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GUIDANCE FOR QUANTIFYING AND USING SWITCH YARD LOCOMOTIVE IDLING EMISSION REDUCTIONS

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LIST OF ABBREVIATIONS

BACT	Best Available Control Technology
BART	Best Available Retrofit Technology
CAA	Clean Air Act
EMD	Electro-Motive Division of General Motors
g/bhp-hr	Grams per brake horsepower hour
g/kW-hr	Grams per kilowatt hour
g/hr	Gram per hour
hp	Horsepower
hr	Hour
GE	General Electric
GPS	Global Positioning Sysyem
lbs	Pounds
LAER	Lowest Achievable Emission Rate
NESHAPS	National Emission Standard for Hazardous Air Pollutants
NOx	Nitrogen Oxides
NSPS	New Source Performance Standards
NSR	New Source Review
RACT	Reasonably Available Control Technology
RFP	Reasonable Further Progress
ROP	Rate of Progress
RPM	Revolutions per minute
SIP	State Implementation Plan
VOCs	Volatile Organic Compounds

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Guidance for Quantifying and Using Locomotive Idling Emission Reductions

(Note: As used in this document, the terms "we", "us" and "our" refer to EPA. The terms "you" and "your" refer to a state air pollution control agency or private entity.)

Section A: Background Information

1. What is the purpose of this guidance?

The purpose of this document is to provide you with guidance on quantifying emission reductions from technologies and strategies which reduce switch yard locomotive idling emissions. You may wish to use the emission reductions resulting from implementing an idling reduction technology and/or strategy for meeting emission reduction requirements for your SIP, such as offsets required in the new source review program or emission reductions for your attainment or maintenance strategy.

2. How does this guidance relate to existing Clean Air Act requirements?

This document is intended solely as guidance and does not represent final Agency action. It does not supersede or change any existing federal or state regulations or requirements, including those of an approved SIP. If you use this guidance you must still comply with all otherwise applicable Clean Air Act requirements pertaining to the crediting of emission reductions for your SIP, such as offsets required in the new source review program or emission reductions for your attainment or maintenance strategy.

3. What are switch yard locomotive idling emissions?

Switch yard locomotive engines are designed or used for the primary purpose of propelling railroad cars a short distance within a confined area. They usually idle their engines when not in use, and they idle for a variety of reasons, such as maintaining engine operating temperature during cold weather to avoid engine freezing (most locomotive engines do not have anti-freeze). Other reasons for idling include immediate engine availability, preventing start-up engine damage, maintaining air brake pressure, and in some cases, company policy or habit.

4. What is an idle reduction technology?

An idle reduction technology consists of the use of an alternative energy source in lieu of using the main locomotive engine for the purpose of supplying hotelling loads, such as heat to the engine, which reduces the overall idling of the locomotive. EPA maintains a list of commercially available switch yard locomotive idle reduction technologies on its web site at the following address:

http://www.epa.gov/otaq/retrofit/idlingtech.htm

5. What is an idle reduction strategy?

An idle reduction strategy can include a railroad company policy that prohibits idling the switch yard locomotive engine while not in use. In some cases, an idle reduction technology can be combined with an idle reduction strategy. We include strategies here as a means to reduce idling because some railroad companies idle due to policy or habit, and a commitment to not idle will also achieve emission reductions.

6. Are there other benefits from utilizing technologies and strategies to reduced switch yard locomotive idling emissions?

Although the primary purpose of this guidance is to focus on the reduction in emissions to the atmosphere of NOx, there are other significant benefits associated with reductions in locomotive idling emissions including:

- Reductions in other criteria pollutants, such as coarse and fine particles.
- Reductions in the emissions of toxic air pollutants, such as formaldehyde and trace metals such as lead.
- Reductions in emissions of carbon dioxide, a global warming pollutant.
- Reductions in fuel consumption which results in cost savings to the locomotive operator, decreased maintenance costs, and longer engine life.
- Substantial reductions in noise levels at the switch yard.
- Decreased dependancy on oil imports.

Local communities near switch yards, many of which are comprised of low income and minority populations, will directly benefit from the reduced pollution and noise levels.

7. Is a state preempted from requiring the use of an idle reduction technologies?

We believe that states are not precluded under Section 209 of the CAA from regulating the use and operation of nonroad engines (including locomotives) once the engines are no longer new. If a state idling requirement, therefore, is written as a use or operational restriction, the state requirement will not be preempted. Under such a requirement, locomotive operators could utilize an idling strategy and/or idling reduction technology for compliance purposes.

Questions regarding preemption would be raised under section 209(e)(1) when a state prescribes retrofit requirements for reducing idling emissions from new locomotives or new locomotive

engines. A state retrofit requirement would appear to be preempted if it would lead to design or production changes by manufacturers of new locomotives and new locomotive engines.

[*Further discussion reserved*]

Section B: Emission Reduction Requirements

8. What are the basic requirements for using emission reductions?

In order to be approved as a measure providing additional emission reductions in a SIP, or as a NSR offset, a control measure reducing switch yard locomotive idling emissions cannot interfere with other requirements of the CAA, would need to be consistent with SIP attainment, maintenance or RFP/ROP requirements, and must provide emission reductions that are:

(A) Quantifiable - the emission reductions generated by measures to reduce switch yard locomotive idling emissions must be quantifiable. Procedures are needed to evaluate and verify over time the level of emission reductions actually achieved. The emission quantification and evaluation protocols in this guidance may be used to satisfy this criteria. However, alternative protocols may also be acceptable, and would be evaluated by us on a case-by-case basis.

(B) Surplus - emission reductions are surplus as long as they are not otherwise relied on to meet air quality attainment requirements in air quality programs related to your SIP, SIP related requirements, other state air quality programs adopted but not in your SIP, or federal rules that focus on reducing criteria pollutants or their precursors. In the event that the measures to reduce switch yard locomotive idling emissions are relied on by you to meet air quality-related program requirements, they are no longer surplus and may not be used for NSR offsets or used to provide additional reduction to meet SIP emission reduction requirements, such as the attainment demonstration, RFP, or ROP.

Specifically, to be surplus, the emission reductions cannot be required or assumed by an existing SIP or permit and cannot otherwise be relied on or required to meet any of the following:

- A technology based requirement of the CAA, including, but not necessarily limited to, RACT, BACT, LAER, BART, NSPS limits, or NESHAPS limits.
- Conformity-based requirements - for example, reductions needed to demonstrate conformity.
- Emission reductions used or needed for offset or netting purposes.
- Other adopted state air quality programs not in the applicable SIP.
- Federal rules that reduce criteria pollutants (or their precursors) such as rules for reducing VOCs promulgated under section 183 of the CAA.

In addition, to be considered surplus the emissions from the switch yard locomotive must be a part of the SIP inventory (See Section D of this document).

(C) Enforceable - measures to reduce switch yard locomotive idling emissions may be enforceable either (1) through a SIP or SIP revision, or (2) through a permit issued under a SIP permitting program. Where the emission reductions are part of a rule, regulation, or permit, they are considered enforceable if they meet all of the following requirements:

- They are independently verifiable.
- Violations are defined.
- Those liable for violations can be identified.
- You and EPA maintain the ability to apply penalties and secure appropriate corrective actions where applicable.
- Citizens have access to all the emissions-related information obtained from the source.
- Citizens can file suits against the source for violations.
- They are practicably enforceable in accordance with EPA guidance on practicable enforceability.

When the SIP revision is approved under an EPA voluntary measures policy[1], the reductions are not enforceable against the source and may not be used for NSR offsets. Here, the state is responsible for assuring that the reductions credited in the SIP occur. The state would need to make an enforceable SIP commitment to monitor, assess and report on the emission reductions resulting from the measure and to remedy any shortfalls from forecasted emission reductions in a timely manner. Further, the voluntary measures may not exceed 3% of the total reductions needed to meet any requirements for ROP or attainment. In the circumstance where the actual emission reductions achieved are more than the amount projected, you may take credit for the additional emission reductions provided it does not exceed the 3% cap on voluntary measures.

For the purposes of this guidance, we assume you will be seeking reductions through a rule, regulation, or permit. If you wish to have a SIP revision approved under a voluntary measures policy, consult the specific voluntary measures policy document for further information. For specific information on penalties and verification see Section E of this document.

(D) Permanent - the emission reduction must be permanent throughout the term that the credit is granted unless it is replaced by another emission reduction measure or the state demonstrates in a SIP

[1] Stationary Source Voluntary Measures Policy and Mobile Source Voluntary Measures Policy. For a description of EPA's Mobile Source Voluntary Measures policy see the following web site: http://www.epa.gov/oms/transp/traqvolm.htm.

revision that the emission reductions from the original measure are no longer needed to meet applicable requirements. For more information on permanence see Section E of this document.

9. What are the threshold requirements for generating emission reductions?

To generate emission reductions the following requirements should be met:

(A) An idle reduction technology and/or strategy is used, in lieu of idling the main propulsion engine, to reduce idling and/or provide hotelling system power (e.g., heat or air conditioning) when the locomotive is not in use (this does not include already existing technologies or strategies which would comprise the switch yard locomotive baseline emissions);

(B) The idle reduction technology is equipped with a non-resettable meter or data logger capable of measuring total hours it operated on the locomotive engine;

(C) The switch yard locomotive engine is equipped with a non-resettable meter or data logger capable of measuring the total number of engine idling hours;

(D) The switch yard locomotive engine is equipped with a global positioning system (GPS), or another method that is capable of demonstrating that the locomotive engine remains within the designated switch yard throughout the time frame during which the emission reduction is generated;

(E) The switch yard locomotive engine owner or operator has the right through direct ownership, an agreement, or contract to operate the switch yard locomotive engine;

(F) The switch yard is located within a non-attainment or maintenance area for the pollutant for which an emission reduction is generated;

(G) The switch yard locomotive owner complies with all monitoring, recordkeeping, and reporting requirements specified in Section E of this document.

(H) Prior to generating emission reductions, the switch yard locomotive owner has provided you with the following information for the switch yard locomotives that will generate emission reductions and the switch yard they are located in:

(1) The location of the switch yard, through GPS coordinates or other method for demonstrating location;

(2) A list of all switch yard locomotives generating emission reductions, including at a minimum:

(i) the engine manufacturer, model, manufacture date, and rated power (hp);

(ii) the estimated scheduled dates (month, year) for remanufacture or rebuild;

(iii) the estimated dates (month, year) for replacement or retirement; and

(iv) the regularly scheduled dates (month, year) and duration (hours, weeks) when the locomotive will leave the switch yard for maintenance.

(3) For each locomotive that will be generating emission reductions, the actual number of hours it idled each calendar quarter for the previous twenty-four consecutive months obtained from a non-resettable meter or data logger;

(4) If using an idle reduction technology, the engine technology manufacturer and model, manufacture date, and maximum rated power.

Section C: Quantifying Switch Yard Locomotive Idling Emission Reductions

In order to quantify emission reductions, take the baseline emissions[2] in g/hr from the switch yard locomotive engine, subtract the emissions in g/hr from the use of the idle reduction technology, multiply this by the number of hours the idle reduction technology operated, and finally, divide this number by the g/hr to lbs conversion factor. The following steps outline this process. In addition, a case example illustrating the steps is provided in Appendix C of this document.

10. How do you quantify NO_x emission reductions from the use of an idle reduction technology?

Step 1(a): *Determine the baseline emissions factor for each locomotive engine.*

For each switch yard locomotive generating emission reductions, quantify the baseline emissions. This document contains idle emission factors (g/hr) for a representative number of switch yard locomotives per engine type (two and four stroke engines). These emission factors represent average emissions in the idle notch and are available in Appendix B. You will need to know the type of switch yard locomotive engine (two stroke or four stroke).

If you want to use your own baseline emission factors, you will need to submit to us all

[2] By baseline emissions, we refer to the emissions from the locomotive engine in the idle notch without the use of an idle reduction technology.

supporting data and justification for the emission factors used. We will review this information and determine its appropriateness for use on a case-by-case basis.

Step 1(b): *Multiply the g/hr factor by the number of hours per calendar quarter the idle reduction technology is estimated to be, or has been, used.*

Thus, to determine the baseline emissions (g/quarter) for the switch yard locomotive use the following equation:

$$[(EF_{BASE})\ (AL_{IRT})]$$

Where,

EF_{BASE} = Baseline emission factor (NOx g/hr)

AL_{IRT} = Activity level of idle reduction technology (hr/quarter)

Step 2(a): *Determine emission factor for the idle reduction technology.*

You will now determine the emission factor associated with the idle reduction technology used. If the idle reduction technology is an EPA certified diesel fueled internal combustion engine, use the emission factor provided for that engine family by the manufacturer as part of its certification application under 40 CFR Part 89. This factor is in g/kW-hr or g/bhp-hr and is publicly available. To obtain this data contact EPA's Office of Transportation and Air Quality (Certification and Compliance Division) or consult the certification data at http://www.epa.gov/otaq/certdata.htm (search under "Engine Family General Information"). You will need to know the manufacturer's name, year of manufacture, and EPA engine family number. This information is available on the engine label.

If you are using a non-certified engine or alternative energy source, you will need to provide data that demonstrates the emissions associated with this engine or energy source. The data should comply with EPA regulations regarding the measurement of emissions from the engine or energy source. If no regulations exist, provide all emissions data available to you for the energy source. We will review this information and determine its appropriateness for use on a case-by-case basis.

Step 2(b): *Multiply emission factor by the maximum rated power of the technology.*

The maximum rated power refers to the expected maximum load of the idle reduction technology when installed on the locomotive. While not all engines will operate at maximum load, using the maximum rated power will provide a conservative estimate of the emissions associated with this engine. If the maximum rated power is in kW, you simply need to multiply the kW by the baseline

factor from step 2(a) to determine the g/hr emission factor. If the maximum rated power is in hp, you need to convert this factor to kW.

Step 2(c): *Multiply the g/hr factor by the number of operating hours (per calendar quarter) the idle reduction technology is estimated to be, or has been, used.*

Thus, to determine the emissions (g/hr) for the idle reduction technology you should follow the following equation:

$$(EF_{IRT})\ (KW)\ (AL_{IRT})]$$

Where,

EF_{IRT} = Idle reduction technology emission factor (NOx g/kW-hr)

KW = Rated maximum load (kW)

AL_{IRT} = Activity level of idle reduction technology (hours per calendar quarter)

Step 3: *Determining the net emission reduction*.

The next step is to subtract the emissions from the use of the idle reduction technology as determined in Step 2 from the baseline locomotive emissions as determined in Step 1. The equation is as follows:

$$NER = [(EF_{BASE})\ (AL_{IRT}) - (EF_{IRT})\ (KW)\ (AL_{IRT})]$$

Where,

NER = Net emission reduction (g) per calendar quarter

Step 4: *Convert net emission reduction to pounds*.

To convert the g/per calendar quarter to pounds, you will need to divide the NER factor by 454[3]. The final equation is as follows:

$$\text{Emission Reduction} = \frac{(EF_{BASE})\ (AL_{IRT}) - (EF_{IRT})\ (KW)\ (AL_{IRT})]}{454}$$

[3] 454 = conversion factor of g/per calendar quarter to lbs.

Where,

Emission Reduction = Emission Reduction in pounds per calendar quarter

Step 5: *Sum all emission reductions for switchers included in project*.

11. How do you quantify NO_x emission reductions from the use of an idle reduction strategy ?

If you utilize an idle reduction strategy or automatic shut-down/turn-on system[4], follow the ***Steps 1(a) and (b)*** from question 9, and then multiply the g/hr factor by the number of actual idling hours reduced. Apply ***Step 4*** for conversion to pounds. The equation is as follows:

$$\text{Emission Reductions} = \frac{[(EF_{BASE})\ (IR_{STRG})]}{454}$$

Where:

IR_{STRG} = The number of idling hours reduced per calendar quarter

In the circumstance where an idle reduction technology is combined with an idle reduction strategy on the same switch yard locomotive, you must ensure that the emission reductions are not double-counted.

12. How do you quantify emission reductions for other criteria pollutants?

To quantify emission reductions for other criteria pollutants you can follow the same steps outlined in this section, substituting the emission factors for that pollutant as provided in Appendix B of this document. Once we have identified an emissions factor for use, such as those listed or referenced in this document, it may subsequently be used in the same manner without additional review by us.

Section D: Using Emission Reductions

13. Are locomotive switch yard idling emissions part of the state's emissions inventory?

To use the emission reductions you must demonstrate that the emissions from the locomotive rail yard (at which the emission reductions will take place) are accurately included in the applicable SIP

[4] An automatic shut-down/start-up system is a commercially available idle reduction technology that will shut down or start up the main locomotive engine based on time delay (e.g., after 10 minutes of idling) and/or ambient temperature.

emissions inventory. In addition, the quantification of the emission reductions must also be consistent with the assumptions in the emission inventory upon which the attainment or maintenance demonstration is based. If they are not already in the SIP inventory, you cannot use the emission reductions unless the SIP inventory baseline is reassessed to include such emissions at their current level.

14. How can the estimated emission reductions be used for SIP purposes?

For use in a SIP attainment or maintenance strategy, you can estimate the emission reductions which are expected to be generated from the use of the idling reduction technology or strategy based on the quantification steps outlined above. To estimate the emission reductions, use the historic total idling hours for each locomotive to estimate the number of hours the technology is expected to be used. In general, the number of hours the technology will be in use will be case-specific and some percentage of the total historic idling hours. To estimate the emission reductions in the case of a strategy, you would estimate the number of reduced idling hours expected. In both cases, the estimated number of hours the technology is expected to be used and the number of reduced idling hours expected can be used for AL_{IRT} under Section C.

To quantify the actual emission reduction achieved for a technology or strategy in place, use the actual documented activity level of the idle reduction technology (or in the case of a strategy, the actual number of reduced idling hours documented) for AL_{IRT} in the quantification under Section C.

When quantifying emission reductions the following criteria are to be applied:

(A) For each locomotive which will be utilizing an idling emission reduction technology and/or strategy, determine the actual historic amount of idling hours based on the previous twenty-four consecutive months of actual idling hours. This data should be evaluated to determine the number of hours that an idling emission reduction technology would be estimated to displace normal idling, or the estimated number of idling hours that would be reduced as a result of an idling time reduction strategy. The data collection should conform with Section B of this document.

(B) Estimated emission reduction should be discounted by at least ten percent to address uncertainties associated with projecting the amount of time an emission idling reduction technology and/or strategy will actually displace historic idling time.

(C) Where required, emission reductions must be discounted for seasonality. For example, if your SIP only credits those reductions which take place during the ozone season, then only reductions in idling emissions which take place during the ozone season may be credited.

(D) Every two years the emission reductions are to be verified and any shortfall should be reconciled in a timely manner, but not to exceed 3 months from the time of verification. Additional credits should not be granted until the shortfall is remedied. In the circumstances where the actual emission reductions achieved is more than the amount estimated, you may take credit for the additional actual emission reductions.[5]

15. How can the estimated emission reductions be used for NSR offset purposes?

For use as NSR offsets, you can estimate the emission reductions which are expected to be generated from the use of the idling emission reduction technology based on the quantification steps outlined above. To estimate the emission reductions, use the historic total idling hours for each switch yard locomotive to estimate the number of hours the technology is expected to be used. In general, the number of hours the technology will be in use will be case-specific and some percentage of the total historic idling hours. For the reductions to be creditable there must be an enforceable requirement on the part of the credit generator and/or the credit user to apply and use the specified idling reduction technology. The estimated number of hours the technology is expected to be used can be used for AL_{IRT} under Section C.

The quantity of emission reductions generated when an idle reduction strategy is used is based on the difference between the actual historic number of hours idled of a switch yard locomotive and the number of hours of reduced idling that the credit generator accepts as an enforceable requirement. The reduced number of hours can be used for AL_{IRT} under Section C. In this case the amount of credit generated is the actual amount of the reduction. It is not an estimate (in contrast to the amount of reductions generated when a technology is used) and will not vary annually. In addition, an idle reduction strategy should cover a significant enough number of engines at the switch yard to ensure that the reduction in idling time cannot be accomplished by simply shifting switch yard operations from locomotives with restrictions on idling to those without.

When quantifying and using emission reductions the following criteria are to be applied:

(A) To determine the number of hours that an idling emission reduction technology would be estimated to displace normal idling, or the actual number of idling hours that will be reduced as a result of an idling time reduction strategy (resulting from an enforceable limit on hours of idling), use the previous twenty-four consecutive months of actual historic idling data. The data

[5] Where emission reductions are credited under our voluntary measures policy, in the circumstance where the actual emission reductions achieved is more than the amount projected, you may take credit for the additional emission reductions provided it does not exceed the 3% cap on voluntary measures.

collection should conform with Section B of this document.

(B) Estimated emission reductions should be discounted by ten percent to address uncertainties associated with projecting the amount of time an emission idling reduction technology and/or strategy will actually displace historic idling time.

(C) Each year the emission reductions generated by the use of an emissions reduction technology are to be verified and any shortfall should be reconciled in a timely manner, but not to exceed 3 months from the time of verification. Additional credits should not be granted until the shortfall is remedied. In the circumstances where the actual emission reductions achieved is more than the amount estimated, you may take credit for the additional actual emission reductions.

(D) Emission reductions generated by the use of an emissions reduction technology cannot be banked and must be used during the year that they are generated. Actual emission reductions generated should be discounted by at least 25% to address concerns related to the use of emission reductions from mobile sources for NSR offset purposes.

16. What are the additional criteria for using idling reductions for major source NSR offsets?

In addition to the general requirements for emission reductions discussed above, emission reductions for use as NSR offsets must also meet the following criteria:

(A) In areas that are nonattainment for the ozone standard, reductions in ozone precursors may be used to comply with the NSR offset requirement, if at a minimum, all federal NSR offset provisions are met;

(B) An emission reduction that is generated or used to comply with any other CAA requirement (including title IV of the Acid Rain requirements) may not be used as a NSR offset;

(C) An emission reduction that is used as an NSR offset may not be used to meet any other CAA requirement (including title IV of the Acid Rain requirements); and

(D) An emission reduction used as an NSR offset must be federally enforceable.

(E) The NSR permit for the source using the reductions requires that at least one year prior to the date the switch yard locomotive emission reductions cease, additional offsets must be obtained. These offsets undergo a public comment period equivalent to the public comment period for NSR permits.

17. For NSR offset purposes, can reductions from switch yard locomotive engines be used to offset a stationary source?

The federal new source review program requirements governing offsets do not distinguish between emission reductions generated by mobile sources and emission reductions generated by stationary sources. Consequently, mobile sources may generate emission reductions for major source offsetting purposes as long as the reductions meet the requirements for otherwise creditable NSR offsets.

Section F: Verification and Penalties

18. What are the monitoring, record keeping and reporting requirements?

(A) For each switch yard locomotive engine generating emission reductions, the credit generator is to record and submit the following information for each quarterly emission reduction generation period:

(1) The number of hours that the main propulsion locomotive engine idled, using a non-resettable meter or data logger capable of recording total number of engine idling hours.

(2) The number of hours the auxiliary engine or other energy source operated while the main propulsion engine did not idle, using a non-resettable meter or data logger capable of total hours operated on each locomotive engine.
(3) No later than thirty days after the end of each quarterly emission reduction generation period, submit the information recorded in (1) and (2) above to the state or local air pollution control agency.

(B) All information required to be recorded and submitted in accordance with this guidance is to be maintained by the credit generator for a period of no less than five years.

19. What kind of validation and reconciliation is required?

(A) Emission reductions should be reviewed by you upon submittal to validate the activity level. If the review indicates that the activity level reported is not consistent with records specified in Section E, then the activity level should be adjusted appropriately, and shortfall penalties may be assessed as described below.

(B) The activity level should be validated by you within thirty days after the reported activity

level is submitted.

20. What types of penalties can be assessed for not complying with CAA requirements?

(A) Use of this guidance does not relieve you of any obligation to comply with all otherwise applicable CAA requirements, including those pertaining to the crediting of emission reductions for your SIP, such as offsets required in the new source review program or emission reductions for your attainment or maintenance strategy. Violations of CAA requirements are subject to administrative, civil, and/or criminal enforcement under Section 113 of the CAA, as well as to citizen suits under Section 304 of the CAA. The full range of penalty and injunctive relief options would be available to the federal or state government (or citizens) bringing the enforcement action.

In addition, any person who submits false information to you or fails to implement or comply with provisions pursuant to this guidance necessary to demonstrate compliance with CAA requirements, should be subject to one or more of the following actions:

(1) Disapprove the application for emission reductions.

(2) Void all previously issued emission reductions.

(3) Designate the person to be ineligible to generate emission reductions.

(4) Assess a penalty specified in paragraph (B) below.

(B) Violations are subject to administrative, civil, and/or criminal enforcement under Section 113 of the CAA, as well as to citizen suits under Section 304 of the CAA. The full range of penalty and injunctive relief options would be available to the federal or state government (or citizens) bringing the enforcement action.

Section G: The SIP Process for Crediting Reductions from Switch Yard Locomotive Idling Emissions

21. What should a state submit to EPA which meets the requirements for the incorporation of a source specific control measure in a SIP?

The state should submit to EPA a written document in which the state must:

(A) identify and describe the measure to reduce locomotive idling emissions;

(B) contain estimates of emission reductions attributable to the measure, along with relevant technical support documentation;

(C) contain enforceable requirements to implement, track, and monitor the measure;

(D) commit to monitor, evaluate, and report the resulting emissions effect of the measure;

(E) commit to remedy any SIP shortfall in a timely manner as described above if the measure does not achieve estimated emission reductions; and

(F) meet all other requirements for SIP revisions under sections 110 and 172 of the CAA.

Section H: Contact Information

22. Who should you contact for additional information?

State agencies, the regulated community and members of the public with questions concerning a case-specific application of this guidance should contact the EPA Regional Office with responsibility for air quality planning in the area where the switch yard is located. A contact list of your EPA Regional Office is available at the following web address: http://www.epa.gov/epahome/locate2.htm

For general questions regarding the quantification of switcher idling emissions reductions, please contact Paul Bubbosh of EPA's Office of Transportation and Air Quality at (202) 564-9322 .

For general questions concerning the crediting of switcher idling emissions reductions, please contact David Solomon of EPA's Office of Air Quality Planning and Standards at (919)-541-5375.

Appendix A

DEFINITIONS

For the purposes of this guidance only, the following definitions apply:

(A) ACTIVITY LEVEL (AL) means the number of operating hours of the switch yard locomotive engine or the idle reduction technology per calendar quarter (in hours).

(B) AUXILIARY ENGINE means an engine that provides hotelling power (e.g, heat to engine), but does not provide power to propel the locomotive.

(C) BASELINE EMISSION FACTOR (EF_{BASE}) means the emission factor used to quantify quarterly emissions from switch yard locomotive engines that would be emitted during idling periods.

(D) BRAKE HORSEPOWER means the sum of the alternator/generator input horsepower and the mechanical accessory horsepower, excluding any power used to circulate engine coolant, circulate engine lubricant, or to supply fuel to the engine.

(E) CLASS I means the size of the railroad as classified by the Surface Transportation Board. The Board defines Class I as any railroad with an average annual operating revenue of $255.9 million or more.

(F) EMISSION REDUCTION GENERATION PERIOD means the time frame in which emission reductions are being generated and begins on the date that the requirements of Section B are met.

(G) GLOBAL POSITIONING SYSTEM means a satellite-based radio navigation receiver capable of providing the time, the date, and position of the switch yard locomotive.

(H) HOTELLING OPERATION OR SYSTEMS means those operations on a switch yard locomotive engine that require energy to power operations that include, but are not limited to, heating or cooling.

(I) IDLE REDUCTION STRATEGY means a company policy or other means that reduces the idling of switch yard locomotives.

(J) IDLE REDUCTION TECHNOLOGY means a currently available technology or device that provides hotelling operation or systems, or otherwise reduces the need for long-duration locomotive idling.

(K) LOCOMOTIVE SWITCHER means a locomotive designed or used solely for the primary purpose of propelling railroad cars a short distance.

(L) LOCOMOTIVE ENGINE means an engine incorporated into a locomotive or intended for incorporation into a locomotive. Locomotive means a self-propelled piece of on-track equipment designed for moving or propelling cars that are designed to carry freight, passengers or other equipment, but which itself is not designed or intended to carry freight, passengers (other than those operating the locomotive) or other equipment.

(M) LOCOMOTIVE IDLING (or long-duration idling) means the idle speed at which an engine can be set when not under load for purposes of propelling the locomotive. Idle speed means that speed, expressed as the number of revolutions of the crankshaft per unit of time (e.g., rpm), at which the engine is set to operate when not under load for purposes of propelling the locomotive.

(N) REMANUFACTURE means:

(i) To replace, or inspect and qualify, each and every power assembly of a locomotive or locomotive engine, whether during a single maintenance event or cumulatively within a five year period; or
(ii) To upgrade a locomotive or locomotive engine; or
(iii) To convert a locomotive or locomotive engine to enable it to operate using a fuel other than it was originally manufactured to use; or
(iv) To install a remanufactured engine or a freshly manufactured engine into a previously used locomotive.

(O) QUARTER OR QUARTERLY is a consecutive three-month period from January 1 to March 31, April 1 to June 30, July 1 to September 30, or October 1 to December 31.

Appendix B

Baseline Emission Factors

2 Stroke Locomotive Engines

NOx g/hr	PM g/hr
840	25

4 Stroke Locomotive Engines

NOx g/hr	PM g/hr
700	35

Emission factors are based on average idle notch emissions from both controlled and uncontrolled locomotive engines found in Tier O and Tier 1 certification packages, industry supplied emission test data, published emission test data, and EPA's 1998 Locomotive Regulatory Support Document.

Appendix C

Example Quantification

In this example we will quantify the NO_x emission reductions from a 2 stroke locomotive engine. We estimate the locomotive idling activity level at 3,000 hr/yr or 750 hours per quarter.

For the idle reduction technology, we will use the diesel driven heating system (DDHS) manufactured by Kim Hotstart Manufacturing Company. The DDHS allows an idling locomotive to be shut down by heating and circulating the coolant and oil, charging the batteries and powering the cab heaters It is important to note that not all idling can be eliminated. In certain circumstances, such as when the wait from active use to active use is not long, the operator may decide to keep the engine idling.

The DDHS uses a Lister Petter engine (EPA engine family 2L5XL1.86LWS) which was certified under 40 CFR Part 89. The maximum rated hp for this engine is 39.6 at 3000 rpm. As stated in Section C, while this engine may not operate at its maximum hp or rpm, we will use the maximum factors to represent a conservative assessment of the engine's performance. Based on this information, the certified emission levels are as follows (in g/kW-hr): NO_x (6.69); HC (.24); PM (.540); and CO (1.26). The 39.6 hp converted to kW is 29 kW.

Per the steps outlined in this guidance document, the NO_x emission reduction associated with the use of the DDHS is calculated as follows:

Step 1(a)*: Determine the baseline emissions factor (EF_{BASE}) for each locomotive engine*.

Since we are using a 2 stroke locomotive engine, the baseline emission factor as indicated in Appendix B is 840 g/hr. This represents the EF_{BASE}.

Step 1(b)*: Multiply the g/hr factor by the estimated number of hours per calendar quarter the idle reduction technology will be used*.

For the purpose of this example, it is estimated that the DDHS will reduce, conservatively, 80% (as noted above, not all idling can be eliminated) of total estimated idling time of 750 hours per quarter, thus 600 hours.

$$(EF_{BASE})\ (AL_{IRT})$$

(840 g/hr) (600 hr/quarter) = 504,000 g/quarter

***Step 2(a)**: Determine baseline emission factor of the idle reduction technology.*

As mentioned above, the DDHS has been certified by EPA and the NOx emission factor is 6.69 g/kW-hr.

***Step 2(b)**: Multiply baseline emission factor by the maximum rated power of the technology.*

As mentioned above the DDHS has a maximum rated power of 29 kW.

***Step 2(c)**: Multiply the g/hr factor by the number of operating hours (per calendar quarter) the idle reduction technology has been in use.*

We assume the DDHS is operating 600 hours per quarter.

$(EF_{IRT})\ (KW)\ (AL_{IRT})]$

(6.69 g/kW-hr) (29 kW) (600 hr/quarter) = 116,406 g/hr

***Step 3**: Determine the net emission reduction.*

In this step you subtract the baseline technology emission factor as determined in Step 2 from the baseline locomotive emissions as determined in Step 1. The equation is as follows:

504,000 - 116,406 = 387,594 g/quarter

***Step 4**: Convert net emission reduction to pounds.*

To convert the g/hr to pounds, you will need to divide by 454. The final equation is as follows:

387,594/ 454 = 854 pounds/quarter (or 3,400 lbs/yr or 1.7 tons/yr)