotive locomotive with model number 3GS-21C.
2. This analysis conservatively assumes that the locomotive operates 10 hours per day and 30 days per month.
3. Locomotive is scheduled to operate during construction from October 2012 through March 2016.
4. Load factor from Appendix A of "Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling," EPA, 2004.
5. Tier III emission factors for VOC and PM2.5 are from Table III-2 of Federal Register notice Vol. 73, No. 126 issued Monday, June 30,2008 containing current emission standards for switch locomotives.
6. Emission factors for VOC are assumed to be the same as the emission factor for THC listed in Table III-1 of FR, Vol. 73, No. 126.
7. Emission factor for PM2.5 is conservatively assumed to be the same as the emission factor for PM listed in Table III-1 of FR, Vol. 73, No. 126.
8. Emission factor for NOx is from the specifications for a NREC N-ViroMotive locomotive (www.nationalrailway.com/nviro.asp).
9. Carbon Dioxide (CO2) Emission Factor is a fuel consumption emission factor (gallon/hp-hr) derived from an average BSFC of 7,000 Btu/hp-hr and a heating value of diesel fuel of 137,000 Btu/gal.
10. The average BSFC of 7,000 Btu/hp-hr is from footnote E in Table 3.4-1 "Gaseouse Emission Factors for Large Stationary Diesel and All Stationary Dual-Fuel Engines," of USEPA, AP-42, Fifth Edition, Vol. I. Chapter 3 "Stationary Internal Combustion Sources", Section 3.4 "Large Stationary Diesel and All Dual-fuel Engines," October 1996.
11. The heating value of deisel fuel of 137,000 Btu/gal is from USEPA, AP-42, Fifth Edition, Vol. I, Appendix A "Miscellaneous Data & Conversion Factors," September 1985.
12. Carbon Dioxide (CO2) Emission Rate for diesel fuel is 22.2 pounds of CO2/gallon of diesel as provided in "Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel," EPA420-F-05-001, February 2005.
13. Sulfur Dioxide (SO2) Emission Factor is in units of pounds/hour (lb/hr).
14. Sulfur content of diesel fuel oil is 15 ppmw.

Appendix A.2
Construction Emissions from Fugitive Sources

Total Fugitive Source Emissions

Total Fugitive Source Emissions
Appendix A.2

	2011	2012	2013	2014	2015	2016
			$PM_{2.5}$			
Atmospheric Transfers	0.0001	0.0016	0.0016	0.0016	0.0011	0.0000
Bulldozing	0.1024	0.1106	0.0737	0.0000	0.0000	0.0123
Grading	2.05	0.5491	0.3660	0.3660	0.0915	0.2668
Blasting	0.0000	0.0576	0.0000	0.0000	0.0000	0.0000
Concrete Production	0.1090	1.3076	1.3076	1.3076	0.8717	0.0000
Active Pile Wind Erosion	0.0742	0.8908	0.8908	0.8908	0.5939	0.0000
Construction Area Wind Erosion	3.95	5.27	5.27	5.27	5.2725	2.1969
Paved Roads	0.5493	1.8763	13.1147	9.7624	3.5722	1.4882
Unpaved Roads	12.63	23.58	44.99	32.78	21.8596	1.9348
Total Annual Emissions (tons)	**19.47**	**33.65**	**66.02**	**50.39**	**32.26**	**5.90**

Notes [ ]:

1. Estimated emissions for bulldozing, grading, and unpaved roads are based on a 75 percent utilization factor assuming that all equipment does not operate continuously over a full 10 hour shift.

Fugitive Source Emissions within NRC's Jurisdictional Authority

Fugitive Source Emissions within NRC's Jurisdictional Authority

Appendix A.2

	2011	2012	2013	2014	2015	2016
			$PM_{2.5}$			
Atmospheric Transfers	0.0000	0.0005	0.0014	0.0012	0.0008	0.0000
Bulldozing	0.0000	0.0246	0.0655	0.0000	0.0000	0.0123
Grading	0.00	0.0915	0.3127	0.2730	0.0641	0.2668
Blasting	0.0000	0.0576	0.0000	0.0000	0.0000	0.0000
Concrete Production	0.0327	0.3759	1.1169	0.9753	0.6756	0.0000
Active Pile Wind Erosion	0.0223	0.2561	0.7609	0.6644	0.4603	0.0000
Construction Area Wind Erosion	0.0000	1.3181	4.5036	3.9324	4.4816	2.1969
Paved Roads	0.1465	0.5352	11.2021	7.2811	3.0363	1.4882
Unpaved Roads	3.44	12.47	39.24	24.46	17.1931	1.9348
Total Annual Emissions (tons)	**3.64**	**15.13**	**57.20**	**37.58**	**25.91**	**5.90**

Notes [ ]:

1. Estimated emissions for bulldozing, grading, and unpaved roads are based on a 75 percent utilization factor assuming that all equipment does not operate continuously over a full 10 hour shift.
2. The estimated emissions for fugitive sources are assumed to cover only activities under the NRC's jurisdictional authority.

Appendix A.2.1
Atmospheric Transfers

Atmospheric Transfers
Appendix A.2.1

Emission Factor (EF) Equation [1]
$EF = k(0.0032)\{U/5\}^{1.3}/(M/2)^{1.4}$ Equation 1 [1]

Where:

EF (lb/ton) =
k = 0.74 for TSP
0.35 for PM-10
0.053 for PM-2.5
U = 9.9 mph [2]
M= 14.00 Backfill (Clay/Dirt Mix) [1a]

Calculated Emission Factors:

TSP	PM-10	PM-2.5	
3.775E-04	1.785E-04	2.704E-05	for Backfill

Following calculation based upon 45 Months of Operation (months 9-53)

Total Backfill: 405,000 yd^3 4950 ton/mo [3] Backfill

Atmospheric Transfers:

Barge Unloading	Potential to Emit Calculations								
	Max Material Transferred	Potential Uncontrolled Emissions			Control Method	Control Efficiency	Potential Controlled Emissions		
		TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
	ton/mo	ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
Backfill - Backhoe to Truck	4,950	0.0009	0.0004	0.0001	None	0	0.0009	0.0004	0.0001
Backfill - Truck to Fill Location	4,950	0.0009	0.0004	0.0001	None	0	0.0009	0.0004	0.0001

Notes [ ]:
1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.4 "Aggregate Handling and Storage Piles". November 2006.
   a. Table 13.2.4-1 "Typical Silt and Moisture Contents of Materials at Various Industries".
2. U.S. Department of Commerce. "Annual LCD for Detroit Metro Airport, Michigan". National Climatic Data Center, NESDIS, NOAA. 2006.
3. Based upon Calculation 147483.51 9016 of the DTE COLA Application. Density for fill material was assumed to be 1,100 lb/yd^3

Atmospheric Transfers (Continued)

Appendix A.2.1

Construction Activities (ton/mo)		2011	2012												2013				
Equip ID	EQUIPMENT	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May
None	Backfill - Backhoe to Truck	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
None	Backfill - Truck to Fill Location	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Totals (ton/mo)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Construction Activities (ton/mo)		2013							2014										
Equip ID	EQUIPMENT	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November
None	Backfill - Backhoe to Truck	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
None	Backfill - Truck to Fill Location	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
Totals (ton/mo)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

Construction Activities (ton/mo)		2014	2015												2016				
Equip ID	EQUIPMENT	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May
None	Backfill - Backhoe to Truck	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001									
None	Backfill - Truck to Fill Location	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001									
Totals (ton/mo)		0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Appendix A.2.2
Bulldozing

Bulldozing
Appendix A.2.2

Bulldozing Emissions Calculation

Overburden PM Emission Factors (EF) Equation [1]

EF = 5.7 * (s^1.2) / (M^1.3) TSP
EF = (1.0 * (s^1.5) / (M^1.4))*0.75 PM-10
EF = (1.0 * (s^1.5) / (M^1.4))*0.105 PM2.5

Where:

EF = particulate emission factor, lb/hr
s = surface material silt content, % = 9.2 Dirt/Clay Mix [2a]
M = material moisture conent, % = 14.0 Dirt/Clay Mix [2a]

Basis:

Bulldozing:

Equip ID	Bulldozing Activity		Potential to Emit Calculations												
			Hours of Operation	Emission Factor			Control Method	Potential Uncontrolled Emissions			Control Method	Control Efficiency [4]	Potential Controlled Emissions		
				TSP	PM-10	PM-2.5		TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
			hrs/day [3]	lbs/hr	lbs/hr	lbs/hr		ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
3	Bulldozer Cat/D9		10.0	2.65	0.5202	0.0728	None	0.3968	0.0780	0.0109	Watering	50	0.1984	0.0390	0.0055

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 11 Table 11.9-1 "Emission factor equations for uncontrolled open dust sources at western surface coal mines". July 1998.
2. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.4 "Aggregate Handling and Storage Piles". November 2006.
   a. Table 13.2.4-1 " Typical Silt and Moisture Contents of Materials at Various Industries."
3. Bulldozing is assumed to take place 10 hours per day, 30 days per month.
4. Table 2.1.1-3 "Summary of techniques, Efficiencies and costs for controlling fugitive dust from paved and unpaved surfaces", RACM for Fugitive Dust Sources, Ohio EPA, 1980.

Bulldozing (Continued)

Appendix A.2.2

Construction Activities (ton/mo)		2011									2012								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
3	Bulldozer Cat/D9 (ton/mo)	0.0109	0.0109	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109
	Totals (ton/mo)	0.0109	0.0109	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0164	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109

Construction Activities (ton/mo)		2012			2013												2014		
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March
3	Bulldozer Cat/D9 (ton/mo)	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109						
	Totals (ton/mo)	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109	0.0109						

Construction Activities (ton/mo)		2014									2015								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
3	Bulldozer Cat/D9 (ton/mo)																		
	Totals (ton/mo)																		

Construction Activities (ton/mo)		2015			2016				
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May
3	Bulldozer Cat/D9 (ton/mo)						0.0055	0.0055	0.0055
	Totals (ton/mo)						0.0055	0.0055	0.0055

Appendix A.2.3
Grading

Grading
Appendix A.2.3

Grading Emissions Calculation

PM Emission Factors (EF) Equation [1]

EF = 0.040 * (S^2.5) TSP
EF = 0.051 * (S^2.0)* 0.60 PM-10
EF = 0.051 * (S^2.0)* 0.031 PM2.5

Where:

EF = particulate emission factor, lb/VMT

S = Cat Scraper 637 [3] 10 mph [2]
Grader 200hp 14' [4] 7 mph [3]

Calculated Emission Factors:

		TSP	PM-10	PM-2.5	
EF	Scraper Cat 651	12.6491	3.0600	0.1581	lb/VMT
	Grader 200hp 14'	5.1857	1.4994	0.0775	lb/VMT

Grading:

Equip ID	Grading Activity	Potential to Emit Calculations													
		Ave Vehicle Speed	Hours of Operation [4]	Emission Factor				Potential Uncontrolled Emissions [4]			Control Method	Control Efficiency [5]	Potential Controlled Emissions		
				TSP	PM-10	PM-2.5		TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
		VMT/hr	hrs/day	lb/hr	lb/hr	lb/hr		ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
4	Scraper Cat 651	10.0	10.0	126.49	30.60	1.58		18.97	4.59	0.2372	Watering	50	9.49	2.30	0.1186
9	Grader 200hp 14'	7.0	10.0	36.30	10.50	0.5423		5.44	1.57	0.0813	Watering	50	2.72	0.7872	0.0407

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 11 Table 11.9-1 "Emission factor equations for uncontrolled open dust sources at western surface coal mines". July 1998.
2. Speed based upon a Caterpillar 637 Wheel Tractor Scraper.
3. Speed Based upon a Caterpillar 140M Motor Grader.
4. Grading is assumed to take place 10 hours per day, 30 days per month.
5. Table 2.1.1-3 "Summary of techniques, Efficiencies and costs for controlling fugitive dust from paved and unpaved surfaces", RACM for Fugitive Dust Sources, Ohio EPA, 1980.

Grading (Continued)

Appendix A.2.3

Construction Activities (ton/mo)		2011									2012								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
4	Scraper Cat 651 (ton/mo)	0.4743	0.4743	0.4743	0.4743	0.2372	0.1186	0.1186											
9	Grader 200hp 14' (ton/mo)	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0813	0.0813	0.0813	0.0813	0.0813	0.0813
	Totals (ton/mo)	0.5150	0.5150	0.5150	0.5150	0.2778	0.1592	0.1592	0.0407	0.0407	0.0407	0.0407	0.0407	0.0813	0.0813	0.0813	0.0813	0.0813	0.0813

Construction Activities (ton/mo)		2012			2013												2014		
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March
4	Scraper Cat 651 (ton/mo)																		
9	Grader 200hp 14' (ton/mo)	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407
	Totals (ton/mo)	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407

Construction Activities (ton/mo)		2014									2015								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
4	Scraper Cat 651 (ton/mo)																		
9	Grader 200hp 14' (ton/mo)	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407						
	Totals (ton/mo)	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.0407	0.00	0.00	0.00	0.00	0.00	0.00

Construction Activities (ton/mo)		2015			2016				
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May
4	Scraper Cat 651 (ton/mo)						0.1186	0.1186	0.1186
9	Grader 200hp 14' (ton/mo)								
	Totals (ton/mo)	0.00	0.00	0.00	0.00	0.00	0.1186	0.1186	0.1186

Appendix A.2.4
Blasting

Blasting
Appendix A.2.4

Blasting Emissions Calculation

PM Emission Factors (EF) Equation [1]

EF = 0.000014(A)^1.5 TSP
EF = 0.000014(A)^1.5 * 0.52 PM-10
EF = 0.000014(A)^1.5 * 0.03 PM2.5

Where:

EF = particulate emission factor, (lb/blast)

A = 49.0 X 49.0 meters	25844 ft^2	Reactor Building [4]
30.3 X 23.8 meters	7762 ft^2	Control Building [2]
21.0 X 49.0 meters	11076 ft^2	Fuel Building [2]
66.0 X 33.8 meters	24012 ft^2	Rad Waste [2]

Calculated Emission Factors:

EF	TSP	PM-10	PM-2.5		
	58.17	30.25	1.74	lb/blast	Reactor Building
	9.57	4.98	0.29	lb/blast	Control Building
	16.32	8.49	0.49	lb/blast	Fuel Building
	52.09	27.09	1.56	lb/blast	Rad Waste Building

Blasting:

Equip ID	Blasting Activity	Emission Factor			Number of Blasts [3]	Potential Uncontrolled Emissions			Potential Uncontrolled Emissions [4]		
		TSP	PM-10	PM-2.5		TSP	PM-10	PM-2.5	TSP	PM-10	PM-2.5
		lb/blast	lb/blast	lb/blast		Total Tons	Total Tons	Total Tons	ton/mo	ton/mo	ton/mo
None	Reactor Building	58.17	30.25	1.74	32	0.9307	0.4839	0.0279	0.9307	0.4839	0.0279
None	Control Building	9.57	4.98	0.2872	21	0.1005	0.0523	0.0030	0.1005	0.0523	0.0030
None	Fuel Building	16.32	8.49	0.4896	26	0.2122	0.1103	0.0064	0.2122	0.1103	0.0064
None	Radiation Waste Building	52.09	27.09	1.5628	26	0.6772	0.3521	0.0203	0.6772	0.3521	0.0203

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 11 Table 11.9-1 "Emission Factors for Uncontrolled Open Dust Sources at Western Surface Coal Mines". Blasting Equation, July 1998.
2. Surface Area for each building requiring blasing. Building dimensions from ESBWR Rev 5 DCD Table 3.8-8.
3. It was assumed each blast cleared 1 meter of rock from the entire area for each structure representated.
4. The blasting was assumed to be conducted in month 19 of construction.

Blasting (Contined)

Appendix A.2.4

Construction Activities (ton/mo)		2011									2012								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
None	Reactor Building																		
None	Control Building																		
None	Fuel Building																		
None	Radiation Waste Building																		
	Totals (ton/mo)	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	0.00	0.00	0.00	0.00	0.00

Construction Activities (ton/mo)		2012			2013												2014		
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March
None	Reactor Building	0.0279																	
None	Control Building	0.0030																	
None	Fuel Building	0.0064																	
None	Radiation Waste Building	0.0203																	
	Totals (ton/mo)	0.0576	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	0.00	0.00	0.00	0.00

Construction Activities (ton/mo)		2014									2015								
Equip ID	EQUIPMENT	January	Feburary	March	April	May	June	July	August	September	January	Feburary	March	April	May	June	July	August	September
None	Reactor Building																		
None	Control Building																		
None	Fuel Building																		
None	Radiation Waste Building																		
	Totals (ton/mo)	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	0.00	0.00	0.00	0.00	0.00

Construction Activities (ton/mo)		2015			2016				
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May
None	Reactor Building								
None	Control Building								
None	Fuel Building								
None	Radiation Waste Building								
	Totals (ton/mo)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A.2.5
Concrete Production

Concrete Production
Appendix A.2.5

Emission Factor Drop (EF) Equation [1]

$EF = k(0.0032)(U/5)^{1.3}/(M/2)^{1.4}$ Equation 1 [1]

Where:

EF = (lb/ton)

k = 0.74 for TSP
0.35 for PM-10
0.053 for PM-2.5

U = 9.9 mph [2]

M = 0.70 Aggregate [1a]

Calculated Emission Factors:

	TSP	PM-10	PM-2.5	
EF (lb/ton)	2.502E-02	1.184E-02	1.792E-03	for Aggregate

Following calculation based upon 45 Months of Operation (months 9-53)

Total Aggregate: 460,000 yd³

[3] or 10,222.22 yd³/mo 14,490 ton/mo [3] Aggregate

Concrete Unloading to Silo Emission Calculation [4] (lb/ton)

EF=	0.0089	(lb/ton) for TSP
EF=	0.0049	(lb/ton) for PM 10
EF=	0.0049	(lb/ton) for PM 2.5 [5]

Weight Hopper Loading Emission Calculation [6] (lb/ton)

EF=	0.0051	(lb/ton) for TSP
EF=	0.0024	(lb/ton) for PM 10
EF=	0.0024	(lb/ton) for PM 2.5 [5]

Mixer Loading Emission Calculation [7]

EF= $k(0.0032)*(U^a / M^b)+c$ (lb/ton) for TSP,PM 10, and PM 2.5

Parameters for Controlled PM

Parameter Cate	k	a	b	c
TSP	0.19	0.95	0.9	0.001
PM 10	0.13	0.45	0.9	0.001
PM 2.5	0.03	0.45	0.9	0.0002

Concrete Production:

Aggregate Transfer	Potential to Emit Calculations								
	Max Material Transferred	Potential Uncontrolled Emissions			Control Method	Control Efficiency	Potential Controlled Emissions [8]		
		TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
	ton/mo	ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
Aggregate - Barge to Trucks using E-Crain	14,490	0.1813	0.0857	0.0130	None	0	0.1813	0.0857	0.0130
Aggregate - Trucks to Pile	14,490	0.1813	0.0857	0.0130	None	0	0.1813	0.0857	0.0130
Aggregate - Pile to Conveyor	14,490	0.1813	0.0857	0.0130	None	0	0.1813	0.0857	0.0130
Aggregate - Conveyor to Silo	14,490	0.1813	0.0857	0.0130	None	0	0.1813	0.0857	0.0130
Concrete Unloading to Silo - Point Source	14,490	0.0645	0.0355	0.0355	None	0	0.0645	0.0355	0.0355
Aggregate - Weigh Hopper Loading	14,490	0.0369	0.0174	0.0174	None	0	0.0369	0.0174	0.0174
Aggregate - Mixer Loading	14,490	0.0609	0.0189	0.0041	None	0	0.0609	0.0189	0.0041

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.4 "Aggregate Handling and Storage Piles". November 2006.
   a. Table 13.2.4-1 "Typical Silt and Moisture Contents of Materials at Various Industries".
2. U.S. Department of Commerce. "Annual LCD for Detroit Metro Airport, Michigan". National Climatic Data Center, NESDIS, NOAA. 2006.
3. Total Aggregate is amount needed to create concrete for construction of facility. Density of aggregate was assumed to be same as sand & gravel in AP-42, which is 105 lb/ft³ (Appendix A of AP-42).
4. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 11 "Concrete Batching", table 11.12-2 "Emission Factors for Concrete Batching". " Concrete Supplement Unloading to Elevated Storage Silo", controlled emission factors. June 2006
5. PM 2.5 emission factor was conservatively assumed to equal PM 10 emission factor.
6. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 11 "Concrete Batching", table 11.12-2 "Emission Factors for Concrete Batching". " Weight Hopper Loading", uncontrolled emission factors. June 2006
7. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 11 "Concrete Batching", Equation 11.12-1 using table 11.12-4 "Equation for Cental Mix Operations". June 2006
8. Emmission estimates applied to months 9-53. Months 9-53 are the months that the concrete batch plant will be in operation.

Concrete Production (Continued)

Appendix A.2.5

Construction Activities (ton/mo)		2011	2012												2013				
Equip ID	EQUIPMENT	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May
None	Aggregate - Barge to Trucks using E-Crain	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Aggregate - Trucks to Pile	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Aggregate - Pile to Conveyor	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Aggregate Conveyor to Silo	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Concrete Unloading to Silo	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355
None	Weight Hopper Unloading	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174
None	Mixer Loading	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041
Totals (ton/mo)		0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090

Construction Activities (ton/mo)		2013							2014										
Equip ID	EQUIPMENT	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November
None	Aggregate - Barge to Trucks using E-Crain	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Aggregate - Trucks to Pile	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Backfill - Backhoe to Truck	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Backfill - Truck to Fill Location	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130
None	Concrete Unloading to Silo	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355
None	Weight Hopper Unloading	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174
None	Mixer Loading	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041
Totals (ton/mo)		0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090

Construction Activities (ton/mo)		2014	2015												2016				
Equip ID	EQUIPMENT	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May
None	Aggregate - Barge to Trucks using E-Crain	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130									
None	Aggregate - Trucks to Pile	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130									
None	Backfill - Backhoe to Truck	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130									
None	Backfill - Truck to Fill Location	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130	0.0130									
None	Concrete Unloading to Silo	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355	0.0355									
None	Weight Hopper Unloading	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174	0.0174									
None	Mixer Loading	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041	0.0041									
Totals (ton/mo)		0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.1090	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A.2.6
Active Pile Wind Erosion

Active Pile Wind Erosion
Appendix A.2.6

Wind Erosion Calculations

Emission Factor (EF) Equation [1]

EF =	1.7*(s/1.5)*(f/15)*((365-p)/235)	TSP
EF =	1.7*(s/1.5)*(f/15)*((365-p)/235) * 0.5	PM-10
EF =	1.7*(s/1.5)*(f/15)*((365-p)/235) * 0.075	PM2.5 [2]

Where:

EF = particulate (TSP) emission factor, (lb/day/acre)

s = material silt content, %

7.1 Aggregate [3a]

7.1 Silica Sand [3a]

f = percentage of time the unobstructed wind speed exceeds 12 mph — 32.5 % [4]

p = number of days per year with at least 0.01 in of precipitation — 136 days [5]

Calculated Emission Factors:

	TSP	PM-10	PM-2.5		
EF	16.9893	8.4947	1.2742	lb/day/acre of surface	Aggregate
EF	16.9893	8.4947	1.2742	lb/day/acre of surface	Silica

Active Pile Wind Erosion Emissions:

Wind Erosion	Potential to Emit Calculations									
	Number of Piles	Exposed Surface Area [6]	Potential Uncontrolled Emissions			Control Method	Control Efficiency	Potential Controlled Emissions [7]		
			TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
		acres	ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
Aggregate Piles	12	0.1942	0.5939	0.2969	0.0445	None	0	0.5939	0.2969	0.0445
Silica Piles (Sand)	8	0.1942	0.3959	0.1980	0.0297	None	0	0.3959	0.1980	0.0297

Notes [ ]:

1. USEPA. "Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures". EPA-450/2-92-004. September 1992.
2. Western Governors' Association Western Regional Air Partnership (WRAP). "Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors". Final. November 1, 2006. Prepared by Midwest Research Institute. It was assumed that the PM2.5/PM10 ratio of 0.15 recommended for the transfer of aggregate associated with conveyor transfer points subject to an open atmosphere is applicable general material handling operations. Therefore the updated equation calculates a TSP ratio of 0.075 (0.15/2) since TSP is 2 times the PM10 value.
3. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.4 "Aggregate Handling and Storage Piles". November 2006.
   a. Table 13.2.4-1 "Typical Silt and Moisture Contents of Materials at Various Industries".
4. U.S. Department of Commerce. "International Station Meteorological Climate Summary Ver 3.0 CD-ROM". Detroit, MI. National Climatic Data Center, NESDIS, NOAA. 1995.
5. U.S. Department of Commerce. "Annual LCD for Detroit Metro Airport, Michigan". National Climatic Data Center, NESDIS, NOAA. 2006.
6. Size of piles 20' high and 100' diameter approx 8459 sq feet.
7. Wind erosion for piles applied to months 9-53. During construction months 9-53 the piles will be used to prepare concrete to build the facility.

Active Pile Wind Erosion (Continued)

Appendix A.2.6

Construction Activities (ton/mo)		2011	2012												2013				
Equip ID	EQUIPMENT	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May
None	Aggregate Piles	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445
None	Sand Piles	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297
Totals (ton/mo)		0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742

Construction Activities (ton/mo)		2013							2014										
Equip ID	EQUIPMENT	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November
None	Aggregate Piles	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445
None	Sand Piles	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297
Totals (ton/mo)		0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742

Construction Activities (ton/mo)		2014	2015												2016				
Equip ID	EQUIPMENT	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May
None	Aggregate Piles	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445	0.0445									
None	Sand Piles	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297	0.0297									
Totals (ton/mo)		0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.0742	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix A.2.7
Construction Area Wind Erosion

Construction Area Wind Erosion

Appendix A.2.7

Wind Erosion Calculations

Emission Factor (EF) Equation [1]

EF = 0.38A TSP
EF = 0.38A * 0.5 PM-10 [2]
EF = 0.38A * 0.075 PM2.5 [3]

Where:

EF = particulate (TSP) emission factor, (ton/yr)
A = total construction acres 185 Acres [4]

Calculated Emission Factors:

	TSP	PM-10	PM-2.5		
EF	70.3000	35.1500	5.2725	ton/yr	Particulate Matter

Construction Area Wind Erosion Emissions:

Wind Erosion	Potential to Emit Calculations								
	Months per year	Potential Uncontrolled Emissions			Control Method	Control Efficiency	Potential Controlled Emissions [5]		
		TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
	mo/yr	ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
Exposed Construction Area	12	5.86	2.93	0.4394	None	0	5.86	2.93	0.4394

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol I Chapter 11 Table 11.9-4 "Uncontrolled Particulate Emission Factors for Uncontrolled Open Dust Sources at Western Surface Coal Mines". Wind Erosion of Exposed Areas, July 1998.
2. USEPA. "Fugitive Dust Background Document and Technical Information Document for Best Available Control Measures". EPA-450/2-92-004. September 1992. TSP to PM10 ratio of 0.5 used in active pile erosion equation was used here for consistancy.
3. Western Governors' Association Western Regional Air Partnership (WRAP). "Background Document for Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors". Final. November 1, 2006. Prepared by Midwest Research Institute. It was assumed that the PM2.5/PM10 ratio of 0.15 recommended for the transfer of aggregate associated with conveyor transfer points subject to an open atmosphere is applicable general material handling operations. Therefore the updated equation calculates to a TSP/PM2.5 ratio of 0.075 (=0.5*.15) since PM10 value is half the value of TSP.
4. Total number of new acres to be disturbed during construction of Fermi3.
5. Wind erosion was assumed for the full 62 month construction period.

Construction Area Wind Erosion (Continued)

Appendix A.2.7

Construction Activities (ton/mo)		2011									2012								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
None	PM 2.5	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394
Totals (ton/mo)		0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394

Construction Activities (ton/mo)		2012			2013												2014		
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March
None	PM 2.5	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394
Totals (ton/mo)		0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394

Construction Activities (ton/mo)		2014									2015								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
None	PM 2.5	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394
Totals (ton/mo)		0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394

Construction Activities (ton/mo)									
Equip ID	EQUIPMENT	55	56	57	58	59	60	61	62
None	PM 2.5	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394
Totals (ton/mo)		0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394	0.4394

Appendix A.2.8
Paved Roads

Paved Roads
Appendix A.2.8

Paved Road Emissions Calculation

Emission Factor (EF) Equation [1]
EF = [k * (sL/2)^0.65 * (W/3)^1.5 - C] * (1-(P/(4*N)))

Where:

EF =	particulate emission factor, (lb/VMT)		
k =	particle size multiplier =	0.082	for TSP [1a]
		0.016	for PM-10 [1a]
		0.004	for PM-2.5 [1a]
sL =	surface silt loading, g/m^2 =	0.6	[1c]
W =	average vehicle weight, tons =	see Table below	
C =	emission factor for 1980's vehicle fleet exhaust, brake & tire wear	0.00047	for TSP & PM-10 [1b]
		0.00036	for PM-2.5 [1b]
P =	number of days per year with at least 0.01 in of precipitation	136	[2]
N =	number of days in the averaging period	365	

Basis:

Highway Dump Truck	Empty Weight:	4.25 tons [3]	Payload Weight:	7.5 tons [3]
Passenger Car	Empty Weight:	2 tons [4]	Payload Weight:	0 tons [4]
Passenger Truck	Empty Weight:	3 tons [4]	Payload Weight:	0 tons [4]

Vehicle Traffic:

Equip ID	Paved Roads	Potential to Emit Calculations													
		Average Vehicle Weight	One-way Distance [5]	TSP Emission Factor	PM-10 Emission Factor	PM-2.5 Emission Factor	Miles Traveled per Vehicle	Potential Uncontrolled Emissions			Control Method	Control Efficiency [6]	Potential Controlled Emissions		
								TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
		tons	ft	lbs/VMT	lbs/VMT	lbs/VMT	VMT/mo	ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
5	Highway Dump Truck (Months 1-18)	8.00	52800	0.1476	0.0285	0.0069	600.00	0.0443	0.0085	0.0021	None	0	0.0443	0.0085	0.0021
5	Highway Dump Truck (Months 19-62)	8.00	5470	0.1476	0.0285	0.0069	62.16	0.0046	0.0009	0.0002	Watering	80	0.0009	0.0002	0.0000
None	Passenger Car	2.00	151061	0.0181	0.0032	0.0006	1,716.60	0.0155	0.0027	0.0005	None	0	0.0155	0.00273	0.000495
None	Passenger Truck	3.00	151061	0.0336	0.0062	0.0013	1,716.60	0.0288	0.0053	0.0011	None	0	0.0288	0.00533	0.00114

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.1 "Paved Roads". November 2006 (Updated March 7, 2007).
   a. Table 13.2.1-1 "Particle Size Multipliers for Paved Road Equation"
   b. Table 13.2.1-2 "Emission Factor for 1980's Vehicle Fleet Exhaust, Brake Wear and Tire Wear"
   c. Table 13.2.1-3 "Ubiquitous Silt Loading Default Values with Hot Spot Contributions from Anti-Skid Abrasives (g/m^2)"
2. U.S. Department of Commerce. "Annual LCD for Detroit Metro Airport, Michigan". National Climatic Data Center, NESDIS, NOAA. 2006.
3. Based upon and F650 Ford Truck equiped with a dumper. One is empty vehical weight, the other is with dumper at capacity.
4. Passenger car weight was assumed to be 2 tons. Passenger truck weight was assumed to be 3 tons.
5. One-way distance for Highway dump truck during months 1-18 is from Fermi site to off-site rock quarry within 10 miles of Fermi site . During months 19-62 the one-way distance for Highway dump truck is one round trip across the construction site. Total miles/trip for the passenger cars and trucks is based on the average round trip commuting distance indicated in Table 4.4-4(A) of the response to RAI TR4.8.3-2 modified to account for vehicles traveling only within the non-attainment/maintenance area.
7. Table 2.1.1-3 "Summary of techniques, Efficiencies and costs for controlling fugitive dust from paved and unpaved surfaces", RACM for Fugitive Dust Sources, Ohio EPA, 1980.

Paved Roads (Continued)

Appendix A.2.8

Construction Activities (ton/mo)		2011									2012								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
5	Highway Dump Truck (Months 1-18)	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021	0.0021
None	Passenger Cars (ton/mo)	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0178	0.0467	0.0467	0.0467	0.0467	0.0467	0.0467	0.0467	0.0467	0.0467
None	Passenger Trucks (ton/mo)	0.0412	0.0412	0.0412	0.0412	0.0412	0.0412	0.0412	0.0412	0.0412	0.1080	0.1080	0.1080	0.1080	0.1080	0.1080	0.1080	0.1080	0.1080
Totals (ton/mo)		0.0610	0.0610	0.0610	0.0610	0.0610	0.0610	0.0610	0.0610	0.0610	0.1569	0.1569	0.1569	0.1569	0.1569	0.1569	0.1569	0.1569	0.1569

Construction Activities (ton/mo)		2012			2013												2014		
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March
5	Highway Dump Truck (Months 19-62)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001
None	Passenger Cars (ton/mo)	0.0467	0.0467	0.0467	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.2457	0.2457	0.2457
None	Passenger Trucks (ton/mo)	0.1080	0.1080	0.1080	0.7628	0.7628	0.7628	0.7628	0.7628	0.7628	0.7628	0.7628	0.7628	0.7628	0.7628	0.7628	0.5678	0.5678	0.5678
Totals (ton/mo)		0.1549	0.1549	0.1549	1.0929	1.0929	1.0929	1.0929	1.0929	1.0929	1.0929	1.0929	1.0929	1.0929	1.0929	1.0929	0.8135	0.8135	0.8135

Construction Activities (ton/mo)		2014									2015								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
5	Highway Dump Truck (Months 19-62)	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001		
None	Passenger Cars (ton/mo)	0.2457	0.2457	0.2457	0.2457	0.2457	0.2457	0.2457	0.2457	0.2457	0.0899	0.0899	0.0899	0.0899	0.0899	0.0899	0.0899	0.0899	0.0899
None	Passenger Trucks (ton/mo)	0.5678	0.5678	0.5678	0.5678	0.5678	0.5678	0.5678	0.5678	0.5678	0.2078	0.2078	0.2078	0.2078	0.2078	0.2078	0.2078	0.2078	0.2078
Totals (ton/mo)		0.8135	0.8135	0.8135	0.8135	0.8135	0.8135	0.8135	0.8135	0.8135	0.2977	0.2977	0.2977	0.2977	0.2977	0.2977	0.2977	0.2976	0.2976

Construction Activities (ton/mo)		2015			2016				
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May
5	Highway Dump Truck (Months 19-62)								
None	Passenger Cars (ton/mo)	0.0899	0.0899	0.0899	0.0899	0.0899	0.0899	0.0899	0.0899
None	Passenger Trucks (ton/mo)	0.2078	0.2078	0.2078	0.2078	0.2078	0.2078	0.2078	0.2078
Totals (ton/mo)		0.2976	0.2976	0.2976	0.2976	0.2976	0.2976	0.2976	0.2976

Appendix A.2.9
Unpaved Roads

Unpaved Roads

Appendix A.2.9

Emission Factor (EF) Equation [1]

$EF = k * (s/12)^a * (W/3)^b * ((365-p)/365)$

Where:

EF = particulate emission factor, lb/VMT

k =	particle size multiplier =	4.9	for TSP
		1.5	for PM-10
		0.15	for PM-2.5
a =	constant =	0.7	for TSP
		0.9	for PM10
		0.9	for PM-2.5
s =	surface material silt content, % =	9.2	Clay /Dirt Mix [2]
b =	constant =	0.45	for TSP, PM10, & PM2.5
W =	average vehicle weight, tons =	see Table below	
p =	number of days per year with at least 0.01 in of precipitation	136	[3]

Basis:

Dump Trucks			**Concrete Trucks**		
Average Speed	10 mph		Average Speed	10 mph	
Empty Vehicle Weight (Truck)	39.0 tons	[4]	Empty Vehicle Weight (FE Loader)	10.0 tons	[5]
Full Vehicle Weight (Truck)	90.5 tons	[4]	Full Vehicle Weight (FE Loader)	32.0 tons	[5]
Fill and Aggregate Dump Truck			**Yard Truck**		
Average Speed	10 mph		Average Speed	10 mph	
Empty Vehicle Weight (Truck)	12.0 tons	[6]	Empty Vehicle Weight (FE Loader)	10.0 tons	[7]
Full Vehicle Weight (Truck)	32.0 tons	[6]	Full Vehicle Weight (FE Loader)	23.0 tons	[7]

Bulldozer Cat/D9		**Cat Scraper 651**		**Grader 200hp 14'**	
Average Speed	4 mph	Average Speed	10 mph [9]	Average Speed	7 mph
Empty Vehicle Weight	53.0 tons [8]	Empty Vehicle Weight	59.0 tons [9]	Empty Vehicle Weight	26.0 tons [10]
Full Vehicle Weight	53.0 tons [8]	Full Vehicle Weight	59.0 tons [9]	Full Vehicle Weight	26.0 tons [10]

Vehicle Traffic:

Equp ID	Unpaved Roads	Potential to Emit Calculations													
		Average Vehicle Weight	Hours of Operation	Emission Factor			Vehicle Mile Traveled	Potential Uncontrolled Emissions			Control Method	Control Efficiency [11]	Potential Controlled Emissions		
				TSP	PM-10	PM-2.5		TSP	PM-10	PM-2.5			TSP	PM-10	PM-2.5
		tons	hrs/day	lbs/VMT	lbs/VMT	lbs/VMT	VMT/mo	ton/mo	ton/mo	ton/mo		%	ton/mo	ton/mo	ton/mo
6	Non Highway Dump Truck	64.8	10.0	10.17	2.95	0.2952	3,000	15.25	4.43	0.4428	Watering	50	7.63	2.21	0.2214
14	Concrete from plant to facility	21.0	10.0	6.13	1.78	0.1779	3,000	9.19	2.67	0.2668	Watering	50	4.60	1.33	0.1334
15	Fill and Aggregate Dump Truck	22.0	10.0	6.26	1.82	0.1816	3,000	9.39	2.72	0.2724	Watering	50	4.69	1.36	0.1362
35	Yard Truck	16.5	10.0	5.50	1.60	0.1596	3,000	8.25	2.39	0.2394	Watering	50	4.12	1.20	0.1197
3	Bulldozer Cat/D9	53.0	10.0	9.29	2.70	0.2698	1,260	5.85	1.70	0.1700	Watering	50	2.93	0.85	0.0850
4	Scraper Cat 651	59.0	10.0	9.75	2.83	0.2831	3,000	14.63	4.25	0.4247	Watering	50	7.31	2.12	0.2123
9	Grader 200HP 14'	26.0	10.0	6.75	1.96	0.1958	2,040	6.88	2.00	0.1997	Watering	50	3.44	1.00	0.0999

Notes [ ]:

1. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.2 "Unpaved Roads". November 2006.
2. USEPA, AP-42, Fifth Edition, Vol. I. Chapter 13 "Miscellaneous Sources", Section 13.2.4 "Aggregate Handling and Storage Piles". November 2006.
   a. Table 13.2.4-1 " Typical Silt and Moisture Contents of Materials at Various Industries".
3. U.S. Department of Commerce. "Annual LCD for Detroit Metro Airport, Michigan". National Climatic Data Center, NESDIS, NOAA. 2006.
4. Based on a Caterpillar772 Off-Highway Truck.
5. Based on a MACK RD690S Mixer Truck with concrete weighting 4050 lbs/yd^3.
6. Based on a Freightliner Business Class M2 11 S dump truck.
7. Based on a TJ5000 DOT Unit #19906 yard truck.
8. Based upon a Caterpillar D9 Bulldozer.
9. Speed based upon a Caterpillar 637 Wheel Tractor Scraper.
10. Based upon a Caterpillar 140M Motor Grader.
11. Table 2.1.1-3 "Summary of techniques, Efficiencies and costs for controlling fugitive dust from paved and unpaved surfaces", RACM for Fugitive Dust Sources, Ohio EPA, 1980.

Unpaved Roads (Continued)

Appendix A.2.9

Construction Activities (ton/mo)		2011									2012								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
6	Non Highway Dump Truck (ton/mo)	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	1.11	1.11	1.11	1.11	1.11	1.11
14	Concrete Truck (ton/mo)		0.13	0.13	0.13														
15	Fill and Agg Dump Truck (ton/mo)									0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
14	Concrete Truck (ton/mo)			0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27						
6	Non Highway Dump Truck (ton/mo)			0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44						
14	Concrete Truck (ton/mo)					0.27	0.27												
3	Bulldozer Cat/D9 (ton/mo)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17
4	Scraper Cat 651 (ton/mo)	0.85	0.85	0.85	0.85	0.42	0.21	0.21											
9	Grader 200hp 14' (ton/mo)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20	0.20	0.20	0.20	0.20	0.20
	Totals (ton/mo)	1.56	1.70	2.40	2.40	2.11	1.90	1.63	1.42	1.69	1.69	1.69	1.69	1.75	1.75	1.75	1.75	1.75	1.75

Construction Activities (ton/mo)		2012			2013												2014		
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May	June	July	August	September	October	November	December	January	Feburary	March
6	Non Highway Dump Truck (ton/mo)	1.11	1.11	1.11	1.11	1.11	1.11	0.44	0.44	0.44	0.44	0.44							
15	Fill and Agg Dump Truck (ton/mo)	2.72	2.72	2.72	3.00	3.00	3.00	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	1.09	0.54
35	Yard Truck (ton/mo)	0.12	0.12	0.12	0.12	0.12	0.12	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
14	Concrete Truck (ton/mo)	1.07	1.07	1.07	1.07	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67
3	Bulldozer Cat/D9 (ton/mo)	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.00	0.00	0.00	0.00	0.00	0.00
4	Scraper Cat 651 (ton/mo)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
9	Grader 200hp 14' (ton/mo)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
	Totals (ton/mo)	5.29	5.29	5.29	5.56	7.16	7.16	4.71	4.71	4.71	4.71	4.71	4.27	4.10	4.10	4.10	4.10	4.10	3.55

Construction Activities (ton/mo)		2014									2015								
Equip ID	EQUIPMENT	April	May	June	July	August	September	October	November	December	January	Feburary	March	April	May	June	July	August	September
6	Non Highway Dump Truck (ton/mo)																		
15	Fill and Agg Dump Truck (ton/mo)	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.27	0.27	0.27	0.27
35	Yard Truck (ton/mo)	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24
14	Concrete Truck (ton/mo)	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	2.67	
3	Bulldozer Cat/D9 (ton/mo)	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	0.00	0.00	0.00		
4	Scraper Cat 651 (ton/mo)																		
9	Grader 200hp 14' (ton/mo)	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10						
	Totals (ton/mo)	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.55	3.45	3.45	3.18	3.18	3.18	0.51

Construction Activities (ton/mo)		2015			2016				
Equip ID	EQUIPMENT	October	November	December	January	Feburary	March	April	May
6	Non Highway Dump Truck (ton/mo)						0.22	0.22	0.22
15	Fill and Agg Dump Truck (ton/mo)	0.27	0.27	0.27	0.27	0.27			
35	Yard Truck (ton/mo)	0.24	0.24	0.24	0.24	0.24			
14	Concrete Truck (ton/mo)								
3	Bulldozer Cat/D9 (ton/mo)						0.08	0.08	0.08
4	Scraper Cat 651 (ton/mo)						0.21	0.21	0.21
9	Grader 200hp 14' (ton/mo)								
	Totals (ton/mo)	0.51	0.51	0.51	0.51	0.51	0.52	0.52	0.52

Appendix B
Operation Emissions

B.1 Operation Emissions from Stationary Sources
B.2 Operation Emissions from Mobile Sources
Worker Vehicles
On-Site Heavy Equipment and Support Vehicles
Delivery of Materials and Disposal of Wastes

Appendix B.1
Operation Emissions from Stationary Sources

Operation Emissions from Stationary Sources

Appendix B.1

Stationary Source	Number of Units[1]	Annual Hours of Operation[1] (hr/yr)	Power Rating[1] (kW)	Power Rating[1] (hp)
Standby Diesel Generators (SDG)	2	48	17100	22931
Ancilary Diesel Generators (ADG)	2	8	1650	2213
Diesel Driven Fire Pumps (FP)	2	48	200	268
Auxiliary Boiler (Aux Boiler)	1	720	33000	44254

Diesel Fuel Oil Sulfur Content[2]	0.0015	%
Aux Boiler Heat Input[1]	112.00	MBtu/hr

	Emission Factors (g/kWh)				Estimated Emissions (tons/year)			
Stationary Source	PM	NOx	SO2	VOC	$PM_{2.5}$	NOx	SO2	VOC
SDG[3][4]	0.1500	1.60	0.0074	0.4286	0.2714	2.8953	0.0134	0.7756
ADG[5][6]	0.0300	0.6700	0.0074	0.1900	0.0009	0.0195	0.0002	0.0055
FP[7][8][9]	0.2000	4.00	1.25	4.00	0.0042	0.0847	0.0264	0.0847
Aux Boiler[10][11]	0.0143	0.1714	0.0017	0.0018	0.5760	6.9120	0.0678	0.0726
Natural Draft Cooling Tower[12]					6.63			
Mechanical Draft Cooling Tower[12]					1.84			
TOTAL Emissions from Stationary Sources					**9.32**	**9.91**	**0.1078**	**0.9384**

Notes:

1. Number of units, hours of operation, power rating, and heat input (auxiliary boiler only) for the standby diesel generators (SDG), ancillary diesel generators (ADG), diesel driven fire pumps, and auxiliary boiler are from information stated in Environmental Report, Subsection 3.6.3.1 and the response submitted for RAI HH3.6.3-1.
2. Sulfur content of diesel fuel oil is assumed to be 15 ppmw.
3. Standby diesel generator emission factors for PM and NO_x from 40 CFR 60.4205 paragraphs (d)(1) and (2).
4. Standby diesel generator emission factors for SO_2 and VOC from Table 3.4-1 of USEPA, AP-42, Fifth Edition, Vol. I, Chapter 3.4 "Large Stationary Diesel and All Stationary Dual-fuel Engines," October 1996.
5. Ancillary diesel generator emission factors for PM, NO_x, and VOC from Table 1 of 40 CFR 1039.101.
6. Ancillary diesel generator emission factors for SO_2 from Table 3.4-1 of USEPA, AP-42, Fifth Edition, Vol. I, Chapter 3.4 "Large Stationary Diesel and All Stationary Dual-fuel Engines," October 1996.
7. Diesel driven fire pump generator emission factors for PM, NO_x, and VOC from Table 4 to Subpart IIII of Part 60 "Emission Standards for Sationary Fire Pump Engines" as referred to in 40 CFR 60.4202(d).
8. The emission limits for NOx and VOC's are combined in 40 CFR 60.4202(d). Using the emission limit individually for each pollutant provides a maximum bounding value.
9. Diesel driven fire pump generator emission factor for SO_2 from Table 3.3-1 of USEPA, AP-42, Fifth Edition, Vol. I, Chapter 3.3 "Gasoliine and Diesel Industrial Engines," October 1996.
10. Auxiliary boiler emission factors for PM, NO_x, and SO_2 from Table 1.3-1 of USEPA, AP-42, Fifth Edition, Vol. I, Chapter 1.3 "Fuel Oil Combustion," September 1998.
11. Emission factors for auxiliary boiler are in units of lb/MBtu. To convert the emission factors in Note 12 from lb/10^3 gal to lb/Mbtu divide by 140 Mbtu/10^3 gal (the heating value of distillate fuel oil) which is from USEPA, AP-42, Fifth Edition, Vol. I, "Miscellaneous Data & Conversion Factors," Appendix A, September 1985.
12. Emissions of $PM_{2.5}$ from operation of the natural draft and mechanical draft cooling towers is from the response submitted for RAI AQ3.6.3-1.

Appendix B.2
Operation Emissions from Mobile Sources

Worker Vehicles

Worker Vehicles

Appendix B.2

Vehicle Type[4]	Emission Factors[5] (g/mi)			
	$PM_{2.5}$	NOx	SO2	VOC
Passenger Car	0.0112	0.256	0.0068	0.319
Light Duty Truck	0.0113	0.433	0.0095	0.473

Operations Type	Trips/Day[1]	Days/Year[2]	Miles/Trip[3]	Annual Emissions (ton/year)			
				$PM_{2.5}$	NOx	SO2	VOC
Normal Operations (Weekday)	1189	241	39.26	0.1395	4.2721	0.1011	4.9108
Normal Operations (Weekend)	306	94	39.26	0.0140	0.4288	0.0101	0.4929
Outage (Weekday)	2187	20	39.26	0.0213	0.6521	0.0154	0.7496
Outage (Weekend)	1827	10	39.26	0.0089	0.2724	0.0064	0.3131
		Total Annual Emissions		**0.1837**	**5.6254**	**0.1331**	**6.4664**

Notes:

1a. Trips per day for normal operations is from Table titled "Enrico Fermi Drive North of Leroux Road: May 2009 Normal Plant Operations Traffic" in The Mannik & Smith Group, Inc., "Traffic Study: Fermi Nuclear Power Plant Unit 3 Expansion," Appendix A, November 2009.

1b. Trips per day for outages is from Table titled "Enrico Fermi Drive: April 2009 Shutdown Traffic" in The Mannik & Smith Group, Inc., "Traffic Study: Fermi Nuclear Power Plant Unit 3 Expansion," Appendix A, November 2009.

2. Days per year is based on operation schedule of Fermi 2 during normal operations and outages.

3. Total miles/trip is based on the average roundtrip commuting distance indicated in Table 5.8.4(A) of the response to RAI TR4.8.3-2 modified to account for vehicles traveling only within the non-attainment/maintenance area.

4. It is assumed that the fleet of worker vehicles will be 50% passenger cars and 50% light-duty gasoline trucks.

5. Emission Factors for Passenger Car (LDGV) and Light-Duty Gasoline Truck (LDGT All) were obtained from MOBILE6.2 model.

On-Site Heavy Equipment and Support Vehicles

On-Site Heavy Equipment and Support Vehicles

Appendix B.2

Vehicle Type	Fuel Consumption[1][2] (gallons/year)	Fuel Economy[3] (miles/gallon)	Miles/ Year[4]	Emission Factors[5] (g/mi)				Annual Emissions (ton/year)			
				$PM_{2.5}$	NOx	SO2	VOC	$PM_{2.5}$	NOx	SO2	VOC
Light Duty Gasoline Trucks	18562	16.35	303489	0.0113	0.4330	0.0095	0.4730	0.0038	0.1449	0.0032	0.1582
Light Duty Diesel Trucks	2150	19.55	42032.5	0.0227	0.2610	0.0056	0.2080	0.0011	0.0121	0.0003	0.0096
Heavy Duty Diesel Vehicles	2150	9.23	19841.8	0.0395	1.66	0.0131	0.2660	0.0009	0.0363	0.0003	0.0058
						Total Emissions		0.0057	0.1933	0.0037	0.1737

Notes:

1. Fuel consumption for gasoline and diesel is based on total volume of fuels dispensed for Fermi 2 operations during 2008.
2. It is assumed that the fuel consumption for the fleet of diesel vehicles will be 50% light duty diesel trucks (LDDT) and 50% heavy duty diesel vehicles (HDDV).
3. Fuel economy is based on average fuel economy values for light duty gasoline trucks (LDGT), light duty diesel trucks (LDDT) and heavy duty diesel vehicles (HDDV) from MOBILE6.2 model.
4. Miles per year is calculated by multiplying fuel consumption by fuel economy for each type of vehicle.
5. Emission Factors for light duty gasoline trucks (LDGT), light duty diesel trucks (LDDT), and heavy duty diesel vehicles (HDDV) were obtained from MOBILE6.2 model.

Delivery of Materials and Disposal of Wastes

Delivery of Materials and Disposal of Wastes

Appendix B.2

Activity	Vehicle Trips/Year	Vehicle Class[6]	Miles/ Trip[7]	Emission Factors[8] (g/mi)				Annual Emissions (ton/year)			
				$PM_{2.5}$	NOx	SO2	VOC	$PM_{2.5}$	NOx	SO2	VOC
New Fuel Delivery[1]	119	HDDV	184	0.0395	1.66	0.0131	0.2660	0.0010	0.0401	0.0003	0.0064
Materials Delivery[2]	287	HDDV	184	0.0395	1.66	0.0131	0.2660	0.0023	0.0967	0.0008	0.0155
Materials Removal[3]	52	HDDV	184	0.0395	1.66	0.0131	0.2660	0.0004	0.0175	0.0001	0.0028
Class A Radioactive Waste Removal[4]	65	HDDV	184	0.0395	1.66	0.0131	0.2660	0.0005	0.0219	0.0002	0.0035
Radioactive Waste Cask Delivery[5]	1	HDDV	184	0.0395	1.66	0.0131	0.2660	0.0000	0.0003	0.0000	0.0001
						Total Emissions		0.0042	0.1765	0.0014	0.0283

Notes:

1. New fuel deliveries per year is based on 475 fuel elements are delivered every two years and one ANF-10 transport container holds two fuel elements.
2. Materials deliveries per year uses the following assumptions:

a. The total weight of materials removal from Fermi 2 (513.68 tons) is equal to the weight for materials delivery.
b. The delivery truck is similar to the specifications for a 2010 General Motors Chevrolet Express Cutaway 3500, which has a maximum payload of 7,169 lbs.
c. The delivery truck is filled to a capacity of 50% of the maximum payload for each delivery to Fermi 3.

3. The schedule for materials removal is once per week for 52 weeks.
4. Class A radioactive waste removals per year uses the following assumptions:

a. The weight restriction for each removal is 40,000 lbs for the combined weight of the semi-tractor with flatbed, container weight, and radioactive waste.
b. The empty tare weight of the 20' DOT IP-1 Container is 7,200 lbs.
c. The empty weight of the semi-tractor trailer is 20,200 lbs. based on the specifications for an International Durastar 4300.
d. The weight of Class A radioactive waste for each trip is 12,100 lbs.
e. The total weight of Class A radioactive waste for Fermi 3 is the same as was historically recorded for Fermi 2 (780,916.76 lbs.)

5. One Class B radioactive waste cask delivery per year is based on what was historically recorded for Fermi 2.
6. It is assumed that vehicles for delivery and removal activities are heavy duty diesel vehicles (HDDV).
7. Total miles/trip is conservatively based on the total roundtrip distance to the Fermi site from the farthest point in the non-attainment/maintenance area. This straightline distance is the point from the Fermi site to the northeast corner of St. Clair County.
8. Emission factors for heavy duty diesel vehicles (HDDV) were obtained from the MOBILE6.2 model.