SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Rule 2306 Calculation Methodology and Data Appendix

Rule 2306 – Freight Rail Yards
Rule 316.2 – Fees for Rule 2306

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This document provides the methodology for calculating: 1) Actual Annual NOx Emissions for the Freight Rail Yard; 2) Annual Reference NOx Emissions for the Freight Rail Yard; and 3) Aggregate Emission Factor for the Freight Rail Yard, as required under Rule 2306 – Freight Rail Yards (Rule 2306).

The data tables for input parameters referenced in emissions calculation equations in this methodology document are provided in its Data Appendix.

For all emission calculations described below, supporting documentation must be provided if actual operating parameters are used in lieu of default parameters (if provided in equations) for applicable mobile sources operating at and travelling through the freight rail yards.

1. Actual Annual NOx Emissions for a Freight Rail Yard

This section outlines the methodologies to calculate the actual NOx emissions for a freight rail yard for each milestone year from the applicable mobile sources, including locomotives, drayage trucks, CHE, TRU, and OSE, to be used in Rule 2306 Equation 1, Equation 2, and Equation 3, as applicable.

A. Locomotives

This section provides the detailed methodology to calculate the actual annual NOx emissions for each milestone year from all locomotives operating at the freight rail yard(s), which are operated by the same freight rail yard operator, within the State of California or within South Coast AQMD.

The statewide actual annual NOx emissions from all locomotives operated by the same freight rail yard within the State of California are calculated based on the annual usage in megawatt-hours (MWhr) in non-zero-emissions (ZE) configuration for all locomotives operating at all freight rail yards in California operated by the same freight rail yard operator in conjunction with the corresponding average NOx emission factors by locomotive Tier level using the following equation:

$$CAEL_i = \left\{\sum_l \left[\left(CAMWhr_{l,i} - CAMWhr_{l,i}^{ze}\right) \times CF \times EF_l\right]\right\} \times U \qquad \textit{(Equation 1.A.1)}$$

Where:

$CAEL_i$ = Actual NOx emissions (in tons) from all Locomotives operated by the same Freight Rail Yard Operator within the State of California in year *i*

$CAMWhr_{l,i}$ = Annual usage (in megawatt-hours) of Locomotive l operated by the same Freight Rail Yard Operator within the State of California in year i

$CAMWhr_{l,i}^{ze}$ = Annual usage (in megawatt-hours) in ZE Configuration of Locomotive l operated by the same Freight Rail Yard Operator within the State of California in year i

CF = Conversion factor for megawatt to horsepower (1341.02)

EF_l = Average NOx emission factor for Locomotive l (in grams per brake horsepower-hour), as specified in Data Appendix, Table A-1

U = Unit conversion factor for grams to tons (1/907,180[1])

The average NOx emission factors for locomotives are based on EPA's average emission factors for line-haul and switcher locomotives by locomotive Tier level[2] and are provided in Data Appendix, Table A-1.

The actual annual NOx emissions for all locomotives operating at and travelling to and from a freight rail yard within South Coast AQMD is calculated based on the total annual usage in MWhr in non-ZE configuration for locomotives operating within South Coast AQMD, NOx emission factors for locomotives, and the number of days locomotives operated at and travelling to and from this freight rail yard compared to the total number of days that locomotives operated at and travelling to and from all freight rail yards by the same freight rail yard operator within South Coast AQMD using the following equation:

$$EL_i = \left\{\sum_l \left[\left(MWhr_{l,i} - MWhr_{l,i}^{ze}\right) \times CF \times EF_l \times \frac{DaysFRY_{l,i}}{\sum_y DaysALLFRY_{l,i,y}}\right]\right\} \times U$$

(Equation 1.A.2)

Where:

EL_i = Actual NOx emissions (in tons) from all Locomotives operating at and travelling to and from the Freight Rail Yard in year i

$MWhr_{l,i}$ = Annual usage (in megawatt-hours) by Locomotive l operating within the South Coast AQMD jurisdiction in year i

$MWhr_{l,i}^{ze}$ = Annual usage (in megawatt-hours) in *ZE* Configuration by Locomotive l operating within the South Coast AQMD jurisdiction in year i

[1] Tons to grams conversion: 453.59 grams/pound X 2000 pounds/ton = 907,180 grams/ton

[2] EPA's Emission Factors for Locomotives (Tables 1 and 2), EPA-420-F-09-025, April 2009

CF = Conversion factor for megawatt to horsepower (1341.02)

EF_l = NOx emission rate based on the duty cycle weighted emission test results as provided in Locomotive *l*'s Locomotive Engine Certification Data, or the average NOx emission factor for Locomotive *l* (in grams per brake horsepower-hour) as specified in Data Appendix, Table A-1

$DaysFRY_{l,i}$ = Total number of days Locomotive *l* operating at and travelling to and from the Freight Rail Yard in year *i*

$DaysALLFRY_{l,i,y}$ = Total number of days Locomotive *l* operating at and travelling to and from any Freight Rail Yard *y* within the South Coast AQMD jurisdiction in year *i*

U = Unit conversion factor for grams to tons (1/907,180)

The NOx emission factors for locomotives in this equation can be based on the locomotive engine certification data (i.e., duty cycle weighted emission test result), if available, or based on the EPA's average emission factors by locomotive Tier level provided in Data Appendix, Table A-1. The locomotive engine certification data must be provided as supporting documentation if used in emission calculation for any locomotive in this equation.

The total annual MWhr usage of locomotives may be directly obtained from locomotives megawatt-hour meters or calculated based on the locomotives fuel consumption in gallons using the following equation and conversion factors for line-haul and switcher locomotives provided in Data Appendix Table A-2.

$$MWhr_{l,i} = Fuel\ Consumption_{l,i} \times Conversion\ Factor_l \qquad \textit{(Equation 1.A.2.a)}$$

The conversion factors for line-haul and switcher locomotives in MWhr/gal are extracted from CARB's In-Use Locomotive Regulation.[3]

[3] CARB's In-Use Locomotive Regulation, Table 1; https://ww2.arb.ca.gov/rulemaking/2022/locomotive

B. Drayage Trucks

This section provides the detailed methodology to calculate the actual annual NOx emissions for each milestone year from all drayage trucks operating at and travelling to and from the freight rail yard(s) within the State of California or within South Coast AQMD based on the number of individual truck trips to the freight rail yard(s) within the applicable jurisdiction, miles traveled to and from the freight rail yard(s) using the actual mileage or a default mileage (39.9 miles per trip), and the corresponding composite NOx emission factors by truck model year provided in Data Appendix, Tables B-1 through B-4 using the following equation:

$$EDT_i = \sum_d \left[NT_{d,i} \times VMT_{d,i} \times EF_{d,i} \right] \times U \qquad \textit{(Equation 1.B.1)}$$

Where:

EDT_i = Actual NOx emissions (in tons) from all Drayage Truck operating at and travelling to and from the Freight Rail Yard within the applicable jurisdiction in year *i*

$NT_{d,i}$ = Number of Truck Trips by Drayage Truck *d* in year *i* to and from the Freight Rail Yard, calculated as total number of unique entry date(s) multiplied by 2

$VMT_{d,i}$ = Actual vehicle miles traveled by Drayage Truck *d* in year *i* to and from the Freight Rail Yard, or use default factor of 39.9 miles/trip

$EF_{d,i}$ = Composite emission factor for Drayage Truck *d* (in grams per mile by model year) in year *i*, as specified in Data Appendix, Tables B-1 through B-4, or 0 if Drayage Truck *d* operates in ZE Configuration

U = Unit conversion factor for grams to tons (1/907,180)

The composite NOx emission factors for drayage trucks by truck model year are derived from CARB's EMFAC2021 Model[4] for T7 Tractor Class 8 category by calendar year (EMFAC2021 Emissions Run for statewide or South Coast regions at aggregate speed), and they also reflect the impact of CARB's Heavy-Duty Inspection and Maintenance Regulation[5]. The default mileage of

[4] EMFAC2021: https://arb.ca.gov/emfac/

[5] CARB's Heavy-Duty Inspection and Maintenance Program: https://ww2.arb.ca.gov/our-work/programs/CTC

39.9 miles per round trip for drayage trucks visiting a freight rail yard is derived from 2016 Regional Transportation Plan documents.[6]

The model year and fuel type of the drayage trucks operating at and travelling to and from the freight rail yard can be directly tracked by the freight rail yard operator or obtained from the truck's vehicle identification number (VIN) tracked by the freight rail yard operator using publicly available tools such as from the National Highway Traffic Safety Administration (NHTSA) at: https://vpic.nhtsa.dot.gov/api/.

C. TRU

This section provides the detailed methodology to calculate the actual annual NOx emissions for each milestone year from all TRU operating at and travelling to and from a freight rail yard within South Coast AQMD. The actual annual NOx emissions for TRU operating at and travelling to and from the freight rail yard are calculated based on the maximum rated horsepower (hp), load factor, annual operating hours, fuel correction factor, and emission factor for each TRU using the following equation:

$$ETRU_i = \sum_r \left[HP_{r,i} \times LF_{r,i} \times (HR_{r,i} - HR_{r,i}^{ZE}) \times EF_{r,i} \times FCF_{r,i} \right] \times U$$

(Equation 1.C.1)

Where:

$ETRU_i$ = Actual NOx emissions (in tons) from all TRUs operating at and travelling to and from the Freight Rail Yard in year *i*

$HP_{r,i}$ = Maximum rated horsepower for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*

$LF_{r,i}$ = Load factor for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table C-1

$HR_{r,i}$ = Annual operating hours for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*

$HR_{r,i}^{ZE}$ = Annual operating hours in ZE Configuration for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*

$EF_{r,i}$ = Emission factor (in grams per brake horsepower-hour) for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*, using Equation 1.C.1.a

[6] 2016-2040 Regional Transportation Plan/Sustainable Communities Strategy https://scag.ca.gov/2016-rtpscs

$FCF_{r,i}$ = Fuel Correction Factor for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table F-1

U = Unit conversion factor for grams to tons (1/907,180)

Load factors for various TRU types and horsepower categories are provided in Data Appendix, Table C-1 and are based on CARB's TRU documentation[7]. The fuel correction factors for TRU by fuel type are provided in Data Appendix, Table F-1 and are based CARB's Offroad documentation[8].

If hp data for TRU is not available, the default hp values provided in Data Appendix, Table C-4 may be used in Equation 1.C.1. The default hp values are based on CARB's TRU documentation[9].

The emission factor for each TRU is calculated based on the zero-hour emission factor ($EFzh$), deterioration rate (DR), and accumulated operating hours (reflecting equipment age and capped at 12,000 hours) for each TRU operating at the freight rail yard using the following equation:

$$EF_{r,i} = \left[EFzh_{r,i} + \left(DR_{r,i} \times AccumulatedHours_{r,i}\right)\right] \quad \textit{(Equation 1.C.1.a)}$$

Where:

$EFzh_{r,i}$ = Zero-hour emission factor (in gram per brake horsepower-hour) for TRU *r* operating at and traveling to and from the Freight Rail Yard in year *i*, pursuant to Data Appendix, Tables F-2 through F-10

$DR_{r,i}$ = Deterioration rate (in grams per break horsepower per squared-hour) for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*, pursuant to Data Appendix, Tables F-2 through F-10

$AccumulatedHours_{r,i}$ = Total hours from the unit's non-resettable hour-meter, if available; otherwise, the average annual operating hours times the age of TRU *r* (capped at 12,000 hours) in year *i*

[7] CARB's TRU documentation (Table 10 in Appendix H); https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf

[8] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

[9] CARB's TRU documentation (Table 3 in Appendix H); https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf

The zero-hour emission factors and deterioration rates for each TRU type, fuel type, hp bin, and model year are provided in Data Appendix, Tables F-2 to F-10 and are based on CARB's OffRoad documentation[10]. The accumulated hours for each OSE can be determined based on the total hours from the unit's non-resettable hour-meter or calculated based on the average annual operating hours times the age of the unit. The accumulated hours are capped at 12,000 hours based on CARB's documentation[11]. If model year data is not available for each TRU, then a default age of 7 years can be used for all TRUs.[12]

The annual operating hours for each TRU must be based on the following order of hierarchy pending availability of operational data: 1) non-resettable hour-meters, 2) maintenance records, 3) fuel consumption data, or 4) default average operating hours for each TRU type provided in Data Appendix, Table C-2. adjusted for the TRU operating at and traveling to and from the freight rai yard. For each TRU, only one method for annual operating hours can be used for all milestone years to prevent potential variations between these methods affecting the actual annual emissions.

If the fuel consumption data for TRU operating at and traveling to and from the rail yard is available, the annual operating hours can be estimated using the following equation and fuel consumption conversion factors conversion factors in Data Appendix, Table F-11.

$$HR_{r,i} = Fuel\ Consumption_{r,i} \times Conversion\ Factor_{A2} \div \left(HP_{r,i} \times LF_{r,i}\right)$$

(Equation 1.C.1.b)

[10] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

[11] CARB 2011 CHE Documentation

https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

[12] Figure 6 from CARB's TRU Emissions Inventory shows that 7 years is a conservative default age assumption based on actual data. https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf

The fuel consumption conversion factors in Data Appendix, Table F-11 are derived from brake-specific fuel consumption rates from CARB's Offroad documentation[13] and density for each fuel type.

The total annual operating hours for TRU *r* operating and travelling to and from the rail yard can also be proportioned from the total operating hours for TRU *r* within the South Coast AQMD jurisdiction and the number of days TRU *r* operated at and travelled to and from this freight rail yard compared to the total number of days that TRU *r* operated at South Coast AQMD jurisdiction using Equation 1.C.1.c below.

$$HR_{r,i} = HrSC_{r,i} \times \frac{DaysFRY_{r,i}}{DaysALLSC_{r,i}} \qquad \textit{(Equation 1.C.1.c)}$$

Where:

$HrSC_{r,i}$ = Total number of hours TRU *r* operating within the South Coast AQMD jurisdiction in year *i*

$DaysFRY_{r,i}$ = Total number of days TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*

$DaysALLSC_{r,i}$ = Total number of days TRU *r* operating within the South Coast AQMD jurisdiction in year *i*

For TRU, the annual operating hours can also be calculated using Equation 1.C.1.d below.

$$HR_{r,i} = Time_{Onroad,r} + Time_{Onrail,r} + Time_{Onyard,r} \qquad \textit{(Equation 1.C.1.d)}$$

Where:

$Time_{Onroad,r}$ = 39.9 miles per trip ÷ 47 miles per hour (using default values from the Regional Transportation Plan)[14]. This parameter is 0 for railcar TRUs.

[13] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

[14] SCAG 2016 RTP and Regional Travel Demand Model Validation

$Time_{Onrail,r}$ = Distance via rail from rail yard to South Coast AQMD boundary (miles) ÷ annual average intermodal velocity (miles per hour)[15]

$Time_{Onyard,r}$ = Annual average terminal dwell time[16]

D. CHE

This section provides the detailed methodology to calculate the actual annual NOx emissions for each milestone year from all CHE operating at and travelling to and from a freight rail yard within South Coast AQMD. The actual annual NOx emissions for CHE operating at and travelling to and from the freight rail yard are calculated based on the maximum rated horsepower (hp), load factor, annual operating hours, fuel correction factor, and emission factors for each CHE using the following equation:

$$ECHE_i = \sum_c \left[HP_{c,i} \times LF_{c,i} \times (HR_{c,i} - HR_{c,i}^{ZE}) \times EF_{c,i} \times FCF_{c,i} \right] \times U$$

(Equation 1.D.1)

Where:

$ECHE_i$ = Actual NOx emissions (in tons) from all CHE operating at and traveling to and from the Freight Rail Yard in year *i*

$HP_{c,i}$ = Maximum rated horsepower for CHE *c* operating at and traveling to and from the Freight Rail Yard in year *i*

$LF_{c,i}$ = Load factor for CHE *c* operating at and traveling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table D-1

$HR_{c,i}$ = Annual operating hours for CHE *c* operating at and traveling to and from the Freight Rail Yard in year *i*

$HR_{c,i}^{ZE}$ = Annual operating hours in ZE Configuration for CHE *c* operating at and traveling to and from the Freight Rail Yard in year *i*

$EF_{c,i}$ = Emission factor (in grams per brake horsepower-hour) for CHE *c* operating at and traveling to and from the Freight Rail Yard in year *i*, using Equation 1.D.1.a

$FCF_{c,i}$ = Fuel Correction Factor for CHE *c* operating at and traveling to and from Freight Rail Yard *y* in year *i*, as specified in Data Appendix, Table F-1

[15] Available in reports to Surface Transportation Board here: https://www.stb.gov/reports-data/rail-service-data/

[16] Ibid

U = Unit conversion factor for grams to tons (1/907,180)

Load factors for various CHE types and horsepower categories and the fuel correction factors are provided in Data Appendix, Table D-1 and Table F-1, respectively and are based on CARB's OffRoad documentation[17].

The emission factor for each CHE is calculated based on the zero-hour emission factor, deterioration rate, and accumulated operating hours (reflecting equipment age and capped at 12,000 hours) for each CHE operating at the freight rail yard using the following equation:

$$EF_{c,i} = \left[EFzh_{c,i} + \left(DR_{c,i} \times AccumulatedHours_{c,i}\right)\right] \quad \textit{(Equation 1.D.1.a)}$$

Where:

$EFzh_{c,i}$ = Zero-hour emission factor (in gram per brake horsepower-hour) for CHE *c* operating at and traveling to and from the Freight Rail Yard in year *i*, pursuant to Data Appendix, Tables F-2 through F-10

$DR_{c,i}$ = Deterioration rate (in grams per break horsepower per squared-hour) for CHE *c* operating at and traveling to and from the Freight Rail Yard in year *i*, pursuant to Data Appendix, Tables F-2 through F-10

$AccumulatedHours_{c,i}$ = Total hours from the unit's non-resettable hour-meter, if available; otherwise, the average annual operating hours times the age of CHE *c* (capped at 12,000 hours) in year *i*

The zero-hour emission factors and deterioration rates for each CHE type, fuel type, hp bin, and model year are provided in Data Appendix, Tables F-2 to F-10 are based on CARB's OffRoad documentation[18]. The accumulated hours for each CHE can be determined based on the total hours from the unit's non-resettable hour-meter or calculated based on the average annual operating

[17] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

[18] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

hours times the age of the unit. The accumulated hours are capped at 12,000 hours based on CARB's documentation[19].

The annual operating hours for each CHE must be based on the following order of hierarchy pending availability of operational data: 1) non-resettable hour-meters, 2) maintenance records, or 3) fuel consumption data. If the fuel consumption data for CHE operating at and traveling to and from the rail yard is available, the annual operating hours can be estimated using the Equation 1.C.1.b and the fuel consumption conversion factors in Data Appendix, Table F-11. For each CHE, only one method for annual operating hours can be used for all milestone years to prevent potential variations between these methods affecting the actual annual emissions.

The fuel consumption conversion factors in Data Appendix, Table F-11 are derived from brake-specific fuel consumption rates from CARB's Offroad documentation[20] and density for each fuel type.

E. OSE

This section provides the detailed methodology to calculate the actual annual NOx emissions for each milestone year from all OSE operating at and travelling to and from a freight rail yard within South Coast AQMD. The actual annual NOx emissions for OSE operating at and travelling to and from the freight rail yard are calculated based on the maximum rated horsepower (hp), load factor, annual operating hours, fuel correction factor, and emission factor for each OSE using the following equation:

$$EOSE_i = \sum_o \left[HP_{o,i} \times LF_{o,i} \times (HR_{o,i} - HR_{o,i}^{ZE}) \times EF_{o,i} \times FCF_{o,i} \right] \times U$$

(Equation 1.E.1)

Where:

$EOSE_i$ = Actual NOx emissions (in tons) for all OSE operating at and traveling to and from the Freight Rail Yard in year *i*

[19] CARB 2011 CHE Documentation

https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

[20] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

$HP_{o,i}$ = Maximum rated horsepower for OSE *o* operating at and traveling to and from the Freight Rail Yard in year *i*

$LF_{o,i}$ = Load factor for OSE *o* operating at and traveling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table E-1

$HR_{o,i}$ = Annual operating hours for OSE *o* operating at and traveling to and from the Freight Rail Yard in year *i*

$HR_{o,i}^{ZE}$ = Annual operating hours in ZE Configuration for OSE *o* operating at and traveling to and from the Freight Rail Yard in year *i*

$EF_{o,i}$ = Emission factor (in grams per brake horsepower-hour) for OSE *o* operating at and traveling to and from the Freight Rail Yard in year *i*, using Equation 1.E.1.a

$FCF_{o,i}$ = Fuel Correction Factor for OSE *o* operating at and traveling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table F-1

U = Unit conversion factor for grams to tons (1/907,180)

Load factors for various OSE types and horsepower categories and the fuel correction factors are provided in Data Appendix, Table E-1 and Table F-1, respectively, and are based on CARB's OffRoad documentation[21].

The emission factor for each OSE is calculated based on the zero-hour emission factor, deterioration rate, and accumulated operating hours (reflecting equipment age and capped at 12,000 hours) for each OSE operating at the freight rail yard using the following equation:

$$EF_{o,i} = \left[EFzh_{o,i} + \left(DR_{o,i} \times AccumulatedHours_{o,i}\right)\right] \qquad \textit{(Equation 1.E.1.a)}$$

Where:

$EFzh_{o,i}$ = Zero-hour emission factor (in gram per brake horsepower-hour) for OSE *o* operating at and traveling to and from the Freight Rail Yard in year *i*, pursuant to Data Appendix, Tables F-2 through F-10

[21] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

$DR_{o,i}$ = Deterioration rate (in grams per break horsepower per squared-hour) for OSE o operating at and traveling to and from the Freight Rail Yard in year i, pursuant to Data Appendix Tables F-2 through F-10

$AccumulatedHours_{o,i}$ = Total hours from the unit's non-resettable hour-meter, if available; otherwise, the average annual operating hours times the age of OSE o (capped at 12,000 hours) in year i

The zero-hour emission factors and deterioration rates for each OSE type, fuel type, hp bin, and model year are provided in Data Appendix, Tables F-2 through F-10 are based on CARB's OffRoad documentation[22]. The accumulated hours for each OSE can be determined based on the total hours from the unit's non-resettable hour-meter or calculated based on the average annual operating hours times the age of the unit. The accumulated hours are capped at 12,000 hours based on CARB's documentation[23].

The annual operating hours for each OSE must be based on the following order of hierarchy pending availability of operational data: 1) non-resettable hour-meters, 2) maintenance records, or 3) fuel consumption data. If the fuel consumption data for OSE operating at and traveling to and from the rail yard is available, the annual operating hours can be estimated using the Equation 1.C.1.b and the fuel consumption conversion factors in Data Appendix, Table F-11. For each OSE, only one method for annual operating hours can be used for all milestone years to prevent potential variations between these methods affecting the actual annual emissions.

The fuel consumption conversion factors in Data Appendix, Table F-11 are derived from brake-specific fuel consumption rates from CARB's Offroad documentation[24] and density for each fuel type.

[22] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

[23] CARB 2011 CHE Documentation

https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road

[24] 2017 OffRoad Diesel, Propane and Gasoline Emission Factors; https://ww2.arb.ca.gov/our-work/programs/msei/road-categories/road-diesel-models-and-documentation

2. Annual Reference NOx Emissions for a Freight Rail Yard

This section outlines the methodologies to calculate the annual reference scenario NOx emissions for each milestone year from applicable mobile sources including locomotives, drayage trucks, CHE, TRU, and OSE, to be used in Rule 2306 Equation 1 and Equation 2, as applicable.

A. Locomotives

This section provides the detailed methodology to calculate the annual reference NOx emissions for each milestone year from locomotives operating at the freight rail yard(s) by the same freight rail yard operator within the State of California or within South Coast AQMD.

The statewide annual reference NOx emissions are calculated based on the annual usage in megawatt-hours (MWhr) in non-zero-emissions (ZE) configuration for all locomotives operating at all freight rail yards in California operated by the same freight rail yard operator in conjunction with the composite emission factors by locomotive type (line-haul or switcher) and by calendar year in Data Appendix, Table A-3 using the following equation:

$$CAEL_{i,RS} = \left[\sum_l \left(CAMWhr_{l,i} \times CF \times EF_{l,RS}\right)\right] \times U \qquad \textit{(Equation 2.A.1)}$$

Where:

$CAEL_{i,RS}$ = Reference Scenario (RS) NOx emissions (in tons) from all Locomotives operated by the same Freight Rail Yard Operator within the State of California in year i

$CAMWhr_{l,i}$ = Annual usage (in megawatt-hours) of Locomotive l operated by the same Freight Rail Yard Operator within the State of California in year i

CF = Conversion factor for megawatt to horsepower (1341.02)

$EF_{l,RS}$ = Composite NOx emission factor for Locomotive l (in grams per brake horsepower-hour) under Reference Scenario (RS), as specified in Data Appendix, Table A-3

U = Unit conversion factor for grams to tons (1/907,180)

The annual reference NOx emissions for all locomotives operating at and travelling to and from a freight rail yard within South Coast AQMD is calculated based on the annual usage in MWhr in non-ZE configuration for these locomotives in conjunction with the composite emission factors by locomotive type (line-haul or switcher) and by calendar year, and the number of days locomotives operated at this freight rail yard compared to the total number of days that locomotives operated

at all freight rail yards operated by the same operator within South Coast AQMD using the following equation:

$$EL_{i,RS} = \left[\sum_l \left(MWhr_{l,i} \times CF \times \frac{DaysFRY_{l,i}}{\sum_y DaysALLFRY_{l,i,y}}\right)\right] \times EF_{i,RS} \times U \qquad \textit{(Equation 2.A.2)}$$

Where:

$EL_{i,RS}$ = Reference Scenario (RS) NOx emissions (in tons) from all Locomotives operating at and travelling to and from the Freight Rail Yard in year *i*

$MWhr_{l,i}$ = Annual usage (in megawatt-hours) by Locomotive *l* operating within the South Coast AQMD jurisdiction in year *i*

CF = Conversion factor for megawatt to horsepower (1341.02)

$EF_{l,RS}$ = Composite NOx emission factor (in grams per brake horsepower-hour) under Reference Scenario (RS) in year *i*, as specified in Data Appendix, Table A-3

$DaysFRY_{l,i}$ = Total number of days Locomotive *l* operating at and travelling to and from the Freight Rail Yard in year *i*

$DaysALLFRY_{l,i,y}$ = Total number of days Locomotive *l* operating at and travelling to and from any Freight Rail Yard *y* within the South Coast AQMD jurisdiction in year *I*

U = Unit conversion factor for grams to tons (1/907,180)

The composite NOx emission factors by locomotive type (line-haul and switcher) and by calendar year are provided in Data Appendix, Table A-3 and are based on CARB's In-Use Locomotive Regulation.[25]

The total annual MWhr usage of locomotives may be directly obtained from locomotives megawatt-hour meters or calculated based on the locomotives fuel consumption in gallons using Equation 1.A.2.a. and conversion factors provided in Data Appendix, Table A-2 for line-haul and switcher locomotives.

[25] CARB's In-Use Locomotive Regulation; https://ww2.arb.ca.gov/rulemaking/2022/locomotive

B. Drayage Trucks

This section provides the detailed methodology to calculate the annual reference NOx emissions for each milestone year from all drayage trucks visiting freight rail yards within the State of California or within South Coast AQMD.

The annual reference NOx emissions from drayage trucks are calculated based on the number of individual truck trips to the freight rail yard(s) within the applicable jurisdiction, miles traveled to and from the freight rail yard(s) using the actual mileage or a default mileage and the corresponding composite NOx emission factors by calendar year using the following equation:

$$EDT_{i,RS} = \sum_d \left(NT_{d,i} \times VMT_{d,i}\right) \times EF_{i,RS} \times U \qquad \textit{(Equation 2.B.1)}$$

Where:

$EDT_{i,RS}$ = Reference Scenario NOx emissions (in tons) from all Drayage Truck operating at and travelling to and from the Freight Rail Yard within the applicable jurisdiction in year *i*

$NT_{d,i}$ = Number of Truck Trips by Drayage Truck *d* in year *i* to and from the Freight Rail Yard, calculated as total number of unique entry date(s) multiplied by 2

$VMT_{d,i}$ = Actual vehicle miles traveled by Drayage Truck *d* in year *i* to and from the Freight Rail Yard, or use default factor of 39.9 miles/trip

$EF_{i,RS}$ = Composite emission factor (in grams per mile by calendar year) in year *i* under Reference Scenario (RS), as specified in Data Appendix, Table B-5

U = Unit conversion factor for grams to tons (1/907,180)

The composite NOx emission factors (EF) for drayage trucks by calendar year are derived from CARB's EMFAC2021 Model[26] for T7 Tractor Class 8 category by calendar year (EMFAC2021 Emissions Run for statewide or South Coast region at aggregate model year and aggregate speed), and they also reflect the impact of CARB's Heavy-Duty Inspection and Maintenance Regulation[27].

[26] EMFAC2021: https://arb.ca.gov/emfac/

[27] CARB's Heavy-Duty Inspection and Maintenance Program: https://ww2.arb.ca.gov/our-work/programs/CTC

C. TRU

This section provides the detailed methodology to calculate the annual reference NOx emissions for each milestone year from all TRU operating at and travelling to and from a freight rail yard within South Coast AQMD. The annual reference NOx emissions for TRU operating at and travelling to and from the freight rail yard are calculated based on the annual operating hours for each TRU type (i.e., same equipment type, fuel, hp bin, model year) and the average emission factor for each TRU type using the following equation:

$$ETRU_i^{RS} = \sum_t \left[\left(\sum_{r \in t} HR_{r,i} \right) \times ER_{t,i}^{RS} \right] \quad \textit{(Equation 2.C.1)}$$

Where:

$ETRU_i^{RS}$= Reference Scenario NOx emissions (in tons) from all TRUs operating at and travelling to and from the Freight Rail Yard in year *i*

$HR_{r,i}$ = Annual operating hours for TRU *r* associated with TRU type *t* operating at and travelling to and from the Freight Rail Yard in year *i*

$ER_{t,i}^{RS}$ = NOx emissions rate of TRU type *t* (in grams per hour) in year *i* under Reference Scenario (RS), as specified in Data Appendix, Tables C-3

The annual operating hours and emission rates in the above equation are for each TRU type which is defined as TRU with the same equipment type, fuel type, hp, and model year (referred to TRU *r* type *t* in above equation).

The annual operating hours for each TRU must be based on the following order of hierarchy pending availability of operational data: 1) non-resettable hour-meters, 2) maintenance records, 3) fuel consumption data, or 4) default average operating hours for each TRU type from Data Appendix, Table C-2. If the fuel consumption data is available, the annual operating hours can be estimated using Equation 1.C.1.b, and the fuel consumption conversion factors in Data Appendix, Table F-11. Annual operating hours may also be calculated using Equation 1.C.1.c. or 1.C.1.d. If model year data is not available for each TRU, then a default age of 7 years can be used for all TRUs.[28]

[28] Figure 6 from CARB's TRU Emissions Inventory shows that 7 years is a conservative default age assumption based on actual data. https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf

For each TRU, the same method for annual operating hours used for calculating the actual annual NOx emissions should also be used for calculating the annual reference NOx emissions to prevent potential variations between these methods affecting annual reference emissions as well as for consistent comparison between the actual and reference emissions for the same milestone year.

D. CHE

This section provides the detailed methodology to calculate the annual reference NOx emissions for each milestone year from all CHE operating at and travelling to and from a freight rail yard within South Coast AQMD. The annual reference NOx emissions for CHE operating at and travelling to and from the freight rail yard are calculated based on the annual operating hours for each CHE type (i.e., same equipment type, fuel, hp bin, model year) and the average emission factors for each CHE type using the following equation:

$$ECHE_i^{RS} = \sum_t \left[\left(\sum_{c \in t} HR_{c,i} \right) \times ER_{t,i}^{RS} \right] \quad \textit{(Equation 2.D.1)}$$

Where:

$ECHE_i^{RS}$= Reference Scenario NOx emissions (in tons) from all CHE operating at and travelling to and from the Freight Rail Yard in year *i*

$HR_{c,i}$ = Annual operating hours for CHE *c* associated with CHE type *t* operating at and travelling to and from the Freight Rail Yard in year *i*

$ER_{t,i}^{RS}$ = NOx emissions rate of CHE type *t* (in grams per hour) in year *i* under Reference Scenario (RS), as specified in Data Appendix, Tables D-2 through D-4

The annual operating hours and emission rates in the above equation are for each CHE type which is defined as CHE with the same equipment type, fuel type, hp, and model year (referred to CHE *c* type *t* in above equation).

The annual operating hours for each CHE must be based on the following order of hierarchy pending availability of operational data: 1) non-resettable hour-meters, 2) maintenance records, or 3) fuel consumption data. If the fuel consumption data is available, the annual operating hours can be estimated using Equation 1.C.1.b, and the fuel consumption conversion factors in Data Appendix, Table F-11. For each CHE, the same method for annual operating hours used for calculating the actual annual NOx emissions should also be used for calculating the annual reference NOx emissions to prevent potential variations between these methods affecting annual

reference emissions as well as for consistent comparison between the actual and reference emissions for the same milestone year.

E. OSE

This section provides the detailed methodology to calculate the annual reference NOx emissions for each milestone year from all OSE operating at and travelling to and from a freight rail yard within South Coast AQMD. The annual reference NOx emissions for OSE at and travelling to and from the freight rail yard are calculated based on the annual operating hours for each OSE type (i.e., same equipment type, fuel, hp bin, model year) and the average emission factor for each OSE type using the following equation:

$$EOSE_i^{RS} = \sum_t \left[\left(\sum_{o \in t} HR_{o,i} \right) \times ER_{t,i}^{RS} \right] \quad \textit{(Equation 2.E.1)}$$

Where:

$EOSE_{i,RS}$ = Reference Scenario NOx emissions (in tons) from all OSE operating on the Freight Rail Yard in year *i*

$HR_{o,i}$ = Annual operating hours for OSE *o* associated with OSE type *t* operating at and travelling to and from the Freight Rail Yard in year *i*

$ER_{t,i}^{RS}$ = NOx emissions rate of OSE type *t* (in gram per hour) in year *i*, as specified in Data Appendix Tables E-2 and E-3

The annual operating hours and emission rates in the above equation are for each OSE type which is defined as OSE with the same equipment type, fuel type, hp, and model year (referred to OSE *o* type *t* in above equation).

The annual operating hours for each OSE must be based on the following order of hierarchy pending availability of operational data: 1) non-resettable hour-meters, 2) maintenance records, or 3) fuel consumption data. If the fuel consumption data is available, the annual operating hours can be estimated using Equation 1.C.1.b, and the fuel consumption conversion factors in Data Appendix, Table F-11. For each OSE, the same method for annual operating hours used for calculating the actual annual NOx emissions should also be used for calculating the annual reference NOx emissions to prevent potential variations between these methods affecting annual reference emissions as well as for consistent comparison between the actual and reference emissions for the same milestone year.

3. Aggregate Emission Factor for a Freight Rail Yard

This section outlines the methodology for the owner or operator of a freight rail yard within the South Coast AQMD jurisdiction to calculate the annual aggregate NOx emission factor (AEF) for the freight rail yard for the milestone year and the base period encompassing all applicable mobile sources including locomotives, drayage trucks, CHE, TRU, and OSE as part of the Initial Facility Information Report pursuant to subparagraph (e)(1)(E) and the Milestone Compliance Report pursuant to subparagraph (f)(1)(E) of this rule.

The annual AEF for each freight rail yard is expressed in grams per brake-horsepower-hour (g/hp-hr) for NOx emissions and is calculated based on the actual annual NOx emissions in tons and the energy consumed in hp-hr for the applicable mobile sources using the following equation:

$$AEF_i = \frac{(EL_i + EDT_i + ETRU_i + ECHE_i + EOSEi) \times V}{L_i + DT_i + TRU_i + CHE_i + OSE_i} \qquad \textit{(Equation 3)}$$

Where:

AEF_i = Aggregate Emission Factor in g/hp-hr in year *i*

EL_i = Actual NOx emissions (in tons) from all Locomotives operating at and travelling to and from the Freight Rail Yard in year *I*, as calculated by Equation 1.A.1

EDT_i = Actual NOx emissions (in tons) from all Drayage Trucks operating at and travelling to and from the Freight Rail Yard in year *i*, as calculated by Equation 1.B.1

$ETRU_i$ = Actual NOx emissions (in tons) for all TRUs operating at and travelling to and from the Freight Rail Yard in year *i*, as calculated by Equation 1.C.1

$ECHE_i$ = Actual NOx emissions (in tons) for all CHE operating at and travelling to and from the Freight Rail Yard in year *i*, as calculated by Equation 1.D.1

$EOSE_i$ = Actual NOx emissions (in tons) for all OSE operating at and travelling to and from the Freight Rail Yard in year *i*, as calculated by Equation 1.E.1

V = Unit conversion factor for tons to grams (907,180)

L_i = Total energy consumed (in hp-hr) by all Locomotives operating at and travelling to and from the Freight Rail Yard in year *i*

DT_i = Total energy consumed (in hp-hr) by all Drayage Trucks operating at and travelling to and from the Freight Rail Yard in year *i*

TRU_i = Total energy consumed (in hp-hr) by all TRU operating at and travelling to and from the Freight Rail Yard in year *i*

CHE_i = Total energy consumed (in hp-hr) by all CHE operating at and travelling to and from the Freight Rail Yard in year *i*

OSE_i = Total energy consumed (in hp-hr) by all OSE operating at and travelling to and from the Freight Rail Yard in year *i*

The actual NOx emissions in tons for each milestone year for the freight rail yard from the applicable mobile sources are calculated based on the detailed methodologies provided in Section 1 of this document and converted to grams using the unit conversion factor (907,180 grams per ton[29]).

A. Locomotives

The total annual energy consumed for locomotives at each freight rail yard is calculated based on the annual usage in MWhr for all locomotives operating at and travelling to and from the freight rail yard and the number of days locomotives operated at the freight rail yard compared to the total number of days that locomotives operated at all freight rail yards by the same freight rail yard operator within South Coast AQMD using the following equation:

$$L_i = \sum_l \left(MWhr_{l,i} \times \frac{DaysFRY_{l,i}}{\sum_y DaysALLFRY_{l,i,y}} \right) \times CF \qquad \textit{(Equation 3.A.1)}$$

Where:

$MWhr_{l,i}$ = Annual usage (in megawatt-hours) by Locomotive *l* operating within the South Coast AQMD jurisdiction in year *i*

$DaysFRY_{l,i}$ = Total number of days Locomotive *l* operating at and travelling to and from the Freight Rail Yard in year *i*

$DaysALLFRY_{l,i,y}$ = Total number of days Locomotive *l* operating at and travelling to and from any Freight Rail Yard *y* within the South Coast AQMD jurisdiction in year *i*

CF = Conversion factor for megawatt to horsepower (1341.02)

[29] Grams to tons conversion: 453.59 grams/pound X 2000 pounds/ton = 907,180 grams/ton

B. Drayage Trucks

The total annual energy consumed for drayage trucks visiting each freight rail yard is calculated based on the total number of individual truck trips to and from the freight rail yard, miles traveled to and from the freight rail yard using the actual mileage or default mileage, and a conversion factor (to convert miles to hp-hr) using the following equation:

$$DT_i = \sum_d (NT_{d,i} \times VMT_{d,i} \times CF) \qquad \textit{(Equation 3.B.1)}$$

Where:

$NT_{d,i}$ = Number of Truck Trips by Drayage Truck *d* in year *i* to and from the Freight Rail Yard, calculated as total number of unique entry date(s) multiplied by 2

$VMT_{d,i}$ = Actual vehicle miles traveled by Drayage Truck *d* in year *i* to and from the Freight Rail Yard, or use default factor of 39.9 miles/trip

CF = Conversion factor (2.9 hp-hr/mile for diesel trucks and 3.65 hp-hr/mile for CNG trucks) [30]

C. TRU

The total annual energy consumed for TRU for each freight rail yard is calculated based on the maximum rated horsepower (hp), load factor, and annual operating hours for TRUs operating at and travelling to and from the freight rail yard using the following equation:

$$TRU_i = \sum_r (HP_{r,i} \times LF_{r,i} \times HR_{r,i}) \qquad \textit{(Equation 3.C.1)}$$

Where:

$HP_{r,i}$ = Maximum rated horsepower for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*

[30] Methods to Find the Cost-Effectiveness of Funding Air Quality Projects (for diesel trucks): https://ww2.arb.ca.gov/sites/default/files/2023-01/Cost%20Effectiveness%20Tables%202022_final.pdf, and In-Use Emissions Testing and Activity Profiles for On-Road Heavy-Duty Vehicles (for CNG trucks): https://www.energy.ca.gov/sites/default/files/2023-03/CEC-500-2023-002.pdf.

$LF_{r,i}$ = Load factor for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table C-1

$HR_{r,i}$ = Annual operating hours for TRU *r* operating at and travelling to and from the Freight Rail Yard in year *i*

D. CHE

The hp, load factor and the annual operating hours for each TRU used in this equation must be the same as the ones used for calculating the actual NOx emissions based on the detailed methodologies specified in Section 1 of this document.

The total annual energy consumed for CHE for each freight rail yard is calculated based on the maximum rated horsepower (hp), load factor, and annual operating hours for CHE operating at the freight rail yard using the following equation:

$$CHE_i = \sum_c (HP_{c,i} \times LF_{c,i} \times HR_{c,i}) \qquad \textit{(Equation 3.D.1)}$$

Where:

$HP_{c,i}$ = Maximum rated horsepower for CHE *c* operating at and travelling to and from the Freight Rail Yard in year *i*

$LF_{c,i}$ = Load factor for CHE *c* operating at and travelling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table D-1

$HR_{c,i}$ = Annual operating hours for CHE *c* operating at and travelling to and from the Freight Rail Yard in year *i*

E. OSE

The hp, load factor and the annual operating hours for each CHE used in this equation must be the same as the ones used for calculating the actual NOx emissions based on the detailed methodologies specified in Section 1 of this document.

The total annual energy consumed for OSE for each freight rail yard is calculated based on the maximum rated horsepower (hp), load factor, and annual operating hours for OSE operating at the freight rail yard using the following equation:

$$OSEi = \sum_o (HP_{o,i} \times LF_{o,i} \times HR_{o,i}) \quad \textit{(Equation 3.E.1)}$$

Where:

$HP_{o,i}$ = Maximum rated horsepower for OSE *o* operating at and travelling to and from the Freight Rail Yard in year *i*

$LF_{o,i}$ = Load factor for OSE *o* operating at and travelling to and from the Freight Rail Yard in year *i*, as specified in Data Appendix, Table E-1

$HR_{o,i}$ = Annual operating hours for OSE *o* operating at and travelling to and from the Freight Rail Yard in year *i*

The hp, load factor and the annual operating hours for each OSE used in this equation must be the same as the ones used calculating the actual NOx emissions based on the detailed methodologies specified in Section 1 of this document.

DATA APPENDIX

TABLE A-1 – A-3

TABLE B-1 – B-5

TABLE C-1 – C-4

TABLE D-1 – D-4

TABLE E-1 – E-3

TABLE F-1 – F-11

Table A-1 : EPA Average NOx Emission Factors (g/bhp-hr)		
Tier Level	**Line Haul Locomotive**	**Switch Locomotive**
Pre- Tier 0	13	17.4
Tier 0	8.6	12.6
Tier 0+	7.2	10.6
Tier 1	6.7	9.9
Tier 1+		
Tier 2	4.95	7.3
Tier 2+		
Tier 3		4.5
Tier 4	1	1

Table A-2 : Locomotive Fuel Conversion Factors		
Locomotive Type	**Rated Horsepower**	**Conversion Factor (MWhr/gal)**
Line Haul	≥4000	0.0155
	2,301-3,999	0.0137
Switch	≤2300	0.0133

Table A-3 : Reference Scenario Composite NOx Emissions Factors (g/bhp-hr)		
Locomotive Type	**Line-Haul**	**Switchers**
2025	5.30	10.69
2026	5.26	10.69
2027	5.24	10.69
2028	5.21	10.69
2029	5.19	10.69
2030	5.17	10.08
2031	5.07	10.08
2032	4.93	10.08
2033	4.78	10.08
2034	4.56	10.08
2035	4.37	10.08
2036	4.02	10.08
2037	3.67	10.08
2038	3.43	10.08
2039	3.15	10.08
2040	2.93	10.08
2041	2.72	10.08
2042	2.51	10.08
2043	2.29	10.08
2044	2.07	10.08
2045	1.97	10.08
2046	1.87	10.08
2047	1.77	10.08
2048	1.68	10.08
2049	1.59	10.08
2050	1.50	10.08

Table B-1 : South Coast Composite NOx Emission Factor for T7 Tractor Class 8 (g/mi)																														
	Model Year \ Calendar Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Diesel	1981	18.967	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1982	18.967	18.970	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1983	18.967	18.970	18.959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1984	18.967	18.970	18.959	18.959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1985	18.967	18.970	18.959	18.959	18.959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1986	18.967	18.970	18.959	18.959	18.959	18.959	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1987	19.010	19.013	19.002	19.002	19.002	19.002	19.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1988	19.010	19.013	19.002	19.002	19.002	19.002	19.002	19.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1989	19.010	19.013	19.002	19.002	19.002	19.002	19.002	19.002	18.989	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1990	19.010	19.013	19.002	19.002	19.002	19.002	19.002	19.002	18.989	18.989	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1991	22.608	22.608	22.613	22.613	22.613	22.613	22.613	22.615	22.618	22.618	22.618	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1992	22.608	22.608	22.613	22.613	22.613	22.613	22.613	22.615	22.618	22.618	22.618	22.617	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1993	20.912	20.912	20.916	20.916	20.916	20.916	20.916	20.918	20.920	20.920	20.920	20.919	20.919	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	18.295	18.295	18.297	18.297	18.297	18.297	18.297	18.298	18.299	18.299	18.299	18.298	18.298	18.299	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	18.295	18.295	18.297	18.297	18.297	18.297	18.297	18.298	18.299	18.299	18.299	18.298	18.298	18.299	18.299	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	18.052	18.052	18.054	18.054	18.054	18.054	18.054	18.055	18.056	18.056	18.056	18.055	18.055	18.056	18.056	18.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	18.052	18.052	18.054	18.054	18.054	18.054	18.054	18.055	18.056	18.056	18.056	18.055	18.055	18.056	18.056	18.056	18.056	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1998	18.096	18.096	18.098	18.098	18.098	18.098	18.098	18.099	18.100	18.100	18.100	18.099	18.099	18.100	18.100	18.100	18.100	18.100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1999	22.722	22.722	22.727	22.727	22.727	22.727	22.727	22.729	22.732	22.732	22.732	22.731	22.731	22.737	22.737	22.737	22.737	22.737	22.737	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2000	22.722	22.722	22.727	22.727	22.727	22.727	22.727	22.729	22.732	22.732	22.732	22.731	22.731	22.737	22.737	22.737	22.737	22.737	22.737	22.737	0.000	0.000	0.000	0.000	0.000	0.000
	2001	22.722	22.722	22.727	22.727	22.727	22.727	22.727	22.729	22.732	22.732	22.732	22.731	22.731	22.737	22.737	22.737	22.737	22.737	22.737	22.737	22.737	0.000	0.000	0.000	0.000	0.000
	2002	22.722	22.722	22.727	22.727	22.727	22.727	22.727	22.729	22.732	22.732	22.732	22.731	22.731	22.737	22.737	22.737	22.737	22.737	22.737	22.737	22.737	22.737	0.000	0.000	0.000	0.000
	2003	12.391	12.393	12.383	12.383	12.383	12.383	12.383	12.383	12.371	12.371	12.371	12.371	12.371	12.351	12.351	12.351	12.351	12.351	12.351	12.351	12.351	12.351	12.351	0.000	0.000	0.000
	2004	10.534	10.538	10.522	10.522	10.522	10.522	10.522	10.522	10.502	10.502	10.502	10.503	10.503	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	0.000	0.000
	2005	10.534	10.538	10.522	10.522	10.522	10.522	10.522	10.522	10.502	10.502	10.502	10.503	10.503	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	10.472	0.000
	2006	10.542	10.545	10.529	10.529	10.529	10.529	10.529	10.529	10.510	10.510	10.510	10.510	10.510	10.480	10.480	10.480	10.480	10.480	10.480	10.480	10.480	10.480	10.480	10.480	10.480	10.480
	2007	9.740	9.743	9.729	9.729	9.729	9.729	9.729	9.729	9.712	9.712	9.712	9.712	9.712	9.687	9.687	9.687	9.687	9.687	9.687	9.687	9.687	9.687	9.687	9.687	9.687	9.687
	2008	7.854	7.856	7.846	7.846	7.846	7.846	7.846	7.846	7.835	7.835	7.835	7.835	7.835	7.819	7.819	7.819	7.819	7.819	7.819	7.819	7.819	7.819	7.819	7.819	7.819	7.819
	2009	7.764	7.772	7.762	7.762	7.762	7.762	7.762	7.762	7.751	7.751	7.751	7.752	7.752	7.736	7.736	7.736	7.736	7.736	7.736	7.736	7.736	7.736	7.736	7.736	7.736	7.736
	2010	7.046	7.065	7.067	7.067	7.067	7.067	7.067	7.066	7.059	7.059	7.059	7.058	7.058	7.046	7.046	7.046	7.046	7.046	7.046	7.046	7.046	7.046	7.046	7.046	7.046	7.046
	2011	4.212	4.246	4.278	4.287	4.287	4.287	4.287	4.285	4.291	4.291	4.291	4.284	4.284	4.285	4.285	4.285	4.285	4.285	4.285	4.285	4.285	4.285	4.285	4.285	4.285	4.285
	2012	3.503	3.551	3.598	3.619	3.628	3.628	3.628	3.626	3.634	3.634	3.634	3.626	3.626	3.629	3.629	3.629	3.628	3.628	3.628	3.628	3.628	3.628	3.628	3.628	3.628	3.628
	2013	3.249	3.305	3.360	3.391	3.410	3.418	3.418	3.416	3.423	3.423	3.423	3.416	3.416	3.417	3.417	3.417	3.417	3.417	3.417	3.417	3.417	3.417	3.417	3.417	3.417	3.417
	2014	0.513	0.477	0.460	0.434	0.418	0.406	0.398	0.391	0.386	0.383	0.381	0.378	0.377	0.375	0.374	0.373	0.373	0.372	0.372	0.371	0.371	0.371	0.372	0.372	0.372	0.371

Table B-1 : South Coast Composite NOx Emission Factor for T7 Tractor Class 8 (g/mi) *(con.)*

	Calendar Year / Model Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Diesel	2015	0.514	0.478	0.462	0.436	0.421	0.410	0.401	0.394	0.388	0.384	0.382	0.379	0.378	0.375	0.375	0.374	0.373	0.372	0.372	0.371	0.371	0.371	0.371	0.372	0.372	0.371
	2016	0.514	0.480	0.465	0.439	0.424	0.413	0.405	0.398	0.392	0.387	0.384	0.381	0.379	0.376	0.375	0.374	0.373	0.373	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372
	2017	0.515	0.482	0.467	0.441	0.427	0.417	0.409	0.403	0.396	0.390	0.386	0.383	0.381	0.377	0.376	0.375	0.374	0.373	0.372	0.372	0.372	0.372	0.372	0.372	0.372	0.372
	2018	0.515	0.484	0.470	0.444	0.430	0.420	0.413	0.407	0.401	0.395	0.390	0.386	0.383	0.379	0.378	0.376	0.375	0.374	0.373	0.372	0.372	0.372	0.372	0.372	0.372	0.372
	2019	0.516	0.487	0.473	0.447	0.433	0.424	0.417	0.411	0.405	0.400	0.395	0.390	0.386	0.381	0.379	0.377	0.376	0.374	0.373	0.373	0.373	0.372	0.372	0.372	0.372	0.372
	2020	0.516	0.489	0.476	0.450	0.436	0.427	0.421	0.415	0.409	0.404	0.400	0.394	0.390	0.384	0.381	0.379	0.377	0.375	0.374	0.373	0.373	0.373	0.373	0.373	0.372	0.372
	2021	0.516	0.491	0.480	0.452	0.439	0.431	0.424	0.419	0.413	0.408	0.404	0.399	0.395	0.388	0.384	0.381	0.379	0.377	0.375	0.374	0.373	0.373	0.373	0.373	0.373	0.372
	2022	0.517	0.494	0.483	0.455	0.443	0.434	0.428	0.422	0.417	0.413	0.409	0.404	0.400	0.393	0.388	0.384	0.381	0.378	0.376	0.375	0.374	0.374	0.373	0.373	0.373	0.372
	2023	0.513	0.494	0.484	0.456	0.444	0.436	0.430	0.424	0.419	0.415	0.411	0.407	0.403	0.397	0.392	0.386	0.382	0.379	0.376	0.375	0.374	0.373	0.372	0.372	0.372	0.371
	2024	0.510	0.497	0.488	0.459	0.447	0.440	0.434	0.428	0.423	0.419	0.415	0.411	0.407	0.402	0.397	0.392	0.386	0.382	0.379	0.376	0.375	0.374	0.373	0.373	0.372	0.371
	2025	0.470	0.446	0.444	0.420	0.418	0.420	0.419	0.416	0.410	0.406	0.402	0.398	0.395	0.390	0.386	0.381	0.376	0.371	0.367	0.364	0.362	0.360	0.359	0.359	0.358	0.358
	2026	0.463	0.462	0.445	0.414	0.413	0.417	0.419	0.419	0.415	0.411	0.406	0.402	0.399	0.394	0.390	0.386	0.382	0.376	0.371	0.367	0.364	0.362	0.361	0.360	0.359	0.359
	2027	0.000	0.464	0.463	0.409	0.409	0.413	0.418	0.419	0.419	0.416	0.411	0.406	0.403	0.398	0.395	0.391	0.387	0.382	0.377	0.372	0.368	0.365	0.363	0.361	0.360	0.360
	2028	0.000	0.000	0.356	0.338	0.349	0.364	0.379	0.392	0.399	0.404	0.403	0.398	0.394	0.390	0.387	0.384	0.380	0.377	0.372	0.367	0.362	0.358	0.355	0.353	0.352	0.351
	2029	0.000	0.000	0.000	0.358	0.339	0.351	0.365	0.380	0.393	0.401	0.405	0.403	0.399	0.394	0.391	0.388	0.385	0.382	0.378	0.373	0.368	0.363	0.359	0.356	0.354	0.353
	2030	0.000	0.000	0.000	0.000	0.360	0.341	0.352	0.367	0.382	0.395	0.403	0.406	0.405	0.399	0.395	0.392	0.389	0.386	0.383	0.379	0.374	0.369	0.364	0.360	0.357	0.355
	2031	0.000	0.000	0.000	0.000	0.000	0.362	0.342	0.353	0.368	0.384	0.397	0.404	0.407	0.405	0.400	0.396	0.394	0.391	0.388	0.384	0.380	0.375	0.370	0.365	0.361	0.358
	2032	0.000	0.000	0.000	0.000	0.000	0.000	0.345	0.323	0.334	0.352	0.371	0.387	0.397	0.400	0.400	0.396	0.392	0.389	0.386	0.383	0.380	0.376	0.371	0.366	0.361	0.357
	2033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.344	0.323	0.334	0.352	0.370	0.387	0.395	0.400	0.400	0.396	0.392	0.389	0.386	0.383	0.380	0.376	0.371	0.366	0.361
	2034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.344	0.323	0.334	0.351	0.370	0.385	0.395	0.400	0.400	0.396	0.392	0.389	0.386	0.383	0.380	0.376	0.371	0.365
	2035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.344	0.323	0.333	0.351	0.369	0.385	0.395	0.400	0.400	0.396	0.392	0.389	0.386	0.383	0.380	0.376	0.369
	2036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.344	0.322	0.333	0.350	0.369	0.385	0.395	0.400	0.400	0.396	0.392	0.389	0.386	0.383	0.380	0.372
	2037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.343	0.322	0.332	0.350	0.369	0.385	0.395	0.400	0.400	0.396	0.392	0.389	0.386	0.383	0.375
	2038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.343	0.321	0.332	0.350	0.369	0.385	0.395	0.400	0.400	0.396	0.392	0.389	0.386	0.377
	2039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.385	0.395	0.401	0.400	0.396	0.392	0.389	0.380
	2040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.385	0.395	0.401	0.400	0.396	0.392	0.381
	2041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.385	0.395	0.401	0.400	0.396	0.383
	2042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.385	0.395	0.401	0.400	0.386
	2043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.385	0.395	0.401	0.389
	2044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.385	0.395	0.388
	2045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.385	0.382
	2046	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.369	0.371
	2047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.350	0.354
	2048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.332	0.336
	2049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.321	0.321
	2050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.342	0.324

Table B-2 : South Coast Composite NOx Emission Factor for Natural Gas T7 Tractor Class 8 (g/mi)																														
	Calendar Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
	Model Year																										
Natural Gas	2009	0.547	0.548	0.545	0.545	0.545	0.545	0.545	0.545	0.542	0.542	0.542	0.542	0.542	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538
	2010	0.547	0.548	0.545	0.545	0.545	0.545	0.545	0.545	0.542	0.542	0.542	0.542	0.542	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538	0.538
	2011	0.546	0.547	0.544	0.544	0.544	0.544	0.544	0.544	0.541	0.541	0.541	0.541	0.541	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537
	2012	0.546	0.546	0.544	0.544	0.544	0.544	0.544	0.544	0.541	0.541	0.541	0.541	0.541	0.536	0.536	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537
	2013	0.546	0.546	0.544	0.544	0.544	0.544	0.544	0.544	0.541	0.541	0.541	0.541	0.541	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537
	2014	0.546	0.547	0.544	0.544	0.544	0.544	0.544	0.544	0.541	0.541	0.541	0.541	0.541	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537
	2015	0.545	0.546	0.544	0.543	0.543	0.543	0.543	0.543	0.541	0.541	0.541	0.541	0.541	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536	0.536
	2016	0.546	0.547	0.544	0.544	0.544	0.544	0.544	0.544	0.541	0.541	0.541	0.541	0.541	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537	0.537
	2017	0.412	0.413	0.411	0.411	0.411	0.411	0.411	0.411	0.410	0.410	0.410	0.410	0.410	0.408	0.408	0.408	0.408	0.408	0.408	0.408	0.408	0.408	0.408	0.408	0.408	0.408
	2018	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2019	0.155	0.156	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2020	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2021	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2022	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2023	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2024	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2025	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2026	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2027	0.000	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2028	0.000	0.000	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2029	0.000	0.000	0.000	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2030	0.000	0.000	0.000	0.000	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2031	0.000	0.000	0.000	0.000	0.000	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2032	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.155	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154	0.154
	2046	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154	0.154
	2047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154	0.154
	2048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154	0.154
	2049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154	0.154
	2050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.154	0.154

Table B-3 : Statewide Composite NOx Emission Factor for Diesel T7 Tractor Class 8 (g/mi)																														
	Model Year \ Calendar Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Diesel	1981	19.283	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1982	19.285	19.285	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1983	19.286	19.285	19.282	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1984	19.285	19.285	19.281	19.280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1985	19.284	19.284	19.280	19.280	19.279	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1986	19.286	19.285	19.282	19.281	19.280	19.280	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1987	19.329	19.329	19.325	19.325	19.324	19.324	19.323	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1988	19.333	19.333	19.329	19.328	19.327	19.327	19.327	19.326	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1989	19.333	19.333	19.329	19.328	19.328	19.327	19.327	19.327	19.323	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1990	19.335	19.335	19.331	19.330	19.329	19.329	19.329	19.328	19.325	19.325	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1991	22.971	22.970	22.971	22.970	22.969	22.969	22.969	22.969	22.970	22.970	22.970	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1992	22.975	22.973	22.974	22.973	22.972	22.972	22.972	22.972	22.972	22.972	22.972	22.972	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1993	21.291	21.289	21.289	21.288	21.288	21.287	21.287	21.287	21.287	21.287	21.287	21.287	21.287	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1994	18.693	18.692	18.691	18.690	18.689	18.689	18.688	18.688	18.689	18.688	18.688	18.688	18.688	18.688	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1995	18.698	18.696	18.695	18.694	18.693	18.693	18.692	18.692	18.692	18.692	18.692	18.692	18.692	18.692	18.692	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1996	18.459	18.457	18.456	18.455	18.454	18.454	18.453	18.453	18.453	18.453	18.453	18.453	18.453	18.453	18.453	18.453	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1997	18.463	18.461	18.460	18.459	18.458	18.457	18.457	18.457	18.457	18.457	18.456	18.456	18.456	18.456	18.456	18.456	18.456	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1998	18.513	18.511	18.510	18.509	18.508	18.507	18.507	18.507	18.506	18.506	18.506	18.506	18.506	18.506	18.506	18.506	18.506	18.506	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	1999	23.116	23.114	23.114	23.112	23.111	23.111	23.110	23.110	23.111	23.110	23.110	23.110	23.110	23.111	23.111	23.111	23.111	23.111	23.111	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2000	23.122	23.120	23.120	23.118	23.117	23.116	23.116	23.116	23.116	23.116	23.116	23.116	23.116	23.116	23.116	23.116	23.117	23.117	23.117	23.117	0.000	0.000	0.000	0.000	0.000	0.000
	2001	23.132	23.129	23.129	23.127	23.126	23.125	23.124	23.124	23.125	23.125	23.125	23.124	23.124	23.125	23.125	23.125	23.125	23.125	23.125	23.125	23.125	0.000	0.000	0.000	0.000	0.000
	2002	23.142	23.139	23.139	23.137	23.136	23.135	23.134	23.134	23.134	23.134	23.134	23.133	23.134	23.134	23.134	23.134	23.134	23.134	23.134	23.134	23.134	23.134	0.000	0.000	0.000	0.000
	2003	12.698	12.696	12.693	12.691	12.690	12.689	12.689	12.688	12.685	12.685	12.685	12.685	12.685	12.683	12.683	12.683	12.683	12.683	12.683	12.683	12.683	12.683	12.683	0.000	0.000	0.000
	2004	10.847	10.846	10.841	10.840	10.839	10.838	10.837	10.836	10.833	10.833	10.832	10.833	10.833	10.829	10.829	10.829	10.829	10.829	10.829	10.829	10.829	10.829	10.829	10.829	0.000	0.000
	2005	10.863	10.861	10.857	10.855	10.854	10.853	10.853	10.852	10.849	10.849	10.848	10.849	10.849	10.846	10.846	10.846	10.846	10.846	10.846	10.846	10.846	10.846	10.846	10.846	10.846	0.000
	2006	10.884	10.882	10.879	10.877	10.876	10.875	10.874	10.874	10.871	10.871	10.870	10.871	10.871	10.868	10.868	10.868	10.868	10.868	10.868	10.868	10.868	10.868	10.868	10.868	10.868	10.868
	2007	10.041	10.040	10.037	10.036	10.035	10.034	10.033	10.033	10.031	10.031	10.031	10.031	10.031	10.029	10.029	10.029	10.029	10.029	10.029	10.029	10.029	10.029	10.029	10.029	10.029	10.029
	2008	8.038	8.037	8.036	8.035	8.034	8.034	8.034	8.034	8.032	8.032	8.032	8.032	8.032	8.031	8.031	8.031	8.031	8.031	8.032	8.032	8.031	8.031	8.031	8.031	8.031	8.031
	2009	7.952	7.958	7.956	7.956	7.955	7.955	7.955	7.955	7.954	7.954	7.954	7.954	7.954	7.953	7.953	7.953	7.953	7.953	7.953	7.953	7.953	7.953	7.953	7.953	7.953	7.953
	2010	7.221	7.237	7.243	7.243	7.243	7.243	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242	7.242
	2011	4.272	4.305	4.329	4.338	4.338	4.338	4.338	4.337	4.339	4.339	4.339	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336	4.336
	2012	3.554	3.601	3.639	3.660	3.669	3.669	3.669	3.668	3.670	3.670	3.670	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667	3.667
	2013	3.301	3.356	3.403	3.434	3.454	3.462	3.462	3.461	3.463	3.463	3.463	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460	3.460
	2014	0.532	0.493	0.469	0.445	0.430	0.419	0.410	0.404	0.399	0.396	0.394	0.392	0.391	0.390	0.389	0.388	0.387	0.387	0.386	0.386	0.386	0.386	0.386	0.386	0.386	0.386

Table B-3 : Statewide Composite NOx Emission Factor for Diesel T7 Tractor Class 8 (g/mi) *(cont.)*

	Calendar Year / Model Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Diesel	2015	0.532	0.495	0.471	0.447	0.433	0.423	0.414	0.407	0.401	0.397	0.395	0.393	0.392	0.390	0.389	0.388	0.387	0.387	0.386	0.386	0.386	0.386	0.386	0.386	0.386	0.386
	2016	0.531	0.496	0.472	0.449	0.435	0.425	0.418	0.411	0.404	0.399	0.396	0.394	0.392	0.390	0.389	0.388	0.387	0.386	0.386	0.385	0.385	0.386	0.386	0.386	0.386	0.385
	2017	0.533	0.499	0.476	0.453	0.439	0.430	0.423	0.416	0.410	0.404	0.400	0.397	0.394	0.392	0.391	0.390	0.389	0.388	0.387	0.387	0.387	0.387	0.387	0.387	0.387	0.386
	2018	0.533	0.501	0.479	0.456	0.443	0.434	0.427	0.420	0.414	0.409	0.404	0.399	0.397	0.394	0.392	0.391	0.389	0.388	0.387	0.387	0.387	0.387	0.387	0.387	0.387	0.386
	2019	0.534	0.503	0.481	0.458	0.446	0.437	0.431	0.425	0.419	0.414	0.409	0.404	0.400	0.396	0.394	0.392	0.390	0.389	0.388	0.387	0.387	0.387	0.387	0.387	0.387	0.386
	2020	0.534	0.505	0.484	0.461	0.449	0.440	0.434	0.428	0.423	0.418	0.413	0.408	0.403	0.399	0.396	0.393	0.391	0.390	0.388	0.388	0.387	0.387	0.387	0.387	0.387	0.386
	2021	0.534	0.508	0.487	0.464	0.452	0.444	0.438	0.432	0.427	0.422	0.418	0.413	0.408	0.403	0.399	0.396	0.393	0.391	0.389	0.388	0.388	0.387	0.387	0.387	0.387	0.386
	2022	0.535	0.511	0.491	0.467	0.456	0.448	0.442	0.436	0.431	0.426	0.423	0.418	0.414	0.408	0.403	0.399	0.395	0.393	0.391	0.389	0.389	0.388	0.388	0.387	0.387	0.387
	2023	0.530	0.510	0.491	0.468	0.457	0.450	0.444	0.438	0.433	0.429	0.425	0.421	0.417	0.412	0.407	0.401	0.397	0.393	0.391	0.389	0.388	0.387	0.387	0.386	0.386	0.385
	2024	0.527	0.513	0.495	0.471	0.461	0.454	0.448	0.442	0.437	0.433	0.429	0.425	0.421	0.417	0.412	0.406	0.401	0.396	0.393	0.391	0.389	0.388	0.387	0.387	0.386	0.386
	2025	0.486	0.461	0.448	0.431	0.431	0.433	0.432	0.429	0.424	0.419	0.416	0.412	0.409	0.405	0.401	0.396	0.390	0.385	0.381	0.378	0.375	0.374	0.373	0.372	0.372	0.371
	2026	0.479	0.477	0.447	0.425	0.426	0.431	0.433	0.432	0.429	0.424	0.420	0.416	0.413	0.409	0.405	0.401	0.396	0.391	0.385	0.381	0.378	0.376	0.374	0.373	0.373	0.372
	2027	0.000	0.479	0.457	0.420	0.422	0.427	0.431	0.433	0.432	0.430	0.425	0.420	0.417	0.413	0.410	0.406	0.402	0.397	0.391	0.386	0.382	0.378	0.376	0.375	0.374	0.373
	2028	0.000	0.000	0.368	0.349	0.361	0.376	0.391	0.404	0.413	0.417	0.416	0.412	0.408	0.404	0.401	0.398	0.395	0.391	0.386	0.380	0.375	0.371	0.368	0.366	0.365	0.364
	2029	0.000	0.000	0.000	0.370	0.350	0.362	0.377	0.393	0.406	0.414	0.419	0.417	0.413	0.409	0.406	0.403	0.400	0.396	0.392	0.387	0.382	0.376	0.372	0.369	0.367	0.366
	2030	0.000	0.000	0.000	0.000	0.372	0.352	0.363	0.379	0.394	0.408	0.416	0.420	0.419	0.414	0.410	0.407	0.404	0.401	0.397	0.393	0.388	0.383	0.378	0.374	0.370	0.369
	2031	0.000	0.000	0.000	0.000	0.000	0.374	0.353	0.365	0.381	0.397	0.410	0.418	0.422	0.420	0.416	0.411	0.409	0.405	0.402	0.399	0.395	0.390	0.384	0.379	0.375	0.372
	2032	0.000	0.000	0.000	0.000	0.000	0.000	0.356	0.333	0.345	0.364	0.383	0.400	0.411	0.416	0.415	0.411	0.406	0.404	0.401	0.397	0.394	0.390	0.385	0.380	0.374	0.370
	2033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.356	0.333	0.345	0.364	0.383	0.400	0.410	0.416	0.415	0.411	0.406	0.404	0.401	0.397	0.394	0.390	0.385	0.380	0.374
	2034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.333	0.345	0.363	0.383	0.400	0.410	0.416	0.415	0.411	0.406	0.404	0.401	0.397	0.394	0.390	0.385	0.379
	2035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.333	0.345	0.363	0.383	0.400	0.410	0.416	0.415	0.411	0.406	0.404	0.401	0.397	0.394	0.390	0.383
	2036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.333	0.345	0.363	0.383	0.400	0.410	0.415	0.415	0.411	0.406	0.404	0.401	0.397	0.394	0.386
	2037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.333	0.344	0.363	0.382	0.400	0.410	0.415	0.415	0.411	0.406	0.404	0.400	0.397	0.389
	2038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.332	0.344	0.363	0.382	0.400	0.410	0.415	0.415	0.411	0.406	0.403	0.400	0.391
	2039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.332	0.344	0.363	0.382	0.400	0.410	0.415	0.415	0.411	0.406	0.403	0.394
	2040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.332	0.344	0.363	0.382	0.400	0.410	0.415	0.415	0.411	0.406	0.396
	2041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.332	0.344	0.363	0.382	0.400	0.410	0.415	0.415	0.410	0.397
	2042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.332	0.344	0.363	0.382	0.399	0.410	0.415	0.415	0.400
	2043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.355	0.332	0.344	0.363	0.382	0.399	0.410	0.415	0.403
	2044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.332	0.344	0.363	0.382	0.399	0.410	0.402
	2045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.332	0.344	0.363	0.382	0.399	0.396
	2046	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.332	0.344	0.363	0.382	0.384
	2047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.332	0.344	0.363	0.367
	2048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.332	0.344	0.349
	2049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.332	0.333
	2050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.354	0.336

Table B-4 : Statewide Composite NOx Emission Factor for Natural Gas T7 Tractor Class 8 (g/mi)																														
	Model Year \ Calendar Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
Natural Gas	2009	0.579	0.579	0.578	0.578	0.578	0.578	0.578	0.578	0.577	0.577	0.577	0.577	0.577	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576	0.576
	2010	0.571	0.572	0.571	0.571	0.571	0.571	0.571	0.571	0.570	0.570	0.570	0.570	0.570	0.569	0.569	0.569	0.569	0.569	0.569	0.569	0.569	0.569	0.569	0.569	0.569	0.569
	2011	0.577	0.577	0.576	0.576	0.576	0.576	0.576	0.576	0.575	0.575	0.575	0.575	0.575	0.574	0.574	0.574	0.574	0.574	0.574	0.574	0.574	0.574	0.574	0.574	0.574	0.574
	2012	0.574	0.574	0.573	0.573	0.573	0.573	0.573	0.573	0.572	0.572	0.572	0.572	0.572	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571
	2013	0.570	0.570	0.569	0.569	0.569	0.569	0.569	0.569	0.568	0.568	0.568	0.568	0.568	0.567	0.567	0.568	0.568	0.568	0.568	0.568	0.568	0.568	0.568	0.568	0.568	0.568
	2014	0.573	0.573	0.573	0.572	0.572	0.572	0.572	0.572	0.571	0.571	0.571	0.572	0.572	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571	0.571
	2015	0.573	0.573	0.572	0.572	0.572	0.572	0.572	0.572	0.571	0.571	0.571	0.571	0.571	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570	0.570
	2016	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596	0.596
	2017	0.423	0.423	0.423	0.423	0.423	0.423	0.423	0.423	0.422	0.422	0.422	0.422	0.422	0.421	0.421	0.421	0.421	0.421	0.421	0.421	0.421	0.421	0.421	0.421	0.421	0.421
	2018	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156
	2019	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.157	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156	0.156
	2020	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2021	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2022	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2023	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2024	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2025	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2026	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2027	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2028	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2029	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2030	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2031	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2032	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2033	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2034	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2035	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2036	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2037	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2038	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2039	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2040	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2042	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2043	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2044	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2045	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158	0.158
	2046	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158	0.158
	2047	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158	0.158
	2048	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158	0.158
	2049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158	0.158
	2050	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.158	0.158

Table B-5 : Reference Composite NOx Emission Factors for T7 Tractor Class 8 (g/mi)		
Calendar Year	**South Coast**	**Statewide**
2025	0.868	0.902
2026	0.791	0.823
2027	0.728	0.749
2028	0.650	0.674
2029	0.593	0.617
2030	0.549	0.572
2031	0.514	0.536
2032	0.483	0.503
2033	0.454	0.473
2034	0.429	0.447
2035	0.407	0.425
2036	0.389	0.406
2037	0.375	0.391
2038	0.362	0.378
2039	0.352	0.367
2040	0.343	0.358
2041	0.335	0.350
2042	0.329	0.343
2043	0.323	0.337
2044	0.319	0.332
2045	0.315	0.328
2046	0.312	0.325
2047	0.310	0.322
2048	0.307	0.320
2049	0.306	0.318
2050	0.298	0.310

Table C-1 : TRU Load Factors				
Category	**Below 23 hp**	**Between 23 and 25 hp (All Years)**	**Over 25 hp (2012 and Older)**	**Over 25 hp (2013 and Newer)**
California TRU	0.56	0.46	0.46	0.38
Out-of-State TRU	-	0.46	0.46	0.38
California Gen sets	-	0.33	0.33	0.27
Out-of-State Gen set	-	0.33	0.33	0.27
Railcars	-	0.46	0.46	0.38

Table C-2 : Default Average Annual TRU Operating Hours												
Fuel Type	Calendar Year	Transport Refrigeration Unit - Instate Genset		Transport Refrigeration Unit - Instate Trailer		Transport Refrigeration Unit - Instate Truck	Transport Refrigeration Unit - Out-Of-State Genset		Transport Refrigeration Unit - Out-Of-State Trailer		Transport Refrigeration Unit - Railcar TRU	
		Horsepower Bin		Horsepower Bin		Horsepower Bin	Horsepower Bin		Horsepower Bin		Horsepower Bin	
		25	50	25	50	23	25	50	25	50	25	50
Diesel	2025	781.19	781.38	1781.78	1781.73	952.13	124.01	124.02	272.00	272.01	327.47	326.83
	2026	781.21	781.41	1793.21	1793.16	748.11	124.00	124.02	272.00	272.01	327.48	326.82
	2027	781.18	781.39	1767.42	1767.39	544.07	124.01	124.02	272.00	272.01	327.41	327.22
	2028	781.19	781.46	1793.44	1793.41	340.05	124.01	124.02	272.00	272.01	327.39	327.29
	2029	781.17	781.49	1776.92	1776.90	136.02	124.01	124.02	272.00	272.01	327.37	327.41
	2030	781.16	781.53	1804.93	1804.89	0.00	124.01	124.02	272.00	272.01	327.32	327.62
	2031	781.14	781.52	1795.47	1795.42	0.00	124.01	124.02	272.00	272.01	327.31	327.63
	2032	781.17	781.64	1800.37	1800.32	0.00	124.01	124.02	272.00	272.01	327.31	327.76
	2033	781.14	781.58	1790.92	1790.88	0.00	124.01	124.02	272.00	272.01	327.28	327.79
	2034	781.13	781.67	1787.39	1787.32	0.00	124.01	124.02	272.00	272.01	327.31	327.75
	2035	781.14	781.68	1789.20	1789.14	0.00	124.00	124.02	272.00	272.01	327.29	327.75
	2036	781.14	781.71	1781.17	1781.10	0.00	124.01	124.03	272.00	272.01	327.28	327.78
	2037	781.14	781.67	1790.61	1790.54	0.00	124.01	124.02	272.00	272.01	327.28	327.72
	2038	781.14	781.67	1786.56	1786.50	0.00	124.01	124.02	272.00	272.01	327.27	327.71
	2039	781.13	781.65	1794.40	1794.32	0.00	124.00	124.02	272.00	272.01	327.27	327.76
	2040	781.14	781.63	1791.74	1791.66	0.00	124.00	124.02	272.00	272.01	327.26	327.78
	2041	781.12	781.57	1792.26	1792.19	0.00	124.00	124.02	272.00	272.01	327.27	327.85
	2042	781.13	781.68	1788.37	1788.29	0.00	124.01	124.02	272.00	272.01	327.26	327.78
	2043	781.14	781.61	1786.98	1786.91	0.00	124.00	124.02	272.00	272.01	327.26	327.75
	2044	781.13	781.57	1787.61	1787.54	0.00	124.00	124.02	272.00	272.01	327.27	327.79
	2045	781.13	781.58	1786.05	1785.98	0.00	124.00	124.02	272.00	272.01	327.27	327.77
	2046	781.13	781.62	1789.33	1789.26	0.00	124.00	124.02	272.00	272.01	327.27	327.74
	2047	781.11	781.54	1789.09	1789.02	0.00	124.00	124.02	272.00	272.01	327.27	327.73
	2048	781.12	781.55	1791.50	1791.43	0.00	124.00	124.02	272.00	272.01	327.26	327.70
	2049	781.12	781.52	1790.67	1790.60	0.00	124.00	124.02	272.00	272.01	327.26	327.78
	2050	781.12	781.57	1790.07	1790.02	0.00	124.00	124.02	272.00	272.01	327.25	327.71

Table C-3 : TRU NOx Emissions Rate (g/hr)												
Fuel Type	Calendar Year	Transport Refrigeration Unit - Instate Genset		Transport Refrigeration Unit - Instate Trailer		Transport Refrigeration Unit - Instate Truck	Transport Refrigeration Unit - Out-Of-State Genset		Transport Refrigeration Unit - Out-Of-State Trailer		Transport Refrigeration Unit - Railcar TRU	
		Horsepower Bin		Horsepower Bin		Horsepower Bin	Horsepower Bin		Horsepower Bin		Horsepower Bin	
		25	50	25	50	23	25	50	25	50	25	50
Diesel	2025	30.00	29.73	36.30	37.08	28.62	29.98	33.00	37.08	36.81	41.78	38.07
	2026	30.00	28.34	36.44	35.80	31.02	29.97	31.19	37.17	36.73	41.79	37.85
	2027	29.97	27.27	36.94	35.56	34.83	29.97	29.81	36.52	36.02	41.79	37.97
	2028	29.98	26.70	36.35	34.59	35.29	29.97	28.51	35.95	34.72	41.78	37.95
	2029	29.98	26.61	36.19	33.78	35.29	29.97	27.07	36.23	33.53	41.78	37.94
	2030	29.97	26.57	36.29	33.87	0.00	29.97	26.60	36.35	32.68	41.79	37.90
	2031	29.97	26.41	36.67	32.75	0.00	29.97	26.20	37.21	32.14	41.79	37.87
	2032	29.98	26.20	36.94	32.58	0.00	29.98	26.00	37.69	31.70	41.79	37.86
	2033	29.98	26.03	35.53	32.51	0.00	29.98	25.95	37.12	31.42	41.79	37.92
	2034	29.96	25.89	36.36	33.37	0.00	29.98	25.92	37.52	31.20	41.77	37.94
	2035	29.97	25.81	36.14	32.38	0.00	29.97	25.93	37.27	31.01	41.78	38.01
	2036	29.98	25.77	36.95	33.09	0.00	29.97	25.92	36.75	31.82	41.78	38.07
	2037	29.98	25.73	36.60	32.41	0.00	29.98	25.91	36.55	32.57	41.77	38.13
	2038	29.97	25.72	36.17	33.91	0.00	29.97	25.88	36.33	33.31	41.77	38.11
	2039	29.98	25.77	35.89	33.23	0.00	29.97	25.87	36.41	34.97	41.79	38.09
	2040	29.98	25.77	36.44	32.97	0.00	29.97	25.86	36.76	35.64	41.79	38.09
	2041	29.98	25.76	36.73	33.67	0.00	29.97	25.86	36.52	35.38	41.78	38.05
	2042	29.98	25.81	36.52	35.00	0.00	29.98	25.86	36.27	36.04	41.77	38.05
	2043	29.97	25.81	36.28	34.63	0.00	29.97	25.86	36.02	35.79	41.78	38.04
	2044	29.98	25.79	36.52	34.76	0.00	29.97	25.86	36.32	35.54	41.77	38.04
	2045	29.98	25.80	36.25	35.53	0.00	29.98	25.86	36.06	36.14	41.79	38.06
	2046	29.97	25.77	35.95	35.00	0.00	29.98	25.86	36.34	35.86	41.78	38.06
	2047	29.97	25.75	35.89	35.12	0.00	29.97	25.87	36.08	35.58	41.78	38.08
	2048	29.97	25.75	36.07	35.25	0.00	29.97	25.86	36.58	35.30	41.78	38.07
	2049	29.97	25.74	36.01	34.71	0.00	29.97	25.86	37.06	35.04	41.78	38.08
	2050	29.97	25.74	35.97	34.16	0.00	29.98	25.84	37.26	34.79	41.79	38.06

Table C-4 : TRU Default Horsepower	
Category	**Average hp**
California TRU	25.3
Out-of-State TRU	29.2
California Gen sets	29.0
Out-of-State Gen set	29.0
Railcars	29.2

Table D-1 : CHE Load Factors	
Equipment Type	**Load Factor**
Compactor (Portable)	0.51
Container Handling Equipment	0.59
Crane	0.43
Electric Pallet Jack	0.50
Excavator	0.55
Forklift	0.30
Lift	0.51
Other	0.51
Rail Car Mover	0.51
RTG Crane	0.20
Skid-steer Loaders	0.55
STS Crane	0.43
Tractor	0.55
Tractors/Loaders/Backhoes	0.55
Truck	0.51
Yard Truck	0.39

Table D-2 : CHE NOx Emissions Rate (g/hr)																					
Fuel Type	Calendar Year	Cargo Handling Equipment - Port Container Handling Equipment				Cargo Handling Equipment - Port Crane				Cargo Handling Equipment - Port Excavator	Cargo Handling Equipment - Port Forklift						Cargo Handling Equipment - Port Lift			
		Horsepower Bin				Horsepower Bin				Horsepower Bin	Horsepower Bin						Horsepower Bin			
		175	300	600	9999	175	300	600	9999	75	50	75	100	175	300	600	50	75	100	175
Diesel	2025	59.24	315.58	272.97	1726.58	52.07	12.79	18.08	1059.66	188.25	48.67	66.26	80.39	81.45	105.58	155.40	132.97	112.87	119.45	48.57
	2026	59.24	315.55	244.57	1726.58	52.31	12.74	18.10	1070.98	188.25	48.71	66.37	80.40	73.55	105.69	155.41	133.00	112.87	118.94	49.18
	2027	59.24	242.90	222.50	1726.58	52.29	12.79	21.03	1080.58	188.25	48.66	66.39	79.13	73.34	105.74	155.40	132.99	113.57	74.07	49.06
	2028	59.24	187.35	216.36	1726.58	51.95	12.77	20.97	1080.58	108.06	48.62	63.56	79.90	69.67	53.94	153.95	81.00	111.89	73.76	49.16
	2029	59.24	38.51	191.06	1726.58	52.31	12.79	21.00	1080.58	125.09	48.50	64.16	80.40	59.55	51.55	90.87	93.34	102.64	74.09	49.16
	2030	59.24	39.51	187.50	1726.58	52.31	12.78	20.92	1080.58	125.09	48.64	63.45	80.40	59.51	51.55	91.35	93.35	98.88	64.75	49.17
	2031	59.24	39.53	190.29	1726.58	52.10	12.78	20.92	1080.58	125.09	39.00	63.89	80.41	57.07	51.56	89.97	77.10	107.12	64.37	45.62
	2032	59.24	39.50	184.11	1726.58	52.29	12.78	21.02	1080.58	109.54	39.05	62.66	80.40	54.47	28.59	90.67	77.23	105.74	64.61	45.62
	2033	59.24	30.17	164.12	1726.58	52.32	12.77	21.00	1080.58	125.09	38.88	63.57	80.41	48.75	20.78	90.95	80.95	106.26	55.77	45.78
	2034	59.24	30.29	97.53	1726.58	52.30	12.77	20.97	1080.58	125.09	48.69	62.62	80.40	40.41	13.57	51.14	80.99	106.28	46.17	45.74
	2035	59.24	26.51	80.67	1726.58	28.31	12.78	20.93	497.90	125.09	48.63	83.24	80.40	24.30	13.62	14.65	80.97	105.16	46.17	49.21
	2036	59.24	26.58	47.87	797.72	28.56	12.77	21.00	575.21	125.09	48.59	60.21	0.76	15.03	13.64	14.95	80.88	106.24	35.76	23.86
	2037	7.48	24.59	32.59	921.59	9.00	12.77	20.95	575.21	125.09	48.51	64.22	0.88	12.84	13.61	15.42	80.90	106.95	35.77	24.36
	2038	8.64	20.23	31.09	921.59	9.45	12.79	21.00	575.21	125.09	48.65	64.41	0.88	10.56	8.80	15.42	80.95	105.91	8.87	8.68
	2039	8.64	20.50	31.00	921.59	9.46	12.65	20.95	575.21	125.09	48.56	64.12	0.88	7.22	9.12	15.11	80.96	104.10	8.92	8.95
	2040	8.64	20.53	31.36	921.59	9.22	12.55	20.99	575.21	125.09	48.68	64.53	0.88	7.31	9.19	15.23	80.98	105.92	8.95	8.94
	2041	8.50	20.55	31.38	921.59	9.06	11.83	18.06	575.21	125.09	48.57	64.65	0.88	6.49	9.17	15.43	77.48	106.03	8.95	8.69
	2042	8.53	20.54	31.37	921.59	9.44	11.95	20.97	575.21	125.09	38.95	64.31	0.88	6.50	9.17	15.14	77.54	107.51	8.94	8.48
	2043	8.54	20.45	31.38	921.59	9.45	11.98	20.97	575.21	125.09	38.88	64.41	0.88	6.47	9.17	15.43	77.54	108.00	8.95	8.48
	2044	8.55	20.05	31.33	921.59	9.47	12.03	20.96	575.21	125.09	48.55	64.34	0.88	6.47	9.16	15.43	80.98	107.72	1.60	8.42
	2045	8.55	20.52	31.36	921.59	9.06	12.78	20.94	575.21	125.09	48.64	64.54	0.88	6.47	9.18	15.44	80.98	106.68	1.65	8.95
	2046	8.55	20.55	31.31	921.59	9.24	12.79	18.15	564.09	125.09	48.67	64.68	0.88	6.44	9.12	15.43	80.95	106.65	1.49	8.44
	2047	8.55	20.55	31.27	921.59	9.46	12.75	18.10	570.10	125.09	48.67	64.78	0.88	6.44	9.14	15.43	80.95	106.64	1.47	8.94
	2048	8.55	20.24	31.29	921.59	9.45	12.78	20.99	575.21	125.09	48.63	64.80	0.87	6.49	9.19	15.43	80.98	107.42	1.45	8.95
	2049	8.55	20.16	31.36	921.59	9.10	12.79	20.97	575.21	108.06	48.55	64.20	0.88	6.46	8.86	15.35	68.66	107.41	1.48	8.95
	2050	8.55	19.54	31.21	921.59	9.44	12.78	20.94	575.21	125.09	48.58	64.80	0.88	6.41	9.18	14.95	80.97	101.51	1.49	8.95

Table D-2 : CHE NOx Emissions Rate (g/hr) *(cont.)*																	
Fuel Type	**Calendar Year**	**Cargo Handling Equipment - Port Other**		**Cargo Handling Equipment - Port Rail Car Mover**		**Cargo Handling Equipment - Port RTG Crane**					**Cargo Handling Equipment - Port Skid Steer Loaders**	**Cargo Handling Equipment - Port Tractor**	**Cargo Handling Equipment - Port Tractors/Loaders/Backhoes**				
		Horsepower Bin		**Horsepower Bin**		**Horsepower Bin**					**Horsepower Bin**	**Horsepower Bin**	**Horsepower Bin**				
		25	**300**	**175**	**300**	**175**	**300**	**600**	**750**	**9999**	**75**	**75**	**50**	**75**	**175**	**300**	**600**
Diesel	2025	25.77	404.77	161.22	197.98	80.06	25.40	125.71	313.58	587.54	146.95	105.69	89.10	98.75	176.78	215.38	300.43
	2026	25.77	404.77	162.84	197.97	80.06	25.40	125.78	181.46	452.73	146.86	105.80	89.10	98.75	176.78	184.87	300.52
	2027	25.76	404.77	163.90	197.97	80.06	25.41	125.78	97.45	459.96	146.79	105.79	89.10	98.75	176.78	185.00	224.61
	2028	25.76	15.67	163.90	197.97	80.06	25.41	125.78	91.99	459.98	101.10	105.80	89.10	98.75	176.78	148.72	136.77
	2029	25.76	18.17	163.90	197.98	80.06	25.41	125.78	92.01	459.98	110.75	105.95	89.10	79.24	176.78	148.77	137.43
	2030	25.76	18.16	163.90	197.97	3.36	25.41	125.78	91.99	459.50	110.23	85.12	89.10	85.80	7.39	148.95	137.61
	2031	24.28	18.15	163.90	196.82	3.88	25.41	125.78	100.91	459.81	110.73	98.38	86.88	91.73	8.58	116.97	136.29
	2032	24.28	18.15	163.90	197.27	3.88	23.17	114.18	101.48	459.98	110.16	98.48	89.10	91.73	8.58	74.20	136.30
	2033	24.28	18.15	163.90	143.84	3.88	23.20	86.38	118.72	459.59	105.17	98.31	89.10	91.73	8.58	74.66	121.61
	2034	24.28	18.17	9.37	13.59	3.88	23.20	21.40	30.59	357.04	108.69	98.35	89.10	91.73	8.57	35.90	97.32
	2035	24.28	18.16	10.85	15.01	3.89	23.20	22.26	31.33	303.86	109.13	98.32	89.10	91.73	8.58	22.03	97.36
	2036	24.28	18.17	10.84	14.39	3.88	23.88	13.21	21.50	313.33	108.63	98.31	89.10	91.73	8.59	19.88	31.92
	2037	24.28	18.16	10.86	15.01	3.81	8.32	13.37	21.77	313.33	109.23	98.48	89.10	91.73	8.57	20.24	33.43
	2038	24.28	18.15	10.85	15.02	3.87	10.03	13.43	21.77	312.88	109.23	98.43	89.10	91.73	8.57	16.54	30.84
	2039	24.28	17.83	10.85	15.01	3.88	6.06	13.44	21.77	313.18	109.23	98.31	89.10	90.81	8.57	16.89	31.30
	2040	24.28	18.03	10.84	14.90	3.89	6.58	13.45	21.76	313.12	109.23	98.47	89.10	90.60	8.58	16.91	31.33
	2041	24.28	18.17	10.85	14.90	3.89	6.53	13.45	21.77	313.14	109.11	98.40	89.10	91.44	8.45	16.88	31.33
	2042	24.28	18.16	10.84	15.00	3.89	6.58	13.45	21.77	313.06	109.03	98.48	89.10	91.73	8.54	16.91	31.24
	2043	24.28	18.16	10.84	15.01	3.88	6.57	13.45	21.33	313.26	109.19	86.11	89.10	91.73	8.58	16.92	30.68
	2044	24.28	18.16	10.84	15.01	3.89	6.55	13.42	21.75	313.27	109.22	86.17	89.10	91.73	8.58	16.85	31.20
	2045	24.28	18.16	10.85	15.02	3.89	6.56	13.45	21.55	311.52	109.23	86.36	71.29	91.73	8.57	16.87	31.30
	2046	24.28	18.16	10.67	15.01	3.88	6.58	13.37	21.74	299.66	109.23	98.40	89.10	91.73	8.57	16.77	31.30
	2047	24.28	18.16	10.78	15.02	3.89	6.58	13.45	21.01	306.13	109.14	98.48	89.10	91.73	8.58	16.80	31.32
	2048	24.28	18.16	10.85	15.01	3.88	6.58	13.45	21.27	313.32	109.11	98.48	89.10	91.73	8.57	16.93	30.94
	2049	24.28	15.68	10.85	15.02	3.89	6.58	13.45	21.72	313.33	99.47	98.39	89.10	91.73	8.58	16.70	30.55
	2050	24.28	18.16	10.85	15.02	3.88	6.58	13.45	21.74	313.33	109.12	98.41	89.10	79.24	8.57	16.74	31.15

Table D-2 : CHE NOx Emissions Rate (g/hr) *(cont.)*																		
Fuel Type	**Calendar Year**	**Cargo Handling Equipment - Port Truck**							**Cargo Handling Equipment - Port Yard Truck**			**Cargo Handling Equipment - Rail Compactor (Portable)**	**Cargo Handling Equipment - Rail Container Handling Equipment**				**Cargo Handling Equipment - Rail Forklift**	
		Horsepower Bin							**Horsepower Bin**			**Horsepower Bin**	**Horsepower Bin**				**Horsepower Bin**	
		25	**50**	**75**	**100**	**175**	**300**	**600**	**175**	**300**	**600**	**600**	**175**	**300**	**600**	**750**	**100**	**175**
Diesel	2025	47.28	75.66	113.39	159.66	60.84	114.40	700.39	72.63	45.02	594.17	431.23	54.43	606.21	606.46	666.80	104.21	61.56
	2026	47.28	75.74	113.39	159.78	60.84	89.35	465.42	72.04	41.58	594.17	431.23	54.43	126.66	606.46	666.80	104.21	52.28
	2027	47.28	75.74	113.39	159.77	55.39	73.93	213.67	71.48	44.00	498.21	431.23	54.43	128.67	336.85	666.80	104.21	52.35
	2028	47.28	75.74	113.39	159.77	55.61	77.97	115.13	57.16	36.12	227.76	431.23	54.43	19.11	85.25	666.80	0.70	40.84
	2029	47.28	75.74	113.39	3.42	55.64	29.51	115.72	53.12	24.25	229.58	19.28	54.43	19.81	86.95	666.80	0.82	40.99
	2030	47.28	75.74	113.39	3.64	55.64	24.14	50.59	53.08	22.34	45.97	22.33	54.43	19.81	86.95	666.80	0.82	41.07
	2031	47.28	61.13	113.39	3.63	55.50	24.86	50.67	52.30	21.24	47.28	22.33	54.43	19.81	86.95	666.80	0.82	35.34
	2032	47.28	64.61	113.39	3.63	55.57	24.25	50.73	52.42	21.96	47.07	21.97	54.43	19.81	86.95	666.80	0.82	35.37
	2033	47.28	64.61	113.39	3.64	55.64	23.75	45.56	52.43	19.11	47.34	22.33	54.43	19.81	86.95	54.38	0.82	35.37
	2034	46.70	64.61	113.39	3.64	39.21	23.20	45.54	51.97	14.96	47.14	22.33	54.43	19.81	86.95	62.98	0.82	31.20
	2035	46.70	60.56	113.39	3.63	39.37	16.05	28.12	52.91	14.18	29.18	22.33	54.43	19.81	86.95	62.98	0.82	21.45
	2036	46.70	61.62	100.20	3.48	39.35	15.72	28.57	34.83	13.86	29.56	22.33	112.14	19.81	86.95	62.98	0.82	16.93
	2037	46.70	52.16	115.99	3.49	27.96	6.50	28.73	35.12	3.07	29.56	22.33	116.21	19.81	30.07	62.98	0.82	10.15
	2038	46.70	57.33	115.99	3.49	28.15	6.74	28.76	35.21	4.51	29.56	22.33	120.28	19.81	31.38	62.98	0.82	7.95
	2039	46.70	57.66	115.99	3.64	28.19	5.94	28.55	11.58	2.81	29.51	22.33	54.43	19.81	31.38	62.98	0.82	7.98
	2040	46.70	57.60	115.99	3.63	28.17	7.92	36.94	7.20	4.57	29.56	22.33	54.43	19.81	31.38	62.98	0.80	7.98
	2041	46.70	57.69	115.99	3.64	28.12	7.76	45.25	8.17	4.80	29.56	22.33	10.83	19.81	31.38	62.98	0.81	7.98
	2042	46.70	57.83	115.99	3.53	10.83	6.09	46.29	6.81	2.62	29.56	22.33	12.55	35.37	31.38	62.98	0.82	6.96
	2043	46.70	57.68	115.99	3.54	11.82	6.47	37.21	7.66	2.96	29.56	22.33	12.55	36.47	31.38	62.98	0.82	6.33
	2044	46.70	57.73	115.99	1.65	12.09	8.20	28.61	7.23	4.46	29.56	22.33	12.55	37.57	31.38	62.98	0.82	6.53
	2045	46.70	57.77	115.99	1.66	12.10	7.03	28.62	6.87	3.16	29.56	22.33	12.55	19.81	31.38	62.98	0.82	6.57
	2046	46.70	57.77	115.99	1.65	12.11	7.09	28.47	7.17	3.51	29.56	22.33	12.55	19.81	31.38	62.98	0.82	6.55
	2047	46.70	57.83	115.99	1.65	12.11	6.53	27.64	6.83	3.13	29.56	22.33	12.55	17.81	31.38	62.98	0.82	6.50
	2048	46.70	57.83	115.99	1.66	12.01	6.42	27.44	7.56	2.86	29.11	22.33	12.55	19.81	30.10	62.98	0.82	6.51
	2049	46.70	57.83	115.99	1.66	12.09	5.97	27.99	6.83	3.66	27.74	22.33	12.55	19.11	29.67	62.98	0.71	6.46
	2050	46.70	57.84	115.99	1.44	12.11	6.20	28.43	6.89	2.98	29.56	19.28	12.55	19.81	31.38	62.98	0.82	6.55

Table D-2 : CHE NOx Emissions Rate (g/hr) *(cont.)*								
Fuel Type	**Calendar Year**	**Cargo Handling Equipment - Rail Lift**		**Cargo Handling Equipment - Rail RTG Crane**		**Cargo Handling Equipment - Rail Truck**		**Cargo Handling Equipment - Rail Yard Truck**
		Horsepower Bin		**Horsepower Bin**		**Horsepower Bin**		**Horsepower Bin**
		25	**50**	**175**	**600**	**25**	**50**	**300**
Diesel	2025	46.79	133.21	80.06	88.06	47.10	97.58	28.69
	2026	46.92	133.14	80.06	87.19	47.10	97.58	27.48
	2027	46.75	133.04	80.06	87.19	47.10	97.58	35.11
	2028	46.86	64.75	80.06	84.33	47.10	97.58	28.98
	2029	46.95	64.84	80.06	79.12	47.10	47.60	28.90
	2030	46.75	80.85	3.35	79.16	47.10	59.49	27.42
	2031	46.93	80.84	3.88	79.16	47.10	59.49	12.96
	2032	46.83	81.08	3.88	68.49	47.10	59.49	19.91
	2033	46.72	81.04	3.88	27.76	47.10	59.49	5.45
	2034	46.87	80.98	3.88	22.53	46.86	59.49	5.61
	2035	46.74	80.90	3.88	17.01	46.86	59.49	4.23
	2036	46.72	81.07	3.88	13.48	46.70	59.49	5.28
	2037	46.69	80.96	3.88	10.28	46.70	59.49	1.75
	2038	46.64	66.18	8.32	9.66	46.70	59.49	4.35
	2039	46.58	66.27	3.88	9.72	46.70	59.49	2.42
	2040	46.75	66.35	3.88	11.16	46.70	59.49	2.95
	2041	46.66	81.00	3.88	15.26	46.70	59.49	3.17
	2042	46.80	81.01	3.88	10.36	46.70	59.49	1.68
	2043	46.70	81.02	3.88	10.71	46.70	150.72	3.21
	2044	46.61	81.02	3.88	10.55	46.70	158.08	3.26
	2045	46.75	81.03	3.88	10.38	46.70	165.45	3.19
	2046	46.65	81.04	3.88	10.21	46.70	59.49	3.33
	2047	46.79	81.05	3.88	9.72	46.70	59.49	3.15
	2048	46.70	81.05	3.88	9.72	46.70	59.49	3.27
	2049	46.60	64.80	3.88	9.70	46.70	59.49	3.64
	2050	46.74	64.99	3.88	9.68	46.70	47.60	2.05

Table D-3 : CHE NOx Emissions Rate (g/hr)								
Fuel Type	**Calendar Year**	**Cargo Handling Equipment - Port Forklift**			**Cargo Handling Equipment - Port Lift**		**Cargo Handling Equipment - Port Truck**	**Cargo Handling Equipment - Port Yard Truck**
		Horsepower Bin			**Horsepower Bin**		**Horsepower Bin**	**Horsepower Bin**
		50	**75**	**100**	**75**	**100**	**300**	**600**
Gasoline	2025	7.64	11.95	17.98	65.43	19.08	312.92	92.55
	2026	7.64	11.89	18.14	65.56	19.17	55.41	92.55
	2027	7.64	11.85	17.99	65.52	29.65	74.23	92.50
	2028	7.52	11.95	18.05	9.41	29.62	74.23	92.59
	2029	7.64	11.91	18.10	19.52	29.74	74.23	92.63
	2030	7.64	11.86	18.13	19.51	29.68	74.23	92.29
	2031	7.44	11.92	17.57	19.53	29.76	74.23	92.34
	2032	7.55	10.71	17.70	19.52	29.65	74.23	64.86
	2033	7.64	11.68	17.18	19.53	29.71	74.23	83.81
	2034	7.64	7.46	13.77	19.51	29.76	74.23	92.58
	2035	7.64	11.58	18.13	19.53	19.98	74.23	92.41
	2036	7.64	10.97	16.52	19.51	20.07	74.23	92.62
	2037	7.64	10.90	16.51	19.52	20.15	74.23	92.76
	2038	7.64	11.76	17.41	19.52	29.69	74.23	92.55
	2039	7.64	12.01	18.09	19.52	29.70	74.23	81.19
	2040	7.55	12.01	17.97	10.32	29.71	74.23	83.88
	2041	7.58	11.71	18.00	10.38	29.64	74.23	91.05
	2042	3.60	11.52	17.22	19.52	29.67	74.23	91.90
	2043	6.46	12.01	18.13	19.57	29.67	74.23	91.99
	2044	7.01	12.00	16.85	19.58	25.22	55.41	91.93
	2045	7.65	11.88	16.96	19.58	29.65	74.23	92.23
	2046	7.65	11.95	17.99	19.56	19.09	74.23	92.55
	2047	7.64	11.90	18.14	19.53	19.18	55.41	92.55
	2048	7.64	11.85	17.99	19.48	29.71	74.23	92.50
	2049	7.53	11.95	18.05	9.42	29.72	74.23	92.59
	2050	7.64	11.91	18.09	19.51	29.72	74.23	92.63

Table D-4 : CHE NOx Emissions Rate (g/hr)												
Fuel Type	Calendar Year	Cargo Handling Equipment - Port Forklift					Cargo Handling Equipment - Port Tractor	Cargo Handling Equipment - Port Truck			Cargo Handling Equipment - Port Yard Truck	
		Horsepower Bin					Horsepower Bin	Horsepower Bin			Horsepower Bin	
		50	75	100	175	300	175	50	75	175	175	300
Natural Gas	2025	7.14	13.89	21.32	37.29	71.40	42.55	115.17	10.46	52.43	60.40	75.48
	2026	7.14	13.94	22.15	24.20	71.40	42.55	9.87	16.25	36.34	60.38	81.00
	2027	7.14	11.94	22.20	29.76	71.40	42.55	9.93	16.24	54.38	40.78	81.08
	2028	7.14	12.12	21.08	25.23	71.40	42.55	9.93	16.23	54.43	60.38	54.48
	2029	5.18	10.36	20.85	26.75	18.61	42.55	9.93	16.25	54.40	60.39	49.10
	2030	5.18	10.53	21.27	27.68	21.34	41.05	9.92	16.25	52.48	42.77	58.73
	2031	5.18	10.65	20.95	28.12	45.96	42.12	9.87	16.24	52.47	51.87	57.70
	2032	5.18	10.95	20.83	27.59	45.96	42.55	9.88	16.24	54.43	51.93	52.88
	2033	5.18	10.78	21.32	27.27	45.96	42.55	9.93	16.24	54.41	51.89	57.11
	2034	5.18	10.57	15.83	27.86	45.96	42.55	9.93	9.82	54.38	50.04	57.44
	2035	5.18	10.72	18.20	28.15	45.96	42.55	9.93	9.87	54.39	51.92	57.66
	2036	5.18	10.14	20.17	26.07	45.96	42.55	9.93	16.24	51.25	51.88	57.96
	2037	5.18	10.75	20.80	28.23	45.96	42.55	9.92	16.24	54.34	51.90	57.88
	2038	5.18	10.92	21.32	27.85	43.22	42.55	9.97	16.26	54.35	51.89	57.85
	2039	5.18	10.76	21.06	28.22	45.96	42.55	9.91	16.24	51.26	51.89	57.83
	2040	5.18	10.82	20.83	28.13	45.96	42.55	9.93	16.24	54.39	51.91	57.79
	2041	5.17	10.85	21.19	21.01	45.96	42.55	9.93	16.25	31.47	45.32	57.88
	2042	5.18	10.50	20.48	26.83	45.96	17.47	9.91	16.25	50.05	45.35	57.91
	2043	5.17	10.60	20.97	27.99	45.96	37.04	9.96	16.25	54.38	51.89	58.03
	2044	5.17	9.58	19.95	26.57	45.96	42.55	9.94	10.36	54.44	30.15	57.88
	2045	5.18	9.86	21.35	27.85	45.96	42.55	9.90	10.40	46.97	51.93	57.89
	2046	5.18	10.76	20.54	22.27	45.96	42.55	9.93	10.45	52.41	51.91	52.25
	2047	5.18	10.77	21.37	20.52	45.96	42.55	9.88	16.27	36.32	51.90	57.42
	2048	5.18	10.71	21.42	27.22	45.96	42.55	9.95	16.26	54.38	32.25	57.93
	2049	5.18	10.89	20.70	25.01	45.96	42.55	9.90	16.23	54.41	51.91	44.03
	2050	5.17	10.36	20.84	26.78	18.60	42.55	9.95	16.19	54.40	51.90	47.87

Table E-1 : Other On-Site Support Equipment Load Factors	
Equipment Type	**Load Factor**
Other General Industrial Equipment	0.34
Other Material Handling Equipment	0.4
Sweepers/Scrubbers	0.46

Table E-2 : OSE NOx Emissions Rate (g/hr)									
Fuel Type	Calendar Year	Industrial - Misc - Other General Industrial Equipment							
		Horsepower Bin							
		50	75	100	175	300	600	750	9999
Diesel	2025	48.64	73.68	89.32	78.37	147.82	192.87	324.43	938.67
	2026	47.17	71.39	78.30	69.13	129.41	148.07	273.70	912.31
	2027	45.90	69.95	70.18	62.93	118.00	132.92	246.46	884.69
	2028	44.17	66.71	53.97	49.39	99.55	107.23	217.25	799.42
	2029	43.17	65.96	48.90	45.25	92.23	97.22	196.36	781.97
	2030	41.88	64.55	42.01	39.73	78.77	86.20	179.20	734.52
	2031	41.24	64.19	38.59	36.62	72.96	78.23	163.82	725.08
	2032	39.95	61.85	33.42	32.90	66.09	70.52	146.13	693.33
	2033	39.62	62.00	30.99	30.20	61.49	65.43	135.99	688.36
	2034	39.32	62.12	28.73	27.78	57.06	61.20	127.82	683.54
	2035	39.04	62.18	26.71	25.65	52.89	57.38	121.42	678.99
	2036	38.16	60.45	19.66	19.51	29.77	42.07	98.79	675.00
	2037	38.16	60.62	18.35	18.21	28.35	40.62	94.99	670.86
	2038	38.19	60.79	17.12	17.09	27.27	39.53	92.34	667.06
	2039	38.22	60.94	15.96	16.13	26.50	38.69	90.46	663.81
	2040	38.25	61.09	14.83	15.31	25.84	38.00	88.90	661.24
	2041	38.27	61.21	13.73	14.65	25.34	37.38	87.51	659.38
	2042	38.29	61.31	12.82	14.07	24.90	36.89	86.26	658.12
	2043	38.26	61.41	12.04	13.58	24.45	36.32	85.08	657.34
	2044	38.20	61.47	11.23	13.14	23.93	35.80	83.75	656.60
	2045	38.11	61.51	10.43	12.74	23.40	35.10	81.75	656.19
	2046	37.97	61.53	9.69	12.46	22.73	34.29	79.98	656.10
	2047	37.81	61.54	9.16	12.19	22.02	33.32	79.37	655.90
	2048	37.64	61.52	8.64	11.88	21.29	32.60	78.49	655.74
	2049	37.49	61.48	8.12	11.61	20.52	32.03	76.44	655.62
	2050	37.35	61.43	7.63	11.30	19.67	31.38	74.64	655.22

Table E-3 : OSE NOx Emissions Rate (g/hr)									
Fuel Type	Calendar Year	Industrial - Misc - Other General Industrial Equipment			Industrial - Misc - Other Material Handling Equipment		Industrial - Misc - Sweepers/Scrubbers		
		Horsepower Bin			Horsepower Bin		Horsepower Bin		
		50	100	175	50	100	50	100	175
Gasoline	2025	42.16	105.71	220.15	65.26	84.35	54.27	110.40	227.68
	2026	42.20	105.74	220.42	64.76	82.01	54.31	110.42	225.29
	2027	42.24	105.78	220.16	64.02	79.91	54.16	110.29	226.17
	2028	42.09	105.60	219.94	64.10	78.13	54.17	110.30	224.56
	2029	42.09	105.59	219.91	63.00	76.60	54.19	110.31	225.61
	2030	42.09	105.62	219.72	63.01	75.36	54.20	110.33	224.74
	2031	42.11	105.64	220.21	61.45	74.48	54.21	110.33	225.24
	2032	42.12	105.63	219.35	60.51	73.79	54.20	110.32	226.46
	2033	42.12	105.63	219.93	60.86	73.36	54.14	110.27	225.05
	2034	42.12	105.66	219.69	61.09	73.14	54.14	110.26	225.01
	2035	42.06	105.59	220.02	60.67	73.06	54.16	110.27	224.97
	2036	42.07	105.57	219.19	60.51	73.00	54.17	110.29	226.20
	2037	42.08	105.59	220.16	60.47	72.88	54.17	110.29	226.14
	2038	42.09	105.58	219.50	60.35	72.87	54.17	110.28	224.76
	2039	42.10	105.59	219.60	60.34	72.88	54.15	110.26	224.61
	2040	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2041	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2042	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2043	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2044	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2045	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2046	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2047	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2048	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2049	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06
	2050	42.11	105.65	219.84	61.04	72.98	54.15	110.27	225.06

Table F-1 : NOx Fuel Correction Factor			
Diesel		Gasoline	
Model Year	NOx Fuel Correction Factor	Model Year	NOx Fuel Correction Factor
<2007	0.93	<1998	0.867
2007+	0.95	1998+	0.977

Table F-2 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings Less Than or Equal to 25 Horsepower

Diesel			Gasoline			Propane		
Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)
1920-1999	7.000	0.0000000	1950-1994	3.480	0.0010900	1950-1994	1.770	0.0004410
2000	5.685	0.0000000	1995-2001	2.320	0.0000000	1995-1998	8.440	0.0004410
2001	5.614	0.0000000	2002-2008	2.680	0.0032100	1999-2050	2.700	0.0004410
2002-2003	5.422	0.0000000	2009-2050	1.710	0.0032400			
2004	5.389	0.0000000						
2005-2006	4.132	0.0000000						
2007	4.248	0.0000000						
2008	4.148	0.0000000						
2009	3.879	0.0000000						
2010	4.090	0.0000000						
2011-2012	3.832	0.0000000						
2013	3.903	0.0000000						
2014	3.866	0.0000000						
2015	3.879	0.0000000						
2016-2050	3.855	0.0000000						

Table F-3 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings from 26-50 Horsepower

Diesel			Gasoline			Propane		
Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)
1920-1987	7.000	0.0001050	1950-2000	8.010	0.0000406	1950-2000	13.000	0.0000662
1988-1998	7.000	0.0001055	2001	6.910	0.0001440	2001	10.400	0.0001560
1999	5.327	0.0000989	2002	5.520	0.0003080	2002	7.790	0.0002450
2000	5.283	0.0000980	2003	4.520	0.0004020	2003	5.190	0.0003350
2001	5.143	0.0000954	2004-2006	1.330	0.0004710	2004-2006	1.950	0.0002760
2002-2003	5.078	0.0000942	2007-2009	0.887	0.0001190	2007-2009	1.300	0.0000011
2004	4.462	0.0000816	2010-2050	0.266	0.0000250	2010-2050	0.390	0.0000002
2005	4.536	0.0000886						
2006	4.536	0.0000914						
2007	4.514	0.0000909						
2008	4.476	0.0000932						
2009	4.069	0.0000848						
2010	4.475	0.0000932						
2011-2012	4.534	0.0000945						
2013	3.122	0.0000650						
2014	3.271	0.0000681						
2015	3.116	0.0000649						
2016	3.162	0.0000659						
2017-2050	2.729	0.0000568						

Table F-4 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings from 51-75 Horsepower

Diesel			Gasoline			Propane		
Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)
1920-1987	13.000	0.0003010	1950-2000	9.925	0.0000504	1950-2000	11.765	0.0000598
1988-1997	8.302	0.0001917	2001	8.245	0.0001540	2001	9.470	0.0001510
1998	8.302	0.0001925	2002	6.420	0.0002870	2002	7.175	0.0002420
1999	5.308	0.0001231	2003	4.790	0.0003850	2003	4.880	0.0003330
2000	5.399	0.0001252	2004-2006	1.555	0.0003390	2004-2006	1.765	0.0003130
2001	5.368	0.0001245	2007-2009	1.028	0.0000925	2007-2009	1.170	0.0000068
2002-2003	5.180	0.0001201	2010-2050	0.308	0.0000275	2010-2050	0.350	0.0000191
2004	4.653	0.0000850						
2005	4.552	0.0000732						
2006	4.552	0.0000677						
2007	4.077	0.0000606						
2008	2.968	0.0000390						
2009	2.965	0.0000390						
2010	2.937	0.0000386						
2011-2012	2.903	0.0000382						
2013	2.632	0.0000346						
2014	2.688	0.0000353						
2015	2.696	0.0000354						
2016	2.757	0.0000363						
2017-2050	2.757	0.0000362						

Table F-5 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings from 76-100 Horsepower								
Diesel			Gasoline			Propane		
Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)
1920-1987	13	0.0003010	1950-2000	11.84	0.0000601	1950-2000	10.53	0.0000533
1988-1997	8.302	0.0001917	2001	9.58	0.0001630	2001	8.54	0.0001460
1998	8.302	0.0001925	2002	7.32	0.0002660	2002	6.56	0.0002390
1999	5.682	0.0001318	2003	5.060	0.0003680	2003	4.570	0.0003310
2000	5.593	0.0001297	2004-2006	1.780	0.0002070	2004-2006	1.580	0.0003500
2001	5.590	0.0001296	2007-2009	1.170	0.0000660	2007-2009	1.040	0.0000125
2002-2003	5.413	0.0001255	2010-2050	0.350	0.0000300	2010-2050	0.310	0.0000380
2004	4.494	0.0000821						
2005	4.553	0.0000733						
2006	4.553	0.0000677						
2007	3.738	0.0000556						
2008	2.997	0.0000394						
2009	2.844	0.0000374						
2010	2.817	0.0000370						
2011	2.786	0.0000366						
2012	2.786	0.0000367						
2013	2.563	0.0000338						
2014	2.491	0.0000328						
2015	2.722	0.0000359						
2016	2.365	0.0000312						
2017	1.836	0.0000242						
2018	1.652	0.0000218						
2019	1.467	0.0000193						
2020	1.283	0.0000169						
2021	1.099	0.0000145						
2022	0.914	0.0000121						
2023	0.730	0.0000096						
2024	0.546	0.0000072						
2025	0.361	0.0000048						
2026	0.177	0.0000023						
2027-2050	0.030	0.0000004						

Table F-6 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings from 101-175 Horsepower								
Diesel			**Gasoline**			**Propane**		
Model Year	**EFzh (g/hphr)**	**DR (g/hphr/hr)**	**Model Year**	**EFzh (g/hphr)**	**DR (g/hphr/hr)**	**Model Year**	**EFzh (g/hphr)**	**DR (g/hphr/hr)**
1920-1987	11.000	0.0002540	1950-2000	12.94	0.0001270	1950-2000	10.51	0.0001040
1988-1996	9.607	0.0002222	2001	10.29	0.0001090	2001	8.53	0.0000908
1997-1998	5.892	0.0001366	2002	7.64	0.0000917	2002	6.54	0.0000777
1999	5.838	0.0001354	2003	4.980	0.0000740	2003	4.560	0.0000645
2000	5.772	0.0001339	2004-2006	1.940	0.0002780	2004-2006	1.580	0.0002640
2001	5.651	0.0001310	2007-2009	1.170	0.0000660	2007-2009	1.040	0.0000125
2002	5.440	0.0001262	2010-2050	0.350	0.0000300	2010-2050	0.310	0.0000380
2003	5.440	0.0000997						
2004	4.188	0.0000667						
2005-2006	3.966	0.0000577						
2007	2.856	0.0000373						
2008	2.760	0.0000360						
2009	2.659	0.0000347						
2010	2.992	0.0000391						
2011-2012	2.673	0.0000349						
2013	1.950	0.0000254						
2014	1.874	0.0000244						
2015	1.126	0.0000148						
2016	0.896	0.0000118						
2017	1.152	0.0000152						
2018	0.954	0.0000126						
2019	0.757	0.0000100						
2020	0.559	0.0000074						
2021	0.362	0.0000048						
2022	0.165	0.0000022						
2023-2050	0.129	0.0000017						

Table F-7 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings from 176-300 Horsepower								
Diesel			**Gasoline**			**Propane**		
Model Year	**EFzh (g/hphr)**	**DR (g/hphr/hr)**	**Model Year**	**EFzh (g/hphr)**	**DR (g/hphr/hr)**	**Model Year**	**EFzh (g/hphr)**	**DR (g/hphr/hr)**
1920-1987	11.000	0.0002540	1950-2000	12.94	0.0001270	1950-2000	10.51	0.0001040
1988-1995	7.339	0.0001698	2001	10.29	0.0001090	2001	8.53	0.0000908
1996	5.788	0.0001343	2002	7.64	0.0000917	2002	6.54	0.0000777
1997-1998	5.739	0.0001331	2003	4.980	0.0000740	2003	4.560	0.0000645
1999	5.958	0.0001382	2004-2006	1.940	0.0002780	2004-2006	1.580	0.0002640
2000	5.907	0.0001370	2007-2009	1.170	0.0000660	2007-2009	1.040	0.0000125
2001	5.696	0.0001321	2010-2050	0.350	0.0000300	2010-2050	0.310	0.0000380
2002	5.527	0.0001282						
2003	5.527	0.0001000						
2004	4.373	0.0000690						
2005	4.078	0.0000589						
2006	4.078	0.0000589						
2007	2.697	0.0000350						
2008	2.583	0.0000335						
2009	2.579	0.0000335						
2010	2.673	0.0000347						
2011-2012	1.515	0.0000197						
2013	1.631	0.0000212						
2014	0.837	0.0000110						
2015	0.645	0.0000085						
2016	0.886	0.0000117						
2017	0.332	0.0000044						
2018-2050	0.121	0.0000016						

Table F-8 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings from 301-600 Horsepower								
Diesel			**Gasoline**			**Propane**		
Model Year	**EFzh (g/hphr)**	**DR (g/hphr/hr)**	**Model Year**	**EFzh (g/hphr)**	**DR (g/hphr/hr)**	**Model Year**	**EFzh (g/hphr)**	**DR (g/hphr/hr)**
1920-1987	11.000	0.0001830	1950-2000	12.94	0.0001270	1950-2000	10.51	0.0001040
1988-1995	7.339	0.0001222	2001	10.29	0.0001090	2001	8.53	0.0000908
1996	5.832	0.0000970	2002	7.64	0.0000917	2002	6.54	0.0000777
1997-1998	5.906	0.0000983	2003	4.980	0.0000740	2003	4.560	0.0000645
1999	5.743	0.0000956	2004-2006	1.940	0.0002780	2004-2006	1.580	0.0002640
2000	5.668	0.0000943	2007-2009	1.170	0.0000660	2007-2009	1.040	0.0000125
2001	5.449	0.0000808	2010-2050	0.350	0.0000300	2010-2050	0.310	0.0000380
2002	5.276	0.0000739						
2003	5.276	0.0000714						
2004	4.161	0.0000563						
2005	4.041	0.0000535						
2006	4.041	0.0000525						
2007	2.807	0.0000364						
2008	2.567	0.0000333						
2009	2.542	0.0000330						
2010	2.550	0.0000331						
2011-2012	1.234	0.0000161						
2013	1.497	0.0000195						
2014	0.973	0.0000128						
2015	0.813	0.0000107						
2016	0.904	0.0000119						
2017	0.231	0.0000031						
2018-2050	0.133	0.0000017						

Table F-9 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings from 601-750 Horsepower

Diesel			Gasoline			Propane		
Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)
1920-1987	11.000	0.0001830	1950-2000	12.94	0.0001270	1950-2000	10.51	0.0001040
1988-1996	7.339	0.0001222	2001	10.29	0.0001090	2001	8.53	0.0000908
1997-1998	6.264	0.0001042	2002	7.64	0.0000917	2002	6.54	0.0000777
1999	6.199	0.0001032	2003	4.980	0.0000740	2003	4.560	0.0000645
2000	5.688	0.0000946	2004-2006	1.940	0.0002780	2004-2006	1.580	0.0002640
2001	5.651	0.0000940	2007-2009	1.170	0.0000660	2007-2009	1.040	0.0000125
2002	5.461	0.0000810	2010-2050	0.350	0.0000300	2010-2050	0.310	0.0000380
2003	5.461	0.0000765						
2004	3.951	0.0000535						
2005	3.904	0.0000529						
2006	3.904	0.0000507						
2007	2.598	0.0000337						
2008	2.747	0.0000357						
2009	2.692	0.0000349						
2010	2.610	0.0000339						
2011-2012	1.641	0.0000214						
2013	1.881	0.0000245						
2014	1.099	0.0000145						
2015	0.986	0.0000130						
2016	1.496	0.0000197						
2017	0.706	0.0000093						
2018	0.486	0.0000064						
2019	0.267	0.0000035						
2020-2050	0.155	0.0000020						

Table F-10 : NOx Zero Hour Emission Factors and Deterioration Rates CHE, TRU, and OSE with Engine Ratings Greater Than 750 Horsepower

Diesel			Gasoline			Propane		
Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)	Model Year	EFzh (g/hphr)	DR (g/hphr/hr)
1920-1987	11.000	0.0001830	1950-2000	12.94	0.0001270	1950-2000	10.51	0.0001040
1988-1999	7.339	0.0001222	2001	10.29	0.0001090	2001	8.53	0.0000908
2000	5.725	0.0000953	2002	7.64	0.0000917	2002	6.54	0.0000777
2001	5.928	0.0000986	2003	4.980	0.0000740	2003	4.560	0.0000645
2002-2003	5.793	0.0000964	2004-2006	1.940	0.0002780	2004-2006	1.580	0.0002640
2004	5.948	0.0000990	2007-2009	1.170	0.0000660	2007-2009	1.040	0.0000125
2005	5.842	0.0000972	2010-2050	0.350	0.0000300	2010-2050	0.310	0.0000380
2006	5.842	0.0000866						
2007	3.533	0.0000495						
2008	3.346	0.0000453						
2009	3.559	0.0000482						
2010	3.699	0.0000480						
2011-2012	3.342	0.0000433						
2013	3.185	0.0000413						
2014	3.048	0.0000395						
2015	3.040	0.0000394						
2016	2.967	0.0000385						
2017	1.944	0.0000252						
2018	1.697	0.0000220						
2019-2050	1.623	0.0000210						

Table F-11 : Brake-Specific Fuel Consumption Rate				
		CARB	**Density**	**Conversion Factor**
Fuel Type	**HP Range**	BSFC (lb/hp-hr)	(lb/gal)	(hp-hr/gal)
Diesel	Up to 100 hp	0.408	7	17.2
Diesel	>100 hp	0.367	7	19.1
Gasoline	All	0.484	6	12.4
Propane	All	0.406	4.2	10.3