

PRELIMINARY DRAFT - DO NOT CITE OR QUOTE

APPENDIX A

**PROPOSED DETERMINATION OF
RACT AND BARCT FOR STATIONARY SPARK-IGNITED IC ENGINES**

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PROPOSED DETERMINATION OF REASONABLY AVAILABLE CONTROL TECHNOLOGY AND BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY FOR STATIONARY SPARK-IGNITED INTERNAL COMBUSTION ENGINES

I. Applicability

Except as provided in Section IV. (Exemptions), the provisions of this proposed determination are applicable to all stationary spark-ignited internal combustion engines with a current or past rating of 50 brake horsepower or greater, or a maximum fuel consumption of 0.52 million Btu per hour or greater.

II. Definitions

- A. **ANNUAL** means any consecutive twelve month period.
- B. **BEST AVAILABLE RETROFIT CONTROL TECHNOLOGY (BARCT)** means Best Available Control Technology as defined in the California Health and Safety Code, Section 40406.
- C. **CALENDAR YEAR** means the time period from January 1 through December 31.
- D. **CYCLICALLY-LOADED ENGINE** means an engine that under normal operating conditions has an external load which varies by 40 percent or more of rated brake horsepower during any load cycle.
- E. **DISASTER OR STATE OF EMERGENCY** means a fire, flood, earthquake, or other similar natural catastrophe.
- F. **DISTRIBUTED GENERATION (DG)** refers to relatively small power plants, such as IC engine gensets, which are used to generate electrical power that is either fed into the power grid or used on-site. DG units are located throughout the grid and are usually sited in or close to load centers or utility customers' sites. Distributed generation also refers to a mechanical drive system consisting of one or more IC engines and electric motors, where use of the IC engines or electric motors is interchangeable.
- G. **EMERGENCY STANDBY ENGINE** is an engine which operates as a temporary replacement for primary mechanical or electrical power during an unscheduled outage caused by sudden and reasonably unforeseen natural disasters or other events beyond the control of the operator. An engine shall not be considered to be an emergency standby engine if it is used for purposes other than: periodic maintenance, periodic readiness testing, readiness testing during and after repair work, unscheduled outages, or to supply power while maintenance is performed or repairs are made to the primary power supply. An engine shall not be considered to be an emergency standby engine if it is used:
 - (1) to reduce the demand for electrical power when normal electrical power line service has not failed, or
 - (2) to produce power for the utility electrical distribution system, or
 - (3) in conjunction with a voluntary utility demand reduction program or interruptible power contract.
- H. **ENGINE** is any spark-ignited reciprocating internal combustion engine.

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- I. **EXEMPT VOC COMPOUNDS** means carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and the following compounds:
- (1) methane,
methylene chloride (dichloromethane),
1,1,1-trichloroethane (methyl chloroform),
trichlorofluoromethane (CFC-11),
dichlorodifluoromethane (CFC-12),
1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113),
1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC)-114,
chloropentafluoroethane (CFC-115),
chlorodifluoromethane (HCFC-22),
1,1,1-trifluoro-2,2-dichloroethane (HCFC-123),
1,1-dichloro-1-fluoroethane (HCFC-141b),
1-chloro-1,1-difluoroethane (HCFC-142b),
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124),
trifluoromethane (HFC-23),
1,1,2,2-tetrafluoroethane (HFC-134),
1,1,1,2-tetrafluoroethane (HFC-134a),
pentafluoroethane (HFC-125),
1,1,1-trifluoroethane (HFC-143a),
1,1-difluoroethane (HFC-152a),
cyclic, branched, or linear completely methylated siloxanes,
the following classes of perfluorocarbons:
 - (a) cyclic, branched, or linear, completely fluorinated alkanes;
 - (b) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
 - (c) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
 - (d) sulfur-containing perfluorocarbons with no unsaturations and with the sulfur bonds to carbon and fluorine, and
 - (2) The following low-reactive organic compounds which have been exempted by the U.S. EPA:
acetone
ethane
parachlorobenzotrifluoride (1-chloro-4-trifluoromethyl benzene)
perchloroethylene (tetrachloroethylene).

Methylated siloxanes and perfluorocarbon compounds shall be assumed to be absent from a product or process unless a manufacturer or facility operator identifies the specific individual compounds (from the broad classes of methylated siloxanes and perfluorocarbon compounds) and the amounts present in the product or process and provides a validated test method which can be used to quantify the specific compounds.

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- J. **EXHAUST CONTROLS** are devices or techniques used to treat an engine's exhaust to reduce emissions, and include (but are not limited) to catalysts, afterburners, reaction chambers, and chemical injectors.
- K. **FACILITY** is one or more parcels of land in physical contact, or separated solely by a public roadway:
- (1) all of which are under the same ownership or operation, or which are owned or operated by entities which are under common control; and
 - (2) belong to the same industrial grouping, either by virtue of falling within the same two-digit standard industrial classification code or are part of a common industrial process, manufacturing process, or connected process involving a common raw material; and
 - (3) upon which one or more stationary engines operate.
- L. **FUEL** means any substance which when burned or combusted in an SI engine supplies power and which includes but is not limited to gasoline, natural gas, methane, ethane, propane, butane, and liquefied petroleum gas (LPG).
- M. **HIGH FUEL CONSUMPTION** means the consumption of 180 million Btu or more of fuel per calendar year for a spark-ignited engine.
- N. **LEAN-BURN** means a spark-ignited engine with an air-to-fuel ratio operating range that is fuel-lean of stoichiometry and can be adjusted to operate with an exhaust oxygen concentration of greater than 2 percent.
- O. **LOW FUEL CONSUMPTION** means the consumption of less than 180 million Btu of fuel per calendar year for a spark-ignited engine.
- P. **NONROAD ENGINE** means a nonroad engine as defined by the U.S. EPA in 40 CFR Part 89, Subpart A, Section 89.2. The term "nonroad" is synonymous with offroad.
- Q. **OFFROAD ENGINE** means a nonroad engine.
- R. **PORTABLE ENGINE** means an engine which is designed and capable of being carried or moved from one location to another. Indicators of portability include, but are not limited to, wheels, skids, carrying handles, lifting eyes, dolly, trailer, or platform mounting. The engine is not considered portable if the engine is attached to a foundation or will reside at a fixed location for more than 12 consecutive months or operates during the full annual operating period of a seasonal source.
- S. **ppmv** is parts per million by volume at dry conditions.
- T. **RATED BRAKE HORSEPOWER (bhp)** of an engine is the maximum continuous rating for that engine specified by the manufacturer, based on SAE test 1349 or a similar standard, without taking into account any deratings.
- U. **REASONABLY AVAILABLE CONTROL TECHNOLOGY (RACT)** means an emission limitation based upon "reasonably available" devices, systems, process modifications, or other apparatus or techniques taking into account environmental impacts, technological feasibility, and cost-effectiveness. RACT is required in nonattainment areas that are classified as moderate for the State ozone standard.
- V. **RICH-BURN** means a spark-ignited engine with an air-to-fuel ratio operating range that is near to or fuel-rich of stoichiometry and can be adjusted to operate with an exhaust oxygen concentration of 1 percent or less.

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- W. ***SPARK-IGNITED ENGINE*** means a liquid or gaseous fueled engine designed to ignite its air/fuel mixture by a spark across a spark plug.
- X. ***STATIONARY INTERNAL COMBUSTION ENGINE*** is an engine which is neither portable nor self-propelled and is operated at a single facility.
- Y. ***STOICHIOMETRY*** means the precise air-to-fuel ratio where sufficient oxygen is supplied to completely combust fuel.
- Z. ***VOLATILE ORGANIC COMPOUND (VOC)*** is any compound containing at least one atom of carbon, except exempt compounds.
- AA. ***WASTE GAS*** is any untreated, raw gas derived through a natural process, such as anaerobic digestion, from the decomposition of organic waste at municipal solid waste landfills or a publicly-owned waste water treatment facilities. Waste gas includes landfill gas which is generated at landfills, digester gas which is generated at sewage treatment facilities, or a combination of the two.

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III. Requirements

A. RACT emissions, corrected to 15 percent oxygen on a dry basis and averaged over 15 minutes, shall not exceed the following limits for the appropriate engine type:

| Table A-1 | | | | |
|--|------------------------------------|----------------------------------|------------|-----------|
| Summary of Proposed RACT Standards for Stationary Spark-Ignited Internal Combustion Engines | | | | |
| Spark-Ignited Engine Type | % Control of NO_x | ppmv AT 15% O₂ | | |
| | | NO_x | VOC | CO |
| Low Fuel Consumption All Fuels | ---- | 350 | 750 | 4,500 |
| High Fuel Consumption Rich-Burn, All Fuels | 90 | 50 | 250 | 4,500 |
| Lean-Burn, All Fuels | 80 | 125 | 750 | 4,500 |

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- (1) For NO_x, either the percent control or the ppmv limit must be met by each engine. The percent control option applies only if a percentage is listed, and applies only to engines using exhaust controls. The percent control shall be determined by measuring concurrently the NO_x concentration upstream and downstream from the exhaust control. The ppmv limits for VOC and CO apply to all engines.
 - (2) California Reformulated Gasoline shall be used as the fuel for all gasoline-fired, spark-ignited engines.

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- B. BARCT emissions, corrected to 15 percent oxygen on a dry basis and averaged over 15 minutes, shall not exceed the following limits for the appropriate engine type:

| Table A-2 | | | | |
|---|------------------------------------|----------------------------------|------------|-----------|
| Summary of Proposed BARCT Standards for Stationary Spark-Ignited Internal Combustion Engines | | | | |
| Spark-Ignited Engine Type | % Control of NO_x | ppmv AT 15% O₂ | | |
| | | NO_x | VOC | CO |
| Low Fuel Consumption All Fuels | ---- | 350 | 750 | 4,500 |
| High Fuel Consumption Rich-Burn, Waste Gas Fueled | 90 | 50 | 250 | 4,500 |
| Rich-Burn, All Fuels | 96 | 25 | 250 | 4,500 |
| Lean-Burn, All Fuels | 90 | 65 | 750 | 4,500 |

- (1) For NO_x, either the percent control or the ppmv limit must be met by each engine. The percent control option applies only if a percentage is listed, and applies only to engines using exhaust controls. The percent control shall be determined by measuring concurrently the NO_x concentration upstream and downstream from the exhaust control. The ppmv limits for VOC and CO apply to all engines.
- (2) California Reformulated Gasoline shall be used as the fuel for all gasoline-fired, spark-ignited engines.

IV. Exemptions

- A. The provisions of this rule shall not apply to:

- (1) The operation of any engine while being used to preserve or protect property, human life, or public health during the existence of a disaster or state of emergency, such as a fire or flood.
- (2) Portable Engines.
- (3) Nonroad engines.

Per Section 42310 of the California Health and Safety Code, spark-ignited engines used directly and exclusively by the owner or operator for agricultural operations necessary for the growing of crops or raising of fowl or animals shall be exempt

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from permit. This does not preclude districts from controlling the emissions from these engines through some type of regulatory, voluntary, or incentive program.

- B. The provisions of this rule, except for Section VII.B.(2), shall not apply to:
- (1) Engines whose total annual hours of operation do not exceed 100 hours as determined by a nonresettable elapsed operating time meter and which are not used to generate electrical power that is either fed into the electrical utility power grid or used to reduce electrical power purchased by a facility; to generate mechanical power that is used to reduce electrical power purchased by a facility; or in a distributed generation application; or
 - (2) Emergency standby engines that, excluding periods of operation during unscheduled power outages, do not exceed 100 hours of operation annually as determined by a nonresettable elapsed operating time meter. During periods of non-emergency operation, these engines shall not generate electrical power that is either fed into the electrical utility power grid or used to reduce electrical power purchased by a facility; generate mechanical power to reduce electrical power purchased by a facility; or be used in a distributed generation application.

V. Compliance Schedule

The owner or operator of one or more stationary internal combustion engines shall comply with the applicable parts of Sections III. and VII. of this rule in accordance with the following schedule:

- A. For each engine to be permanently removed from service and not replaced by
- (1) by (6 months after adoption date), submit a statement to the Air Pollution Control Officer identifying the engine to be removed;
 - (2) by (3 years after adoption date), remove or replace the engine with an electric motor.
- B. For low fuel consumption engines:
- (1) by (6 months after adoption date), submit an emission control plan for Air Pollution Control Officer approval;
 - (2) by (9 months after adoption date), receive approval from the Air Pollution Control Officer for the emission control plan;
 - (3) by (1 year after adoption date), have engines under compliance in accordance with an approved emissions control plan.

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- C. For all other engines subject to this rule:
- (1) by (6 months after adoption date), submit an emission control plan for Air Pollution Control Officer approval;
 - (2) by (9 months after adoption date), receive approval from the Air Pollution Control Officer for the emission control plan;
 - (3) by (1 year after adoption date), have all required applications for permits to construct submitted and deemed complete by the Air Pollution Control Officer;
 - (4) by (2 years after adoption date), have engines and stack modifications, including applicable monitoring systems, under compliance in accordance with an approved emission control plan.

VI. Test Methods

- A. The following test methods shall be used to determine oxygen content, oxides of nitrogen emissions, volatile organic compound emissions, and carbon monoxide emissions:

O₂: ARB Method 100 or U.S. EPA Method 3A

NO_x: ARB Method 100 or U.S. EPA Method 7E

VOC: ARB Method 100 or U.S. EPA Method 25A or 25B

CO: ARB Method 100 or U.S. EPA Method 10

- B. Alternative test methods which are shown to accurately determine the concentration of NO_x, VOC, and CO in the exhaust of IC engines may be used upon the written approval of the Executive Officer of the California Air Resources Board and the air pollution control officer.

VII. Administrative

- A. Emission Control Plan

The owner or operator of a stationary internal combustion engine subject to both Sections III and V.B. or V.C. of this rule shall submit an emissions control plan to the Air Pollution Control Officer for approval.

- (1) The plan shall describe all actions, including a schedule of increments of progress, which will be taken to meet the applicable emissions limitations in Section III. and the compliance schedule in Section V.B or V.C. Such plan shall also contain the following information for each engine where applicable:
 - (a) district permit or identification number;
 - (b) name of engine manufacturer;
 - (c) model designation;

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- (d) rated brake horsepower;
 - (e) engine type and fuel type (e.g., natural gas-fired rich-burn);
 - (f) total hours of operation in the previous one-year period, including typical daily operating schedule;
 - (g) fuel consumption (cubic feet of gas or gallons of liquid) for the previous one year period;
 - (h) stack modifications to facilitate continuous in-stack monitoring and source testing;
 - (i) type of controls to be applied, including in-stack monitoring specifications;
 - (j) the applicable emission limits; and
 - (k) documentation showing existing emissions of NO_x, VOC, and CO.
- (2) The emission control plan shall include an inspection and monitoring (I&M) plan. The I&M plan shall include procedures requiring the owner or operator to establish ranges for control equipment parameters, engine operating parameters, and engine exhaust oxygen concentrations that source testing has shown result in pollutant concentrations within the rule limits. The inspection and monitoring plan shall include monthly emissions checks by a procedure specified by the Air Pollution Control Officer. It is recommended that engine owner/operators monitor NO_x and oxygen exhaust emission readings using a portable NO_x analyzer. The applicable control equipment parameters and engine operating parameters will be inspected and monitored monthly in conformance with a regular inspection schedule listed in the I&M plan. If an engine owner or operator or district staff find an engine to be operating outside the acceptable range for control equipment parameters, engine operating parameters, engine exhaust NO_x, CO, VOC or oxygen concentrations, the owner/operator is required to take corrective actions on the noncompliant parameter(s) within 15 days. The I&M plan shall also include preventive and corrective maintenance procedures. Before any change in operations can be implemented, the I&M plan must be revised as necessary, and the revised plan must be submitted to and approved by the Air Pollution Control Officer.

B. Monitoring and Recordkeeping

- (1) The owner or operator of one or more stationary internal combustion engines subject to both Sections III, and V.B. or V.C. of this rule shall meet the following requirements:
- (a) For each stationary internal combustion engine with a rated brake horsepower of 1,000 or greater and which is permitted to operate more than 2,000 hours per calendar year, the owner or operator shall install, operate, and maintain in calibration a continuous NO_x and O₂ monitoring system, as approved by the Air Pollution

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Control Officer, to demonstrate compliance with the emissions limits of this rule. This system shall determine and record exhaust gas NO_x concentrations in ppmv, corrected to 15 percent oxygen. Continuous emissions monitoring systems (CEMS) shall meet the applicable federal requirements described in 40 CFR Part 60. These include the performance specifications found in Appendix B, Specification 2, the quality assurance requirements found in Appendix F, and the reporting requirements of Parts 60.7(c), 60.7(d), and 60.13. Alternatives to CEMS may be considered by the Air Pollution Control Officer. Adequate verification of the alternative continuous monitoring system's acceptability must be submitted to the Air Pollution Control Officer. This would include data demonstrating the alternative system's accuracy under typical operating conditions for the specific application and any other information or data deemed necessary in assessing the acceptability of an alternative continuous monitoring system.

- (b) Data collected through the I&M plan described in Section VII.A.(2) shall be in a form approved by the Air Pollution Control Officer, and shall have retrieval capabilities as approved by the Air Pollution Control Officer. The monitoring system described in Section VII.B.(1) shall have data gathering and retrieval capability approved by the Air Pollution Control Officer. All data collected pursuant to the requirements of Section VII.A.(2) and VII.B.(1) shall be maintained for at least two years and made available for inspection by the Air Pollution Control Officer or the Officer's designee.
- (c) The owner or operator shall arrange for and assure that an emissions source test is performed on each stationary internal combustion engine at least once every 8,760 hours of operation or every 24 months, whichever is the shorter time period. In addition, the owner or operator shall arrange for and assure that an initial emissions source test is performed on each stationary internal combustion engine to verify compliance with Section III. by the date specified in Section V.B.(3) or V.C.(4). Emissions source testing shall be conducted at an engine's actual peak load and under the engine's typical duty cycle. Prior to any source test required by this rule, a source test protocol shall be prepared and submitted to the Air Pollution Control Officer. In addition to other information, the source test protocol shall describe which critical parameters will be measured, and how the appropriate range for these parameters shall be established and incorporated into the I&M plan described in Section VII.A.(2). The source test protocol shall be approved by the Air Pollution Control Officer prior to any testing. VOC shall be reported as methane. VOC, NO_x, and CO concentrations shall be reported in ppmv, corrected to 15 percent

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oxygen. For engines using exhaust controls, NO_x shall also be reported as a percent reduction across the control device.

- (2) Any engine subject to this rule shall be required to install a nonresettable fuel meter and a nonresettable elapsed operating time meter. The owner or operator shall assure that these required meters are maintained in proper operating condition and shall maintain an engine operating log that includes, on a monthly basis, the total hours of operation and fuel type (e.g, natural gas, gasoline, LPG) and quantity of fuel used. The fuel meter shall be calibrated periodically per the recommendations of the manufacturer. For emergency standby engines, the hours of operation during unscheduled power outages shall also be reported. This information shall be available for inspection at any time, and shall be submitted to the Air Pollution Control Officer at the end of each calendar year in a manner and form approved by the Air Pollution Control Officer.