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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: State Implementation Plan (SIP) Call for Reducing Nitrogen Oxides (NO_x)--
Stationary Reciprocating Internal Combustion Engines

FROM: Lydia N. Wegman, Director 
Air Quality Strategies and Standards Division

TO: Air Division Director
Regions I-V & VII

The purpose of this memorandum is to provide guidance to States that choose to adopt rules covering stationary reciprocating internal combustion engines (IC engines) as part of their response to the NO_x SIP call. Although the schedule for submittal of the SIPs addressing IC engines under the NO_x SIP call is the subject of on-going rulemaking, I am aware that several States are taking steps toward compliance with the requirements of the SIP call. This memorandum addresses questions on the IC engine source category that have been raised recently by several States as well as by the affected industry in various discussions and meetings. Specifically, EPA is providing guidance on the following issues related to IC engines: State flexibility, periodic monitoring, new source review, and early reductions. The EPA is also clarifying that the guidance in this memorandum reflects EPA's current views and supersede the views underlying the proposed requirements in the Federal implementation plan proposed October 21, 1998 regarding IC engines. This guidance is effective immediately.

State Flexibility

For purposes of complying with the NO_x SIP call, a State is free to choose whatever mix of controls will meet its budget and is free not to regulate IC engines at all. Where States choose to regulate large IC engines, EPA encourages the States to allow owners and operators of large IC engines the flexibility to achieve the NO_x tons/season reductions by selecting from among a variety of technologies or a combination of technologies applied to various sizes and types of IC engines. Flexibility would be helpful as companies take into account that individual engines or engine models may respond differently to control equipment. That is, while certain controls are known to have a specific average control effectiveness for an engine population, some individual engines that install the controls would be expected to be above and some below that average control level, simply because it is an average. Available technologies include combustion modifications, such as pre-combustion chambers or high energy ignition, and post-combustion controls, such as non-selective catalytic reduction.

During the SIP development process the States may establish a NO_x tons/season emissions decrease target for individual companies and then provide the companies with the opportunity to develop a plan that would achieve the needed emissions reductions. The companies may select from a variety of control measures to apply at their various emission units in the State or portion of the State affected under the NO_x SIP call. These control measures would be adopted as part of the SIP and must yield enforceable and demonstrable reductions equal to the NO_x tons/season reductions required by the State. What is important from EPA's perspective is that the State, through a SIP revision, demonstrate that all the control measures contained in the SIP are collectively adequate to provide for compliance with the State's NO_x budget during the 2007 ozone season.

Periodic Monitoring

The NO_x SIP call requires the State to provide for monitoring the status of compliance with any control measures adopted to meet the NO_x budget.¹ Title V air operating permit programs recognize SIP emissions limitations as applicable requirements that must be included in operating permits. Title V permit programs require SIP emissions limitations (and other applicable requirements) in permits to be accompanied by periodic monitoring sufficient to yield reliable data from the relevant time period that is representative of a source's compliance with the emissions limitation. In addition, the compliance assurance monitoring rule² may apply to these emissions limitations at certain emissions units at Title V major sources. Acceptable monitoring is not limited to those monitoring methods such as continuous or predictive emissions measurement systems that rely on automated data collection from instruments. Non-automated monitoring may provide a reasonable assurance of compliance for IC engines provided such periodic monitoring is sufficient to yield reliable data for the relevant time periods determined by the emission standard.

Using parametric data may be appropriate, as the source owners and operators in permitting authorities' jurisdiction might already be collecting data that could be used to indicate compliance as part of normal, ongoing operations. When using parametric data to satisfy the periodic monitoring requirement, Title V permits should specify an operating range for each parameter or combination of conditions which will provide a reasonable assurance that the source is in compliance with the underlying requirement. The proposed range should be supported by documentation indicating a site-specific developed relationship between parameter indicator ranges and compliance with the emission limit, although it is not required that the range be set such that an excursion from the range will prove noncompliance with the associated limit. Operational data collected during performance testing is a key element in establishing indicator

¹See 40 CFR section 51.121(i).

²See 40 CFR part 64.

ranges; however, other relevant information in establishing indicator ranges would be engineering assessments, historical data, and vendor data. The permit should also include some means of periodically verifying the continuing validity of the parameter ranges.

New Source Review (NSR)

Where sources choose to install combustion modification technology to reduce emissions of NO_x at natural gas-fired lean-burn IC engines, EPA believes this action should be considered by permitting authorities for exclusion from major NSR as a pollution control project (PCP). Combustion modification technology for these IC engines is similar to the “low-NO_x burner” technology already listed as a type of project that may be considered for exclusion from major NSR under EPA’s PCP exclusion policy.³ Combustion modification technologies to reduce NO_x emissions at natural gas-fired lean-burn IC engines include, for example, pre-combustion chambers, low emission combustion, high pressure fuel injection, and high energy ignition. It should be noted that, as the air to fuel ratio increases to very lean conditions, carbon monoxide and hydrocarbon emissions may increase slightly as excess air cools combustion temperatures and inhibits complete combustion. Pursuant to EPA’s policy, if the source is located in a nonattainment area, the State or the source must provide offsetting emissions reductions for any significant increase in a nonattainment pollutant from the PCP.

Unless information regarding a specific case indicates otherwise, installation of combustion modification technology for the purpose of reducing NO_x emissions at natural gas-fired lean-burn IC engines can be presumed, by its nature, to be environmentally beneficial. This presumption arises from EPA’s experience that combustion modification technology is an effective pollution control technology when applied to new and modified natural gas-fired lean-burn IC engines. Therefore, under EPA’s PCP exclusion policy, the combustion modification controls may be exempted from NSR provided that the safeguards and procedural steps contained in the exclusion policy memorandum are met.

Early Reductions by IC Engines

For large IC engines, development of the NO_x SIP call budget involved (1) obtaining a 1995 emissions inventory, (2) applying NO_x reasonably available control technology (RACT) controls to major sources in certain areas, including the Ozone Transport Region, (3) projecting emissions to 2007, (4) modifying that subinventory to represent an uncontrolled level of emissions, and (5) calculating a percentage reduction from the uncontrolled 2007 baseline to determine the NO_x tons reduction to include in the States’ budget calculations. Because this methodology uses the uncontrolled value, any emission reduction from a large IC engine may be considered for credit toward meeting the NO_x SIP call requirements. Creditable reductions may

³Memorandum from John Seitz to EPA Regional Office Air Directors, “Pollution Control Projects and New Source Review (NSR) Applicability,” July 1, 1994.

include emission controls in place during or prior to 1995 as well as after 1995 for the large engines. The applicable control requirements must be adopted as part of the SIP and must yield enforceable and demonstrable reductions.

For smaller IC engines, the first three steps above were completed as part of the NO_x SIP call budget calculation, but the subinventory was not modified to represent an uncontrolled level of emissions, and no percentage reduction was applied to the 2007 baseline in determining the States' budgets. Thus, the 2007 baseline for the smaller IC engines may include controls at IC engines, for example, that were subject to NO_x RACT. Such controls would not be creditable toward meeting the NO_x SIP call reductions because they are part of the 2007 baseline. Where the controls are not part of the 2007 baseline in the NO_x SIP call inventory⁴, States may use emission reductions achieved after 1995 at the smaller engines as part of their NO_x SIP call budget demonstration. The applicable control requirements must be adopted as part of the SIP and must yield enforceable and demonstrable reductions.

Federal Implementation Plan (FIP)

On October 21, 1998, EPA proposed FIP requirements for States that failed to meet the NO_x SIP call requirements published on October 27, 1998. In subsequent litigation, the issue of the level of control for IC engines was remanded to EPA. On February 22, 2002 EPA published a proposed rule regarding the NO_x SIP call and level of control for IC engines. The views in the February 22 proposal and in the guidance in this memorandum reflect EPA's current views regarding IC engines and supersede the views underlying the proposed requirements in the FIP with respect to IC engines. For example, although the FIP proposed selective catalytic reduction (SCR) for lean-burn engines, in the February 22 notice we propose there is currently an insufficient basis to identify SCR as a highly cost-effective control technology for lean-burn engines in variable load operations and we propose that low emission combustion technology is a highly cost-effective control technology for the lean-burn engines. As a result, EPA would need to repropose the FIP requirements for IC engines prior to issuing a final FIP concerning the IC engines. A FIP reproposal would need to be consistent with the final rule on the NO_x SIP call and control levels for IC engines.

⁴The 2007 baseline NO_x SIP Call emission inventory may be downloaded from the following site: ftp://ftp.epa.gov/EmisInventory/NOxSIPCall_Mar2_2000/

Please feel free to contact me or Doug Grano of my staff at (919) 541-3292 if you have any questions or wish to discuss any issues relating to this memorandum.

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