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June 3, 2009

Air and Radiation Docket and Information Center
U.S. Environmental Protection Agency
Attention: Docket ID No. EPA-HQ-OAR-2008-0708
Mailcode-6102T
1200 Pennsylvania Avenue, NW
Washington, D.C. 20460

Dear Sir or Madam:

The Interstate Natural Gas Association of America (INGAA), a trade association of the interstate natural gas pipeline industry, submits these comments on the U.S. EPA's proposed rule National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Reciprocating Internal Combustion Engines (RICE), hereinafter referred to as the "Proposed Rule". The proposal, which would revise 40 CFR Part 63, Subpart ZZZZ, was published in the Federal Register on March 5, 2009 at 74 FR 9698.

INGAA member companies transport more than 90 percent of the nation's natural gas, through some 180,000 miles of interstate natural gas pipelines. INGAA member companies operate over 6,000 stationary natural gas-fired spark ignition internal combustion (IC) engines, which are installed at compressor stations along the pipelines to transport natural gas to residential, commercial, industrial and electric utility customers.

INGAA and its member companies have a history of working with the U.S. EPA Office of Air Quality Planning and Standards (OAQPS) on standards that affect equipment used in natural gas transmission, including stationary spark ignited IC engines and combustion turbines. In supporting the development of MACT standards and more recent EPA NSPS rulemakings, INGAA members have provided data and input integral to the technical foundation of these important regulations. As demonstrated through its prior work and the comments that follow, INGAA remains committed to providing constructive comments on proposed rules based on the underlying principle that regulatory requirements must be rooted in empirical evidence and sound science.

The background documentation and projected benefits for the Proposed Rule appear to primarily on diesel engines. For natural gas-fired engines, the Proposed Rule includes emission limits and conclusions regarding controls "beyond the MACT floor" that are based on very limited and questionable data. INGAA believes that for natural gas-fired engines additional data are needed to support further analysis regarding emission limits, applicability of limits for different operating conditions, and control technology performance. **Accordingly, EPA should negotiate an alternative rulemaking schedule for natural gas-fired units.**

INGAA comments, detailed in the document that follows, address the following issues:

Rule Development and Area Source Requirements

1. INGAA is concerned about the technical basis for key rule decisions for natural gas-fired engines and believes that additional analysis is needed. To address timing concerns, EPA should negotiate an alternative rulemaking schedule for natural gas-fired units.
2. With five federal rulemakings for stationary engines in the last five years, differing requirements are causing significant implementation issues that will only be exacerbated by the Proposed Rule. EPA should harmonize and simplify rule requirements for stationary RICE to facilitate rule implementation.
3. For area sources, EPA should conduct an analysis of urban versus rural emissions and rural engine impacts on urban areas. INGAA believes that this analysis will warrant different standards or exemption for rural natural gas-fired engines, especially those in remote locations. Since EPA has indicated that a lower formaldehyde unit risk estimate (URE) is the current "best science" for formaldehyde and formaldehyde is the primary HAP of concern for natural gas-fired units, EPA should consider the implications of uncertainty in the formaldehyde URE when considering the timing and requirements for natural gas-fired engine area source regulations.
4. Section 112(h) provides alternative approaches to emission limits if it is infeasible to prescribe or enforce emission standards based on the technical and economic practicality of applying measurement methodology. With significant technical and cost issues for emission measurements associated with prescribing and enforcing emission standards, EPA should consider alternatives for design, equipment, work practice, or operational standards as appropriate (e.g., startup, shutdown and malfunction).

Emission Standards

5. INGAA has reviewed the emissions data used to develop MACT floor emission limits for natural gas-fired engines. Many data elements are deficient and should be removed from the RICE NESHAP database, and the remaining data is not sufficient to develop the MACT floor for natural gas-fired engines. In addition, the analysis failed to consider source emissions variability. EPA should collect additional data and repeat the MACT floor analysis for gas-fired engine subcategories.
6. Recent court decisions have questioned EPA's MACT floor analysis and consideration of variability. EPA has not considered emissions variability in establishing the MACT floor. This analysis should be completed, with variability reflected in the emission standards.
7. Depending upon conclusions that result from re-analysis of the MACT floor and "beyond the floor" controls, it may be necessary to identify additional subcategories with unique characteristics, such as lean burn engines that have - exhaust temperatures too cool to achieve adequate catalytic reduction.

Startup, Shutdown, and Malfunction and Emission Limit Applicability

8. It is premature to include emission limits for startup, shutdown and malfunction (SSM) events in the Proposed Rule. Data are not available to establish SSM limits and EPA's conclusion that SSM emissions are commensurate with the MACT floor are not supported by a basic technical understanding of combustion emissions behavior. Alternative options available under Section 112(h) should be considered.

9. To meet the emission level associated with the "best performing" MACT floor limits for an uncontrolled unit, catalytic control will be required for nearly all units. EPA has not appropriately considered the cost implications or emission limit achievability.

10. Rule requirements imply that emission limits apply at all conditions, but there are not data or analyses in the docket that supports emission limit applicability at reduced load or operating conditions other than the "high load" basis for the MACT floor.

11. INGAA supports performance test requirements at full load or the highest load achievable in practice. This test condition should also constrain emission limit applicability.

12. To respond to Court mandates, EPA has revised the context for emission limits to indicate the limits apply "at all times."" However, EPA has failed to gather data or provide scientific analysis to support conclusions regarding emission limit applicability. The rule should provide analysis and data to support emission limit applicability at operating conditions other than those associated with the MACT floor data and clarify the applicable standard for operating conditions other than high load. If technical support is not available, it is inappropriate for EPA to assign standards "at all times" and §112(h) alternatives should be considered.

<u>"Above the Floor" Analysis</u>

13. EPA's "above the floor" cost effectiveness analysis concludes that post-combustion controls are justified for several categories of natural gas-fired engines. The cost effectiveness analysis is flawed, and based on limited and erroneous data and assumptions. INGAA recommends revisiting the analysis. Based on more realistic cost assumptions, INGAA believes that the appropriate conclusion is that above the floor controls are not cost effective and thus not warranted for natural gas-fired engines.

14. EPA should define the "cost effective" threshold for analysis of above the floor emission controls. If a "brightline" threshold cannot be defined due to peripheral benefits, associated negative impacts, and/or consideration of HAP toxicity or other issues, EPA should identify a cost range and the basis and process for evaluating peripheral benefits and negative impacts.

<u>Catalytic Control Requirements</u>

15. EPA has not adequately supported its conclusion that 90% control is readily achievable, especially for engines or operating conditions with lower characteristic exhaust temperature.

16. The assumption of 90% control contradicts results from the EPA sponsored test program associated with the original RICE NESHAP rulemaking. EPA should explain test data deviations from 90% control and conclusions that contradict those from the original RICE NESHAP rulemaking.

17. For compliance at reduced load (or other lower temperature operating conditions that affecta catalyst performance), alternative standards available under §112(h) should be considered.
18. Current EPA regulations (specifically, 40 CFR § 63.6640(d)) provides for a 200 hour burn in period for catalyst-equipped engines that are new, reconstructed, or rebuilt. This allowance should also address a burn-in period for commissioning of an engine following major maintenance if concerns regarding catalyst damage are specified or implied in the catalyst guarantee or performance specification.

GACT and Management Practices

19. EPA should consider additional opportunities to rely on management or operating practices for compliance. Management practices are warranted for area sources under "Generally Achievable Control Technology" (GACT) provisions and for both area and major source engines under CAA §112(h).
20. The GACT management practices for small area source engines define maintenance frequency that far exceeds current practices. The basis for these requirements is not clearly presented in the docket. EPA should consider alternative practices or more reasonable frequency for the proposed practices.
21. Operator defined management practices should be included as an acceptable alternative to rule-defined or vendor specified maintenance requirements. This approach is consistent with using an operator-defined maintenance plan for compliance assurance for the spark ignition IC engine NSPS (40 CFR 60, Subpart JJJJ).
22. If the current proposed practices are retained, the ***frequency*** must be revised to be consistent with current reasonable practices, and consider current maintenance approaches such as performance-based decisions for defining when to complete a maintenance task.
23. If maintenance frequency is defined in the rule, it must be specified as *operating* hours. The proposed Rule implies the use of calendar hours. EPA must also define operator requirements when a maintenance schedule elapses while an engine is operating and performing a necessary function.
24. If operator defined practices are not allowed and a more reasonable frequency for the proposed maintenance cannot be determined, then EPA should convene a group of stakeholders to define consensus management practices.
25. For all affected emergency engines the Proposed Rule should impose management practices, not emission limits, to recognize the limited operating time of emergency units and the limitations in the ability to measure compliance.

Test Methods

26. INGAA supports the proposed CO test methods.
27. EPA should include FTIR test methods as acceptable methods for CO percent reduction performance tests.

28. EPA should more thoroughly investigate whether Method 323 can be retained or another alternative to Method 320 is available for formaldehyde testing.
29. Without an alternative to FTIR, formaldehyde testing will not be accessible for rich burn engines due to several factors, including FTIR test van access to remote locations, cost, and commercial availability. Thus, §112(h) alternatives related to measurement feasibility must be considered or an easier to measure surrogate for formaldehyde must be identified.
30. INGAA supports the conclusion that CARB Method 430 data are non-quantitative for formaldehyde measurement from natural gas-fired engines. EPA should ensure that CARB 430 data are not included in the rulemaking analysis.
31. For percent reduction compliance, sequential pre- and post-catalyst testing should be allowed as long as quality assurance measures are in place to preserve test integrity. Otherwise, significant burden is imposed for simultaneous measurement.

Compliance assurance / parameter monitoring

32. EPA should clarify whether parameter monitoring is required for any existing sources covered by the Proposed Rule. Currently, the preamble and rule text present conflicting information.
33. EPA should not require parameter monitoring for area source engines. The Proposed Rule should consider engine location and other site limitations if area source parameter monitoring is required.
34. EPA should reconsider new test requirements added for major source rich burn engines 500 hp and larger originally affected by the 2004 RICE MACT or provide analysis that justifies the new compliance requirement and added costs.

Reporting and Recordkeeping

35. Part 63 General Provision reporting and recordkeeping should not broadly apply to existing engines. EPA has not properly considered the burden associated with Part 63 reporting and recordkeeping and should harmonize requirements for new and existing engines.

Cost Benefit Analysis and Docket Support Information

36. The summary costs presented in the preamble and the information in the Regulatory Impact Analysis (RIA) do not adequately represent the actual costs of implementing the rule and they significantly underestimate the cost impacts.
37. The RIA and rule preamble focus on diesel particulate benefits and do not adequately discuss benefits associated with standards for gas-fired engines. This supports the INGAA assertion that this is a diesel focused rule and a rule for natural gas-fired units should be developed through a more thoughtful, data driven transparent process.
38. The docket often relies on data and analysis from previous rulemakings, some of which is over a decade old. The docket is not sufficiently detailed or documents from previous rules were not appropriately cited, thus hindering the ability to review or understand EPA analysis. A robust docket should be developed to support regulatory transparency.

39. The population of existing RICE is based on the ***proprietary*** Power Systems Research's (PSR) North American Engine PartsLink Database. EPA's reliance on a proprietary database, and failure to identify the data and data limitations conflicts with the Administrator's commitment to a transparent regulatory process.

40. The Proposed Rule addresses a number of recent Court decisions and in many cases this is the first rulemaking that integrates EPA's response to the Court decisions. Separate from this rulemaking, INGAA recommends EPA develop guidance and policy memos that discuss and substantiate the basis for EPA responses to Court mandates.

Clarifications and Errors

41. EPA should revise errors to the "greater than" and "less than" mathematical symbols in the Proposed Rule tables. This same error was made (and corrected) in the 2006 proposal for the January 2008 NESHAP revisions.

42. Monthly ΔP measurement has presented implementation questions and problems since the original 2004 RICE MACT. INGAA recommends that EPA revise the rule to clarify this requirement for months when engine operation is limited (e.g., an idle engine should not be started solely to complete the monthly ΔP measurement).

43. EPA should both clarify the schedule to complete a performance test after a catalyst is changed and indicate that this test fulfills the periodic test requirement for affected units (i.e., the regulations should provide that the schedule for periodic tests is "reset" when the catalyst change test is completed). EPA should also clarify that temporary catalyst replacement for washing or cleaning does not trigger a catalyst change test.

INGAA appreciates the opportunity to comment on this rulemaking. If needed, we offer our assistance to EPA in understanding our concerns, developing additional data to support a technically sound basis for the revisions, and clarifying EPA questions regarding these comments. If you have any questions, please feel free to contact me at 202-216-5935 or lbeal@ingaa.org.

Sincerely,

Lisa S Beal

Lisa Beal
Director, Environment and Construction Policy
Interstate Natural Gas Association of America

cc (by email): Melanie King, Energy Strategies Group, Sector Policies and Programs Division (D243-01), U.S. EPA, Research Triangle Park, NC 27711 (king.melanie@epa.gov)

Attachment: INGAA Comments on Proposed Revisions to the RICE NESHAP, 40 CFR 63, Subpart ZZZZ

COMMENTS ON THE PROPOSED REVISIONS TO THE NATIONAL EMISSION STANDARD FOR HAZARDOUS AIR POLLUTANTS FOR RECIPROCATING INTERNAL COMBUSTION ENGINES

Proposed Revisions to Code of Federal Regulations Title 40, Part 63, Subpart ZZZZ

74 Federal Register 9698, March 5, 2009

Submitted by:
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Submitted to:
Docket ID No. EPA-HQ-OAR-2008-0708
Air and Radiation Docket and Information Center
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Mailcode: 6102T
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June 3, 2009

TABLE OF CONTENTS

INTRODUCTION

The Interstate Natural Gas Association of America (INGAA), a trade association of the interstate natural gas pipeline industry, submits these comments on the U.S. EPA's proposed rule to revise the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Reciprocating Internal Combustion Engines (referred to hereinafter as the Proposed Rule). The Proposed Rule would revise 40 CFR Part 63, Subpart ZZZZ. The proposal was published in the Federal Register on March 5, 2009 at 74 FR 9698.

INGAA member companies transport more than 90 percent of the nation's natural gas, through some 180,000 miles of interstate natural gas pipelines. INGAA member companies operate over 6,000 stationary natural gas-fired spark ignition internal combustion (IC) engines, which are installed at compressor stations along the pipelines to transport natural gas to residential, commercial, industrial and electric utility customers.

INGAA and its member companies have a history of working with the U.S. EPA Office of Air Quality Planning and Standards (OAQPS) on standards that affect equipment used in natural gas transmission, including stationary spark ignited IC engines and combustion turbines. Recently, INGAA member companies provided comments and background material to support the January 2008 final rules, including the spark ignition IC engine New Source Performance Standard (NSPS) and revisions to the reciprocating IC engine (RICE) NESHAP. In addition, representatives from INGAA member companies served on the Federal Advisory Committee, known as the Coordinating Committee, established for the Industrial Combustion Coordinated Rulemaking (ICCR) for the development of the combustion maximum achievable control technology (MACT) standards. INGAA members served on the Combustion Turbine MACT Work Group and the Boilers/Process Heaters Work Group, and chaired the Reciprocating Internal Combustion Engine Work Group under ICCRThroughout these proceedings, INGAA has demonstrated an ongoing commitment to provide constructive comments on proposed rules, based on the underlying principle that regulatory requirements must be rooted in empirical science and sound science.

The detailed comments that follow discuss numerous issues, and the issues are frequently linked. In many cases, the INGAA comments discuss the lack of data, support documentation, or analysis to justify decisions reflected in the proposed requirements. For example, the MACT floor analysis is flawed and INGAA comments indicate that additional data are needed to complete the MACT floor analysis. In this example, INGAA is collecting information from member companies, but with limited time for comment preparation, that data collection effort is ongoing. INGAA offers its assistance to work with EPA to try to address data gaps. To accommodate effective data gathering and analysis, it is imperative that EPA pursues a modest extension to the schedule for completing the rulemaking for natural gas-fired sources.

An itemized list of the comments is provided in the cover letter and Table of Contents. INGAA's detailed comments on the proposed revisions to Subpart ZZZZ of 40 CFR Part 63 follow.

DETAILED COMMENTS – Proposed Revisions to Title 40, Part 63, Subpart ZZZZ

Rule Development and Area Source Requirements

1. INGAA is concerned about the technical basis for key rule decisions for natural gas-fired engines and believes that additional analysis is needed. To address timing concerns, EPA should negotiate an alternative rulemaking schedule for natural gas-fired units.

Background on the Proposed Rule schedule focuses on a diesel engine consent decree. The Proposed Rule support documentation and benefits analysis is primarily focused on diesel emissions, and EPA issued an advanced notice of proposed rulemaking (ANPRM) in 2008 to collect additional data on diesel engine emissions and controls. As discussed in comments below, for natural gas-fired engines, INGAA review of the docket and associated data for natural gas-fired engines indicates questionable, deficient, or flawed data for key rule decisions, including the MACT floor analysis and cost analysis for beyond the floor control requirements. Due to these questions, INGAA is concerned about the record basis for a number of key decisions. Substantiation for our concern is detailed in the comments that follow. INGAA believes that thoughtful consideration of our comments will result in the conclusion that additional data are needed to support additional analysis for key decisions.

In some cases, limited data have been collected by INGAA and these data are discussed below. In addition, INGAA offers its support to assist EPA with collecting additional data for natural gas-fired engines. However, additional time is needed to collect the emissions, cost and other data necessary, to support additional analysis and provide the opportunity to adequately revisit key rule requirements. It will be extremely difficult to complete a credible effort to support a February 2010 Final Rule, and INGAA therefore recommends removing natural-gas fired engines from the Proposed Rule, collecting additional data for natural gas-fired engines, and proposing a separate set of regulations for natural gas-fired units at a later date.

INGAA offers its support to assist EPA with collecting additional data for natural gas-fired engines, but is concerned that it will be difficult to complete a credible effort to support a February 2010 Final Rule. INGAA understands that EPA is obligated under other consent orders to complete the rulemaking for natural gas-fired engines. However, the rule background, support documentation, and 2008 ANPRM indicate that the EPA focus has been on diesel engines, and the docket data deficiencies for gas-fired equipment further substantiates that conclusion.

To address natural gas engine requirements, INGAA recommends a separate rulemaking for natural gas-fired engines with a schedule that slightly lags the diesel schedule. INGAA understands that this will require EPA to revisit the schedule with petitioners, but the situation warrants pursuing this avenue. While EPA used an ANPRM to collect diesel engine data in 2008, INGAA believes that a cooperative data collection effort with stakeholders for natural gas-fired engines can preclude the need for an ANPRM. This cooperative effort could also expedite the process to provide data that can result in more informed decision-making for natural gas-fired engines. INGAA offers its support for this effort and is willing to assist in devising a plan and revised schedule for timely completion of a NESHAP rulemaking for natural gas-fired engines.

2. The Proposed Rule is the fifth federal rulemaking for stationary engines in the last five years, and differing requirements are causing significant implementation issues that will only be exacerbated by the Proposed Rule. EPA should harmonize and simplify rule requirements for stationary RICE to facilitate rule implementation.

INGAA and its members began working with EPA through the Industrial Combustion Coordinated Rulemaking (ICCR) process in 1997. The ICCR supported the development of a considerable amount of technical information to support NESHAP standard development for combustion sources, including reciprocating IC engines. In fact, much of the data used for the Proposed Rule was developed during the ICCR process. For RICE, the ICCR culminated with the original RICE NESHAP which was proposed in December 2002 and finalized in June 2004. The RICE NESHAP was the initial federal rulemaking for stationary IC engines. Since then there have been four additional rules proposed and/or finalized, including NSPS for compression ignition and spark ignition IC engines, NESHAP revisions in January 2008, and the Proposed Rule in March 2009.

Operators affected by these rules, the service providers and manufacturers that support IC engines, and state and local regulatory agencies have been struggling with implementing all these rules. For example, many state agencies have struggled with addressing requirements of the recent NSPS rules and 2008 NESHAP revision. The Proposed Rule will affect a large number of sources and implementation problems will be greatly exacerbated, especially since regulatory applicability and competing requirements will add confusion to the applicable requirements for a specific engine. INGAA is very concerned about the ability of states to fulfill their obligations. Permitting and other delays could affect the ability of operators to comply in a timely fashion and could have implications for permitting not only of the units affected under this rule, but the backlog that could be caused by the need to address hundreds of thousands of units implicated by the Proposed Rule. For example, many states have specific requirements that would be triggered, e.g., permitting for any NESHAP-affected source, state mandatory testing requirements for any catalyst-equipped engine, etc. The Proposed Rule does not consider these implications and resulting implementation problems or costs.

For the January 2008 rules, based on comments on that rule proposal, EPA introduced numerous revisions that provided some level of harmonization and simplification of rule requirements. For the Proposed Rule, there is no indication that EPA considered confounding and seemingly contradictory requirements for engines under these different but related rules; thus, it is likely that operators, the service community, and implementing agencies will have many difficulties with rule implementation. INGAA recommends that EPA revisit rule requirements and consider ways that requirements could be harmonized across the different rulemakings to facilitate implementation. In the comments below, some specific examples are provided. Several examples of confusing issues and requirements for natural gas-fired engines that could be reconsidered are briefly mentioned here.

For example, in the 2008 rulemaking, EPA simplified reporting and recordkeeping for NESHAP subject engines (new and reconstructed units) via compliance with NSPS requirements. The Proposed Rule will result in subject *existing* engines having more onerous reporting and recordkeeping requirements than required for new engines. Similarly, existing engines will have more stringent emission limits than new engines for many subcategories. Thus, when permitting and reviewing compliance, a facility with several co-located engines could have similar engines sitting side-by-side with different federal requirements for each engine, and older, existing equipment may have more stringent criteria than newer engines. EPA should consider areas that could be "harmonized" within these rules. For example, EPA should review options to require similar reporting and recordkeeping requirements and similar requirements for maintenance procedures / recordkeeping across the different standards.

3. For area sources, EPA should conduct an analysis of urban versus rural emissions and rural engine impacts on urban areas. INGAA believes that this analysis will warrant different standards or exemption for rural natural gas-fired engines, especially those in remote locations. Since EPA has indicated that a lower formaldehyde unit risk estimate (URE) is the current "best science" for formaldehyde and formaldehyde is the primary HAP of concern for natural gas-fired units, EPA should consider the implications of uncertainty in the formaldehyde URE when considering the timing and requirements for natural gas-fired engine area source regulations.

EPA is required to address HAP emissions from stationary RICE located at area sources under section 112(k) of the Clean Air Act, which is principally a risk-driven requirement. EPA has proposed area source regulations within this rulemaking without providing support documentation and analysis necessary to consider the risk, environmental benefit, and cost. Justification for HAP control from area source engines, especially smaller engines and those located in remote locations should be supported in the docket through an assessment of risk and justification for expanding the rule beyond urban areas and urban clusters. If EPA retains non-urban area source standards in the Final Rule, alternatives should be considered that segregate requirements for urban versus rural engines. For example, where EPA has proposed emissions standards, generally available control technology (GACT) management practices may be more appropriate for rural sources, especially smaller engines and engines in remote locations.

To address area source requirements under §112(k), EPA developed an Urban Air Toxics Strategy. Key provisions of the Urban Air Toxics Strategy include:

- <u>Identify the 30 Worst HAPs</u>. §112(k)(3)(B)(i) of the CAA requires EPA to "identify not less than 30 hazardous air pollutants which, as the result of emissions from area sources, present the greatest threat to public health in the largest number of ***urban*** [emphasis added] areas…". EPA implemented this provision and identified 33 air toxics in 1999 in the Integrated Urban Air Toxics Strategy (64 FR 38705, July 19, 1999).
- <u>List the Area Sources representing at least 90 percent of the emissions of these 30 HAPs</u>. §112(c)(3) of the CAA requires EPA to list area sources to ensure that area sources representing 90 percent of the area source emissions of the 30 hazardous air pollutants that present the greatest threat to public health in the largest number of urban areas are subject to regulation under this section. The area source stationary engine source category was added to this list in 1999 in the Integrated Urban Air Toxics Strategy (64 FR 38715, July 19, 1999).
- <u>Regulate the Listed Area Sources</u>. Paragraphs 112(c)(3) and 112(k)(3)(B)(ii) both require that the listed area sources are to be subject to standards pursuant to §112(d). Per

§112(d)(5), area source regulations can be addressed based on *generally available control technology* (GACT) standards that include work practices, rather than MACT, which is required for major sources.

In the preamble EPA acknowledges that they have chosen to expand the Urban Air Toxics Strategy to rural environs:

> "The requirements being proposed in this action are applicable to stationary RICE located at area sources of HAP emissions. EPA has chosen to propose national requirements, which not only focus on urban areas, but address emissions from area sources in all areas (urban and rural)." (74 FR 9709)

EPA continues its discussion by stating:

> "For stationary RICE, it would not be practical or appropriate to limit the applicability to urban areas and EPA has determined that national standards are appropriate. Stationary RICE are located in both urban and rural areas. In fact, there are some rural areas with high concentrations of stationary RICE. Stationary RICE are employed in various industries used for both the private and public sector for a wide range of applications such as generator sets, irrigation sets, air and gas compressors, pumps, welders, and hydro power units." (74 FR 7409)

The docket fails to provide support to EPA's contention in these citations that:

> *"… it would* ***not be appropriate*** *to limit the applicability to urban areas and EPA has* ***determined that national standards are appropriate****.*" [Emphasis added]

INGAA understands that RICE are a listed area source category and EPA rulemaking is necessary, but INGAA believes that consideration of the appropriate standards warrants a transparent, documented, technical review that considers subcategory specific attributes (e.g., engine type and size) as well as location. The proposed area source requirements stipulate controls for very small engines in remote locations. For example, a 60 hp rich burn engine at a communications tower along a pipeline may be in a very remote location distant from population – and even difficult to access during some parts of the year. There are a host of other examples and it is not apparent that EPA has thoughtfully considered the area source requirements, control implications, and cost-benefit of the proposed rules. EPA's support of its decision is provided in the preamble text noted above, and this statement regarding "practicality" appears to be founded more opinion than fact. EPA does not indicate in the preamble or docket support material how it reached this substantive conclusion. Notably, INGAA commented on this issue in response to the last NESHAP proposed revisions that were promulgated in January 2008. The issue of area source requirements became a moot point for that rule because the NESHAP requirements for affected area sources were revised in the final rule and addressed via compliance with the NSPS (e.g., 40 CFR 40, Subpart JJJJ for natural gas-fired engines). For the Proposed Rule, which addresses existing engines, it is imperative that a more thoughtful review and complete analysis be completed by EPA.

EPA's approach appears to extend the Congressional intent of area source requirements beyond urban areas, without completing the corresponding risk review or justification for regulating rural sources. Section 112(k)(1) of the Clean Air Act (CAA) states the purpose of area source standards:

> "The Congress finds that emissions of hazardous air pollutants from area sources may individually, or in the aggregate, present **significant risks** to public health in **urban areas**. Considering the large number of persons exposed and the risks of carcinogenic and other adverse health effects from hazardous air pollutants, ambient concentrations characteristic of **large urban areas** should be reduced to levels substantially below those currently experienced. It is the purpose of this subsection to achieve a substantial reduction in emissions of hazardous air pollutants from area sources and an **equivalent reduction in the public health risks** associated with such sources including a reduction of not less than 75 per centum in the incidence of cancer attributable to emissions from such sources." [emphasis added]

Legislative history reinforces the perception that the fundamental purpose of the area source program (encompassed in sections 112(c)(3), 112(d)(5), and 112(k)(3) as a single integrated program) is urban area risk reduction. Further, EPA should incorporate risk in its consideration of cost effectiveness – e.g., the cost effectiveness threshold for beyond the floor controls should consider the HAPs of concern for different engine types. In short, any controls which do not contribute to significant reductions in risk cannot be considered cost effective or consistent with CAA Section 112(k).

The exercise, while admittedly challenging, would provide assurance to the public and directly affected stakeholders that the regulatory action is necessary, justifiable, and commensurate with the cost of implementing such a rule. Without support for such an argument, a simple statement that the action is "impractical and inappropriate" is not proper justification for such an important conclusion. INGAA recommends EPA properly assess the reduction in public health risk associated with nationwide applicability for the area source requirement, thus addressing the Congressional intent and purpose of Title III Section 112(k). This issue is even more compelling for natural gas-fired engines when considering the uncertainty in the Unit Risk Estimate for formaldehyde. As discussed below, EPA used an updated formaldehyde URE, termed by EPA the "current best science,", in the agency's 2006 National Air Toxics Assessment (NATA).

In fact, the preamble indicates that EPA has not determined the prevalence of stationary IC engines in certain areas of the country:

> "…EPA had determined that stationary RICE are located all over the U.S., and **EPA cannot say that these sources are more prevalent in certain areas of the country. Therefore,** for the source category of stationary RICE, **EPA is proposing national requirements without a distinction between urban and nonurban areas.**" [emphasis added] (74 FR 97090)

The *lack of analysis* and consequent jump to nationwide regulations is surprising. Numerous data sources exist in varied forms including state and federal emission inventories, Title V permits, BLM maps, OEM records, pipeline maps, agricultural bureaus, etc., that would aid in assessing the distribution of engines throughout the U.S. and in rural areas. Failure to evaluate the geographic distribution, emissions, and public health impact of engine populations by size, type, and fuel raises additional concerns regarding whether the need for emission reductions has been adequately justified; or, if regulation is required, how a cost-benefit determination can be completed to consider the basis, e.g., should GACT or MACT be required. Other area source regulations made a more concerted effort to address this issue, and INGAA recommends that EPA take a similar approach for the IC engine area source NESHAP. The NESHAP for area source dehydrators (40 CFR 63, Subpart HH) provides precedent for consideration.

At the close of the brief preamble discussion in the Proposed Rule, EPA requests comment on the nationwide approach. INGAA emphatically responds that the overly simplistic and unsupported approach proposed by EPA is insufficient. Additional analysis is required to identify:

(1) whether standards are warranted for all area sources;

(2) segregation of urban versus rural engines when defining the standard;

(3) the appropriateness of MACT versus GACT for rural area source engines, and alternatives that consider exemption or lesser requirements for small engines and remote engines – for example, consideration of environmental benefit (e.g., risk) and costs from regulation;

(4) the implication of the formaldehyde URE when considering environmental impacts and regulatory cost-benefit for natural gas-fired area source engines; and

(5) significant cost and compliance burden that would be incurred for very remote and typically small engines, such as generators at some communication towers along interstate natural gas transmission pipelines.

In regard to precedent from Subpart HH, on July 8, 2005, EPA published a proposed rule to amend the Oil and Natural Gas Production Facilities NESHAP (40 CFR Part 63 Subpart HH) to address area sources. This rule affects triethylene glycol (TEG) dehydrators at area sources. EPA considered urban proximity for this rulemaking, which was promulgated as a final rule on January 3, 2007.

In the proposal, EPA offered the following two options:

1) require all affected TEG dehydrator units be subject to the rule.
2) require only TEG dehydrator units located in urban areas be subject to the rule.

The final rule implemented an alternative that was identified based on comments and additional review. The final Subpart HH requirements for area sources allow an owner or operator of an affected unit to determine whether the source is located within an urban area based on proximity to an urban cluster, where "urban cluster" is defined based on the U.S. Census Bureau's definition and most current decennial census data. Requirements and implementation deadlines differ depending upon location, and "non-urban" area source dehydrators comply via a work practice in all cases. This rule was developed by the same EPA division, and its conclusions should have bearing on the Proposed Rule. For example, following urban criteria that parallel Subpart HH, Subpart ZZZZ could provide an exemption for area source engines located in a rural area or require GACT work practices rather than MACT-equivalent emission limits. To implement for IC engines, a determination based on urban proximity could be submitted in the initial notification. INGAA recommends that EPA complete additional analysis, consistent with the intent of CAA Section 112(k) and the Urban Air Toxics Study, to support area source requirements related to location and urban proximity. If the exemption is not defined, INGAA recommends that EPA consider different requirements for the various natural gas-fired engine subcategories depending upon rural versus urban location. This could include alternatives that consider emissions (e.g., engine size) and location (e.g., based on risk-distance plots) when defining regulatory requirements for rural area source engines. For rural area source engines, EPA should complete an analysis to substantiate the standards that considers environmental impacts and associated cost-benefit of the standard.

An additional relevant consideration is the current status of the formaldehyde URE value. INGAA understands that there are additional HAPs emitted from natural gas-fired engines, but formaldehyde has been the HAP of concern. At this time, EPA is reviewing the Integrated Risk Information System (IRIS) health-based criteria for formaldehyde. INGAA has been awaiting that review for several years because it has implications for a de-listing request and ongoing stay for natural gas-fired turbines under the Turbine MACT (40 CFR 63, Subpart YYYY). The deadline for that review has inexplicably changed many times over the last several years and the current EPA schedule for review completion per the IRIS website and EPA Regulatory Agenda is August 2011. This review is relevant because in several recent EPA actions an updated formaldehyde URE has been used, with EPA identifying the revised URE as the current best science. The best example is from the 2006 NATA documentation, which is available on-line at EPA's website.

The following quote from EPA is from the on-line document, "Health Effects Information Used In Cancer and Noncancer Risk Characterization For the 1999 National-Scale Assessment" (November 7, 2005), which is available at: http://www.epa.gov/ttn/atw/nata1999/99pdfs/healtheffectsinfo.pdf

> "Formaldehyde – EPA no longer considers the formaldehyde URE reported in IRIS, which is based on a 1987 study, to represent the best available science in the peer-reviewed literature. Since that time, significant new data and analyses have become available. Accordingly, the 1999 risk estimates for formaldehyde are based on a dose-response value developed by the CIIT Centers for Health Research (formerly the Chemical Industry Institute of Toxicology) and published in 1999. This assessment incorporates mechanistic and dosimetric information on formaldehyde that had been accumulated over the past decade, and developed a URE using approaches that are consistent with EPA's guidelines for carcinogenic risk assessment. EPA had judged that this CIIT modeling effort currently represents the best application of available mechanistic and dosimetric science on the dose-response for portal of entry cancers due to formaldehyde exposures. EPA is currently reviewing the CIIT analysis and other recent information, including recently published epidemiological studies, in our reassessment of our formaldehyde unit risk estimate (URE)."

This "best application of available mechanistic and dosimetric science" for formaldehyde is more than 2,300 times less stringent than the current IRIS published value. Obviously, this has important implications for classification of natural gas-fired engines as key area sources, the cost-benefit associated with NESHAP standards, risk relief from control of gas-fired engines, and whether natural gas-fired engines may warrant a separate categorization and de-listing from Section 112. Unfortunately, delays in completing the IRIS review leave this situation unresolved. However, INGAA recommends that EPA analysis of area source requirements consider the URE review and implications of the updated formaldehyde URE value on environmental cost-benefits for regulating area source natural gas-fired engines. At a minimum, this issue should have significant implications for whether GACT management practices or MACT emission limits are warranted for area source units.

4. Section 112(h) provides alternative approaches to emission limits if it is infeasible to prescribe or enforce emission standards based on the technical and economic practicality of applying measurement methodology. With significant technical and cost issues for emission measurements associated with prescribing and enforcing emission standards, EPA should consider alternatives for design, equipment, work practice, or operational standards as appropriate (e.g., startup, shutdown and malfunction).

Comments below discuss INGAA concerns with the technical basis and standing of several rule requirements related to emission limit applicability. For example, see Comment 8 on startup, shutdown and malfunction (SSM) and Comments 10 and 11 on emission limit applicability at reduced load. Comment 5 discusses issues with the MACT floor determination and data that need to be removed from consideration, but the review process EPA used to determine the floor is evident – even if the data need to be discounted and supplementary data collected. EPA used "best performing" emission tests as the basis for the floor and these test points were typically at high operating load. The docket does not provide support information nor does INGAA's replication of the MACT floor calculation indicate that EPA considered characteristic emissions at other operations. The performance test requirement appropriately requires a high load test based on the constraints associated with the data that serve as the basis of the standard. However, the rule also indicates that the same emission limits apply at all operating conditions and during SSM. The docket does not provide data or reasoned scientific analysis to support that claim. These data limitations and issues associated with defining emission standards or enforcing those standards if implemented cause significant concerns. However, INGAA believes that the Clean Air Act includes provisions that provide for alternative approaches in certain circumstances. INGAA strongly recommends EPA consider how CAA §112(h) can provide pathways to resolving issues associated with defining and enforcing standards across all operations. INGAA is not arguing that emission standards should not be adopted, but rather that EPA needs to appropriately consider limitations in the broad application of those standards and alternative acceptable means of addressing Section 112 requirements.

Several comments below provide specific context and discussion where INGAA believes that Section 112(h) should be considered as a means to address emission limit definition and enforceability across broad engine operating conditions. This comment generally describes INGAA's perspective on how §112(h) can facilitate development of a final rule that is not fraught with implementation and enforceability issues. In addition, removing ambiguous or arbitrary emission standard applicability claims from the Proposed Rule that are not based on actual data or sound science could preclude rule challenges. ,INGAA is not questioning whether standards will apply; rather, INGAA believes that it is important to ensure that standards rest on sound data applied to the proper operating scenario, instead of place parties in the untenable position of being unable to ensure compliance and facing enforcement uncertainty.

Section 112(h) provides alternative approaches to emission limits if it is infeasible to prescribe or enforce emission standards. With technology and cost limitations for emissions measurement and a lack of emissions data, EPA should consider §112(h) alternatives for promulgating design, equipment, work practice, or operational standards. Pertinent text from §112(h) is provided here:

> "§112(h) Work practice standards and other requirements
> (1) In general
> For purposes of this section, ***if it is not feasible in the judgment of the Administrator to prescribe or enforce an emission standard for control of a hazardous air pollutant or pollutants, the Administrator may, in lieu thereof, promulgate a design, equipment, work practice, or operational standard, or combination thereof,*** which in the Administrator's judgment is consistent with the provisions of subsection (d) or (f) of this section. In the event the Administrator promulgates a design or equipment standard under this subsection, the Administrator shall include as part of such standard such requirements as will assure the proper operation and maintenance of any such element of design or equipment.
> (2) Definition
> For the purpose of this subsection, ***the phrase "not feasible to prescribe or enforce an emission standard" means any situation in which the Administrator determines that***—
> …
> (B) ***the application of measurement methodology to a particular class of sources is not practicable due to technological and economic limitations.***
> (3) …
> (4) Numerical standard required
> Any standard promulgated under paragraph (1) shall be promulgated in terms of an emission standard whenever it is feasible to promulgate and enforce a standard in such terms."
> [emphasis added]

As discussed in comments below on SSM limits, reduced load emission limits, emission limit applicability "at all times,", accessibility of FTIR testing, etc., INGAA believes that there are significant issues with both ***prescribing*** and ***enforcing*** an emission standard due to measurement limitations. The measurement methodology is typically limited due to both technological and economic feasibility. Specific examples and context for this rule are discussed in comments below.

Emission Standards

5. INGAA has reviewed the emissions data used to develop MACT floor emission limits for natural gas-fired engines. Many data elements are deficient and should be removed from the RICE NESHAP database, and the remaining data is not sufficient to develop the MACT floor for natural gas-fired engines. In addition, the analysis failed to consider source emissions variability. EPA should collect additional data and repeat the MACT floor analysis for gas-fired engine subcategories.

INGAA has completed a review of the MACT floor analysis for the natural gas-fired engines. The data relied on and the analysis was not clearly defined in the rule docket. However, based on our review of the EPA database, and email correspondence with EPA to assure we were reviewing the appropriate emissions data, INGAA believes that the EPA analysis was replicated. Unfortunately, there are gross deficiencies in the data and analysis for each of the three primary natural gas-fired engine types, i.e., 2-stroke lean burn (2SLB), 4-stroke lean burn (4SLB) and 4-stroke rich burn engines (4SRB). In addition, it is apparent that EPA did not consider emissions variability when conducting the analysis and instead relied upon the "best of the best" data without considering operating condition context or emissions variability. INGAA believes that this approach is deficient and results in inappropriate conclusions regarding an emission standard based on the average performance of the best performing 12% of units – i.e., the Clean Air Act mandated target from §112(d)(2).

This comment discusses:

- Data deficiencies and inappropriate reliance on emission data that should have been excluded from the analysis. This substantiates the need for additional data collection so that subcategory-specific MACT floor analysis can be completed. Primary types of emissions data deficiencies are discussed followed by a subcategory-specific review of the emissions data used for the analysis;
- The relevance of emissions test operating conditions and consideration of emissions variability (discussed in more detail in Comment 6); and,
- A "minimum standard" of sources and data that should be required to complete a MACT floor determination.

The primary data deficiencies are:

- <u>CARB 430 formaldehyde measurements are non-quantitative and should be excluded from the MACT Floor analysis</u>. EPA has included formaldehyde emissions data measured using California Air Resources Board (CARB) Method 430 "Determination of Formaldehyde and Acetaldehyde in Emissions from Stationary Sources" in the MACT floor analyses. However, it is well understood that this method is inappropriate for measuring formaldehyde emissions from reciprocating IC engines. CARB has issued an advisory that pollutant interference may occur for formaldehyde when NOx concentrations are greater than 50 ppm and emissions data collected from sources with these NOx levels should be flagged as "non-quantitative." **EPA acknowledges this method deficiency and categorizes all CARB 430 data as non-quantitative in docket document EPA-HQ-OAR-2005-0030-0009,** "Development of HAP Emission Factors for Small (<500 HP) Stationary Reciprocating Internal Combustion

Engines (RICE)." In addition, all CARB 430 data were excluded from the HAP emission factors development. EPA-HQ-OAR-2005-0030-0009 states:

> "In 2000, CARB issued an advisory on the use of CARB test method 430 which has been used to quantify acrolein, formaldehyde, and acetaldehyde. The advisory states that CARB 430 should not be used to quantify acrolein and pollutant interference may occur for formaldehyde and acetaldehyde measurements when NOx concentrations are greater than 50 ppm. In this situation, formaldehyde and acetaldehyde tests should be flagged as "non-quantitative." All of the CARB 430 tests in the RICE NESHAP emissions database were without NOx concentration data, thus none of the acrolein, formaldehyde, and acetaldehyde data from CARB 430 tests were used in this analysis [to develop HAP emission factors for small (< 500 HP) stationary RICE]"

The HAP emission factors were used by EPA for the above-the-floor analysis (refer to docket document EPA-HQ-OAR-2008-0708-0017). Because EPA has determined the CARB 430 data were deficient and were not used for the beyond-the-floor analysis, these data should not be used for MACT floor determinations. INGAA agrees that formaldehyde measurements using CARB 430 should *not* be used as the basis for any emissions standard because these data could be biased low and would inappropriately affect the MACT Floor determinations.

- <u>Rich-burn engines operated at air-to-fuel ratios for lean burn engines</u>. It is commonly understood that rich burn engines operate with minimal excess exhaust oxygen, and this is reflected in regulatory definitions. For example, the Subpart ZZZZ definition at §63.6675 states,

> "*Rich burn engine* means any four-stroke spark ignited engine where the manufacturer's recommended operating air/fuel ratio divided by the stoichiometric air/fuel ratio at full load conditions is less than or equal to 1.1. Engines originally manufactured as rich burn engines, but modified prior to December 19, 2002 with passive emission control technology for NO_X (such as pre-combustion chambers) will be considered lean burn engines. Also, existing engines where there are no manufacturer's recommendations regarding air/fuel ratio will be considered a rich burn engine if the excess oxygen content of the exhaust at full load conditions is less than or equal to 2 percent."

Lean burns are defined in §63.6675 as,

> "*Lean burn engine* means any two-stroke or four-stroke spark ignited engine that does not meet the definition of a rich burn engine."

As discussed below and shown in Table 1, based on the 2 percent oxygen criteria, ***only one of the 13*** 4SRB engines used to determine the MACT Floor would be classified as a rich-burn engine. The remaining engines are operating at air-to-fuel ratios characteristic of lean burn engines and should not be included in the MACT Floor database for rich burn engines.

- <u>Incorrect engine categorization or inability to confirm subcategory</u>. Correct assignment of performance test data by engine type (i.e., 2-stroke lean burn, 4-stroke lean burn and 4-stroke rich burn) is essential for developing accurate MACT Floor levels. As indicated in the Table 3 footnotes, the 4SLB engine with Test ID 20.1 (Test Report 20) that is included in the best performing 12% and used for the MACT Floor determination could be a rich burn engine.

Test Report 20 also includes Test ID 20.2 which appears to be for the same engine and indicates the engine is equipped with NSCR. NSCR is the control technology for rich burn engines. In addition, data presented in "Appendix A: Emission Factor Documentation for AP-42 Section 3.2, Natural Gas-fired Reciprocating Engines" suggest this is a 4SRB engine. However, reported oxygen levels for tests 20.1 and 20.2 exceed 2%, representative of lean burn operation. The emission test report should be reviewed to determine if this engine is actually a lean burn engine or a rich burn engine improperly operated (i.e. excessive air-to-fuel ratio) during the testing. If the former, the engine should be categorized as lean burn. If the latter, the data should not be used for MACT floor development. This point discusses analysis issues, but these data should also be deleted because CARB 430 was used.

- Multiple tests of single engines are used as the basis for the MACT floor determination. As discussed below and shown in Table 2, fifteen of the sixteen emission tests for 2SLB engines are from a single engine operated at different operating conditions; thus, the proposed MACT floor is based on data from only two engines. In addition, this Colorado State University (CSU) test bed engine is more representative of a large bore, slow speed engine and more illustrative of a unit larger than 1000 hp (rather than a small engine subcategory). Removal of the CARB 430 emissions data will result in a MACT floor based on data from only one engine. Similarly, the 4SLB engine data in Table 3, which are used to develop the proposed MACT floor, are from only eight different engines. Removal of the CARB 430 emissions data will result in a MACT floor based on data from only three engines. There should be a "minimum standard" regarding the number of *sources* used to determine the MACT floor and multiple test runs from a single engine or three engines are not adequate (i.e. the sample size is inadequate for the population of affected units). This issue is discussed further at the close of this comment.
- Single measurement tests. Many of the test data used to develop the MACT floors are based on single measurements, which is not consistent with reference method and compliance determination standards. Three measurements are a standard requirement for compliance tests. With single measurements, it is not possible to identify erroneous or outlier data. For single measurement tests with multiple, similar test conditions (e.g., high load), it may be appropriate to average these data and use as a single test for the analysis; or, this data may be useful for analyzing emissions variability.
- Subcategory-specific data. Subpart ZZZZ includes subcategories based on engine type, fuel type, and engine size. The MACT floor analysis should segregate emissions according to the appropriate subcategory. For example, emissions from a unit indicative of a large engine make and model should not be used as the basis for a standard for a 100 hp engine unless EPA has credible analysis and scientific justification for broader application of the data. The Proposed Rule does not credibly substantiate that application of data from larger engines to subcategories that include very small engines.

Review of 4SRB Gas-Fired IC Engines MACT Floor Data

Table 1 presents formaldehyde emissions data for gas-fired SI non-emergency 4SRB engines 50 to 500 hp without post-combustion emission controls. These data were extracted from the RICE NESHAP emissions database. INGAA believes these are the data used to develop the proposed MACT floor for gas-fired SI non-emergency 4SRB engines 50 to 500 hp. EPA states that the proposed MACT floor for this engine subcategory is the level achieved by 4SRB engines 50 to 500 hp operating without add-on (i.e., post-combustion) controls. Table 1 has data from 13 tests of engines between 50 and 500 hp. The proposed MACT floor is based on the average of the best performing 12% of engines (or 2 tests). These data (shaded in the table) result in a proposed MACT floor of 2 ppmv formaldehyde. However, ***all the emissions were measured using CARB 430 and are considered non-quantitative***. In addition, ***for 12 of the 13 tests, the engines were operating with exhaust oxygen concentrations exceeding 2 percent*** and are characteristic of lean burn engines or anomalous operation for a rich burn engine. **Thus, none of the data in Table 1 are adequate for establishing a MACT floor and there are multiple problems that support excluding these data from the analysis.**

Review of 2SLB Gas-Fired IC Engines MACT Floor Data

Table 2 presents formaldehyde emissions data for gas-fired SI non-emergency 2SLB engines 50 to 500 hp without post-combustion emission controls. These data were extracted from the RICE NESHAP emissions database. INGAA believes these are the data used to develop the proposed MACT floor for gas-fired SI non-emergency 2SLB engines. EPA states the proposed MACT floor for this engine subcategory is the level achieved by 2SLB engines 50 to 500 hp operating without add-on (i.e., post-combustion) controls. Data from 16 tests of engines between 50 and 500 hp are presented.

EPA selected the average of the best performing 12 percent (or 2 tests) of engines, found the corresponding CO test data points and averaged those tests as well. The average of these two data is the proposed MACT floor of 85 ppmvd CO at 15 percent O_2. These data are not adequate for establishing a MACT floor because the database consists of emissions from only two engines and the formaldehyde emissions from the Test ID 7.14 engine were measured using CARB 430 and are considered non-quantitative and inappropriate for MACT floor determinations. In addition, the 15 “CSU” Test ID data are all single-measurement tests from one engine tested at Colorado State University (CSU) over a range of engine operating conditions; thus, these data are more appropriately represented as *one* Test ID. The two points averaged for the MACT floor are both high load tests from this CSU test matrix, and it is apparent from the data that operating load impacts emissions and there is emission variability during high load operation (i.e., 90 – 100%); thus, these data provide an opportunity for EPA to assess *emissions variability* for a single engine. In addition, although the engine rating is 440 hp, the CSU engine test bed 2SLB is more representative of a large, slow speed engine common in gas transmission – i.e., the Cooper Bessemer GMV at CSU is a short block (4 cylinders) version of a typically larger engine (8 or more cylinders typical in the field). Smaller 2SLB engines that are captured by the 500 hp and smaller size categories are not represented in the EPA data.

In summary, the 2SLB MACT Floor data consist of single-measurement test runs from a single engine, cannot be considered representative of the population of 2SLB engines, and do not include 2SLB models prevalent in the size-based subcategory; thus, the data are wholly inadequate for establishing a MACT floor. The CSU data should be reviewed to consider its appropriate use for the MACT floor emissions database. For example, similar test conditions could be averaged to determine average/representative emissions from this engine; the data could be reviewed within the context of “emissions variability” for this particular type of engine;

and/or, data review could inform decisions regarding emission limit applicability "at all loads" (e.g., see Comments 10 and 11). INGAA can assist in this evaluation, but suggest this data be reviewed within the context of a more robust emissions database. It is apparent that additional emissions data collection is needed to develop a more robust and representative database for MACT Floor development. The CSU data variability should be examined during the MACT Floor development as discussed below.

Review of 4SLB Gas-Fired IC Engines MACT Floor Data

Table 3 presents the formaldehyde emissions data for gas-fired SI non-emergency 4SLB engines greater than 500 hp without post-combustion emission controls. These data were extracted from the RICE NESHAP emissions database. INGAA believes these are the data used to develop the proposed MACT floor for gas-fired SI non-emergency 4SLB engines. EPA states that the proposed MACT floor for this engine subcategory is the level achieved by 4SLB engines 50 to 500 hp operating without add-on (i.e., post-combustion) controls. Data from 38 tests of engines greater than 500 hp are presented (*Note – Docket document EPA-HQ-OAR-2008-0708-0006 "Subcategorization and MACT Floor Determination for Stationary Reciprocating Internal Combustion Engines ≤500 HP at Major Sources" references 34 rather than 38 tests*). EPA has not adequately justified using performance test data from engines much larger than 500 hp for the uncontrolled 4SLB engine category between 50 and 500 hp.

EPA identified the best performing 12 percent (or 4 tests); these engines are shaded in Table 3. However, only one of the four best performing formaldehyde engines had corresponding CO emissions data. EPA did not want to propose a MACT floor based on only one CO test and used an alternative CO data selection approach. However, there is some confusion regarding the data used and derivation of the MACT floor for CO. This analysis is not transparent. Docket document EPA-HQ-OAR-2008-0708-0006 states that "EPA took the average of the best performing 12 percent of engines (or 4 tests) for formaldehyde and identified the corresponding CO values from the top 12 tests for formaldehyde." INGAA extracted these CO data from the NESHAP database and they are listed in Table 4 (note that there are corresponding CO values for only six of the engine tests); however, the average of these data is 112 ppmvd CO at 15 percent O_2, which differs from the proposed MACT floor of 95 ppmvd CO at 15 percent O_2. Alternatively, recent email correspondence with staff indicates that EPA based the proposed MACT floor on the average of the top 12 percent of the CO tests. These CO data are in Table 5 and the average of these data is 95 ppmvd of CO at 15 percent O_2. This value equals the proposed MACT floor. It should be noted that two of the CO tests included in Table 5 do not have a corresponding formaldehyde measurement. Numerous deficiencies have been identified for these data:

- All the data are for engines greater than 500 hp. There are no data or analysis that demonstrate that these emissions are representative of 4SLB engines 50 to 500 hp;
- Six of the emission tests in Table 3 used CARB 430 and are thus considered non-quantitative.
- As discussed above, the engine with Test ID 20.1 appears to be equipped with NSCR control and may be a rich burn engine. The emission test report should be reviewed to determine if this engine is actually a lean burn engine or a rich burn engine improperly operated (i.e. excessive air-to-fuel ratio) during the testing. If the former, the engine should be categorized

as lean burn. If the latter, the data should not be used for MACT floor development. However, this is CARB 430 data and should be eliminated from consideration.

- The reported formaldehyde emissions from Test ID 29.33x are less than 2% of the emissions from all the other tests conducted on the Cooper Bessemer LSV-16 and this test appears to be an outlier. Similarly, the reported emissions from Test ID 29.41x are only 15 – 23% of the other tests conducted on the Ingersoll Rand KVS-412 and this test also appears to be an outlier. INGAA is attempting to locate these test reports and conduct an additional review and analysis, but the timing of comments did not allow this task to be completed.
- Removal of the CARB 430 emissions data will result in a MACT floor based on data from only three engines. These are all single-measurement tests. For each engine, these data may be more appropriately represented as one Test ID that is an average of the test runs or the emission tests should be reviewed to determine which tests should be grouped based on common operating conditions (e.g., operating load from 90 to 100%) and averaged. INGAA does not believe it is appropriate for tests from 3 engines to serve as the basis to identify an average of the best performing 12%. As discussed below, using the implied minimum standard in Clean Air Act §112(d)(3), more data should be collected to construct a more robust database or it may be more reasonable to base the floor on the average of all tests when less than 5 tests are available.

Table 6 lists the remaining 4SLB formaldehyde emissions data after the data with the deficiencies discussed above have been removed from the Table 3. The individual test run data from the three engines are presented along with the average emissions. Consistent with the emissions variability discussion in Comment 6, the average values should be used to rank the engines to determine the best performing units and emissions variability considered for determining the MACT floor. Similarly, Table 7 lists the carbon monoxide emissions data that correspond to the formaldehyde emissions data in Table 6 and document the deficiency of only three tests.

To summarize the conclusions regarding the data that serve as the basis of the MACT floor analysis for gas-fired engine, INGAA supports EPA's assertion from earlier RICE NESHAP rules, **EPA concluded during the initial IC engine NESHAP development (June 2004 Final Rule) that there were insufficient data to develop emission standards for existing natural gas-fired engines less than 500 hp. EPA has not supplemented that data in the interim or engaged stakeholders in an effort to supplement the data (e.g., diesel engines were addressed via an Advanced Notice of Proposed Rulemaking).**

The above discussion of the available emissions data supports this conclusion and indicates that insufficient reliable data are currently in the RICE NESHAP database for regulatory development. INGAA recommends that EPA develop and implement appropriate quality assurance and quality control for MACT Floor and Above the Floor determinations for this and all other NESHAP rulemakings to ensure that data relied upon is consistently and appropriately included, correctly characterized, representative of the category, and complete (i.e., see discussion in Comment 40). Removing the non-quantitative CARB 430 data results in a database for MACT Floor analysis with zero 4SRB engines, one 2SLB engine, and three 4SLB engines. An intensive emissions data collection effort is required to develop an emissions database from a representative sampling of the populations of gas-fired 4SRB, 4SLB, and 2SLB engines less than 500 hp. INGAA is attempting to gather available data from its members, but additional time is needed for data collection and possibly additional testing. INGAA welcomes additional discussion with EPA on this topic and the timing required to compile adequate emissions data for MACT floor determinations.

EPA should base MACT floor analyses on emissions data from *multiple engines* that represent the population of affected engines. As discussed in Comment 7, multiple tests on a single engine are more appropriately used to analyze emission variability or provide operating context for emission limit applicability (e.g., if high load tests are used to determine the MACT floor, the standard should apply at high load and EPA should not presume that those emissions are representative of other operating conditions).

Finally, as noted above, INGAA strongly believes that it is imperative to have a larger, more representative database to develop standards that will affect hundreds of thousands of engines, rather than the few data points currently available. INGAA believes there is an implied minimum standard of unit-specific data that should serve as the basis for the MACT floor – i.e., there should be a minimum number of *sources* used to determine the MACT floor and multiple test runs from a single engine or a few engines are not adequate (i.e., the sample size is inadequate for the population of affected units).

The MACT floor for existing engines under Subpart ZZZZ is based Clean Air Act §112(d)(3)(A), i.e., the average emission limitation achieved by the best performing 12 percent of the existing *sources*. For source categories with few sources, §112(d)(3)(B) requires that the MACT floor be based on the best performing 5 sources if the source category has fewer than 30 sources. For the Proposed Rule analysis, where there are many thousands of sources in each subcategory, EPA has based a MACT floor on as few as ONE source (e.g., two data points from the CSU dataset for the 2SLB engine). INGAA finds the anomaly between the minimum data requirement in §112(d)(3)(B) and EPA's analysis under §112(d)(3)(A) striking – i.e., 5 sources are used as the basis for a category with fewer than 30 units, yet EPA bases the MACT floor for a subcategory with thousands of sources on just one unit. While there is a demarcation between §112(d)(3)(A) and (B), one could also argue that there is also an implied minimum standard that should be considered when determining the MACT floor.

Even if the data were all valid for the analysis completed, INGAA believes that the source counts are not significant enough to form the basis for an emission standard, especially when factors such as emissions variability need to be considered. When the "bad data" are deleted from the floor analysis, per the discussion above, EPA is left with 0, 1 or 3 source tests for the three natural gas-fired engine source categories. INGAA does not believe that this limited amount of data can be used to develop a reasoned and practical standard that meets the intent of CAA §112. Additional data is needed for all of the natural gas-fired engine source categories, and INGAA offers our assistance in devising and executing a plan to compile a more robust and representative emissions database.

Table 1. Proposed MACT Floor Formaldehyde Emissions Data for Gas-Fired 4SRB Engines: 50 ≤ hp ≤ 500.

Test ID	Engine Specifications				Test Method	O2 (%)			Formaldehyde ppb @ 15% O2*				Notes
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg	
11.2	Ingersoll Rand	8SVG	440	100%	CARB 430	5.0	5.0	5.0	1,247	1,896	1,900	1,681	A, B
7.4	Waukesha	MM425	54	100%	CARB 430	0.3	0.3	0.3	1,756	1,802	2,323	1,960	B
11.3	Ingersoll Rand	8SVG	440	100%	CARB 430	16.7	16.7	16.7	8,596	5,352	5,543	6,497	A, B
7.1	NR	MM605	60	100%	CARB 430	3.3	3.3	3.3	5,793	14,733	1,797	7,441	A, B
7.5	NR	MM336	77	100%	CARB 430	6.0	6.0	6.0	11,060	3,679	8,359	7,699	A, B
7.12	Waukesha	1197	208	100%	CARB 430	5.7	5.7	5.7	10,752	3,990	8,462	7,735	A, B
7.7	Waukesha	1197	208	100%	CARB 430	2.7	2.7	2.7	7,894	7,401	8,069	7,788	A, B
7.3	Waukesha	1197	159	100%	CARB 430	4.6	4.6	4.6	12,296	10,580	9,787	10,888	A, B
7.10	Waukesha	145	74	100%	CARB 430	7.1	7.1	7.1	13,031	10,795	8,906	10,911	A, B
7.11	Waukesha	145	74	100%	CARB 430	2.4	2.4	2.4	9,169	11,956	12,090	11,072	A, B
7.8	Waukesha	1197	208	100%	CARB 430	6.0	6.0	6.0	12,845	17,696	18,694	16,412	A, B
7.6	NR	MM335	77	100%	CARB 430	7.0	7.0	7.0	16,872	17,471	17,225	17,189	A, B
7.2	NR	MM605	60	100%	CARB 430	4.5	4.5	4.5	38,375	35,569	18,125	30,690	A, B

* Rounding convention may cause slightly different values than reported in other docket documents.

A. Engine exhaust oxygen exceeds 2 percent, engine operating as a lean burn engine during emissions test.

B. Engine formaldehyde emissions measured using CARB 430 and should be considered “non-quantitative.”

Table 2. Proposed MACT Floor Formaldehyde Emissions Data for Gas-Fired 2SLB Engines: 50 $\leq$ hp $\leq$ 500.

Test ID	Engine Specifications				Test Method	O2 (%)			Formaldehyde ppb @ 15% O2*				Notes
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg	
CSU-1.4.1	Cooper Bessemer	GMV-4VTF	440	95%	FTIR	14.7	NR	NR	15,333	NR	NR	15,333	C
CSU-1.14.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.6	NR	NR	15,776	NR	NR	15,776	C
CSU-1.6.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.34	NR	NR	16,091	NR	NR	16,091	C
CSU-1.1.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.6	NR	NR	16,693	NR	NR	16,693	C
CSU-1.9.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.5	NR	NR	16,725	NR	NR	16,725	C
CSU-1.5.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	15.1	NR	NR	17,173	NR	NR	17,173	C
CSU-1.10.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.63	NR	NR	17,369	NR	NR	17,369	C
CSU-1.16.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.6	NR	NR	18,002	NR	NR	18,002	C
CSU-1.11.1	Cooper Bessemer	GMV-4VTF	440	95%	FTIR	15.2	NR	NR	18,002	NR	NR	18,002	C
CSU-1.13.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.6	NR	NR	18,166	NR	NR	18,166	C
CSU-1.15.1	Cooper Bessemer	GMV-4VTF	440	100%	FTIR	14.7	NR	NR	18,274	NR	NR	18,274	C
CSU-1.12.1	Cooper Bessemer	GMV-4VTF	440	95%	FTIR	15.3	NR	NR	18,365	NR	NR	18,365	C
CSU-1.8.1	Cooper Bessemer	GMV-4VTF	440	95%	FTIR	15.6	NR	NR	19,021	NR	NR	19,021	C
CSU-1.3.1	Cooper Bessemer	GMV-4VTF	440	69%	FTIR	16.08	NR	NR	22,443	NR	NR	22,443	C
CSU-1.2/7.1	Cooper Bessemer	GMV-4VTF	440	68%	FTIR	15.8	NR	NR	24,112	NR	NR	24,112	C
7.14	Clark	MA-4	150	100%	CARB 430	14.2	14.2	14.2	33,744	27,704	28,655	30,034	D

* Rounding convention may cause slightly different values than reported in other docket documents.

C. Emissions data from one engine.

D. Engine formaldehyde emissions measured using CARB 430 and should be considered "non-quantitative."

Table 3. Proposed MACT Floor Formaldehyde Emissions Data for Gas-Fired 4SLB Engines: 50 ≤ hp ≤ 500.

Test ID	Engine Specifications				Test Method	O2 (%)			Formaldehyde ppb @ 15% O2*				Notes
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg	
29.33x	Cooper Bessemer	LSV-16	4,200	98%	FTIR	9.6	NR	NR	ND(326)	NR	NR	ND (326)	E, F
20.1	Ingersoll Rand	LVG-82	650	90%	CARB 430	5.6	6.17	7.7	2,000	ND	760	935	G, H
3.12	Dresser-Rand	KVS-412	2,000	90%	CARB 430	9.9	9.9	9.9	2,570	2,570	2,570	2,570	H
27	Delaval	DGSR-46	3,500	100%	CARB 430	12.5	11.7	11.7	5,070	4,660	2,210	3,980	H
29.41x	Ingersoll Rand	KVS-412	2,000	91%	FTIR	8.3	NR	NR	4,680	NR	NR	4,680	E, I
25.2	Ingersoll Rand	KVR 616	5,500	70%	CARB 430	13.8	13.75	13.6	3,570	7,270	3,480	4,773	H
21	Waukesha	7042-GL	1,000	100%	CARB 430	9.28	9.3	9.3	12,300	6,710	8,480	9,163	H
3.7	Dresser-Rand	KVS-412	2,000	100%	CARB 430	12.1	12.1	12.1	10,100	10,100	10,100	10,100	H
29.38x	Cooper Bessemer	LSV-16	4,200	99%	FTIR	9.3	NR	NR	15,900	NR	NR	15,900	F
29.34x	Cooper Bessemer	LSV-16	4,200	101%	FTIR	9.4	NR	NR	16,000	NR	NR	16,000	F
29.37x	Cooper Bessemer	LSV-16	4,200	98%	FTIR	9.5	NR	NR	17,100	NR	NR	17,100	F
29.35x	Cooper Bessemer	LSV-16	4,200	87%	FTIR	9.9	NR	NR	18,900	NR	NR	18,900	F
29.36x	Cooper Bessemer	LSV-16	4,200	85%	FTIR	11	NR	NR	19,700	NR	NR	19,700	F
29.44x	Ingersoll Rand	KVS-412	2,000	89%	FTIR	11.3	NR	NR	20,500	NR	NR	20,500	I
29.46x	Ingersoll Rand	KVS-412	2,000	92%	FTIR	11.3	NR	NR	25,400	NR	NR	25,400	I
29.51x	Ingersoll Rand	KVS-412	2,000	87%	FTIR	11.1	NR	NR	26,700	NR	NR	26,700	I
29.49x	Ingersoll Rand	KVS-412	2,000	88%	FTIR	11.4	NR	NR	26,800	NR	NR	26,800	I
29.50x	Ingersoll Rand	KVS-412	2,000	88%	FTIR	11.2	NR	NR	27,700	NR	NR	27,700	I
29.45x	Ingersoll Rand	KVS-412	2,000	82%	FTIR	11.4	NR	NR	28,400	NR	NR	28,400	I
29.48x	Ingersoll Rand	KVS-412	2,000	84%	FTIR	11.6	NR	NR	30,600	NR	NR	30,600	I
29.52x	Ingersoll Rand	KVS-412	2,000	80%	FTIR	11.3	NR	NR	30,900	NR	NR	30,900	I
29.47x	Ingersoll Rand	KVS-412	2,000	85%	FTIR	11.5	NR	NR	31,000	NR	NR	31,000	I
CSU-2.4.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	33,371	NR	NR	33,371	J
CSU-2.9.1	Waukesha	3521 GL	736	100%	FTIR	9.69	NR	NR	33,806	NR	NR	33,806	J
CSU-2.6.1	Waukesha	3521 GL	736	100%	FTIR	9.1	NR	NR	33,833	NR	NR	33,833	J

Table 3. (Continued)

Test ID	Engine Specifications				Test Method	O2 (%)			Formaldehyde ppb @ 15% O2				Notes
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg	
CSU-2.14.1	Waukesha	3521 GL	736	100%	FTIR	9.81	NR	NR	33,939	NR	NR	33,939	J
CSU-2.11.1	Waukesha	3521 GL	736	100%	FTIR	9.81	NR	NR	33,955	NR	NR	33,955	J
CSU-2.1.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	34,128	NR	NR	34,128	J
CSU-2.10.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	34,383	NR	NR	34,383	J
CSU-2.16.1	Waukesha	3521 GL	736	100%	FTIR	9.82	NR	NR	34,840	NR	NR	34,840	J
CSU-2.3.1	Waukesha	3521 GL	736	70%	FTIR	9.81	NR	NR	34,960	NR	NR	34,960	J
CSU-2.12.1	Waukesha	3521 GL	736	100%	FTIR	9.9	NR	NR	34,987	NR	NR	34,987	J
CSU-2.15.1	Waukesha	3521 GL	736	100%	FTIR	9.9	NR	NR	35,102	NR	NR	35,102	J
CSU-2.2.1	Waukesha	3521 GL	736	70%	FTIR	9.82	NR	NR	36,637	NR	NR	36,637	J
CSU-2.13.1	Waukesha	3521 GL	736	100%	FTIR	10.44	NR	NR	36,742	NR	NR	36,742	J
CSU-2.8.1	Waukesha	3521 GL	736	100%	FTIR	10.5	NR	NR	37,203	NR	NR	37,203	J
CSU-2.7.1	Waukesha	3521 GL	736	70%	FTIR	9.2	NR	NR	37,907	NR	NR	37,907	J
CSU-2.5.1	Waukesha	3521 GL	736	100%	FTIR	10.51	NR	NR	42,046	NR	NR	42,046	J

* Rounding convention may cause slightly different values than reported in other docket documents; “ND” with a value in parenthesis indicates that test result was “not detectable” and half the detection limit is reported.

E. Are these outliers –Emissions data from one engine and outlier analysis should be completed
F. Emissions data from one engine.
G. Engine with Test ID 20.1 appears to be equipped with NSCR control and may be a rich burn engine. The emission test report should be reviewed to determine if this engine is actually a lean burn engine or a rich burn engine improperly operated (i.e. excessive air-to-fuel ratio) during the testing. If the former, the engine should be categorized as lean burn. If the latter, the data should not be used for MACT floor development.
H. Engine formaldehyde emissions measured using CARB 430 and should be considered “non-quantitative.”
I. Emissions data from one engine.
J. Emissions data from one engine.

Table 4. Proposed MACT Floor Carbon Monoxide Emissions Data for Gas-Fired 4SLB Engines: 50 ≤ hp ≤ 500.**

Test ID	Engine Specifications				Test Method	O2 (%)			CO ppbv @ 15% O2				Notes
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg	
29.33x	Cooper Bessemer	LSV-16	4,200	98%	FTIR	9.6	NR	NR	106,000	NR	NR	106,000	K
29.41x	Ingersoll Rand	KVS-412	2,000	91%	FTIR	8.3	NR	NR	59,000	NR	NR	59,000	
29.38x	Cooper Bessemer	LSV-16	4,200	99%	FTIR	9.3	NR	NR	131,000	NR	NR	131,000	K
29.34x	Cooper Bessemer	LSV-16	4,200	101%	FTIR	9.4	NR	NR	111,000	NR	NR	111,000	K
29.37x	Cooper Bessemer	LSV-16	4,200	98%	FTIR	9.5	NR	NR	134,000	NR	NR	134,000	K
29.35x	Cooper Bessemer	LSV-16	4,200	87%	FTIR	9.9	NR	NR	132,000	NR	NR	132,000	K

* Rounding convention may cause slightly different values than reported in other docket documents.
** Based on corresponding CO values from the top 12 tests for formaldehyde
K. Emissions data from one engine.

Table 5. Proposed MACT Floor Carbon Monoxide Emissions Data for Gas-Fired 4SLB Engines: 50 ≤ hp ≤ 500. ***

Test ID	Engine Specifications				Test Method	O2 (%)			CO ppbv @ 15% O2				Notes
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg	
29.41x	Ingersoll Rand	KVS-412	2,000	91%	FTIR	8.3	NR	NR	59,000	NR	NR	59,000	L
29.39x	Ingersoll Rand	KVS-412	2,000	88%	FTIR	8.3	NR	NR	64,600	NR	NR	64,600	L, M
29.40x	Ingersoll Rand	KVS-412	2,000	91%	FTIR	8.56	NR	NR	67,400	NR	NR	67,400	L, M
29.33x	Cooper Bessemer	LSV-16	4,200	98%	FTIR	9.6	NR	NR	106,000	NR	NR	106,000	N
29.34x	Cooper Bessemer	LSV-16	4,200	101%	FTIR	9.4	NR	NR	111,000	NR	NR	111,000	N
29.36x	Cooper Bessemer	LSV-16	4,200	85%	FTIR	11	NR	NR	125,000	NR	NR	125,000	N
29.38x	Cooper Bessemer	LSV-16	4,200	99%	FTIR	9.3	NR	NR	131,000	NR	NR	131,000	N

* Rounding convention may cause slightly different values than reported in other docket documents.
*** Based on the top 12 percent of the CO tests.
L. Emissions data from one engine.
M. Emissions database does not include formaldehyde emissions data for this test run.
N. Emissions data from one engine.

Table 6. Revised MACT Floor Formaldehyde Emissions Data for Gas-Fired 4SLB Engines: 50 ≤ hp ≤ 500.

Test ID	Engine Specifications				Test Method	O2 (%)			Formaldehyde ppb @ 15% O2*			
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg
~~29.33x~~**	~~Cooper Bessemer~~	~~LSV-16~~	~~4,200~~	~~98%~~	~~FTIR~~	~~9.6~~	~~NR~~	~~NR~~	~~ND~~	~~NR~~	~~NR~~	~~625~~
29.38x	Cooper Bessemer	LSV-16	4,200	99%	FTIR	9.3	NR	NR	15,900	NR	NR	15,900
29.34x	Cooper Bessemer	LSV-16	4,200	101%	FTIR	9.4	NR	NR	16,000	NR	NR	16,000
29.37x	Cooper Bessemer	LSV-16	4,200	98%	FTIR	9.5	NR	NR	17,100	NR	NR	17,100
29.35x	Cooper Bessemer	LSV-16	4,200	87%	FTIR	9.9	NR	NR	18,900	NR	NR	18,900
29.36x	Cooper Bessemer	LSV-16	4,200	85%	FTIR	11	NR	NR	19,700	NR	NR	19,700
Average												**17,520**
~~29.41x~~**	~~Ingersoll Rand~~	~~KVS-412~~	~~2,000~~	~~91%~~	~~FTIR~~	~~8.3~~	~~NR~~	~~NR~~	~~4,680~~	~~NR~~	~~NR~~	~~4,680~~
29.44x	Ingersoll Rand	KVS-412	2,000	89%	FTIR	11.3	NR	NR	20,500	NR	NR	20,500
29.46x	Ingersoll Rand	KVS-412	2,000	92%	FTIR	11.3	NR	NR	25,400	NR	NR	25,400
29.51x	Ingersoll Rand	KVS-412	2,000	87%	FTIR	11.1	NR	NR	26,700	NR	NR	26,700
29.49x	Ingersoll Rand	KVS-412	2,000	88%	FTIR	11.4	NR	NR	26,800	NR	NR	26,800
29.50x	Ingersoll Rand	KVS-412	2,000	88%	FTIR	11.2	NR	NR	27,700	NR	NR	27,700
29.45x	Ingersoll Rand	KVS-412	2,000	82%	FTIR	11.4	NR	NR	28,400	NR	NR	28,400
29.48x	Ingersoll Rand	KVS-412	2,000	84%	FTIR	11.6	NR	NR	30,600	NR	NR	30,600
29.52x	Ingersoll Rand	KVS-412	2,000	80%	FTIR	11.3	NR	NR	30,900	NR	NR	30,900
29.47x	Ingersoll Rand	KVS-412	2,000	85%	FTIR	11.5	NR	NR	31,000	NR	NR	31,000
Average												**27,556**
CSU-2.4.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	33,371	NR	NR	33,371
CSU-2.9.1	Waukesha	3521 GL	736	100%	FTIR	9.69	NR	NR	33,806	NR	NR	33,806
CSU-2.6.1	Waukesha	3521 GL	736	100%	FTIR	9.1	NR	NR	33,833	NR	NR	33,833
CSU-2.14.1	Waukesha	3521 GL	736	100%	FTIR	9.81	NR	NR	33,939	NR	NR	33,939
CSU-2.11.1	Waukesha	3521 GL	736	100%	FTIR	9.81	NR	NR	33,955	NR	NR	33,955
CSU-2.1.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	34,128	NR	NR	34,128
CSU-2.10.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	34,383	NR	NR	34,383
CSU-2.16.1	Waukesha	3521 GL	736	100%	FTIR	9.82	NR	NR	34,840	NR	NR	34,840
CSU-2.3.1	Waukesha	3521 GL	736	70%	FTIR	9.81	NR	NR	34,960	NR	NR	34,960
CSU-2.12.1	Waukesha	3521 GL	736	100%	FTIR	9.9	NR	NR	34,987	NR	NR	34,987
CSU-2.15.1	Waukesha	3521 GL	736	100%	FTIR	9.9	NR	NR	35,102	NR	NR	35,102
CSU-2.2.1	Waukesha	3521 GL	736	70%	FTIR	9.82	NR	NR	36,637	NR	NR	36,637
CSU-2.13.1	Waukesha	3521 GL	736	100%	FTIR	10.44	NR	NR	36,742	NR	NR	36,742
CSU-2.8.1	Waukesha	3521 GL	736	100%	FTIR	10.5	NR	NR	37,203	NR	NR	37,203
CSU-2.7.1	Waukesha	3521 GL	736	70%	FTIR	9.2	NR	NR	37,907	NR	NR	37,907
CSU-2.5.1	Waukesha	3521 GL	736	100%	FTIR	10.51	NR	NR	42,046	NR	NR	42,046
Average												**35,490**

* Rounding convention may cause slightly different values than reported in other docket documents. **Data appear to be outliers.

Table 7. Revised MACT Floor Carbon Monoxide Emissions Data for Gas-Fired 4SLB Engines: 50 $\leq$ hp $\leq$ 500.

Test ID	Engine Specifications				Test Method	O2 (%)			Carbon Monoxide ppb @ 15% O2*			
	Manufacturer	Model	hp	Load		Run 1	Run 2	Run 3	Run 1	Run 2	Run 3	Avg
~~29.33x~~**	~~Cooper Bessemer~~	~~LSV-16~~	~~4,200~~	~~98%~~	~~FTIR~~	~~9.6~~	~~NR~~	~~NR~~	~~106,000~~	~~NR~~	~~NR~~	~~106,000~~
29.38x	Cooper Bessemer	LSV-16	4,200	99%	FTIR	9.3	NR	NR	131,000	NR	NR	131,000
29.34x	Cooper Bessemer	LSV-16	4,200	101%	FTIR	9.4	NR	NR	111,000	NR	NR	111,000
29.37x	Cooper Bessemer	LSV-16	4,200	98%	FTIR	9.5	NR	NR	134,000	NR	NR	134,000
29.35x	Cooper Bessemer	LSV-16	4,200	87%	FTIR	9.9	NR	NR	132,000	NR	NR	132,000
29.36x	Cooper Bessemer	LSV-16	4,200	85%	FTIR	11	NR	NR	125,000	NR	NR	125,000
Average												**126,600**
~~29.41x~~**	~~Ingersoll Rand~~	~~KVS-412~~	~~2,000~~	~~91%~~	~~FTIR~~	~~8.3~~	~~NR~~	~~NR~~	~~59,000~~	~~NR~~	~~NR~~	~~59,000~~
29.44x	Ingersoll Rand	KVS-412	2,000	89%	FTIR	11.3	NR	NR	216,000	NR	NR	216,000
29.46x	Ingersoll Rand	KVS-412	2,000	92%	FTIR	11.3	NR	NR	232,000	NR	NR	232,000
29.51x	Ingersoll Rand	KVS-412	2,000	87%	FTIR	11.1	NR	NR	240,000	NR	NR	240,000
29.49x	Ingersoll Rand	KVS-412	2,000	88%	FTIR	11.4	NR	NR	206,000	NR	NR	206,000
29.50x	Ingersoll Rand	KVS-412	2,000	88%	FTIR	11.2	NR	NR	240,000	NR	NR	240,000
29.45x	Ingersoll Rand	KVS-412	2,000	82%	FTIR	11.4	NR	NR	239,000	NR	NR	239,000
29.48x	Ingersoll Rand	KVS-412	2,000	84%	FTIR	11.6	NR	NR	231,000	NR	NR	231,000
29.52x	Ingersoll Rand	KVS-412	2,000	80%	FTIR	11.3	NR	NR	277,000	NR	NR	277,000
29.47x	Ingersoll Rand	KVS-412	2,000	85%	FTIR	11.5	NR	NR	263,000	NR	NR	263,000
Average												**238,222**
CSU-2.4.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	314,000	NR	NR	314,000
CSU-2.9.1	Waukesha	3521 GL	736	100%	FTIR	9.69	NR	NR	326,000	NR	NR	326,000
CSU-2.6.1	Waukesha	3521 GL	736	100%	FTIR	9.1	NR	NR	335,000	NR	NR	335,000
CSU-2.14.1	Waukesha	3521 GL	736	100%	FTIR	9.81	NR	NR	349,000	NR	NR	349,000
CSU-2.11.1	Waukesha	3521 GL	736	100%	FTIR	9.81	NR	NR	330,000	NR	NR	330,000
CSU-2.1.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	330,000	NR	NR	330,000
CSU-2.10.1	Waukesha	3521 GL	736	100%	FTIR	9.8	NR	NR	333,000	NR	NR	333,000
CSU-2.16.1	Waukesha	3521 GL	736	100%	FTIR	9.82	NR	NR	334,000	NR	NR	334,000
CSU-2.3.1	Waukesha	3521 GL	736	70%	FTIR	9.81	NR	NR	305,000	NR	NR	305,000
CSU-2.12.1	Waukesha	3521 GL	736	100%	FTIR	9.9	NR	NR	329,000	NR	NR	329,000
CSU-2.15.1	Waukesha	3521 GL	736	100%	FTIR	9.9	NR	NR	335,000	NR	NR	335,000
CSU-2.2.1	Waukesha	3521 GL	736	70%	FTIR	9.82	NR	NR	315,000	NR	NR	315,000
CSU-2.13.1	Waukesha	3521 GL	736	100%	FTIR	10.44	NR	NR	350,000	NR	NR	350,000
CSU-2.8.1	Waukesha	3521 GL	736	100%	FTIR	10.5	NR	NR	364,000	NR	NR	364,000
CSU-2.7.1	Waukesha	3521 GL	736	70%	FTIR	9.2	NR	NR	323,000	NR	NR	323,000
CSU-2.5.1	Waukesha	3521 GL	736	100%	FTIR	10.51	NR	NR	421,000	NR	NR	421,000
Average												**337,063**

* Rounding convention may cause slightly different values than reported in other docket documents. **Data appear to be outliers.

6. Recent court decisions have questioned EPA's MACT floor analysis and consideration of variability. EPA has not considered emissions variability in establishing the MACT floor. This analysis should be completed, with variability reflected in the emission standards.

Recent court decisions have questioned EPA's MACT floor analysis and consideration of variability. EPA has not considered emissions variability in establishing the proposed MACT floor. As noted in the U.S. Court of Appeals, District of Columbia Circuit "Brick MACT" ruling (479 F.3d 875), the ruling from *Mossville Environmental Action Now v. EPA*, 370 F.3d 1232 (D.C.Cir.2004) holds that "floors may legitimately account for variability [in the best performing sources that are the MACT floor basis] because "each [source] must meet the [specified] standard every day and under all operating conditions." The multi-operating condition data for the 2SLB and 4SLB engines in Tables 2 and 3 provide a measure of the emission variability in these sources. The revised MACT floor analysis and emission standards should reflect this variability.

A challenge in considering variability is the lack of meaningful datasets that provide a means to investigate variability and incorporate technically justified decisions into the emission standard. As discussed in Comment 40, INGAA recommends that EPA publish policy memos that discuss how recent Court decisions will be integrated into NESHAP rules. In the Proposed Rule, it is evident that variability is *not* considered, and INGAA is concerned that this does not comport with recent Court decisions. The consideration of variability is one factor that warrants technical discussion and communication with the public on EPA's intended analytical approach. INGAA recommends that EPA review options and discuss the options and conclusions with the public and affected stakeholders.

For example, one approach to determining MACT is to identify the top 12% of engines based on average emissions for each engine from all testing at high (100 +/- 10%) load. Then, after the "best performers" are identified, use lower load or other non-optimum operating emissions data to determine variability of best performers and MACT Floor; that is, MACT floor must be set less stringent than highest emission data point for best performers. This will result in a higher (less stringent) emission standard than that determined from average of best performing 12%. Another approach is to use an "all data" average (i.e. consider variability in the average calculation, that is, use all emissions data for the 12% to determine the average, not just data from operation at 90-110% load). However, this approach is complicated by the lack of reduced load data or data across the engine operating envelope for most source tests. The same issue is relevant for the first approach discussed. In either case, the paucity of data may require that additional, focused testing be conducted. INGAA does not advocate establishing a standard where this issue is simply ignored, which was the apparent approach in the Proposed Rule. As noted, INGAA is willing to work with EPA on this issue, but any efforts are complicated by the limited timeframe to develop a final rule.

Ultimately, this analysis must relate to the compliance monitoring requirements included in the final rule and context or constraints for emission limit applicability. These issues (e.g., emission limit applicability at reduced load) are discussed in other comments. Resolution of this issue could also relate to whether §112(h) approaches are integrated into the final rule, as discussed in

Comment 4 and other comments. Clearly, these issues are complicated and require compiling additional data, and a thoughtful and scientifically sound review and analysis process.

7. Depending upon conclusions that result from re-analysis of the MACT floor and "above the floor" controls, it may be necessary to identify additional subcategories with unique characteristics, such as lean burn engines that have exhaust temperatures too cool to achieve adequate catalytic reduction.

As proposed, the emission limits cannot be achieved by many engines within particular subcategories. For example, some affected engines have design and/or operating limitations that preclude effective performance of post-combustion controls. In the Proposed Rule, one example is 2-stroke lean burn (2SLB) engines that cannot achieve the required exhaust temperature for effective catalyst performance. Based on the emission limits, those engines would require replacement. Alternatively, if EPA has data to indicate that some 2SLB units can achieve the standard, then a separate subcategory should be considered for those 2SLB makes and models where characteristic exhaust temperatures preclude catalyst performance.

Another example is an IC engine that drives an air compressor. These engines are common at natural gas transmission compressor stations. An air compressor driver will cycle on and off frequently, and typically operate for a very short time when operating. These units are typically 4SRB engines larger than 100 hp and most compressor stations are major sources. Thus, emission limits would apply based on catalytic control. However, testing is not practical because the engine will not operate at a steady load or long enough for a test. With limited operating time, exhaust temperature is not likely to be hot enough for catalyst function and the cyclic load would challenge air to fuel ratio controller performance for NSCR. This example provides many technical reasons why an emission limit and compliance test (i.e., emissions measurement) is not feasible, and is a prime example of an engine type that may warrant a separate subcategory.

Other examples include existing engines with very little run time, such as a fire pumps or other existing units located at a facility that may operate very little depending upon demand. Depending on the engine size, an emission standard will likely apply, – thus requiring installation of controls on units that seldom if ever operate. Or, if management practices apply, a frequency based on calendar hours would require maintenance for an engine that has not operated (discussed further in Comment 23). Thus, a subcategory may be warranted for engines with limited use.

As discussed in Comment 5, it is apparent that additional data need to be collected and reviewed, and the MACT floor re-analyzed for natural gas-fired engines. The the floor analysis also needs to be revisited (see Comment 13). Depending upon the data used and how EPA conducts the analysis, it may be necessary to consider additional or different subcategories. For example, a subcategory may need to consider characteristic exhaust temperature, which is an innate operating characteristic that cannot be manipulated by the operator. A primary example is a lean burn engine with an exhaust temperature that is too cool to achieve adequate catalytic reduction. Comment 17 includes tabulated lean burn data from an EPA-sponsored test program where the engine exhaust temperature was too low for effective catalytic oxidation. Another example is an engine in cyclic load service or with characteristic short operating time, such as an air compressor. An additional example would be engines with limited run time, where management practices based on operating hours may be more appropriate than an emission standard. Other examples surely exist, especially when considering functional applications that may preclude the ability to achieve a hot enough exhaust temperature for a long enough time. If EPA determines that these engine types are not characteristic of the general engine population, their regulation may require the development of appropriate subcategories and emission standards. In some cases, Section 112(h) may need to be invoked to provide work practices as an alternative. If not, the rule would force replacement in some cases or require the elimination of functional equipment (e.g., air compressors) that is required to run the facility. If that scenario should occur, EPA needs to conduct additional analysis that considers the costs and cost-benefit associated with engine replacement or impacts on process operations.

Startup, Shutdown, and Malfunction and Emission Limit Applicability

8. **It is premature to include emission limits for startup, shutdown and malfunction (SSM) events in the Proposed Rule. Data are not available to establish SSM limits and EPA's conclusion that SSM emissions are commensurate with the MACT floor are not supported by a basic technical understanding of combustion emissions behavior. Alternative options available under Section 112(h) should be considered.**

On December 19, 2008, the U.S. Court of Appeals for the District of Columbia Circuit vacated the startup, shutdown and malfunction (SSM) exemption in Part 63, Subpart A (§63.6). The Court concluded that the SSM exemption rule must be vacated because it violates the Clean Air Act (CAA) requirement for HAP emission standards to apply continuously. The court reasoned that the CAA definition of "emissions standard" requires EPA to apply standards at all operating times, including SSM events. The Court ruling was made as EPA was completing the Proposed Rule, but EPA decided to address the issue and add SSM emission limits to the Proposed Rule.

The startup and malfunction limits are the same as the MACT floor emission limits, and the shutdown limits are the same as the "beyond the floor" emission limits when catalytic control is required. The only docket information on this topic is a February 2009 letter to EPA from the Engine Manufacturers Association (EMA). The letter notes that there are not data available on SSM events and provides some conjecture on how emissions may behave. Unfortunately, EPA appears to have used this single correspondence as the basis for establishing SSM emission limits, and has proposed requirements that differ from EMA recommendations. INGAA fails to understand the basis for this unfounded decision, as it is well understood that CO or formaldehyde emissions during low load, anomalous operations, etc., cannot be expected to be as low as a "best performing" stable operating engine. Without actual data or a sound science basis to conclude that SSM emissions are commensurate with the MACT floor, INGAA believes it is inappropriate to establish MACT floor (or beyond the floor) emission limits as SSM limits.

Due to the timing of the Court decision and the complete lack of SSM emissions data, INGAA believes that it is premature to include SSM emission limits in the Proposed Rule. At most, EPA should consider flexibility afforded under CAA §112(h) to consider alternatives to emission limits and adopt a work practice standard. Additional INGAA comment regarding EPA consideration of Section 112(h) is provided in Comment 4.

Since the Court decision is very recent, INGAA suggests that EPA await the final Court mandate and resolution of pending petitions. The Proposed Rule has attempted to address a number of Court decisions, and is the initial rule proposal to implement EPA's response to Court decisions in many cases. As discussed in Comment 40, the compelling nature of many of these issues warrants development of guidance and policy memoranda that inform the public regarding EPA's interpretation of the Court decisions and the process and analysis EPA will use to address them. The implications of these cases are extraordinarily significant and warrant EPA communication with the public and affected stakeholders so that agency interpretation is clear. In the Proposed Rule, INGAA could not identify any data, analysis, or discussion in the docket that would provide a reasonable technical basis to support the important decisions regarding SSM limits.

INGAA is not aware of data that supports the EPA decision – especially as it pertains to the array of *existing* engine subcategories that are included in the rule. If data are available, it is not apparent in the docket and EPA should provide these data for review and comment. However, it is apparent that EPA has used MACT floor emission limits (and beyond the floor catalytic control in some cases) as the basis for the SSM limits. Thus, the implied EPA conclusion is that emissions during SSM events are commensurate with the *average of the best performing 12%* of similar sources. While INGAA provides comments on the MACT floor limits in Comment 5, this comment discusses the conclusion that emissions during SSM are analogous to a "best performing" unit. In fact, basing the emission limit on a "best performing" MACT floor emission level contradicts a statement in the preamble. In requesting comments on the SSM approach in the Proposed Rule, the preamble indicates that,

> "… an approach that sets a single MACT standard that applies at all times, including SSM periods, may result in a higher overall MACT standard, based on the need to account for variation of operations in setting MACT standards." (74 FR 9711)

Thus, while EPA acknowledges that emissions variability is a required consideration for the MACT determination, based on INGAA's review of the MACT floor (see Comment 5), EPA did *not* conduct any analysis regarding operational effects or emissions variability. It is imperative that EPA provide technical rationale to support the important SSM decision, especially since it is not consistent with conventional wisdom on emissions performance for combustion sources. Alternatively, if EPA has somehow concluded that the Court decision compels EPA to base SSM limits on a "best performing" MACT floor representative of stable, high load operation, the basis for this interpretation should be clearly delineated and supported. A basic understanding of combustion chemistry and associated CO or formaldehyde emissions will result in a conclusion contrary to the EPA decision. There are numerous examples related to characteristic emissions performance for combustion sources and one is discussed here.

A basic understanding of combustion chemistry tells us that "hotter" and stable operation result in lower emissions of products of incomplete combustion (PICs) for any type of combustion source, including IC engines. CO and organics HAPs (including formaldehyde) are examples of PICs. For example, CO emissions are expected to be higher at low load because combustion temperature will be lower than at the design rating. This is true even at a *stable* low load. During variable load operation, it is commonly understood that PICs will increase and sometimes even "spike" over a short time duration. The MACT floor analysis has used "best performing" emissions data typically associated with a high load test, and INGAA does not believe that it can be technically supported that emissions during startup, shutdown, or malfunction will be similar to a best performing, stable, high load test point.

INGAA does not understand EPA's decision to include emission limits when data are not available to provide a basis for the emissions limits, and questions whether this violates a basic regulatory principle that standards must be based on data and fact, and not conjecture or supposition. INGAA also believes that it will be difficult or impossible to design a test program that can characterize emissions during SSM events for the array of engine subcategories and applications. For example, INGAA does not know how one would define emissions during "malfunction,", because malfunction by its very nature is an unexpected and anomalous occurrence that lacks any consistent characteristic from one event to another. Thus, it is apparent that alternatives need to be considered. However EPA determined the basis for SSM emissions or concluded that limits commensurate with the floor are required, this analysis or interpretation should be provided for review and comment.

As discussed in Comment 4, alternative options available under CAA §112(h) should be considered in the Proposed Rule, especially for SSM events. Section 112(h) provides EPA discretion to, "…promulgate a design, equipment, work practice, or operational standard, or combination thereof… if it is not feasible… to prescribe or enforce an emission standard…" While emissions measurement in a controlled testing environment is technically possible, there are obvious emissions measurement feasibility issues for prescribing, and more notably, enforcing an emission standard. From INGAA's perspective, §112(h) appears to be specifically designed to address issues such as those posed by SSM events, and it is apparent that §112(h) options should be viable. In rejecting the SSM exemption, the Court decision does not preclude §112(h) as an option but notes that EPA did not purport to act under this section. INGAA believes that EPA action under §112(h) is warranted because a viable and feasible alternative does not exist. In addition, INGAA recommends that SSM requirements be defined in Subpart ZZZZ rather than referring to the General Provisions (e.g., by revising and clarifying the SSM requirements in §63.6605 and §63.6640). If not, Part 63 Subpart A revisions need to be completed coincidental with this rulemaking because confusing or conflicting requirements would exist.

INGAA requests that EPA reconsider the SSM limits and not impose limits until a technically justified basis is available. The proposed limits are not reasonably justified and contradict basic combustion chemistry principles. EPA should also consider the very short duration and minimal emissions associated with SSM events for natural gas-fired engines. INGAA recommends that EPA consider the feasibility of prescribing and enforcing SSM standards for IC engines and alternatives available under §112(h). INGAA recommends defining SSM requirements in Subpart ZZZZ rather than referring to Subpart A. INGAA offers its assistance to work further with EPA addressing questions regarding work practice options and integrating that approach into the rule, and believes that a work practice standard for SSM events is the most justifiable, practical, logical, and reasonable approach.

9. To meet the emission level associated with the "best performing" MACT floor limits for an uncontrolled unit, catalytic control will be required for nearly all units. EPA has not appropriately considered the cost implications or emission limit achievability.

For major source engines and most area source engines, the Proposed Rule includes emissions limits. The MACT floor is based on an *uncontrolled* unit (i.e., the average emission limitation achieved by the average of the best performing 12% of units without catalytic control). For some categories, beyond the floor controls are required. Based on EPA's analysis approach for establishing the MACT floor (see Comment 5), the proposed MACT floor standards are very aggressive and will not be achievable by the vast majority of uncontrolled existing engines. This problem is further exacerbated by the failure to consider the array of operating conditions (e.g., reduced load, SSM events) or emission variability when establishing the MACT floor. Thus, to ensure compliance, the Proposed Rule emission limits would require operators to install catalytic control for all or nearly all existing engines with an emission limit. In its analysis and consideration of the rule costs and implementation issues, EPA fails to properly consider this issue and instead presumes that engines subject to emission standards based on an uncontrolled floor "will be able to meet the emission limitation without adding any aftertreatment controls" and consequently, that a relatively low percentage of units will require catalysts.

The exact number is not clearly presented in the EPA analysis, but a "back-calculated" estimate based on Regulatory Impact Analysis (RIA) engine counts and rolled-up costs implies that less than 20% of the natural gas-fired engines would require a catalyst. With emission limits applying for nearly all area source engines (other than very small lean burns, very small rich burns, and emergency engines <500 hp), INGAA expects this percentage to be much higher. With the limited time available for comment, INGAA cannot provide a specific alternative estimate at this time, but a logical discussion of potential implications provided below provides a description and context for likely implications.

The high demand for catalytic controls has serious implications for market demand, feasibility of installing controls within the mandated timeframe, and the rule cost-benefit analysis. EPA should reconsider the implications for catalytic control and revise the rule to address emission limit and implementation issues. INGAA is concerned that delays in permitting, catalyst delivery, and vendor availability could lead to service interruptions and possibly safety concerns. By not adequately considering the market implications and control technology installation logistics related to the Proposed Rule catalyst requirements, unintended consequences could include impacts on the reliable delivery of natural gas if engine shutdowns are required.

EPA's MACT Floor analysis uses the average of the best performing source tests (typically 2 or 4 test points) with test points at high load. Thus, since this is indicative of high load, stable operation (both associated with lowest CO and formaldehyde emissions) for "best performing" engines, it is obvious that these limits will *not* be achievable for most engines – or perhaps *all* engines when one considers issues like reduced load emission limit applicability. EPA estimates that there are approximately 290,000 natural gas-fired engines. INGAA believes that the majority of these will be subject to emission limits because the management practice provisions for area sources only apply to very small engines and emergency engines. The sheer volume of affected equipment would cause implementation issues because it is impractical to expect that this many units could be controlled by early 2013. Based on some simple assumptions, if it is assumed that about 150,000 of the natural gas-fired engines have an emission limit and thus require catalytic control, and if control installation was started *today,* over 3,300 engines would require control installation every month between now and March 2013 – or over 100 engines every day. This is impractical or impossible, and INGAA believes that an assumption of about half of the gas-fired engines subject to an emission limits is very conservative. In fact, EPA has verbally indicated that they expect that most engines will require control, but that verbal assertion is not consistent with the cost projections and engine counts in the RIA.

The RIA estimate of catalyst counts is not transparent, but INGAA believes that EPA has not properly considered the cost implications in the RIA. The failure to ponder even the most basic implementation quandaries demonstrates a lack of depth and attention to detail in the analysis and rule development process. A number of INGAA comments could influence the implications of this situation by reducing the prevalence of catalytic control requirements. For example, data collection and emission analysis that result in more appropriate MACT floor emission limits, more compliance via management or work practices rather than emission limits, consideration of variability in establishing the MACT floor, etc. could mitigate the potential compliance dilemma that would result from the catalyst demand implied by the Proposed Rule. As EPA reconsiders various other comments regarding emission limits, alternatives, etc. and draws any new conclusions, INGAA requests that a more thorough review of compliance implications and thorough RIA review be completed to properly consider costs and compliance implementation issues caused by the broad application of catalytic controls to stationary engines. If emission limits are not revised, then INGAA recommends that EPA revisit the RIA analysis to provide a more transparent analysis of catalyst requirements, including market availability and practical limitations. The timing and schedule for compliance also needs to be more thoughtfully considered based on market constraints.

10. Rule requirements indicate that emission limits apply at all times, but there are not data or analysis in the docket that supports emission limit applicability at reduced load or operating conditions other than the "high load" basis for the MACT floor.

As discussed in Comment 11, INGAA supports the "high load" performance test requirement. However, the Proposed Rule indicates that emission limits apply at all operating conditions and loads. For example, see the heading to Table 2c to Subpart ZZZZ which indicates that, "You must meet the following emission limitation at all times, except during periods of startup, or malfunction." Then, Table 6 indicates that "continuous compliance" with CO or formaldehyde limits is demonstrated by periodic source tests at high load (as well as other conditions). §63.6640 of the Proposed Rule does indicate that continuous compliance is based on the performance test and monitoring requirements stipulated in the Subpart ZZZZ tables; however, this does not comport with rule statements that indicate that limits apply at all times. This leaves operators in the untenable position of not understanding the basis or requirements for compliance certification.

EPA needs to more directly address compliance criteria and enforceability of the emission standards at operating conditions other than the high load performance test. If the emission limits are intended to be enforceable limits "at all times,", EPA needs to provide data and analysis to support the conclusion that the emission limits proposed are commensurate with the MACT floor or beyond the floor analysis – i.e., operation across all operating conditions was appropriately considered.

While EPA is obligated to address Court decisions that indicate continuous compliant standards are required, EPA should not presume that data indicative of emissions at a single operating point are representative of the emission levels under other operating conditions. For example, it should not be concluded that high load test data are indicative of low load emissions performance, especially when such a conclusion contradicts accepted science and technical understanding of emissions phenomenon. Although EPA has an obligation to address Court decisions, the agency cannot simply "wish it to be so" when trying to extend very limited data to a continuous compliance scenario. INGAA recommends that EPA provide a sound scientific basis to justify decisions: based on data and analysis in the docket. That is not the case when considering emission limit applicability in the Proposed Rule.

Similar to the discussion above for SSM events, INGAA recommends that EPA consider the technical and economic feasibility associated with prescribing and enforcing emission standards under operating scenarios where measurement is technologically and/or economically infeasible. With emission limits based on high load data and compliance validated with a high load performance test, operating, design or work practices allowed per §112(h) should be considered as a means for compliance under other operating conditions. If EPA determines that this approach is not appropriate, then the data and analysis associated with emission standard applicability at all times are sorely lacking and a monumental effort is needed to supplement the docket with additional data and analysis to support technically defensible standards.

11. INGAA supports performance test requirements at full load or the highest load achievable in practice. This test condition should also constrain emission limit applicability.

Other than area source engines with management practice requirements, the Proposed Rule requires an initial performance test for units 100 hp and larger, as well as periodic tests for engines larger than 500 hp. The test must be completed at high load – i.e., per §63.6610(d)(5), the test must be performed "at any load condition within plus or minus 10 percent of 100 percent load." INGAA supports periodic testing at high load as the monitoring method for validating compliance for the affected engine subcategories. However, INGAA also recommends the following:

- The NSPS and NESHAP should include consistent requirements for performance tests to be performed at full load *or the maximum load achieved in practice*. The NSPS includes this latter phrase so that if operating constraints limit the engine to less than 90% site rated load at peak capacity, then the performance test can be completed without special approval from EPA. INGAA recommends that §63.6610(d)(5) be revised to include this "or" provision. This will provide flexibility for operators and also reduce EPA staff burden from what would surely be a slew of requests for alternative testing because many existing engines that would require testing do not operate at 90% load or greater.

- The Proposed Rule should clearly indicate that the emission limits only apply at high load. Compliance criteria for other conditions should be based on alternatives available under Section 112(h) as discussed in Comments 4 and 11. With the engine demonstrating compliance at high load, INGAA believes that it is appropriate to identify a work practice regarding retaining engine and emissions control operability within the confines of allowed and accepted operating practices at other operating conditions. This work practice would validate that engine emissions performance is as good as possible when operating at other than high load. §112(h) alternatives are appropriate because prescribing emission limits is not feasible, and measurement issues to enforce the standard present technical challenges and are not economically feasible. If EPA intends for the limits to apply at all operating conditions, data and sound scientific analysis must be provided to justify this decision because the current docket and support documentation do not substantiate this conclusion. In addition, a common understanding of combustion chemistry does not support the conclusion that high load emissions of CO and formaldehyde would be equivalent to emissions at reduced load. One reference to support this assertion is the testing completed by EPA at Colorado State University in support of the original RICE MACT standard. Additional discussion is included in the following comment regarding clarifying the standard applicability at all operating conditions and ensuring that the regulatory basis for requirements is founded in sound science and supported by a transparent analysis.
- The Proposed Rule should address compliance requirements for engines with cyclic characteristic load that may also only run for relatively short periods. For example, air compressors are discussed in Comment 7. The "high load" test is not feasible due to operating characteristics. Air compressors and other engine types may require a special subcategory with work practices (per §112(h)) rather than emission standards.

12. To respond to Court mandates, EPA has revised the context for emission limits to indicate the limits apply "at all times."" However, EPA has failed to gather data or provide scientific analysis to support conclusions regarding emission limit applicability. The rule should provide analysis and data to support emission limit applicability at operating conditions other than those associated with the MACT floor data and clarify the applicable standard for operating conditions other than high load. If technical support is not available, it is inappropriate for EPA to assign standards "at all times" and §112(h) alternatives should be considered.

In Comment 40, INGAA discusses issues caused by EPA's "response" to several key Court decisions in this rulemaking, and INGAA's recommendation to develop EPA policy and guidance memos to clearly communicate to the public and affected stakeholders how EPA will be addressing Court mandates in revised NESHAPs. One important issue is EPA's approach for addressing the requirement for continuous compliant standards – i.e., standards must apply at all times. In the Proposed Rule, EPA has revised the NESHAP to now indicate in the headings of Tables 2a through 2c that, "You must meet the following emission limitation ***at all times…***", where the bold, italicized text is a revision.

Thus, EPA has extended the applicability of emission standards. Unfortunately, there are no data or analysis in the docket to support this revision to the Proposed Rule. In addition, review of the MACT floor data indicates that EPA *specifically did not* consider emissions across an operating envelope when establishing emission standards. For example, emission data used for the 2SLB engine MACT floor were from a multi-point test program on a single engine completed at CSU (data are presented in Table 2 in Comment 5). Rather than using the 15 data points from one engine as a dataset to review emissions variability and consider how different operating conditions influence emissions on a single engine, EPA considered these as 15 separate tests (of 16 total for this subcategory), and used the two best performing test conditions (i.e., 2 of 16 tests comprise best performing 12%) as the basis for the MACT floor. As discussed in Comment 5, INGAA does not support this analysis approach.

The apparent lack of data and analysis to support a conclusion of emission standard applicability at all times is a serious oversight, and it is imperative that EPA's revision to require emission limit applicability at all times is supported by data, analysis, and sound scientific justification. INGAA could find *nothing* in the docket that even broaches this subject. Thus, EPA is implementing a response to a Court finding without any docket support documentation to discuss, define, or justify the "new" requirement for emission standards at all times. In fact, INGAA's understanding that the MACT floor analyses do not consider emissions at different operating conditions was only gained through a painstaking effort to reproduce the MACT floor analysis. Unfortunately, this EPA analysis was also sorely lacking in transparency and required a review and sorting of data from a decade old database. EPA provided no reference document in the docket to explain the MACT floor analysis with regard to "all times" emission limit applicability. EPA should clarify how it has justified that emission limits "apply at all times" when it is not apparent that emissions data variability across an engine operating envelope was considered. The requirement for applicability at all times must be technically justified and supported by data.

Without a clear indication of emission limit applicability and understanding of emissions at all operating conditions, operators would be faced with a very serious compliance quandary. Operators of Title V facilities have an obligation to sign a compliance certification in semi-annual reports. If limits based on high load data form the basis of the standard, and reduced load emissions are not well characterized, but typically expected to be higher, operators cannot meet their obligation for compliance certification. This problem would be solely caused by EPA's failure to adequately support the basis for the standards. If EPA does not intend for the limits to apply "at all times," then the Proposed Rule Table 2 headings need to be revised and EPA should clearly state the emission limit applicability in the rule. At this time, stakeholders are faced with proposed "all load" emission limits that have not been technically justified and that will result in significant and inestimable implementation problems.

If the limits apply at all time, EPA needs to clarify how compliance would be determined. For example, the performance test basis for compliance is based on the average of 3, one-hour tests, and continuous parameter monitoring (where required) is based on a 4-hour average. EPA does not address how compliance would be determined "at all times" and this needs to be clearly indicated in the rule. For example, if an emissions excursion beyond the standard occurs during a malfunction only minutes in duration, what are the compliance implications? In considering compliance certification for compliance "at all times,"" what averaging time applies? A host of similar practical questions needs to be addressed. INGAA believes that these compliance implementation issues impugn the feasibility of employing emission measurement to enforce an emissions standard; thus §112(h) applies. In this scenario, emission standards will still apply at high load (or as constrained by the MACT floor data) and the performance test is conducted at that load. However, for other operating conditions, §112(h) would provide the basis for a work practice or management standard and the emission performance and catalytic control (where required) would not be compromised beyond the technical constraints imposed by the physics of engine emissions and catalytic control performance. As discussed in Comments above, INGAA believes that EPA should consider the integration of §112(h), where emission limits apply within defined operating conditions and work practices serve as the standard during operations where prescribing or enforcing the standard is not feasible.

"Above the Floor" Analysis

13. EPA's "above the floor" cost effectiveness analysis concludes that post-combustion controls are justified for several categories of natural gas-fired engines. The cost effectiveness analysis is flawed, and based on limited and erroneous data and assumptions. INGAA recommends revisiting the analysis. Based on more realistic cost assumptions, INGAA believes that the appropriate conclusion is that above the floor controls are not cost effective and thus not warranted for natural gas-fired engines.

The MACT floor analysis concluded that the emission standard should be based on an uncontrolled source for all natural gas-fired engine subcategories. The above-the-floor analysis conducted by EPA concluded that controls are cost effective and warranted for many natural gas-fired engines. However, INGAA review of the analysis indicates that different conclusions are warranted, including:

- EPA's cost effectiveness values are significantly lower than those estimated in docket memos for the original 2004 RICE MACT for engines larger than 500 hp. INGAA believes that costs for the Proposed Rule were significantly underestimated and actual cost effectiveness values are about an order of magnitude or more higher than the values from the EPA analysis;
- Flaws in the cost effectiveness analysis that result in the under-estimate by EPA are primarily driven by an under-estimate of control equipment capital cost, operating and compliance costs, and emission assumptions; and,
- Based on target cost effectiveness values and EPA conclusions from a docket document, above the floor controls *are not cost effective and not warranted* for natural gas-fired engines.

Details on the INGAA review and analysis, including alternative cost data, are discussed below. INGAA recommends EPA repeat the above the floor cost effectiveness analysis (i.e., determination of control cost in dollar per ton) using updated, documented, and real-world data for costs, and then reconsider whether the resulting cost effectiveness values are reasonable. In addition, if EPA evaluates peripheral impacts in an attempt to justify above the floor controls, additional effort needs to be committed to analyze emission tradeoffs, characterize the value of perceived benefits, and also characterize disbenefits associated with energy (e.g., efficiency), greenhouse gas emission increases, and possible generation of undesirable emissions (e.g., ammonia from NSCR). Since this rulemaking affects existing equipment, the analysis should also consider revenue losses that occur from downtime associated with control technology retrofit. Since the Proposed Rule requirements would mandate catalytic control for hundreds of thousands of engines, scheduling within planned downtimes will be difficult to achieve and considerable lost revenue could result from process shutdown to accommodate retrofit controls.

This comment initially summarizes questionable assumptions and data used for the above the floor analysis;; provides examples of alternative data and analysis including EPA analysis from the 2004 RICE MACT docket;; discusses real-world records associated with the variety of design;; engineering, and installation costs for comparison to EPA Air Pollution Control Cost Manual algorithms;; and, summarizes alternative cost effectiveness values based on data that INGAA believes are more representative of actual capital and operating costs.

Primary issues regarding cost assumptions include:

- From the INGAA docket review, it appears that email communications on catalyst costs with a *single* vendor in 2003 and 2005 serve as the basis for the capital and annual cost models. This is an insufficient and highly questionable basis for the above the floor analysis and a conclusion that controls are warranted for thousands of engines. In fact, it is apparent that the vendor quote does not include key equipment components (i.e., cost estimates do not include required air-to-fuel ratio controller for NSCR catalysts or other equipment required for remote applications without electricity). EPA should gather catalyst system cost quotes from multiple vendors and operators. EPA should independently validate vendor cost quotes and performance claims to eliminate the conflict of interest associated with control technology vendor sales objectives.
- The EPA cost assumptions result in cost effectiveness values that are significantly lower than EPA's analysis for the 2004 RICE MACT. EPA should compare and contrast the two analyses and explain the differences that have resulted in different cost determinations for this rulemaking.
- Any vendor data used should include specifications and limitations regarding cost and performance (e.g., contractual language for performance guarantees). Any identified limitations should be considered in defining performance, operating constraints, and control costs. For example, vendor guarantees should be considered when defining the frequency of catalyst replacement and associated costs.
- EPA should solicit input from vendors and operators with catalytic control experience, and cost analysis data and assumptions should be reviewed and revised and the analysis corrected. Factors to reconsider include capital costs, catalyst life and cleaning, peripheral equipment, and operating and maintenance costs.

The following discussion provides additional detail regarding the "above the floor" cost effectiveness analysis data, assumptions, and calculations including recalculation of the cost effectiveness for gas-fired engine controls based on "corrected" docket data and information collected from engine operators. These provide some examples, and additional analysis may be required across the range of engine types and sizes. INGAA provides this information as an initial assessment of alternative costs that INGAA believes are more appropriate than the EPA costs, and INGAA offers our assistance to provide additional information as needed to support additional EPA review and re-analysis of this important issue.

Areas where the "above-the-floor" cost analysis is flawed and based on limited and erroneous data and assumptions include, but are not limited to:

- The basis for the above-the-floor analyses for oxidation catalysts and NSCR catalysts is capital costs provided by email communications from a single vendor in 2003 and 2005. These costs are not an appropriate basis for the above the floor cost analysis because these costs are dated, not representative of all industry vendors, not based on specific performance guarantees, and subject to conflict of interest bias. In addition, the capital costs presented in the EPA analysis (Docket documents OAR-2008-0708-0017 and OAR-2005-0030-0005) have the following flaws and inaccuracies:
    - The capital costs for NSCR control are for the catalyst element and housing alone and do not include the cost for an air-to-fuel ratio controller (AFRC). As noted in Docket document OAR-2005-0030-0086, a communication from the catalyst vendor, "None of the prices include an air to fuel ratio controller. AFRC kits cost from $5000 to 10000, depending on the number of valves and sensors needed." An AFRC is required for proper NSCR operation and effective emission control. AFRC costs must be included in all NSCR cost evaluations. In addition, many isolated units will require installation of a battery to power the AFRC and an alternator or solar panel to keep the battery charged. Associated equipment constituting a typical "control package" should be included in the capital costs and should consider the additional costs associated with NSCR at remote sites without electricity, which would be a very common occurrence.
    - The EPA analysis assumes a lifetime of 20 years for NSCR catalysts and oxidation catalysts. This is not consistent with information provided by the catalyst vendor and industry operating experience. Ten years or less would be a more realistic estimation of catalyst lifetime. For a specific application, the vendor guarantee should serve as the basis for the catalyst life and this could include additional costs such as offsite catalyst cleaning. As noted in Docket document OAR-2005-0030-0087, a communication from the catalyst vendor, "catalyst life is hard to estimate. But for budgetary reasons, I would expect to replace a catalyst element after 24,000 to 32,000 hours of operation." The average of these two values is 28,000 hours, or 10 years based on the EPA analysis assumption of 2,800 hours per year operation. However, EPA should compare this vendor "expectation" with vendor guarantees. INGAA expects a very different answer and believes that a guarantee has a much stronger basis that a casual comment from the vendor with no related commitment. Docket document EPA-HQ-OAR-2005-0029-0038, another communication from the catalyst vendor, indicates an NSCR catalyst lifetime of 3 – 5 years.

      For example, catalyst life may be significantly shortened on an engine that experiences higher oil consumption that can contaminate and foul the catalyst. Examples of parameters that can impact catalyst life include, but are not limited to:

        - Engine family;
        - Exhaust temperature;

- Engine misfires and malfunctions;
- Utilization and frequency of startup and shutdown;
- Percent load and load swing cycles;
- Catalyst cleaning frequency;
- Element design and formulation;
- Lubrication oil consumption and formulation; and
- Fuel quality (i.e., for field gas applications).

- INGAA reviewed the basis for EPA cost estimates. A capital cost model for oxidation catalysts was developed for the cost analysis. A linear regression of total capital costs calculated from the vendor-provided capital cost data against engine size/horsepower was used to develop this model. The vendor data were for engines ranging from 500 to 8,000 hp (docket document OAR-2005-0030-0005). The cost model was then used to estimate the cost of applying oxidation catalysts to smaller engines, i.e., 500 hp and smaller. Linear regression models are typically considered valid and applicable for the range of data that is the basis for the model, but EPA uses the linear regression beyond the low end of the actual data to estimate costs for smaller engines.

  Cost estimates for engines outside the 500 to 8,000 hp size range are subject to large errors and this appears to be the case for this cost model. For 500 hp engines, the estimated oxidation catalyst capital cost from the regression ($5,503) is about half of the capital cost determined from the vendor estimate ($10,240 – page 11 of docket document 2005-0030-0005). Further evidence of the model failure for small engines is the negative y-axis intercept (-$170). This y-intercept should be close to the fixed cost that will be incurred regardless of the engine size. A point of comparison is the linear regression for the NSCR catalyst capital cost which has a y-intercept/"fixed cost" of $1,799. These fixed costs will be a larger percentage of the control costs for small engines than for larger engines. Thus, the model likely further underestimates costs for engines less than 500 hp and is inappropriate for estimating oxidation catalyst costs for engines 500 hp and smaller.
- Similar to the oxidation catalyst cost model, EPA developed a model for NSCR catalyst capital costs using linear regression analysis. Total capital costs calculated from the vendor-provided capital cost data were regressed against engine size to develop this model. The vendor data were for engines ranging from 167 to 3,000 hp (docket document OAR-2005-0030-0005). The linear regression analysis for rich burn engines should only include data for rich burn engines less than or equal to 500 hp.
- All the capital costs appear to be from 2003 and 2005 and have not been corrected for inflation. It is assumed that the cost/benefit analyses are initially being calculated in 2007 dollars and will be adjusted to current year and/or year 2013 dollars as required.
- The docket document OAR-2005-0030-0005 highlights that the correlation coefficients for the linear regression equations are near 1.0 with statements (for oxidation catalyst control) "the linear equations have a correlation coefficient of 0.9907, which shows the

data fit the equations very closely" and (for NSCR catalyst control) "the linear equations have a correlation coefficient of 0.9887, which shows the equations are a good estimation of the cost data." Regressions of the vendor basic equipment (catalyst and housing) cost data with engine size return linear equations with the same correlation coefficients. EPA has then applied multipliers from the EPA Cost Control Manual to estimate installed capital costs and annual operating costs. Thus, what the correlation coefficients demonstrate is that the catalyst vendor likely estimated the equipment costs from engine horsepower using a linear model. This should not be interpreted as a demonstration that the linear models accurately estimate real world installed capital and operating costs.

- Engine replacement costs for applications where catalyst retrofit is technologically or economically unfeasible have not been considered. An example replacement cost may be 2SLB Ajax engines where lower exhaust temperatures cannot achieve high catalyst control efficiency with standard commercial catalysts; thus, the compliance options are not available (and thus replacement is required) or the unit requires an extremely expensive "premium" catalyst. Some large bore slow speed 2SLB engines without a turbocharger may also incur considerable cost or trigger replacement for application of catalytic control. EPA has not properly considered these technical limitations on catalyst performance (discussed further in Comment 15). EPA should thus consider cost analysis that includes engine replacement cost in the cost per ton calculations for some engine classes.

- The cost analysis relied upon generic cost factors from the EPA Cost Control Manual (CCM) to determine other direct and indirect installation and start up costs included in a Total Capital Cost (i.e., equipment installed and operating). As an alternative, detailed actual costs from an engine operator were reviewed. In general, the CCM assumptions that apply multipliers for various engineering and installation functions do not appear to introduce error greater than the CCM model uncertainty (quoted by EPA as ±30%). However, this comparison may warrant closer scrutiny for some applications such as remote locations and smaller engines where percentages of a relatively smaller capital cost input may not accurately capture actual costs – i.e., the CCM scaling factor is less accurate when applied to equipment that is smaller than historical equipment sizes reviewed using CCM methodology. As warranted, the analysis and assumptions should be reviewed and revised when EPA revisits the cost effectiveness analysis.

  Based on the detailed cost accounting, in addition to the basic catalyst and housing capital costs, installed capital costs for retrofit post-combustion control catalytic systems can include:

  - Labor to install the catalyst, crane rental for larger engines, shipping, and costs associated with engine downtime.
  - New silencer/muffler that is compatible with catalyst installation – parts and labor. Information provided by industry personnel indicates that catalyst retrofits often require the purchase of a new muffler that can be installed and operated in conjunction with the catalyst. Retrofit muffler cost can be a significant percentage of total purchased equipment costs.
  - Modifications to engine exhaust and/or supports to install the catalyst – parts and labor.

- Modifications to engine shelter/building (e.g. raise roof) to accommodate additional equipment and possible changes to yard piping and other equipment to accommodate new control equipment – parts and labor.
- Emission sampling ports and platform installation – parts and labor.
- Continuous parameter monitoring system – parts and labor.
- Crankcase upgrade. Some engines require installation of a crankcase filter to prevent oil in the exhaust and catalyst poisoning – parts and labor.
- Start-up labor. On-site operator and catalyst supplier representative must ensure engine is operating properly after equipment installation and system modifications.
- Installed capital costs specific to NSCR catalyst systems can include:
  - Air-to-fuel ratio controller (AFRC) – equipment and labor. Significant electrical conduit and wiring installation can be required.
  - O_2 sensor – equipment and labor.
  - AFRC setpoint determination. O_2 sensor response depends on engine exhaust gas composition and can vary from sensor to sensor; thus, the AFRC operating setpoint (e.g. for 90% CO/90% NOx reduction) must be determined during NSCR system start-up.
  - Fuel flow control valve installation – equipment and labor.
  - Thermocouple installation – equipment and labor.
  - NSCR system compatible carburetor – equipment and labor.
  - Battery installation – battery, housing, ancillary equipment (i.e., electrical conduit and wiring) and labor.
  - Alternator and/or solar panel installation – equipment, ancillary equipment (i.e., electrical conduit and wiring) and labor.

Additional detail and discussion on these costs may be warranted.

- The basis for the above-the-floor analyses of the annual costs for oxidation catalysts and NSCR catalysts are the flawed capital costs discussed above and include inaccurate and uninformed assumptions regarding control equipment maintenance and equipment operation:
  - The maintenance costs presented in the EPA analysis for oxidation catalysts and NSCR catalysts (Docket documents EPA-HQ-OAR-2008-0708-0017 and EPA-HQ-OAR-2005-0030-0005) assume annual maintenance costs are the same as required for catalytic diesel particulate filters (CDPF). This assumption is incorrect. CDPF maintenance requirements are basically limited to periodic filter cleaning that consists of ash removal from the filter. The nonroad diesel engine regulatory impact analysis states "The maintenance function for the removal of ash is relatively straightforward, and itself does not present a technical challenge for the industry." [EPA OTAQ 2004, (EPA-HQ-OAR-2005-0029-0196)] Conversely, operating and maintenance requirements for catalysts are multi-faceted and can include:

  - Periodic catalyst cleaning. These costs include the out-sourced cleaning, labor to remove and re-install the catalyst, crane rental for larger engines, shipping, and costs associated with engine downtime.
  - Extra catalysts in inventory to replace catalysts being cleaned and minimize equipment downtime. If catalysts are rotated to minimize equipment downtime, then addition performance testing may be required because the Proposed Rule requires a performance test each time a catalyst is changed (§63.6640 (b)).
  - Engine shut-down and start-up labor. Operators must ensure engine is operating properly after equipment maintenance.
  - Maintenance requirements specific to NSCR catalyst systems include:
    - Periodic (e.g., 2,000 operating hours) oxygen sensor replacement. These costs include the O_2 sensor, equipment downtime, and labor to replace the catalyst and ensure the O_2 sensor(s) is operating properly and determine a new AFRC setpoint. The response of different O_2 sensors to the same engine exhaust gas composition can vary; thus, a unique operating setpoint (e.g. 90% CO/90% NOx reduction) must be determined each time a sensor is replaced.
    - AFRC maintenance – parts and labor.
    - Fuel flow control valve maintenance – parts and labor.
    - Periodic thermocouple replacement – parts and labor.
    - Periodic battery replacement – battery and labor.
    - Alternator maintenance – parts and labor.
    - Periodic solar panel replacement – battery and labor.
- Fuel penalty. Proper NSCR catalyst operation requires engine operation slightly rich of stoichiometric (air to theoretical air (lambda) of about 0.995) to produce sufficient carbon monoxide and hydrocarbons to reduce the oxides of nitrogen. However, engine operation for maximum efficiency is lean of stoichiometric (lambdaa about 1.06). Engine manufacturer data indicate fuel consumption increases about 3% when lambda is reduced from 1.06 to 0.995. For Waukesha VGF GSI engines, which range in size from about 250 to 600 hp, estimated brake-specific fuel consumption (BSFC) increases from 7,188 Btu/bhp-hr during maximum efficiency/low fuel consumption operation (lambda = 1.06) to 7,420 Btu/bhp-hr during pre-catalyst operation (lambda = 0.995) [Waukesha 2009]. For an engine operating 2,800 hours per year and fuel lower heating value of 900 Btu/scf (HHV of about 1000 Btu/scf), this equates to about 0.72 Mcf/yr of natural gas combusted per engine horsepower; thus, a 500 hp engine would consume an additional 360 Mcf/yr of gas after NSCR installation.

- The HAP emission factor used for the gas-fired engines cost effectiveness analyses, 6.88×10^{-4} lb HAP/hp-hr (OAR-2005-0030-0009), is based on emission data from all engine sizes. This document also includes a HAP emission factor for gas-fired engines < 500 hp (4.78×10^{-4} lb HAP/hp-hr) that is more appropriate for the cost effectiveness analyses for engines in this size range. Larger engines have larger cylinders that can result in less complete air/fuel mixing than in small engine cylinders. Incomplete air/fuel mixing contributes to increased products of incomplete combustion and HAP emissions; thus, different emission factors for small (i.e., <500 hp) and large (i.e., > 500 hp) engines may be more appropriate. In addition, this "small engine" emission factor is conservatively high for a rich burn engine and is nearly double the emission factor based on adding HAP emission factors for rich burn engines from AP-42 (about $2.89x10^{-4}$ lb HAP/hp-hr). INGAA believes the AP-42 emission factor is more representative of 4SRB engine emissions.

- The assumption of 90% catalytic control for all engines under all operating conditions is not supported in the docket by data and documentation. This issue is further discussed in Comments 15 and 16 which present data from an EPA-sponsored study that shows oxidation catalyst control efficiencies well below 90%. EPA's revised cost effectiveness analyses should include documented catalyst control efficiencies. For engine categories that may not be able achieve 90% reduction, for example large 2SLB engines, cost effectiveness calculations should reflect control efficiencies achieved in practice.

Based on the above discussion, it is apparent that the control costs presented in docket document OAR-2005-0030-0005 have an extremely low bias and result in above the floor control cost effectiveness values that are incorrect – and conclude that dollars per ton control costs are much lower than is appropriate. EPA should solicit input from vendors and operators with catalytic control experience, and assemble actual costs for control equipment operation and maintenance. The cost effectiveness analysis data and assumptions should be reviewed and revised and the analysis repeated. INGAA has conducted some analysis and arrived at higher cost per ton values.

Cost effectiveness analyses were conducted for gas-fired 4SLB, 2SLB, and 4SRB engines less than and equal to 500 hp using "corrected" control cost data from the docket documents and cost data provided by industry engine operators. The cost/benefit data are summarized in Table 8. In addition, INGAA reviewed several documents from 2002 that are in the docket for the original RICE MACT. Most material for that rulemaking was reviewed by stakeholders participating in the Industrial Combustion Coordinated Rulemaking (ICCR). Although INGAA has not scrutinized the 2002 documents, we expect that the analysis was reviewed by ICCR work group members and is likely more credible than the single-vendor derived estimates for the Proposed Rule. The 2002 review of costs for engines larger than 500 hp, indicated the following in docket document number OAR-2002-0059-0225:

- $72,807 per ton HAP removed for new 4SRB engines from 500 to 1000 hp;
- $13,189 per ton HAP removed for new 4SLB engines from 500 to 1000 hp; and
- $21,039 per ton HAP removed for new 2SLB engines from 500 to 1000 hp.

The costs are many times higher than the EPA cost estimates for the Proposed Rule. In addition, the Proposed Rule affects *existing* engines and primarily smaller engines. Both of these factors should result in marginally higher costs than for the larger, new, major source engines addressed in the 2002 memos. For the 2002 analysis, EPA did not consider above the floor controls for 4SRB engines because the MACT floor required NSCR for engines >500 hp at major sources. However, for lean burn gas-fired engines, EPA concluded that the costs presented above are *not* reasonable and above the floor controls were not required for existing engines.

For additional analysis shown in the tables below, 2SLB and 4SLB engines, estimates of $/ton HAP removed were based on capital and operating cost data provided by industry engine operators. The HAP emission factor for gas-fired engines less than 500 hp (4.78×10^{-4} lb HAP/hp-hr) discussed above, along with 90% HAP control were used for the calculations. Two sets of cost effectiveness data are presented for 4SRB engines. One set is based on capital and operating cost data provided by industry engine operators. The second data set is based on the original EPA cost analysis using the EPA Cost Control Manual factors with selected corrections where the data and assumptions in OAR-2005-0030-0005 were obviously erroneous:

- Catalyst and housing costs in 2005-0030-0005 were adjusted to 2007 dollars assuming an average inflation rate of 3%;
- Catalyst system lifetime was assumed to be 10 years (a 10 year lifetime was assumed for all oxidation and NSCR catalyst systems in these analyses);
- AFRC costs from OAR-2005-0029-0038 ($5,440) were assumed for engines less than and equal to 300 hp and adjusted to 2007 dollars. An average AFRC cost from 2005-0030-0086 ($7,500) was used for engines greater than 300 hp and adjusted to 2007 dollars;
- Additional capital equipment – battery, battery housing, alternator – were assumed to cost $600 per engine. This assumes 50% of the engines do not have access to electricity and require this additional equipment for an NSCR retrofit;
- The linear regression analysis of total capital costs was limited to engines less than or equal to 500 hp because this was the range of interest;
- Annual (unburdened) operating maintenance costs were assumed to be $1800 for parts, labor, and outside services (i.e., catalyst cleaning);
- A fuel penalty of 0.72 Mcf/yr of natural gas combusted per engine hp was included. A natural gas cost of $7/Mcf was assumed based on an approximate average for 2007 [DOE/EIA website]; and,
- An annual performance testing cost of $4,000 that is incurred when catalysts are rotated for annual washing, As discussed in the next bullet item, annual catalyst cleaning will require either require equipment off-line, catalyst rotation, added spare capacity, temporary equipment, or other operating scenarios. All these operating options have associated costs;

Based on industry experience and operational considerations, the capital and operating cost data typically include:

- Catalysts are rotated based on a 12 month washing schedule; that is, when a catalyst is removed from an engine housing for scheduled off-site cleaning, it is replaced by another “rotational spare” catalyst just returned from washing. This rotation minimizes engine and production down time. However, because the Proposed Rule requires a performance test each time a catalyst is changed (§63.6640 (b)), the cost for an annual performance test is included in the annual operating cost for each affected engine. Alternatives to catalyst rotation also have an associated cost. These include engine equipment offline during the catalyst washing period (production loss cost), a spare engine/additional capacity (capital and operating costs), and temporary replacement by portable equipment (rental or capital and operating costs). Some companies have determined that catalyst rotation is most cost effective despite the annual performance testing.

- Periodic replacement, based on operational experience and vendor guarantees, of catalyst system equipment including catalyst elements, AFRCs, fuel flow control valves, and batteries. These costs were annualized by dividing the replacement cost by the practical lifetime. These annualized capital costs and associated labor costs are included in the annual operating and maintenance costs.

Table 8. Cost per Ton ($/ton) of HAP Reduced per Engine (2007 $).

Engine/Control	Engine Size Range ($/ton)				
	<50 hp	**50 - 100 hp**	**100 - 175 hp**	**175 - 300 hp**	**300 - 500 hp**
2SLB w/Ox Catalyst	ND	ND	ND	$192,000	$120,000
4SLB w/Ox Catalyst	ND	ND	ND	$57,000	$32,000
4SRB w/NSCR: Revised EPA Model	ND	$129,000	$129,000	$83,000	$57,000
4SRB w/NSCR: Industry Data	ND	$120,000	$127,000	$88,000	$59,000

The cost to retrofit an oxidation catalyst to a 2SLB engine is considerably greater than 4SLB retrofit applications. This is primarily because 2SLB engines have backpressure limitations (high backpressure would impact combustion cylinder scavenging and engine operation) and catalysts must be constructed with large surface areas for low backpressure. Other 2SLB cost impacts are muffler redesign to incorporate catalyst elements and premium catalysts to operate at lower 2SLB engine exhaust gas temperatures.

The data used to estimate the cost per ton for 4SLB engines equipped with oxidation catalysts are summarized in Table 9. These costs are from detailed accountings of installed and operating equipment. The data used to estimate the cost per ton for 2SLB engines equipped with oxidation catalysts are also summarized in Table 10. The capital costs are based on a quote from a 2SLB engine packager and the total capital cost and annual operating cost were determined using EPA Cost Control Manual methodology. A large fraction of the annual operating cost is from the annualized cost for periodic catalyst replacement. A summary of control options and costs for engines prepared by Argonne National Laboratory estimates a capital cost of $30/hp to retrofit an oxidation catalyst to a 500 hp engine concurrent with an SCR retrofit [Argonne 2007]. Retrofitting only an oxidation catalyst would be expected to have a higher cost; thus, the 4SLB capital cost data in Table 9 compare well. Oxidation catalyst costs for 2SLB engines are higher, suggesting the Argonne estimate is based on 4SLB applications. In addition, Argonne assumes an annual operating cost of $6,000 (that does not vary significantly with engine size) that agrees with the 4SLB operating costs in Table 9. As noted above, the annualized catalyst replacement cost has a large impact on the 2SLB annual operating cost. Data for engines less than 250 hp were not available. The average values for costs and engine horsepower were used for the cost/benefit calculations. Data ranges are in parentheses.

Table 9. Oxidation Catalyst Data Used for 4SLB Engine Cost per Ton Estimates.

Engine/Control	Engine Size Range		
	0 - 175 hp	175 - 300 hp	300 - 500 hp
Engine hp	ND	250	461 (400 – 500)
Total Capital Costs ($)	ND	$16,000 (10,000 - 22,000)	$17,700 (11,800 – 25,000)
Annual Operating Costs ($)	ND	$6,400 (5,100 – 7,100)*	$6,400 (5,100 – 7,100)*

ND – no data available.
* Cost does not include capital recovery cost.

Table 10. Oxidation Catalyst Data Used for 2SLB Engine Cost per Ton Estimates.

Engine/Control	Engine Size Range		
	0 - 175 hp	175 - 300 hp	300 - 500 hp
Engine hp	ND	250	375
Total Capital Cost ($)	ND	$63,800	$63,800
Annual Operating Cost ($)	ND	$19,900*	$19,900*

ND – no data available.
* Cost does not include capital recovery cost.

For 2SLB and 4SLB engines equipped with an oxidation catalyst, the cost per ton HAP removed estimates in Table 8 are about an order of magnitude or more greater than presented in docket document OAR-2008-0708-0017. These cost per ton estimates could be biased low because, as discussed in Comments 15 and 16, the 90% control efficiency assumption for oxidation catalysts does not apply for all operating conditions. Docket document no. OAR-2008-0708-0017 states (for 2SLB and 4SLB engines) “The cost per ton of reducing formaldehyde by oxidation catalyst range from about $2,000 to $8,000. The costs for engines 250 hp and above equipped with oxidation catalyst are reasonable and can be justified in light of the significant reductions of HAP that would be achieved from these particular engines.” The extrapolated cost per ton HAP removed for a 250 hp engine is about $3,600. The cost per ton estimates in Table 8 for lean burn engines less than 500 hp are about an order of magnitude or more greater than this established guideline for above the floor control (i.e., emission standards more stringent than the MACT floor).

Comment 14 has additional discussion regarding cost per ton thresholds and some conclusions regarding “reasonable” versus “unacceptable” costs from the EPA docket document. If, as expected, EPA’s revised cost effectiveness analysis determines costs per ton of the magnitude in Table 8, then above the floor control *cannot* be justified for existing gas-fired 2SLB and 4SLB engines. INGAA is willing to provide additional information to EPA regarding the cost basis for these calculations, and INGAA recommends that additional data be compiled on cost to justify above the floor decisions. A separate report or technical document may be warranted on this comment, but in the time available for comment preparation, INGAA response was limited to compiling the costs and discussion provided in this comment.

The industry data used to estimate the cost per ton HAP removed for 4SRB engines equipped with NSCR catalysts are summarized in Table 11 These costs are from detailed accountings of installed and operating equipment in addition to operator estimates based on numerous applications. A summary of control options and costs for engines prepared by Argonne National Laboratory estimates a capital cost of $50/hp to retrofit an NSCR catalyst system to a 500 hp engine [Argonne 2007]. The capital cost data for 300 — 500 hp engines in Table11 compare very well. Capital cost per horsepower is greater for smaller engines as expected. In addition, Argonne assumes an annual operating cost of $6,000 that does not vary significantly with engine size; this value is consistent with the Table 11 costs. The average values for costs and engine horsepower were used for the cost/benefit calculations. Data ranges are in parentheses.

Table 11 NSCR Catalyst Data Used for "Industry Data" Cost per Ton Estimates.

Engine/Control	Engine Size Range ($/ton)				
	<50 hp	50 - 100 hp	100 - 175 hp	175 - 300 hp	300 - 500 hp
Engine hp	ND	74 (50 – 100)	142 (116 – 172)	239 (203 – 265)	405 (310 – 500)
Total Capital Costs ($)	ND	10,400 (8,000 – 13,100)	13,800 (10,400 – 16,700)	17,400 (14,000 – 24,900)	19,800 (10,300 – 24,100)
Annual Operating Costs ($)	ND	3,500 (3,200 – 3,800)*	8,500 (7,800 – 9,500)*	9,400 (8,800 – 10,800)*	10,000 (8,000 – 11,300)*
Fuel Penalty ($)	ND	370	720	1,200	2,000

ND – no data available.
* Cost does not include capital recovery cost.

For 4SRB engines equipped with NSCR, the cost per ton HAP removed estimates in Table 8 are about an order of magnitude greater than presented in docket document OAR-2008-0708-0017. That document states (for engines less than 50 hp) "The cost of above-the-floor options based of (on) add-on controls for engines less than 50 hp are considered significant. Therefore, MACT is equivalent to the MACT floor" and "The MACT floor for stationary engines less than 50 hp is the level that is achievable by existing engines of this size operating without add-on control technology." The referenced cost per ton of HAP removed for 4SRB engines less than 50 hp is $33,373. Additional discussion on cost effectiveness thresholds is provided in Comment 14.

In addition, it should be noted that the AP-42 HAP emission factor for 4SRB engines (2.89×10^{-4} lb HAP/hp-hr) is likely more appropriate than the HAP emission factor from the docket (4.78×10^{-4} lb HAP/hp-hr); the cost effectiveness values in Table 8 would be about 1.6 times greater if the AP-42 factor is applied (i.e. NSCR is even less cost effective).

The cost per ton HAP removed determined by the two separate approaches in Table 8 agree within about 10% over the range of engine sizes. This agreement is well within the uncertainty of the estimates because "the EPA Cost Control Manual estimating procedure rests on the notion of the "study" (or rough order of magnitude - ROM) estimate, nominally accurate to within ± 30%." This suggests the "corrections" to the docket data provide consistency with current industry equipment, operations, and costs. It also shows that the assumptions and errors in the cost effectiveness analysis that are most important are the capital cost, operating costs, and baseline HAP emission factor. The cost algorithms from the Control Cost Manual do not appear to introduce significant error, but more scrutiny of some of those assumptions may be warranted.

For both of the approaches used to estimate NSCR cost per ton in Table 8, the cost per ton estimates for engines less than 500 hp are greater than the established guideline ($33,373/ton). These data thus suggest that above the floor control (i.e., emission standards more stringent than the MACT floor) cannot be justified for existing gas-fired 4SRB engines. EPA notes that NSCR also controls CO and NOx emissions and these emission reductions reduce the cost per ton pollutant removed when HAP, CO, and NOx reductions are considered. However, this analysis is simplistic and does not consider the impact of NSCR on all pollutant emissions:

- Greenhouse gas emissions will increase. Because rich burn engines must operate at a lower air-to-fuel ratio with NSCR, engine efficiency decreases and CO_2 emissions will increase (i.e., more fuel carbon is oxidized). It is also possible that methane emissions will also increase. NSCR control efficiency for methane is much lower than for CO and HAPs. Because an NSCR equipped engine runs at a sub-stoichiometric air-to-fuel ratio, methane concentrations upstream of an NSCR catalyst are higher than from an uncontrolled engine operating at maximum efficiency (i.e., poorer combust efficiency at the AFR setpoint for NSCR engines); thus, if the catalyst methane control is not sufficient, there will be a net increase in methane emissions. Higher engine exhaust flowrates from increased fuel consumption will also contribute to increased methane emissions for NSCR-equipped engines.
- Ammonia emissions will likely increase. Ammonia formation across NSCR catalysts has been documented in recent studies. In addition to increased CO emissions, a trade-off for richer engine operation for NSCR NOx control is increased ammonia emissions. Ammonia participates in atmospheric chemistry for fine particulate/haze formation and under some conditions ammonia may be a rate-limiting reactant. Thus, in the Rocky Mountain and Intermountain West area and other areas where regional haze is a primary air quality issue, ammonia emissions from NSCR equipped engines in the proximity of National Parks and Class I Wilderness Areas (which are protected air sheds) could be an important consideration.
- CO emission reductions are typically over-estimated. Net CO emission reduction for NSCR should be based on CO emissions from an NSCR- equipped engine relative to an uncontrolled engine rather than comparing CO emissions upstream and downstream of an NSCR catalyst. CO concentration in the exhaust from an uncontrolled engine is typically much lower than the concentration of CO in engine exhaust upstream of an NSCR catalyst. As discussed above, NSCR-equipped engines run richer than uncontrolled engines and CO exhausting the engine will be higher from an NSCR-equipped engine. The impact of increased fuel consumption should also be considered when calculating net CO reduction.

EPA should quantify and consider all potential deleterious emission impacts before requiring above-the-floor NSCR control for rich burn engines. In addition, the relative importance of various pollutants should be considered. For example, CO reduction is typically not an air quality priority and simply adding CO reductions into the cost per ton calculation does not provide reasonable context. EPA should also consider and acknowledge the technological limitations for system optimization for multi-pollutant control. This phenomenon for small rich burn engines is poorly characterized but has been recently investigated in a study in the 4-Corners area. INGAA can assist with accessing that recent data if needed. Finally, EPA should also consider a relative weighting of gas-fired HAP emissions when making the above the floor decision. As discussed in Comment 3, there are important questions regarding the toxicity of formaldehyde and an IRIS review is underway. This uncertainty should be considered when evaluating cost per ton values that may be in a "gray area" regarding whether a cost per ton value is reasonable or unacceptable.

INGAA understands that additional detail may be needed regarding the alternative cost estimates discussed in the comment; nevertheless, INGAA is confident that an independent reassessment of control costs and other assumptions in the cost effectiveness analysis will result in cost per ton values that comport well with the values provides in Table 8 rather than the lower values from the EPA analysis. INGAA believes that an objective re-analysis of cost effectiveness for above the floor controls for gas-fired engines will conclude that controls are *not* cost effective and above the floor emission standards are *not* warranted for natural gas-fired IC engines. INGAA offers our assistance in developing data to support a robust cost effectiveness analysis for existing natural gas-fired engines.

14. EPA should define the "cost effective" threshold for analysis of above the floor emission controls. If a "brightline" threshold cannot be defined due to peripheral benefits, associated negative impacts, and/or consideration of HAP toxicity or other issues, EPA should identify a cost range and the basis and process for evaluating peripheral benefits and negative impacts.

Docket document no. OAR-2008-0708-0017 identifies and discusses the engine size thresholds for above the floor emission controls. Cost per ton thresholds for above the floor controls can be estimated from these engine sizes and the tabulated cost/benefit data. For 2SLB and 4SLB engines, document 0017 states "the costs for engines 250 hp and above equipped with oxidation catalyst are reasonable and can be justified in light of the significant reductions of HAP that would be achieved from these particular engines." The extrapolated cost per ton HAP removed for a 250 hp engine is about $3,600. Similarly, smaller lean burn engines did not require beyond the floor catalytic controls based on cost effectiveness values of about $3,600 per ton or higher. Thus, this indicates a cost threshold of approximately $3,600 per ton for lean burn engines, as discussed further below. INGAA understands that other impacts also affect the decision for above the floor controls – i.e., Clean Air Act §112(d)(2) indicates that EPA shall take into consideration "the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements"…" when making this determination. However, the record for this rule and the previous RICE NESHAP rulemaking indicate that cost effectiveness for HAP control is the primary factor in this decision.

As noted in Comment 13, there are significant issues with the cost analysis, and alternative cost information is provided. INGAA requests that EPA define the cost per ton threshold for above the floor emission controls for natural gas-fired engines. If EPA is unwilling to define a threshold for natural gas-fired engines, at a minimum, EPA should divulge the process for considering cost effectiveness thresholds and evaluating peripheral benefits and negative impacts, and provide context for the analytical process based on the HAPs associated with gas-fired engines. In addition, EPA should identify and justify any divergence in thought as compared to determinations made for the original 2004 RICE MACT regarding whether a particular cost value is considered acceptable or unreasonable.

For example, in Comment 13, cost effectiveness values are provided for natural gas-fired engines from 2002 EPA analysis for the original RICE MACT rule. In docket document no. OAR-2002-0059-0071 for that rulemaking, EPA indicates, "For existing 2SLB, 4SLB, and CI stationary RICE, none of the above-the-floor regulatory alternatives were determined to be cost effective. Non-air quality health, environmental impacts, and energy effects were not significant factors." Thus, the analysis from the original RICE MACT concludes that cost effectiveness values for lean burn engines on the order of $13,000 to $21,000 per ton are *not* reasonable. Analysis was not completed for rich burn engines because the MACT floor required NSCR for engines larger than 500 hp at major sources.

For docket support documentation for the Proposed Rule, the cost effectiveness values in document 0117 Table 2 for non-emergency gas-fired engines are reproduced here for reference. Shading is added to the document 0117 table to indicate cost per ton values for engines that do *not* require above the floor controls. Thus, it is implied that these dollar per ton values are *not* reasonable for that engine subcategory. The next cell to the right indicates a "reasonable" dollar per ton value. INGAA presumes that the "reasonable" threshold for cost effective controls should lie within this range.

Docket Document OAR-2008-0708-0117; Table 2. Cost per ton ($/ton) of HAP Reduced per Engine

Engine	**Size Range (HP)**							
	<50	**50 – 100**	**100 – 175**	**175 - 300**	**300 – 500**	**500 – 600**	**600 – 750**	**>750**
2SLB (OxCat)	$19,887	$7,798	$5,039	$3,658	$2,887	$2,578	$2,425	$2,207
4SLB (OxCat)	$19,887	$7,798	$5,039	$3,658	$2,887	$2,578	$2,425	$2,207
4SRB (NSCR)	$33,373	$13,162	$8,549	$6,241	$4,952	$4,435	$4,180	$3,815

The subcategory sizes from the Proposed Rule are not specifically identified in the table for 2SLB and 4SLB engines. These subcategories require above the floor controls for engines 250 hp and larger. For 4SRB, engines 50 hp and larger require above the floor controls. Review of docket document 0117 notes the following for 2SLB and 4SLB engines, "the costs for engines 250 hp and above equipped with oxidation catalyst are reasonable and can be justified in light of the significant reductions of HAP that would be achieved from these particular engines." Based on the data in Table 2 of document 0117, the extrapolated cost per ton HAP removed for a 250 hp engine is about $3,600. Smaller lean burn engines did not require beyond the floor catalytic controls based on cost effectiveness values of about $3,600 per ton or higher. The docket and preamble also indicate that $2,900 per ton is "reasonable" for 2SLB engines and $3,000 per ton is reasonable for 4SLB engines – i.e., above the floor controls are required for non-emergency lean burn engines 250 hp and **larger. Thus, this indicates a cost threshold of approximately $3,600 per ton for lean burn engines.**

For 4SRB engines, OAR-2008-0708-0017 states (for engines less than 50 hp) "The cost of above-the-floor options based of (on) add-on controls for engines less than 50 hp are considered significant. Therefore, MACT is equivalent to the MACT floor" and "The MACT floor for stationary engines less than 50 hp is the level that is achievable by existing engines of this size operating without add-on control technology." The proposed rule requires above the floor control for affected 4SRB engines greater than or equal to 50 hp at costs within the range of $3,800 to $13,000 per ton of HAP removed. The referenced cost per ton of HAP removed for 4SRB engines less than 50 hp is $33,373. Thus, for gas-fired rich burn engines, this appears to set a threshold that is considered too costly. INGAA understands that other benefits (and negative impacts) may be considered and affect the decision. However, document number 0117 implies that that **the cost per ton threshold for above the floor emission controls for affected rich burn engines would be at or below this cost per ton value – i.e., in the range between $13,000 to $33,000 per ton**. If the average size for the table range is the basis for the category cost presented, then it appears that approximately **$19,000 to $22,000 per ton** is the cost effectiveness value at the subcategory size threshold of 50 hp. This range is determined for the cost effectiveness value at 50 hp based on power or polynomial correlations (both with an R^2 value >0.97) for the data at the lower end of the horsepower ranges presented in the table. Apparently, EPA has concluded that a higher cost per ton threshold is warranted for rich burn engines than for lean burns. For reference, it should also be noted that a threshold of $72,000 per ton for diesel engines is indicated as too costly in the preamble to the Proposed Rule (74 FR 9710), and the EPA analysis implies that co-benefits for diesel engines (i.e., reduction in diesel particulate) is more compelling than co-benefits from control of natural gas-fired engines.

Regarding rich versus lean burn natural gas-fired engines, rich burn engine NSCR can provide peripheral benefits through reduced NOx and CO emissions. Conversely, NSCR negative impacts include increased fuel use, greenhouse gas emissions, and ammonia emissions. Comment 13 provides detailed discussion of these impacts. EPA should quantify and consider all of these positive and negative impacts to determine the cost/benefit threshold for above-the-floor NSCR control for rich burn engines. Weighting or specific EPA determinations regarding the relative impacts of emissions of HAPs, criteria pollutants, and greenhouse gases should be considered and documented. For example, it is inappropriate to present a value based on CO reduction without considering the relative importance of CO emissions as compared to HAPs or other criteria pollutants. In addition, benefits or disbenefits from NOx reductions can depend upon the airshed and geographically specific issues. For example, NOx reductions can be countered by ammonia emissions increases, and ammonia emissions could be more problematic if fine particulate is a key issue. The NOx-ammonia tradeoff has been recently investigated and will be discussed in a forthcoming report from Kansas State University.

Also, it is appropriate to consider the relative toxicity of HAPs from natural gas-fired engines. Formaldehyde has always been considered the primary HAP of concern. However, if the unit risk estimate for formaldehyde is revised (see Comment 3), the relative importance of reducing this HAP may be marginalized, and the associated cost effectiveness threshold would be lowered.

As shown in Comment 13, INGAA believes that the cost analysis in the docket is dramatically under-estimated and some alternative costs are provided. However, EPA should assist INGAA with our effort to provide improved data for the rulemaking docket by substantiating the relevant cost thresholds. This is important because it provides context for the "exactness" needed in any additional cost data gathering exercises – i.e., if the dollars per ton value for applying control to a particular engine subcategory is well above or well below the cost effectiveness threshold, than there is no reason to refine that analysis. If the cost per ton is close to the threshold, those subcategories or engine types warrant additional review and scrutiny to ensure that adequate and representative data are used as the basis for the cost effectiveness analysis and associated above the floor finding.

Catalytic Control Requirements

15. EPA has not adequately supported its conclusion that 90% control is readily achievable, especially for engines or operating conditions with lower characteristic exhaust temperature.

EPA has not provided data to support its conclusion that 90% control is readily achievable for NSCR and oxidation catalysts over the normal operating ranges of affected engines and for all engine types. NSCR and oxidation catalysts have characteristic operating temperatures required for efficient (i.e., 90%) emission control. Below these temperatures, control efficiency rapidly declines. EPA has not presented data that show the typical range of this characteristic temperature for commercial NSCR and oxidation catalysts nor has EPA provided data that show catalysts continuously achieve this temperature under the normal range of engine operating conditions.

Data discussed in Comment 16 from the RICE NESHAP emission database show oxidation catalyst efficiencies for CO and formaldehyde well below 90% over a range of operating loads. For example, 2-stroke lean burn engines are not expected to achieve the required catalyst temperature under some or all operating conditions, and this may vary by engine make and model. EPA should determine the NSCR and oxidation catalyst operating conditions (e.g., temperature, space velocity) required for 90% control and determine if these conditions are routinely achieved during normal operation of affected engines. This issue is complicated by the large number of engine makes and models that comprise the existing fleet and differences in characteristic exhaust temperatures. For example, Ajax engines are smaller lean burn units that are unlikely to achieve the required temperature in most cases. For engine and catalyst operations that cannot achieve 90% emission control, appropriate subcategories should be considered as discussed in Comment 7.

16. The assumption of 90% control contradicts results from the EPA sponsored test program associated with the original RICE NESHAP rulemaking. EPA should explain test data deviations from 90% control and contradictions from the previous RICE NESHAP testing.

EPA sponsored a test program at Colorado State University (CSU) to evaluate oxidation catalyst controls applied to gas-fired lean burn engines. Table 12 summarizes results from 2SLB engine tests. These data are from the RICE NESHAP emission database and presented in EPA Report Number EPA-454-R00-036 (July 2006). Control efficiencies for both CO and formaldehyde were well below 90% for operating loads ranging from 68% to 100%. At that time, it was concluded that lower control efficiencies were due to lower engine exhaust gas temperatures. In addition, it was found that lower operating temperatures increased the catalyst susceptibility to poisoning, which further impedes performance.

These data from an EPA sponsored test program for the original RICE NESHAP rule development contradict the Proposed Rule "conclusion" that 90% control is achievable. The basis for that conclusion is unclear as it is not documented in the docket, other than the statement that this is a commonly accepted assumption. INGAA strongly objects to the EPA opinion that this is an accepted assumption.

If EPA believes that 90% control is readily achievable, additional analysis of the test data deviations from 90% control should be provided to determine if other engine design and/or operating parameters are contributing to the poorer control. As discussed in Comment 7, analysis of these data could require a subcategory for lean burn engines with exhaust gas temperatures too low for effective oxidation catalyst control. There is a very important point that shows contradictions in the EPA analysis for this rule: **the catalyst inlet data from the tests in Table 12 are the basis for the MACT floor for 2SLB engines; however, emissions from this engine exceed the proposed above-the-floor emission limits**.

Table 12 CO & CH2O Control by Oxidation Catalyst Installed on 2SLB Engine.*

Inlet Test ID	Outlet Test ID	Load	O2	CO ppbv @ 15% O2		Percent Reduction	CH2O ppbv @ 15% O2		Percent Reduction
				Inlet	Outlet		Inlet	Outlet	
CSU-1.1.1	CSU-1.1.2	100%	14.6	83,000	27,100	67%	16,700	8,980	46%
CSU-1.15.1	CSU-1.15.2	100%	14.7	91,800	29,900	67%	18,300	9,470	48%
CSU-1.13.1	CSU-1.13.2	100%	14.6	80,600	29,200	64%	18,200	9,450	48%
CSU-1.9.1	CSU-1.9.2	100%	14.5	77,600	28,100	64%	16,700	8,690	48%
CSU-1.6.1	CSU-1.6.2	100%	14.34	75,300	26,900	64%	16,100	7,480	54%
CSU-1.10.1	CSU-1.10.2	100%	14.63	78,900	27,500	65%	17,400	8,670	50%
CSU-1.5.1	CSU-1.5.2	100%	15.1	116,000	40,100	65%	17,200	10,500	39%
CSU-1.16.1	CSU-1.16.2	100%	14.6	87,600	29,600	66%	18,000	9,210	49%
CSU-1.14.1	CSU-1.14.2	100%	14.6	95,000	31,800	67%	15,800	8,310	47%
CSU-1.8.1	CSU-1.8.2	95%	15.6	134,000	44,000	67%	19,000	10,000	47%
CSU-1.4.1	CSU-1.4.2	95%	14.7	74,900	28,800	62%	15,300	8,230	46%
CSU-1.12.1	CSU-1.12.2	95%	15.3	120,000	47,900	60%	18,400	11,900	35%
CSU-1.11.1	CSU-1.11.2	95%	15.2	123,000	50,900	59%	18000	12,200	32%
CSU-1.3.1	CSU-1.3.2	69%	16.08	245,000	91,300	63%	22,400	17,300	23%
CSU-1.2/7.1	CSU-1.2/7.2	68%	15.8	259,000	80,100	69%	24,100	15,900	34%

* 440 hp Cooper Bessemer GMB-4VTF equipped with an oxidation catalyst.

17. For compliance at reduced load (or other lower temperature operating conditions that affect catalyst performance), alternative standards available under §112(h) should be considered.

Comment 4 and other comments above address concerns regarding compliance "at all times" and discuss several scenarios where problems are apparent. This section of the comments discusses catalytic control issues. It is known that a minimum catalyst temperature is required to achieve control for CO and formaldehyde. It is also known that exhaust temperature decreases at lower load and can be affected by other factors such as ambient conditions (temperature, precipitation). Testing EPA conducted at CSU to support the original RICE MACT also showed that additional problems can develop at lower temperature. For the CSU 2-stroke lean burn engine tests, catalyst masking problems occurred at lower exhaust temperatures and the phenomenon was not well understood by the catalyst vendor. When catalytic control is required, measures could be considered to minimize operating time where catalyst temperature is lower (e.g., minimize startup time within reasonable constraints), but those constraints should not limit the ability of the IC engine to perform its function including the low load operation or idle mode in some cases. Another problematic example is IC engines that drive an air compressor. These units cycle on and off and run for very short time periods. Exhaust temperature will not be adequate to reduce emissions.

Thus, similar to discussions in comments above, the Proposed Rule fails to consider the physical limitations of control technology performance. For example, the rule specifies 90% reduction. As discussed in comments above, the basis for that performance standard is questionable, but even if 90% can be achieved and is guaranteed at some conditions, vendor guarantees and actual performance will not achieve high reduction efficiencies at all conditions. The rule fails to address this very well understood limitation on catalyst performance. Trying to specify the appropriate standard as a function of load or operating temperature is not possible because performance variability will be affected by factors such as load, engine type, engine make or model within a subcategory, catalyst formulation, catalyst age, etc. Thus, as with other examples such as SSM and reduced load in general, INGAA believes it is infeasible to prescribe or enforce an emission standard at all times for catalytic control. The Proposed Rule consideration of different performance during startup and malfunction indicates at least some understanding of this issue, but that philosophical approach is not applied broadly enough. In addition, data or analyses are not provided in the docket to justify catalytic control performance at all conditions; and, the basic scientific understanding of exhaust temperature influence on catalyst performance substantiates the position that compromised performance should be expected.

Thus, INGAA recommends that where catalytic control is required, the rule be revised to consider work practice standards for operation at reduced load and other reduced temperature operating conditions. In these scenarios, the exhaust temperature cannot be manipulated by the operator and catalyst performance will be constrained by catalyst design considerations. As with other examples discussed above, if EPA decides to proceed with an emission standard that applies at all times and presume catalytic activity, the basis for that conclusion must be justified with data and transparent scientific analysis. In addition, catalyst vendor quotes without technical support data and an understanding of performance guarantees should not serve as the sole basis for justifying the decision.

18. Current EPA regulations (specifically, 40 CFR § 63.6640(d)) provides for a 200 hour burn in period for catalyst-equipped engines that are new, reconstructed, or rebuilt. This allowance should also address a burn-in period for commissioning of an engine following major maintenance if concerns regarding catalyst damage are specified or implied in the catalyst guarantee or performance specification.

The RICE NESHAP considers damage that can occur to catalyst systems following initial engine startup and provides for a 200 hour "burn-in" period for engines that are new, reconstructed, or rebuilt. In some cases, catalyst manufacturers have guarantee limitations related to catalyst exposures after maintenance activities, and the maintenance may not be significant enough to be considered "rebuild.". In addition, the definition of rebuild is somewhat ambiguous and "major maintenance" activities should also be addressed under this section. For example, engine maintenance activities on the "combustion portion" of the engine (e.g., replacing piston rings, seals) may not be significant enough to be considered "rebuild,"" but still require engine burn-in time upon post-maintenance restart to ensure that catalyst damage does not occur and to preserve catalyst guarantees or address vendor operating specifications. In addition, existing engines that install retrofit controls to comply with the Proposed Rule should also be provided a burn-in period if warranted. For example, upgrades may be required that do not meet the definition of modification, reconstruction, or rebuild (e.g., turbocharger improvements) that require a burn-in period to avoid catalyst damage. Activities required to comply with the rule should also be followed by a burn-in period.

INGAA recommends that §63.6640(d) be supplemented to indicate that "maintenance activities that could damage the catalyst upon startup" are also allotted a burn in period for catalyst-equipped engines. The following text in §63.6640(d) would address this issue:

> "…For new, reconstructed, and rebuilt stationary RICE, ***and stationary RICE that have undergone maintenance that could result in catalyst damage upon startup or equipment changes to comply with the requirements of this Subpart,*** deviations from the emission or operating limitations that occur during the first 200 hours of operation from engine startup (engine burn-in period) are not violations."

GACT and Management Practices

19. EPA should consider additional opportunities to rely on management or operating practices for compliance. Management practices are warranted for area sources under "Generally Achievable Control Technology" (GACT) provisions and for both area and major source engines under CAA §Section 112(h).

EPA can establish standards for area sources listed pursuant to section 112(c) based on *Generally Available Control Technology* (GACT) rather than MACT. The statute does not set any conditional precedent for issuing standards under section 112(d)(5) other than that the area source category or subcategory must be listed pursuant to section 112(c). Table 2d [74 FR 9723], "Requirements for Existing Stationary RICE Located at an Area Source of HAP Emissions" shows area source standards. When there is an emission limit, EPA has concluded that area source standards should be equivalent to MACT. When the standard is a management practice, EPA has concluded that area source GACT can differ from MACT. EPA has opted to broadly apply MACT as opposed to GACT for area source natural gas-fired engines, and the basis for this decision is not clear. The docket does not discuss the decision, alternatives that were considered, or the rationale for selecting the more stringent MACT standards. INGAA questions the basis of this decision, and recommends broader application of GACT for natural gas-fired area source engines. There are several points that support broader use of GACT over MACT, including:

- As discussed in Comment 3, many area source natural gas-fired engines are located in rural areas. In addition, many of these rural engines are in remote locations distant from population. In considering differentiating between rural and urban area sources (see Comment 3), GACT should be broadly applied in rural areas or EPA should more clearly document and justify the basis for requiring MACT.
- Requiring MACT for area sources is also questionable when considering the limited and flawed data used for determining cost effectiveness. Costs are discussed in Comment 13, and actual cost data are presented to better assess cost effectiveness. In addition, cost effectiveness escalation for smaller engines should be considered when deciding whether GACT or MACT is warranted. Additional cost burden can also be incurred for rural area sources due to the lack of electricity and prevalence of unmanned facilities.
- A host of technical issues related to emissions characterization and applicability "at all times" raise questions about the feasibility of developing and enforcing emission limits, as further delineated in the bullet points that follow.

In addition, as discussed in several comments above, Section 112(h) allows EPA to promulgate a work practice standard if it is not feasible to enforce an emission standard. The basis for Administrator discretion is discussed in Comment 4. For RICE, technological and economical limitations include the inability to define or assign hazardous air pollutant emissions limits at reduced / off-load operations and during periods of startup, shutdown, and malfunction.

The following technological or economic limitations for stationary IC engines justify the application of work practice standards in lieu of emission limits, and many of these are also discussed in comments above regarding emission standard applicability and the need to consider alternatives:

- Data are not available to support developing HAP emission limits during these events. HAP emissions during reduced load and SSM events are undefined and uncharacterized. Emission limits and compliance margins cannot be established, predicted, or consistently achieved for these operating conditions without undertaking a monumental emissions characterization study that may result in further ambiguity, and still result in compliance implementation problems. These complexities and technical limitations are not discussed in the support documentation for this rulemaking;
- Emissions variability by engine family, make, model, service, altitude, fuel quality, and percent load has not been characterized or considered in the Proposed Rule;
- The inability to characterize emissions over the large matrix of undefined potential malfunction events;

- Responsible official's inability to certify Title V compliance "at all times" when emissions for many operating scenarios and SSM events are not considered in the MACT floor analysis;
- Method 320 (FTIR) is currently the only approved formaldehyde measurement method and the lack of qualified testing contractors, test equipment, and test trailer site access results in significant technology and cost limitations;
- Event durations are highly variable by engine family, make, and model and are undefined. Short-term FTIR concentration measurements during event durations that may last minutes or less (e.g., malfunction, startup) are inappropriate and would deviate from the form of the three, one-hour average concentration averages provided under RICE performance test requirements.
- Especially for SSM events, if EPA considers applying an emission standard for area sources, concerns regarding natural gas-fired emissions during SSM events should be defined and analyzed to take into account anticipated event duration and potential emission levels. Proper consideration of impacts and benefits may conclude that the benefits are not commensurate with the cost to develop and implement such limits when a GACT standard based on work practices can be used for compliance.

If properly considered, these technical and economic limitations would likely support the conclusion that establishing emission limits for off-load or SSM events is not feasible. INGAA requests that EPA support the need for MACT standards for area sources with a more thorough and complete analysis that accounts for cost effectiveness, geographical location, and associated impacts and risk, and the flexibility available to assign GACT management practices. In addition, section 112(h) alternatives should be considered for at least certain operating conditions for major sources rather than claiming emission limit applicability "at all times.""

INGAA reiterates that the docket does not provide adequate cost justification and assessment of environmental impact and benefit for controls applies to natural gas-fired area source engines. Emission reductions and cost effectiveness for controls for area sources are anticipated to be marginal – especially for smaller engines. EPA should support determinations that MACT is warranted regardless of size and location with adequate detail and discussion. Independent analysis should be conducted for the various MACT-affected subcategories of natural gas-fired engines.

This analysis should appropriately consider the administrative burden associated with reporting and recordkeeping requirements for Part 63 affected sources, and unique technical challenges and costs for rural, unmanned facilities. Similar to the discussion in Comment 3 regarding urban area risk assessment requirements, the docket lacks sufficient documentation to demonstrate necessity and cost-benefit in rural environments or for small engines. Therefore, specific comment regarding the EPA views on cost effectiveness or environmental benefit cannot be assessed because they are not established in the docket.

20. The GACT management practices for small area source engines define maintenance frequency that far exceeds current practices. The basis for these requirements is not clearly presented in the docket. EPA should consider alternative practices or more reasonable frequency for the proposed practices.

INGAA supports the selection and application of GACT work practices for area sources under 112(d)(5) as the only technically and economically viable alternative to SSM and off-load HAP emission limits. However, the proposed maintenance procedures are much more extensive than current industry practice (e.g., frequency of maintenance requirements). These requirements add significant cost that has not been identified or considered in the rulemaking. Further, the docket materials fail to define the basis for the management practices and inform on the relationship between frequency of maintenance activities and acceptable engine performance. In addition, EPA has not considered current practices where performance metrics establish maintenance intervals or explained how these practices are deficient.

For example, the Proposed Rule would require an oil change for a rich burn engine <50 hp every 200 hours (i.e., just over 8 days of continuous operation) and replace spark plugs every 500 hours (i.e., every 3 weeks). These requirements far exceed accepted practice, the basis for these frequencies is not explained in the docket. In addition to review of costs and relating this process to emissions performance, the generation of additional waste oil and filters and the deleterious environmental effects have not been quantified or considered. Additionally, since many of these small area source engines are in very remote, unmanned locations, the increased criteria pollutant, HAP, and CO_2 (i.e., GHG) emissions from service vehicles should be estimated and included in the cost-benefit analysis for this burdensome maintenance frequency.

21. Operator defined management practices should be included as an acceptable alternative to rule-defined or vendor specified maintenance requirements. This approach is consistent with using an operator-defined maintenance plan for compliance assurance for the spark ignition IC engine NSPS (40 CFR 60, Subpart JJJJ).

Operator defined operating and management practices provide flexibility to optimize the time interval between maintenance activities based on performance metrics unique to each company and engine application/service. The principle of operator-defined maintenance was included in the January 2008 NESHAP revisions and NSPS for natural gas-fired engines. This same principle should be adopted in this rule, based on the recognition that operators have vast experience in operating and maintaining their equipment and have developed practices for existing equipment over many years of operations. In fact, because the Proposed Rule affects existing area source engines while the 2008 NESHAP affected new area source engines, it is more logical to apply operator-defined practices for this rulemaking due to operator familiarity with existing operations.

Considerations for alternative and varied maintenance intervals specific to various engine types, include but are not limited to:

- Competitive advantages to maintenance practices and frequency. Extended intervals between major maintenance activities based on increased unit performance and run time availability are typically proprietary in nature and incentivized through profitability;

- Training and inspection programs that are company-specific;
- Oil reservoir capacity and circulation rate;
- OEM component replacement interval recommendations;
- Severity of duty cycle;
- Percent load and utilization rate;
- Oil analysis; and
- Location (i.e. manned vs. unmanned)

22. If the current proposed practices are retained, the *frequency* must be revised to be consistent with current reasonable practices, and consider current maintenance approaches such as performance-based decisions for defining when to complete a maintenance task.

As noted in Comment 20, the proposed maintenance frequency is extremely burdensome and unsubstantiated. INGAA recommends EPA supplant hour intervals with company defined performance-based maintenance practices or metrics. Activities and intervals can be documented in an operator-defined maintenance plan consistent with the compliance assurance for the spark ignition IC engine NSPS (40 CFR 60, Subpart JJJJ).

In addition, EPA should clarify that the Proposed Rule maintenance activities apply as appropriate. For example, continuous oil-feed is inherent to the operation of 2-stroke lean burn engines, so an "oil change" requirement does not make sense for this engine type. This error in the Proposed Rule should be corrected.

23. If maintenance frequency is defined in the rule, it must be specified as *operating* hours. The Proposed Rule implies the use of calendar hours. EPA must also define operator requirements when a maintenance schedule elapses while an engine is operating and performing a necessary function.

In the absence of references to operating hours, the mandated management practices specified in Subpart ZZZZ, Table 2(d) imply that the maintenance frequency is based on calendar hours. If the engine is not utilized during the calendar interval period, no wear or performance or emissions degradation are assumed. Therefore, it is appropriate to include operating hours as the correct interval. Ambiguity should be eliminated through a clarification that includes inserting "operating" prior to each occurrence of "hours" pertaining to maintenance practice frequency. In addition, if frequency is specified, EPA should define allowances around that schedule and actions required if the clock elapses while engine operation is required. For example, with a 200 hour schedule, an emergency event could occur and emergency engine operation required for more than 200 hours. Surely, EPA does not intend for emergency operations to be halted and the engine stopped so an oil change can be completed. Thus, if the final rule includes defined maintenance frequency, provisions must be provided to address operator requirements regarding engine shutdown solely for the purpose of completing maintenance.

24. If operator defined practices are not allowed and a more reasonable frequency for the proposed maintenance cannot be determined, then EPA should convene a group of stakeholders to define consensus management practices.

If recommendations above are not incorporated in the final rule, EPA should convene a work group or solicit information from an array of stakeholders to address management practice requirements for GACT. As noted in comments above, INGAA supports management practices in the rule and believes that this approach should be more broadly applied. However, the management practices must be well-founded.

Although consensus may be difficult to obtain given the proprietary nature of engine maintenance practices and performance metrics, affected stakeholders, service providers, and vendors should be engaged to identify appropriate procedures. The resulting maintenance activities and intervals are expected to be more consistent with current reasonable practices. In soliciting input, care should be taken to eliminate biases from participants that may benefit financially from increased sales of parts or maintenance services.

25. For all affected emergency engines the Proposed Rule should impose management **practices, not emission limits, to recognize the limited operating time of emergency units and the corresponding limitations in the ability to measure compliance.**

While INGAA broadly supports more use of management practice standards for area sources and operations where compliance cannot be reasonably prescribed or enforced, management practice standards are especially relevant for emergency engines. Rule requirements for these units should be given special consideration regarding less rigorous management practices, performance testing, and reporting and recordkeeping requirements. A standard cost-benefit analysis would likely reveal that the HAP emissions from area sources and engines in remote locations are trivial. In addition, accessing remote emergency engines may impose significant burden. The lack of continuous run time warrants special consideration for this subcategory. If emission limits are retained for emergency engines, EPA should evaluate the basis for the limits and provide justification for including emission limits (that will likely trigger control requirements even if based on an uncontrolled MACT floor). The analysis should scrutinize urban health risk attributable to the natural gas-fired emergency engine subcategory, and other factors associated with cost-benefit. ,

Test Methods

26. INGAA supports the proposed CO test methods.

INGAA agrees that the CO emissions test methods in the Proposed Rule are appropriate for stationary internal combustion engine emission measurements. The methods include Method 10 from 40 CFR 60, Appendix A; FTIR methods including EPA Method 320 and ASTM Method D6348-03; and, ASTM Method D6522-00 (2005) for using a portable analyzer. In addition, the ASTM method can be used to measure oxygen.

For portable analyzer testing, procedures other than the ASTM method are commonly used, and many states have accepted alternative methods for portable analyzer compliance tests. In addition to citing the ASTM method, EPA should indicate that alternative methods approved by the Administrator or delegated authority are also acceptable. This provision could be added to footnote "a" in Table 4 to Subpart ZZZZ. That footnote discusses the ASTM method and INGAA recommends adding the statement, "Alternative portable analyzer methods approved by the Administrator or delegated authority are also acceptable."

The cited methods are industry standards and are the typical test methods required for state and regional compliance testing. Thus, the methods, including approved alternative portable analyzer methods, have a history of successful application to stationary internal combustion engines and are appropriate methods to demonstrate compliance with the CO standards in the Proposed Rule.

27. EPA should include the FTIR test methods as acceptable methods for CO "percent reduction" performance tests.

As noted in the previous comment, CO tests methods include the EPA and ASTM test methods for extractive FTIR measurement. In Table 4 to Subpart ZZZZ, the FTIR methods are included as acceptable CO test methods for measuring compliance with the CO concentration limit (i.e., see the last entry for item 3 in Table 4 of Subpart ZZZZ). However, per item 1 in Table 4, the FTIR methods are not identified as acceptable methods for complying with requirements to reduce CO (i.e., "percent reduction" compliance). INGAA believes that this may be an oversight and recommends that the FTIR methods be included as acceptable methods for both concentration based or percent reduction based compliance tests.

The FTIR methods are already cited in the rule – i.e., ASTM Method D6348-03 "Standard Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy" and EPA Method 320 of 40 CFR 63 Appendix A "Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectroscopy" are listed in Table 4 to Subpart ZZZZ. INGAA is not aware of any technical limitations in using FTIR for percent reduction tests, so these methods should be included as acceptable approaches for CO measurement.

Since FTIR tests may be desirable for other reasons (e.g., other pollutants need to be measured to address state requirements and FTIR provides the best solution), including the FTIR methods affords flexibility while not compromising test method efficacy. If FTIR methods exclusion for percent reduction compliance tests was not an oversight, and EPA has technical concerns about FTIR testing for this purpose, these issues should be clearly stated in the public record. INGAA would like to discuss any such concerns with EPA at the earliest convenience so that any such misconceptions can be dispelled and the appropriate methods can be cited in the Final Rule.

28. EPA should more thoroughly investigate whether Method 323 can be retained or another alternative to Method 320 is available for formaldehyde testing.

EPA Method 323 "Measurement of Formaldehyde Emissions from Natural Gas-Fired Stationary Sources—Acetyl Acetone Derivitization Method" was published in the Federal Register on January 14, 2003 as a proposed method for measuring formaldehyde emissions in the exhaust of natural gas-fired, stationary combustion sources. However, the method has yet to be published as a promulgated test method. In the interim, the method has been routinely used to measure formaldehyde emissions from gas-fired engines for regulatory compliance and other purposes. Recent emission test results from EPA Region 8 have raised questions regarding the reliability of Method 323 and the Method was not included in the proposed rule as an option for formaldehyde emission measurements. The single formaldehyde test method in the proposed rule is EPA Method 320 "Measurement of Vapor Phase Organic and Inorganic Emissions by Extractive Fourier Transform Infrared (FTIR) Spectrometry." Relative to Method 323, the FTIR method is complex and typically much more expensive. FTIR testing requires a climate controlled trailer or van, FTIR instruments, calibration gases, heated sample probe and sample line, and specially trained personnel. FTIR does not detect oxygen and a separate O_2 analyzer is required. In addition, as discussed in Comment 30, there are serious doubts regarding the capacity of qualified testing contractors to meet the anticipated testing demand. Comment 30 also discusses access problems for testing remote engines that are located in areas where test trailer transport would be difficult.

Given these concerns regarding FTIR site access, testing costs, and commercial capacity to meet demand, EPA should more thoroughly investigate Method 323 as viable test method. EPA should provide data that more specifically identify issues with Method 323 and investigate possible solutions. The "questionable" test data from Region 8 should be thoroughly reviewed to determine if the apparent anomalies were caused by operator error, a fundamental method flaw, or appear to be random unexplained outliers. The reasons these test data were disallowed and Method 323 was excluded, as well as what investigation is being done to address these concerns should be discussed. Concurrently, EPA should investigate alternative formaldehyde measurement methods for gas-fired engines because FTIR testing alone is unlikely to be able to address compliance testing requirements.

INGAA believes that testing errors may have contributed to the anomalous results from a test in Region 8 that raised concerns. INGAA has obtained what are believed to be two of the questionable test reports. An initial data review suggests that either: (1) incorrect units for the sample rate and volume were entered in the data reduction spreadsheet and, due to this calculation error, the *reported emissions* were an order of magnitude lower than *actual measured emissions*; or (2) the sample rate was well above the method specification and sample breakthrough occurred (i.e., formaldehyde was not completely absorbed in the impinger solution). INGAA will continue to investigate this issue, and EPA should also more closely review the tests in question to determine whether test error rather than method performance is the problem. In addition, it is implied that Region 8 has additional test data with questionable results. If so, the data and test reports should be posted in the docket so review and comment can be completed. Whether testing error rather than method performance contributed to anomalous results is an important issue because INGAA is concerned about the proposed rule viability if extractive FTIR testing is the only allowed test method for formaldehyde measurement. Related issues are discussed in the following two comments.

29. Without an alternative to FTIR, formaldehyde testing will not be accessible for rich burn engines due to several factors, including FTIR test van access to remote locations, cost, and commercial availability. Thus, §112(h) alternatives related to measurement feasibility must be considered or an easier to measure surrogate for formaldehyde must be identified.

There are numerous practical concerns regarding FTIR as the sole formaldehyde test method. FTIR testing requires that a climate controlled test van or trailer with the FTIR instruments and ancillary equipment be driven or transported to the engine. Accessing many remote engine locations, for example engines employed in oil and gas production, will not be practical. Many engines are located miles from a paved road and are only accessible over narrow, hilly, dirt roads that turn to mud and can become rutted during rains and snow melts. As discussed in Comment 28, FTIR equipment and testing are very costly, especially when compared to a simple wet impinger method such as Method 323.

For some small engines, FTIR testing costs could be the same order of magnitude as the engine costs, and INGAA believes that this dramatically affects the cost-benefit analysis for smaller engines. Finally, the capacity of qualified FTIR emission testing companies to meet the testing demand that would be created by this proposed regulation is highly questionable. Based on the counts of affected engines presented in docket document number 2008-0708-0028 and assuming all the engines are non-emergency (the analysis below can be adjusted for the actual percentage of non-emergency engines), it is estimated that 80,000 4SRB engines will require initial performance tests when the rule becomes effective. There are inconsistencies in docket material regarding engine counts and it appears that engine estimates for some sectors (e.g., exploration and production) are under-estimated. For the purposes of discussion in this comment, the engine count was estimated as follows:

- For major source 4SRB engines, Table 1 from docket document 2008-0708-0028 lists the number of affected SI engines from 100 – 500 hp as 39,464. Assuming 75% of these engines are 4SRB (refer to Comment 36 for discussion of 4SRB engine population percentage), then about 29,598 4SRB engines at Major sources would require initial testing.
- For area source 4SRB engines, Table 2 from docket document 2008-0708-0028 lists the number of affected SI engines from 100 – 500 hp as 59,196 (assuming 2/3 of the engines in the 300 – 600 hp size range are less than or equal to 500 hp). Assuming 75% of these engines are 4SRB (refer to Comment 36 for discussion of 4SRB engine population percentage), then about 44,397 4SRB engines 500 hp and smaller at area sources would require initial testing.

- For area source 4SRB engines, Table 2 from docket document 2008-0708-0028 lists the number of affected SI engines greater than 500 hp as 15,395 (assuming 1/3 of the engines in the 300 – 600 hp size range are greater than 500 hp). Assuming 42% of these engines are 4SRB (refer to Comment 38 for discussion of 4SRB engine population percentage), then about 6,466 4SRB engines larger than 500 hp at major sources would require initial testing.
- Thus, the estimated total 4SRB engines that would require initial testing under the proposed rule is about 29,598 + 44,397 + 6,466 ~ 80,000.

It is not practical to test this many engines based on a simple review of engine counts and commercial capacity. Optimistically, assuming an FTIR test van can test 150 engines per year and assuming the testing would be conducted over the course of one year (from §63.6612 (a) "if you own or operate an existing stationary RICE …. must conduct the initial compliance test … within 180 after the compliance date"), then about 540 FTIR testing vans and qualified test teams would be required. INGAA believes that the current industry capacity of qualified FTIR testing contractors is less than 10% of this number and that the incentive for new contractors to purchase expensive FTIR instruments and ancillary equipment for this testing is minimal because over 90% of the affected engines only require an initial test. In addition, a short-term demand for one-time performance tests will likely result in unqualified companies entering the market, to the detriment of data quality.

An alternative, simplistic review of testing practicality can consider the number of affected natural gas-fired engines requiring a formaldehyde test (estimated to be approximately 80,000, which is probably conservative) and the compliance timing. If the 80,000 engines are tested in one year, that would require testing of 219 engines every day of the year. If it is assumed that compliance implementation begins immediately after the rule is final and testing is completed over 3 years, testing of over 70 engines every day for 3 years would still be required. This does not seem possible or practical based on the limited number of test companies available and practical limits for planning, scheduling, executing and reporting test results. The nationwide logistics of formaldehyde testing are staggering, especially if only FTIR testing is available.

These factors – engine location and access, testing cost, and capacity of qualified FTIR testing contractors – demonstrate that formaldehyde testing by FTIR will not be accessible, affordable, and/or available for a large percentage of the rich burn engines. As discussed in other comments, this testing demand problem could be at least partially ameliorated through more liberal application of GACT management practices rather than emission limits for area source engines. If not, then the FTIR testing demand will pose a compliance and enforcement measurement dilemma. Thus, §112(h) alternatives (e.g., work practices) triggered by emissions measurement infeasibility must be considered, an easier to measure surrogate for formaldehyde must be identified, and/or issues related to Method 323 measurements must be resolved.

30. INGAA supports the conclusion that CARB Method 430 data are non-quantitative for formaldehyde measurement from natural gas-fired engines. EPA should ensure that CARB 430 data are not included in the rulemaking analysis.

INGAA supports EPA's conclusion that California Air Resources Board (CARB) Method 430 formaldehyde measurements are non-quantitative and deficient and therefore were not used for the above-the-floor analysis. This issue is discussed further in Comment 5. EPA should eliminate all formaldehyde emissions data based on the CARB 430 method and consistently apply the rationale and conclusion to eliminate these measurements from the rulemaking analysis. This determination should also be consistently applied to the MACT floor analysis.

As discussed in Comment 5, many MACT floor formaldehyde data points include formaldehyde measurements that were obtained using CARB Method 430 (aka dinitrophenyl hydrazine or DNPH method) test data from tests in the early to mid-1990's. In addition to the reactions with formaldehyde that are required to quantify formaldehyde, DNPH also reacts with NOx to form a derivative. This side reaction with NOx can lead to depletion of the DNPH or produce other substances that mask the color that is produced by the aldehyde-DNPH reaction. Thus, CARB 430 tests are subject to a low bias for sources with NOx present (e.g., gas-fired engines) because NOx reacts with and depletes the impinger solution. INGAA supports EPA's determination that formaldehyde measurements using CARB 430 should be invalidated and eliminated from consideration. However, this has not been consistently applied in data analysis, and MACT floor emission limits appear to include CARB 430 tests. This action is in conflict with the CARB advisory that pollutant interference may occur for formaldehyde when NOx concentrations are greater than 50 ppm and emissions data collected from sources with these NOx levels should be flagged as "non-quantitative." This is also in conflict with EPA's acknowledgment of method deficiencies and categorization of all CARB 430 data as non-quantitative in docket document EPA-HQ-OAR-2005-0030-0009 "Development of HAP Emission Factors for Small (<500 hp) Stationary Reciprocating Internal Combustion Engines (RICE)."

In the original RICE MACT rulemaking, EPA appropriately chose to not include CARB 430 or DNPH based methods due to the problems discussed above and in Comment 5. INGAA supports EPA's general conclusion that CARB 430 data are suspect and that all CARB 430 data should be excluded from rule analysis. If EPA chooses to selectively use CARB 430 data, that decision must be supported by considerable analysis including concurrent NOx measurement data to refute the potential for low bias from method interferences.

31. For percent reduction compliance, sequential pre- and post-catalyst testing should be allowed as long as quality assurance measures are in place to preserve test integrity. Otherwise, significant burden is imposed for simultaneous measurement.

Existing 4SRB engines performance testing must demonstrate compliance with either a ppmvd formaldehyde at 15%O_2 emission standard or demonstrate 90% formaldehyde reduction across the catalyst. Similarly, lean burn engines performance testing must demonstrate compliance with either a ppmvd CO at 15%O_2 emission standard or demonstrate 90% CO reduction across the catalyst. Based on the levels of the standard, most operators would likely opt to comply with the percent reduction standard (i.e., the ppmv standard stringent is compounded by both a conservatively low MACT floor and EPA's assumption of high percent reduction). As discussed in Comments 28 and 29, FTIR equipment and formaldehyde testing are relatively expensive. For percent reduction compliance, FTIR testing costs could be minimized without impacting data integrity through sequential pre- and post-catalyst testing.

Significant burden is imposed for simultaneous measurement. A minimum of two FTIR are required and vans will likely need to be equipped with *four* FTIR systems for testing of engines configured with two exhaust stacks – one for each cylinder bank / exhaust manifold. INGAA is not aware of any test vans equipped with that configuration, thus implying that two test vans (each with two FTIR) would be required. Sequential testing would reduce the number of required FTIR instruments from two to one for single stack engines and from four to two for engines with two exhausts. Note that a "two exhaust" configuration is not uncommon, as some engines with a "V" configuration for the engine cylinders have a separate exhaust for each cylinder bank.

Quality assurance measures such as monitoring parameters that determine engine load for consistency during the pre- and post-catalyst testing could be implemented to preserve test integrity. A similar allowance for lean burn engines CO testing would also reduce testing costs. In summary, INGAA recommends that EPA allow sequential pre- and post-catalyst testing to demonstrate percent reduction compliance, and prescribe practical quality assurance measures, such as engine load monitoring, to assure that the pre- and post-catalyst measurements are performed during similar engine operation.

Compliance assurance / parameter monitoring

32. EPA should clarify whether parameter monitoring is required for any existing sources covered by the Proposed Rule. Currently, the preamble and rule text present conflicting information.

The preamble discussion of compliance assurance mentions parameter monitoring for area source engines larger than 500 hp, including catalyst inlet temperature monitoring and catalyst ΔP measurement. The existing RICE NESHAP requires monthly ΔP measurement in some cases, but the preamble discussion on ΔP monitoring is confusing because it also mentions continuous monitoring. However, the tables in Subpart ZZZZ do not specify parameter monitoring for existing area source engines affected by the Proposed Rule. As discussed in Comment 33, INGAA strongly recommends that parameter monitoring *not* be required for area source engines. EPA should clarify misstatements in the preamble. As discussed below, if EPA intends to require parameter monitoring for some area source engines, additional analysis is needed to address the complexity and practicality of the requirement, including significant cost burden or technical infeasibility for some facilities.

33. EPA should not require parameter monitoring for area source engines. The Proposed Rule should consider engine location and other site limitations if area source parameter monitoring is required.

As noted in Comment 32, Table 6 of the Proposed Rule does not require parameter monitoring for area source engines, but the preamble discusses parameter monitoring for larger area source engines. EPA should correct the preamble discussion to clarify that parameter monitoring does not apply. If EPA intends to revise Subpart ZZZZ, Table 6 to include parameter monitoring, there are serious problems that need to be addressed. As noted above, INGAA objects to parameter monitoring for area source engines.

There are significant issues with area source parameter monitoring. EPA has not considered limitations for remote area source engines at unmanned facilities, and many area sources will be unmanned. For example, an area source engine may not have access to electricity, which will present problems for continuous temperature monitoring. In addition, with facilities unmanned and remote, monthly ΔP measurement may be problematic for some area sources. Instituting these requirements will add significant technical challenges and cost burden. The EPA analysis fails to consider these factors. If EPA intends to include area source parameter monitoring, additional analysis is required to justify that decision, including a review of cost, technical challenges, and environmental benefit associated with this additional compliance assurance requirement.

34. EPA should reconsider new test requirements added for major source rich burn engines 500 hp and larger originally affected by the 2004 RICE MACT or provide analysis that justifies the new compliance requirement and added costs.

Existing rich burn engines 500 hp and larger at major HAP sources were required to comply with the 2004 RICE NESHAP by June 2007, and these units installed NSCR for compliance. An initial performance test was required for affected units between 500 and 5000 hp, with subsequent compliance assurance based on parameter monitoring and compliance tests following catalyst replacement. No subsequent periodic tests other than catalyst replacement tests were required per Subpart ZZZZ, Table 3. The Proposed Rule adds periodic performance test requirements for existing area source engines, and those new requirements in Table 3 will also institute a test requirement for the 4SRB engines affected by the 2004 RICE NESHAP. There has been no indication that compliance problems have occurred for those already affected engines, and EPA has not discussed the basis for this decision and justified the new requirement. INGAA recommends that EPA revisit this issue, and revise Subpart ZZZZ Table 3 to clarify that subsequent performance tests are not required for existing 4SRB engines between 500 and 5000 hp.

INGAA believes that the currently required parameter monitoring and testing after catalyst replacement ensure compliance, and the record over the last few years has not indicated anything different for these engines. If EPA has evidence that justifies an additional compliance cost for these engines, discussion should be provided in the docket. INGAA recommends revisions to Subpart ZZZZ Table 3 so that the current compliance requirements are retained for existing 4SRB engines affected by the 2004 RICE NESHAP and no new test requirements are instituted.

<u>Reporting and Recordkeeping</u>

35. Part 63 General Provision reporting and recordkeeping should not broadly apply to existing engines. EPA has not properly considered the burden associated with Part 63 reporting and recordkeeping and should harmonize requirements for new and existing engines.

In the January 2008 RICE NESHAP revision, EPA considered reporting and recordkeeping burden and limited these requirements for new area source and small major source engines. For that rulemaking, the 2006 proposal included more burdensome reporting and recordkeeping, but based on comments and negotiations leading up to the January 2008 RICE NESHAP final rule, EPA agreed that Part 63 General Provision requirements were too onerous in many cases and limited their applicability for new and reconstructed units addressed by the 2008 RICE NESHAP. The Proposed Rule applies the Part 63 General Provisions for existing equipment in cases where the provisions are not required for new units.

In the Proposed Rule preamble, EPA states that, to the extent possible, its intent is to reduce the reporting and recordkeeping burden on affected owners and operators. INGAA does not believe that objective has been met. The inclusion of the Part 63 General Provision recordkeeping and reporting requirements listed in Subpart ZZZZ, Table 8 [74 FR 9729-9731] contain a long list of requirements that are onerous and significantly add to cost burdens imposed by this rule. Section 63.6645(a) includes some minimal relief for the Initial Notification, but even that exclusion does not adequately consider the implications of the proposed requirements.

For example, per §63.6645(a), many area source engines are required to submit an Initial Notification. Emergency engines and engines less than 100 hp do not need to submit the notice, but other area source engines must notify. Based on engine population estimates in the RIA and Docket Document Number 0028, tens of thousands to hundreds of thousands of natural gas-fired area source engines would be required to submit an Initial Notification. Note that the engine population estimates from these two EPA documents are *not* consistent. However, based on engine populations in the natural gas and oil and gas sectors, and presuming a portion of these engines are emergency unit, the engine populations still imply that at least 50,000 area source engines from 100 to 300 hp would require an initial notification. Another example is the requirement to submit a test plan 60 days prior to the test per §63.7(b)(1). With thousands of engines requiring testing, this would introduce logistical problems for affected companies. EPA should consider a test plan requirement specific to this rulemaking that considers the logistics and testing problems that will surely occur as discussed in Comment 30. These are simple, select examples of requirements from the Part 63 General Provisions, and EPA has not considered the costs associated with reporting and recordkeeping burden for this and the vast array of other Part 63, Subpart A requirements. For area source engines and smaller engines at major sources, fewer requirements should apply.

In addition, EPA has not adequately considered impacts to state and local agency permit programs impacted by the number of affected units and corresponding required notifications, recordkeeping, and reporting submittals. EPA should exempt existing area source engines from General Provision requirements. If specific records are warranted, those should be defined in Subpart ZZZZ rather than general reliance on Part 63, Subpart A General Provisions.

Recordkeeping and reporting requirements are also contained in Subpart ZZZZ, Table 2(d) [74 FR 9723] and Table 6 [74 FR 9727-9728]. The docket does not adequately address reporting and recordkeeping costs, especially when considering the breadth and number of affected units. If Part 63 General Provisions broadly apply, EPA should obtain credible information on costs and complete a cost benefit analysis for reporting and recordkeeping for area source engines and small engines. As discussed in earlier comments, the "beyond the floor" cost analysis also omits recordkeeping and reporting costs, and these costs needs to be more carefully examined when evaluating compliance costs and control cost effectiveness.

INGAA recommends EPA review the requirements for *new* area source engines in the January 2008 RICE NESHAP revision. For new area source engines, reporting and recordkeeping requirements are defined in the NSPS. In the Proposed Rule, existing engines would have significantly more reporting and recordkeeping burden than new engines. EPA should harmonize the requirements to avoid implementation confusion and implement requirements for existing engines similar to those required for new units. At a minimum, EPA should clarify the sections of Part 63 Subpart A that apply and consider the cost and associated benefit, especially for small engines and area source engines.

<u>Cost Benefit Analysis and Docket Support Information</u>

36. The summary costs presented in the preamble and the information in the RIA do not adequately represent the actual costs for rule implementation and they significantly underestimate the cost impacts.

The summary costs presented in the preamble severely underestimate the cost impact of the proposed regulation, potentially by an order of magnitude or more. Some examples have been discussed in earlier comments, such as deficiencies in the cost effectiveness analysis (see Comment 13), and INGAA recommends EPA revisit the projected costs. For example, EPA should collect current capital and operating cost data from a representative sampling of equipment suppliers and operators and revise the summary costs. It is difficult to provide a detailed assessment of the cost analysis due to the lack of complete information or transparent analysis in the docket (e.g., see Comments 38 and 39). However, several examples are provided here.

Areas where the summary cost analysis (docket document EPA-HQ-OAR-2008-0708-0028 "Impacts Associated with NSHAP for Existing Stationary RICE) is flawed and based on limited and/or erroneous data and assumptions include:

- On the first page of docket document no. OAR-2008-0708-0028 it is stated, "The total capital cost associated with the NESHAP for existing stationary RICE is estimated to be $528 million in the year 2013. The total annual cost of the NESHAP is estimated to be $345 million in the year 2013. However, the summary costs presented in Table 4 are "presented in 2007 dollars." All costs should be adjusted to 2013 dollars using an appropriate inflation factor (e.g. 3% per year).
- The capital cost and annual cost models used to estimate the cost impacts of applying post-combustion catalytic controls to gas-fired 4SRB, 4SLB, and 2SLB engines underestimate these costs as discussed in Comment 13. Annual costs appear to be underestimated by a factor of five or more and capital costs by a factor or two or more. In addition, specific equipment components were not included in the control technology costs. Revised capital and annual costs, as discussed in Comment 13, should be used for the cost impact analysis.

  Docket document OAR-2008-0708-0014 "Existing Population of Stationary RICE" assumes for gas-fired engines less than 500 hp a population breakdown of 11% 2SLB, 47% 4SLB, and 42% 4SRB. This breakdown is from docket document OAR-2005-0029-0007 "Population and Projection of Stationary Engines" where it was assumed that "the breakdown by engine type for engines in the 50 to 500 hp range obtained from PSR [Power Systems Research (PSR) 1998 North American Engine Partslink Data Base] is the same as the breakdown by engine type for engines between 500 and 1,000 hp obtained from information developed for the RICE NESHAP." Based on discussions with engine operators, INGAA believes the assumption that 47% of engines less than 500 hp are 4SLB is not accurate. Other data support this assertion. There are ***zero*** emission tests in the RICE NESHAP database for gas-fired 4SLB engines less than 500 hp. In addition, a 2005 survey of small (< 500 hp) gas-fired engines driving natural gas production compressors in the eastern part of Texas identified ***one*** 4SLB engine in a population of 1,120 engines – about 74% of the engines were 4SRB [ERG 2005]. Finally, 4SLB engines less than about 300 hp are not produced by the major engine manufacturers. EPA should find alternative engine population data sources for affected gas-fired engines less than 500 hp. It is expected the majority of the engines are 4SRB. The revised engine po***pula***tion breakdown will increase the cost impact estimate because emission controls are required for 4SRB engines 50 hp and higher (as opposed to 250 hp and higher for lean burn engines) and because capital costs, annual costs, and testing co***sts*** are higher for 4SRB engines than for lean burn engines.

The EPA cost analysis assumes that only engines that are subject to above the floor emission standards will install post-combustion catalytic control. However, as discussed in Comment 9, owners and operators of all engines required to comply with an emission limit, either based on the proposed MACT floor or based on above the floor analysis (i.e., all major source engines and most area source engines), will be compelled to install catalytic control to ensure compliance with the proposed emission standards. The costs to install controls on all engines required to comply with an emission limit based on the proposed MACT floor will be substantial and those costs have not been considered for the cost analysis. For existing 2SLB and 4SLB engines 100 to 249 hp, document no. OAR-2008-0708-0028 states, "It is expected that owners and operators of non-emergency 2SLB (and 4SLB) engines will be able to meet the emission limitation without adding any aftertreatment controls. Therefore, no control costs have been estimated for these engines." However, as discussed in Comment 9, all or nearly all engines with emission limits would require a catalyst to meet the proposed MACT floor. By definition, the MACT floor is based on the average of the best performing 12% of engines. Consequently, a simple extrapolation would be that about 94% of existing 2SLB and 4SLB engines 100 to 249 hp would need to install oxidation catalysts to pass the initial performance test; and, because standards must be met "at all times,"" all units would likely require catalytic control.

- INGAA was not able to locate sufficient documentation to recreate the costs presented in Tables 4 – 7 of docket document OAR-2008-0708-0028; however, based on calculations of annual and capital costs, it appears that EPA has assumed that about 80% of affected 4SRB and CI engines less 500 hp are emergency engines. This assumption is not discussed in the document, and INGAA believes the assumed emergency engine populations are greatly over-estimated for natural gas-fired engines. All data and assumptions used to calculate the cost impacts should be clearly presented. EPA should find engine population data sources that accurately estimate percentages of emergency and non-emergency engines for each engine category and size range. It is expected that further research will determine that the percentages of non-emergency engines are considerably higher than in the current analysis and that the cost impact estimate will subsequently increase. This issue is significant because it has implications for implementation associated with the availability of credible service providers to meet market demand for catalytic controls.

- The cost analysis assumes that the cost to conduct a performance test is the portable analyzer testing cost of $1,000 per engine. The portable analyzer testing is for measuring CO emissions from gas-fired 4SLB and 2SLB engines. The testing requirement for gas-fired 4SRB engines is formaldehyde by FTIR. FTIR testing requires a fully equipped test trailer and testing costs are considerably higher than portable analyzer tests, on the order of $5,000 per engine and likely higher in some cases due to the remote location and related transportation and logistical charges. Because the majority of affected gas-fired engines are 4SRB, testing costs for gas-fired engines are significantly underestimated. In addition, the cost analysis should consider that the listed testing costs are only those for the outside testing contractor and do not include operator testing support in terms of test plan preparation and other reporting, recordkeeping and test coordination requirements, personnel on-site during the testing (especially for unmanned facilities), and engine exhaust access (e.g., man-lift or scaffolding, stack modifications to provide ports and safe access). These operator-incurred costs and the assumptions used to determine these costs should be included in the cost analysis. INGAA believes that EPA assumptions regarding numbers of co-located affected engines at facilities and associated testing cost reductions contribute to a significant underestimation of testing costs. In docket document no. 2008-0708-0028, EPA appears to assume (i.e., the text is not clearly written) that all engines less than 500 hp are at a facility that has two engines less than 500 hp and that both engines can be tested for a total of $1,000. For engines >500 hp, the apparent assumption is that all engines greater than 500 hp are at a facility that has three engines greater than 500 hp and that all three engines can be tested for a total of $1,000. However, the first sentence of the performance testing states, "The cost of conducting performance testing is based on the cost of portable analyzer testing and is $1,000 per engine." EPA has not provided documentation that affected engines are clustered at facilities as assumed and although INGAA agrees that some affected engines are co-located, the assumption that all affected engines are co-located and can be tested for the reduced cost is not consistent with normal operations and testing costs. Less co-location is especially common for oil and gas production. EPA should base any engine testing cost savings from co-location on documented engine population and proximity data. In addition, the assumption that three large engines can be tested for the same cost as the initial estimate of $1,000 per engine ignores basic emission testing time and logistical requirements. Testing one engine requires 3 one-hour test runs separated by analyzer calibrations, whereas testing three engines require 9 one-hour test runs separated by analyzer calibrations. Testing a large engine could require a man-lift or scaffolding to safely access the sample ports increasing time between tests. Considering travel to and from the engine site, equipment set up and breakdown, pre- and post-test calibrations, and trouble-shooting, testing three engines in one day would be a challenge under ideal conditions and additional test team costs for hotel, per diem, etc, would likely be incurred in most cases. The longer test day (i.e., more labor hours and overhead charges) would also directly increase testing costs. Similarly, the assumption that two small engines can be tested for the same $1,000 per engine cost is not realistic. Finally, it should be noted that testing timing and logistical assumptions that may be valid for simple portable analyzer testing will often not apply to FTIR testing for formaldehyde; thus, FTIR testing costs require a separate and more detailed analysis. It is not apparent that subsequent (i.e., every 3 years or 8,760 operating hours) performance tests for engines greater than 500 hp have been included in the cost analysis. These costs and the assumptions used to annualize these costs should be included in the analysis. While INGAA's focus is natural gas-fired engines, there are also questions about diesel costs. Capital and annual costs in OAR-2008-0708-0028 for compression ignition engines controls are based on the oxidation catalyst cost models developed for gas-fired engines rather than the CDPF cost models that are the basis for the above-the-floor analysis in docket document no. OAR-2008-0708-0017 "Above the Floor Determination for Stationary Rice." The oxidation catalyst cost model was based on applying catalytic control to gas-fired engines and the model should not be used to estimate oxidation catalyst costs for diesel fuel-fired engines. Diesel engine exhaust has high concentrations of carbonaceous particulate whereas gas-fired lean burn engine exhaust has relatively negligible particulate. Therefore, a catalyst designed for a gas-fired source would not be appropriate for diesel engine exhaust. Based on the cost models in 2008-0708-0017, for engines 100 to 500 hp, annual costs for oxidation catalysts installed on gas-fired engines are three to four times lower than annual costs for CDPF installed on CI engines; thus, the cost impact for CI engines is similarly underestimated. If EPA would like to consider oxidation catalyst control for diesel engines in the cost analysis, then cost data for diesel engine oxidation catalysts are required. For example, an October 10, 2003 email from Bill Clary of Miratech to Jennifer Snyder of Alpha-Gamma provided the following 2003 dollar capital costs (housing and catalyst only) for diesel engine oxidation catalysts:

- 500 hp: \$9,670 (oxidation catalyst for lean burn gas-fired engine = $5,390/1.03^2$ = \$5,081 in 2003 dollars) ;
- 1,000 hp: \$14,720 (oxidation catalyst for lean burn gas-fired engine = $6,930/1.03^2$ = \$6,532 in 2003 dollars); and

- 3,000 hp: \$48,920 (oxidation catalyst for lean burn gas-fired engine = $14,210/1.03^2$ = \$13,394 in 2003 dollars).While INGAA is not supporting these single vendor cost estimates or the correlations used to estimate gas-fired control costs, the information is provided for discussion purposes and to substantiate that costs are underestimated. The data in parentheses provide comparison costs for oxidation catalysts applied to lean burn gas-fired engines (docket document 2005-0030-0006). Based on this estimate, lean burn engine control costs range from about half to a quarter of the diesel engine control costs. It should be noted that maintenance costs (i.e., catalyst cleaning) would likely be more costly for diesel engine catalysts due to the high particulate concentrations in the engine exhaust. Likewise, typical catalyst lifetime for diesel and gas-fired applications could differ.
- For 2SLB engines with lower exhaust temperature and 2SLB engines that are not turbocharged, it may not be possible to meet the proposed emission standards or retrofit control costs may be cost prohibitive. In these cases, extraordinary retrofit costs or engine replacement may be the only compliance option. These costs have not been considered for the cost impact.
- For existing 2SLB and 4SLB engines 100 to 249 hp, document no. OAR-2008-0708-0028 states "It is expected that owners and operators of non-emergency 2SLB (and 4SLB) engines will be able to meet the emission limitation without adding any aftertreatment controls. Therefore, no control costs have been estimated for these engines." However, as discussed in Comment 9, all or nearly all engines with emission limits would require a catalyst to meet the proposed MACT floor. By definition, the MACT floor is based on the average of the best performing 12% of engines. Consequently, about 94% of existing 2SLB and 4SLB engines 100 to 249 hp would need to install oxidation catalysts to comply with the proposed standard.

For 2SLB engines with lower exhaust temperature, it may not be possible to meet the proposed emission standards. These costs have not been considered for the cost impact.

- Docket document no. OAR-2008-0708-0028 assumes 90% control of HAP and CO by NSCR and oxidation catalysts and 90% NOx control by NSCR. As discussed in Comments 15 and 16, CO control by oxidation catalyst depends on engine operation and exhaust gas temperature and 90% control should not be assumed. Comment 13 discusses CO and NOx control by NSCR and how the uncontrolled/baseline operating condition definition impacts percent control efficiency. Actual/net CO reductions and potential increased emissions of greenhouse gases and ammonia after NSCR installation (refer to Comment 13) should be considered for a revised cost impact analysis.
- Some of the emission factors used to calculate the emission reductions presented in OAR-2008-0708-0028 Table 8 appear to be erroneous and all the emission factors should be verified or corrected and documented. For example, the same NOx emission factor is listed for all four engine categories and the CO emission factors are listed in units of lb/hr rather than lb/hp-hr. As discussed in Comment 13, to estimate HAP emissions from engines less than 500 hp, the emission factor for engines less than 500 hp ($4.78x10^{-4}$ lb HAP/hp-hr) is appropriate.
- The existing population of engines in the U.S. was estimated using information obtained from the Power System Research's (PSR) North American Engine PartsLink Database. This database is not a public document and data and assumptions regarding the affected engine population cannot be reviewed and verified. EPA should make this information available through the docket such that engine populations by size, category, emergency/non-emergency, area source/major source, etc., can be determined. Refer to Comments 38and 39 regarding this issue.
- EPA assumes no additional costs for small engines associated with reporting and recordkeeping to address manufacturer's operation and maintenance (O&M) requirements or the owner or operator's own maintenance plan. Cost estimates should be defined because it is unreasonable to assume that regulatory recordkeeping requirements do not incur operator costs.
- INGAA does not agree with the assumption that most *existing* stationary emergency engines are currently equipped with an hour meter. EPA should provide documentation that this assumption is correct or collect data to estimate costs – e.g., the percentage of existing engines without hour meters and consider appropriate hour meter capital and installation costs in the summary cost analysis.
- The costs do not include recordkeeping costs for non-emergency SI engines. Engines that are required to adhere to a prescribed maintenance schedule in Table 2d of the proposed rule will incur increased recordkeeping costs due to the increased maintenance frequency. Engines requiring controls and performance tests will need to retain documentation. EPA should define these costs and include these costs in the summary cost analysis.

No control costs have been included for area source SI engines that are required to adhere to a prescribed maintenance schedule in Table 2d of the Proposed Rule. As discussed in Comment 20, the maintenance schedules in Table 2d require a much more frequent maintenance than is current standard practice. The cost for the additional maintenance requirements should be included in the cost analysis, as well as negative affects associated with additional waste streams, significant mileage increases to frequently visit unmanned sites, etc.

37. The RIA and rule preamble focus on diesel particulate benefits and do not adequately discuss benefits associated with standards for gas-fired engines. This supports the INGAA assertion that this is a diesel focused rule and a rule for natural gas-fired units should be developed through a more thoughtful, data driven transparent process.

The Federal Register advanced notice of proposed rulemaking (ANPRM) [73 FR 4136] addressed regulation of emissions of pollutants from existing stationary diesel engines, generally, and specifically from larger, older stationary diesel engines. INGAA has a history of working with EPA to provide technical data to support rule development, but based on the ANPRM, INGAA did not anticipate a rulemaking for natural gas-fired engines on the same schedule as the diesel Consent Decree. As evident by our historical interactions and ongoing interaction with EPA over the last decade, we would have attempted to remain engaged with EPA over the last year if we had understood that gas engines were on an identical timeline. That said, we are now in a position of attempting to reconcile problems associated with limited or flawed data for gas-fired engines in the docket.

INGAA believes that the docket supports our view that EPA was more focused on diesel engines for this rulemaking. The preamble and RIA primarily focus on issues and benefits associated with diesel engine emission standards. For example, 74 FR 9700 discusses encouragement "to review whether there are further ways to reduce emissions of pollutants from existing stationary diesel engines." This section also discusses the basis of the diesel ANPRM. Discussions on benefits in the RIA primarily focus on diesel particulate emissions and reductions and there is more diesel than gas-fired information in the docket. For benefits discussion, the analogy to diesel particulate discussions for gas-fired engines would be a more detailed discussion of impacts from formaldehyde emissions, and implications of the ongoing review of the formaldehyde unit risk estimate (URE) that could dramatically influence the cost-benefit associated with formaldehyde reduction (see Comment 3 for URE discussion). Similarly, the geographical distribution of natural gas-fired engines could be analyzed and findings presented (e.g., compared to diesel engines, gas-fired engines are more prevalent in rural and remote locations).

In addition, while the ANPRM provided new diesel engine data for EPA to consider, for natural gas-fired engines EPA is relying on the *same data* that EPA previously indicated was insufficient for rulemaking (see Comment 5). The data were not supplemented, yet EPA has now chosen to act. INGAA does not dispel EPA's desire to address diesel emissions, but INGAA is concerned that this focus has resulted in a rulemaking based on insufficient and/or flawed data for natural gas-fired engines, and inadequate consideration of costs and benefits for natural gas-fired engine standards. As indicated in these comments, INGAA offers our assistance in addressing data deficiencies, but this effort may require additional time to complete the gas-fired engine rulemaking.

EPA should consider alternatives that provide a more reasonable opportunity for stakeholders to prepare constructive comments and develop supplementary data by choosing a different timeline for natural gas-fired IC engines. This will provide EPA the opportunity to engage affected stakeholders in the rule process to obtain credible information and support for emission limits, MACT floor determinations, and cost data that at present appear to be limited in scope and highly questionable in at least some cases. In addition, this will allow a more thoughtful consideration of impacts, costs, and benefits associated with rule requirements for the different area source and major source subcategories for natural gas-fired engines.

38. The docket often relies on data and analysis from previous rulemakings, some of which is over a decade old. The docket is not sufficiently detailed or documents from previous rules were not appropriately cited, thus hindering the ability to review or understand EPA analysis. A robust docket should be developed to support regulatory transparency.

Documentation, current and valid data, and access to “primary” data are all lacking in the Proposed Rule docket. Thus, the objective of regulatory transparency is not met. Primary data include engine population databases and emission test reports that are the basis for the MACT floor and above the floor analyses and, ultimately, the emission standards. The existing engine population is based on information in the Power Systems Research (PSR) North American Engine PartsLink Database. The PSR database is not a public document and thus critical engine population data presented in the docket (e.g., total population and breakdown by design (e.g. 4SLB, 2SLB, and 4SRB), emergency/non-emergency, and size) could not be verified and evaluated. Likewise, emission test reports for the data in the RICE NESHAP Emission Database were not in the docket (or, if they are posted in an old docket, the path to find them is so tortuous as to render them invisible) and critical emission data could not be verified and evaluated.

The docket relies almost exclusively on data and analysis from previous rulemakings and dockets, with some data over a decade old. The emission data in the RICE NESHAP Emission Database appear to be primarily from the 1990’s. As a result, as discussed in Comment 5, most of the formaldehyde data were acquired using a test method that has since been deemed invalid. Some of the critical catalyst cost data that are the basis for the above the floor analyses and summary impact costs are from 2003 and from a single vendor with little context regarding guarantees, performance limitations, etc. in the casual email communications. Any effort to find more recent emission data, understand performance guarantees and limitations, and to determine if the cost data apply to current year retrofit applications is not in evidence. In general, data, cost models, emission factors, and assumptions were adopted from previous dockets without critical evaluation or update/modification. In some cases, the relevance of these cost models has changed because this rulemaking has a larger focus on smaller engines and must address retrofit to existing engines. In addition, documentation is lacking for some critical data.

In trying to review support analysis for the Proposed Rule, it was often difficult to locate or understand the basis for EPA decisions, despite the fact that INGAA has been actively engaged and is intimately familiar with each of the EPA natural gas-fired engine rulemakings over the last decade. In some cases, direct communication with EPA was required to trace back to some data, and other data could not be found. For example, the document that developed the cost models used for the above the floor analyses (docket document no. OAR-2005-0030-0005) references correspondence from catalyst vendors and docket identification numbers were not provided for these correspondence; thus, the catalyst cost data that are the basis for the above the floor analyses were not traceable.

INGAA believes that transparency requires that all data, assumptions, and calculations be documented and apparent. Transparency requires an unambiguous, clear, traceable path to all data and assumptions used for all calculations and analyses. Example calculations or explanations using real data should be provided to guide the reader. For example, INGAA has had difficulty in understanding and recreating cost calculations associated with the cost impact analysis for the rule.

In summary, if an external reviewer with acumen on IC engines, emissions, and the regulatory process cannot reasonably find and evaluate all primary data, understand intermediate assumptions and calculations, and recreate all summary data and analyses (e.g., MACT Floor, above the floor, and summary cost impacts), then transparency is lacking. The lack of a robust and transparent docket inhibited INGAA's attempt to conduct these analyses; thus, efforts to provide substantive comment were challenging and could not be fully accomplished based on the available docket material. As discussed throughout these comments, INGAA strongly believes that additional data and analyses are needed to inform important decisions regarding standards for natural gas-fired engines. These data and the associated analysis and conclusions should be clearly presented in a robust docket.

39. The population of existing RICE is based on the *proprietary* Power Systems Research's (PSR) North American Engine PartsLink Database. EPA's reliance on a proprietary database, and failure to identify the data and data limitations conflicts with the Administrator's commitment to a transparent regulatory process.

INGAA is concerned with EPA's use of a proprietary database as the basis to develop population data integral to the cost benefit analysis. EPA Administrator Lisa Jackson, in a memorandum to all EPA employees dated April 23, 2009, stated that "It is crucial that we apply the principles of transparency and openness to the rulemaking process. This can only occur if EPA clearly explains the basis for its decisions and the information considered by the Agency appears in the rulemaking record." As discussed throughout the INGAA comments, transparency and adequate docket material are concerns. The use of a proprietary database is especially troubling.

The existing population of engines in the U.S. was estimated using information obtained from the ***proprietary*** Power System Research's (PSR) North American Engine PartsLink Database. This database is not a public document and data and assumptions regarding the affected engine population cannot be reviewed, verified, or comments offered. EPA should provide a summary of the database query(s) or Microsoft EXCEL data summary and supplemental information relied upon through the docket such that engine populations by size, category, emergency/non-emergency, area source/major source, etc. can be more appropriately reviewed.

The use of a proprietary database is in conflict with the general principles of transparency outlined in the Administrator's memo and is not consistent with transparent regulatory actions and decision making. In addition, the short comment period does not allow for a formal Freedom of Information Act (FOIA) request for information from the North American Engine PartsLink database for review and comment on the RICE Population database.

The relevant calculations, equations, and assumptions affecting emission limits, control cost determinations and basis related to the PSRR database should be clearly defined and fully disclosed. Where spreadsheets were relied on to develop these estimates, these should be included in the docket. In addition, where steps have been taken to quality assure / quality control data and calculations, docket support should be provided to demonstrate adequate care has been taken to avoid errors and omissions. There are inconsistencies in engine counts and related information in docket documents (e.g., see Comment 366). Without supporting documentation, it is assumed that adequate review of data and calculation was missing or omitted. INGAA is supportive of a transparent process with a robust docket to support regulatory transparency. Use of proprietary information as a principle component of the analysis defeats that purpose.

40. The Proposed Rule addresses a number of recent Court decisions and in many cases this is the first rulemaking that integrates EPA's response to the Court decisions. Separate from this rulemaking, INGAA recommends EPA develop guidance and policy memoranda that discuss and substantiate the basis for EPA responses to Court mandates.

In recent years, several court decisions in response to petitions and litigation have required EPA to reconsider its approach to NESHAP requirements. The decisions compel EPA to address issues including:

(1) Standards development when the MACT floor is based on "no control."" In the "Brick MACT" decision, which is discussed in the preamble at 74 FR 9700, the D.C. Circuit Court ruled that, "EPA has a clear statutory obligation to set emissions standards for each listed HAP, which does not allow it to avoid setting standards for HAPs not controlled with technology."

(2) The Brick MACT decision also indicated that when considering emissions variability, EPA must consider the range of emission levels associated with the best performing sources.

(3) The rejection of the SSM exemption. In December 2009, the D.C. Circuit Court ruled that the SSM exemption must be vacated because it violates the Clean Air Act requirement for HAP emission standards to apply continuously. The Court noted that some standard must apply continuously, but this does *not* mean an unchanging standard.

The Proposed Rule is setting initial precedent for EPA's approach to address these important decisions. Unfortunately, documentation in the docket does not provide an indication or even a roadmap of the review process, analysis, or EPA consideration of options available for integrating these decisions into NESHAP rulemakings. Items (1) and (2) relate to the MACT floor analysis, which is discussed in detail in Comment 5. While a MACT floor was established in the Proposed Rule, it was based on flawed and deficient data. Even if the data were valid, the limited number of engines that serve as the basis for the floor is not adequate. Regarding emissions variability, based on the limited information in the docket, it is apparent that EPA did *not* consider variability. Finally, for the SSM limits, EPA has selected emission limits without actual data from SSM events, based the limits the MACT floor levels (i.e., a "best performing" source from a high load, stable test condition, and failed to acknowledge commonly accepted principles regarding combustion by-products of incomplete combustion under lower load, variable load, or cooler combustion conditions. INGAA fears that these decisions not only establish scientifically unfounded requirements for this rule, but precedent for subsequent NESHAP rulemakings.

INGAA believes that the gravity of addressing the Court decisions and integrating regulatory solutions into this rulemaking warrants considerable additional effort by EPA. Not only should EPA more thoughtfully consider issues such as MACT floor calculations, consideration of emissions variability, standards for "continuous" compliance, and treatment of SSM events, but to also communicate EPA's consideration of options and alternatives in response to the decisions. These issues reach beyond this specific rulemaking and are needed to communicate the agency's perspective and retain transparency in the rulemaking process. INGAA recommends EPA prepare guidance and/or policy memoranda on these court cases and EPA's response and plans for rule integration. These memoranda can serve as an important part of the process by which EPA communicates to the public and affected industry on agency interpretation of the Court decisions and how those decisions will be integrated into NESHAP rulemakings. INGAA believes that the approaches for the Proposed Rule do not meet reasonable objectives for implementing the Court decisions, primarily due to the deficiency of data to support "decisions" that are reflected in the emission limits and other requirements in the Proposed Rule. If policy memoranda were available that rationalized and explained EPA's response, it would facilitate a common and broader stakeholder understanding of EPA intent and direction, and also provide objectives for EPA staff to consider during rule development.

Clarifications and Errors

41. EPA should revise errors to the "greater than" and "less than" mathematical symbols in the Proposed Rule tables. This same error was made (and corrected) in the 2006 proposal for the January 2008 NESHAP revisions.

The size categories shown in Proposed Rule tables include errors in "less than" and "greater than" symbols. The systematic error in the preamble and Proposed Rule tables is not consistent with standard mathematical convention. A similar error in the 2006 proposed NESHAP revisions was corrected in a subsequent Federal Register notice and that action can also serve as reference. INGAA provides the "corrected" table columns below that we believe reflect the actual size-based subcategories and reflect common mathematical convention.

To summarize the error, the first symbol in the string X ≤ HP ≤ Y is reversed in the Proposed Rule tables. For example, "50≥HP≤249" from the rule should be changed to "50≤HP≤249". Required corrections to math symbols are shown below in gray highlighted text. For clarity, all rows are shown, even if a revision is not required.

Corrections to Table 1(74 FR 9702), "Subcategories" Column (and Rule Table 2c, Column 1):

Non-Emergency 2SLB 50≤HP≤249
Non-Emergency 2SLB 250≤HP≤500

Non-Emergency 4SLB 50≤HP≤249
Non-Emergency 4SLB 250 ≤HP≤500
Non-Emergency 4SRB 50≤HP≤500
All CI 50≤HP≤300
Emergency CI 300≤HP≤500
Non-Emergency CI ≤300 HP
<50 HP
Landfill/Digester 50≤HP≤500
Emergency SI 50≤HP≤500

Corrections to Table 2 (74 FR 9702 – 9703), "Subcategories" Column (and Rule Table 2c, Column 1):

Non-Emergency 2SLB 50≤HP≤249
Non-Emergency 2SLB HP ≥250
Non-Emergency 4SLB 50≤HP≤249
Non-Emergency 4SLB HP ≥250
Non-Emergency 4SRB HP ≥50
Emergency CI 50≤HP≤500
Emergency CI HP >50
Non-Emergency CI 50≤HP≤300
Non-Emergency CI HP >300
HP < 50
Landfill/Digester 50≤HP≤500
Landfill/Digester HP > 500
Emergency SI 50≤HP≤500
Emergency SI HP > 500

Identical Corrections need to be made to preamble Table 1 and the Proposed Rule Tables 2c, and preamble Table 2 and the Proposed Rule Table 2d.

42. Monthly ΔP measurement has presented implementation questions and problems since the original 2004 RICE MACT. INGAA recommends that EPA revise the rule to clarify this requirement for months when engine operation is limited (e.g., an idle engine should not be started solely to complete the monthly ΔP measurement).

The NESHAP requires monthly catalyst pressure drop (ΔP) monitoring for some affected engines to ensure that the ΔP does not vary more than two inches of water column from a baseline value measured during the performance test. In addition, due to variations in exhaust pressure at different loads, this measurement is conducted when the unit is operating at 100% ±10% load. However, operating scenarios are common where an engine does not operate in a month, operates only sporadically or for limited hours, or only operates at reduced load. This has caused implementation problems since the RICE NESHAP was originally adopted in June 2004. EPA should revise the rule to indicate that the periodic measurement is *not* required in months when the engine does not operate, has very limited operation that precludes completing the test, or only operates at reduced load. Lacking this clarification, operators may be required to startup and run an engine solely for the purpose of completing the measurement, or the operator may be required to artificially load the engine to 90% or rated load, which may not be possible. Alternatively, an operator must submit an alternative monitoring request to EPA for review and approval. These requests cause unnecessary burden for both the operator and EPA staff, and alternative monitoring requests have historically required considerable time for review and approval.

In addition to not operating in a particular month, an engine at a natural gas compressor station may have limited runtime during some months – e.g., summer months when gas demand is usually lower. Following promulgation of Subpart ZZZZ in June 2004, questions were raised regarding clarification of rule requirements and implementation issues by both the affected community and delegated state and local agencies. INGAA submitted a number of questions to Greg Fried, EPA Office of Enforcement and Compliance Assurance (OECA), in a June 2004 letter. In response to these inquiries, OECA issued guidance in a Memorandum dated September 30, 2005. OECA noted that the question and answer document was coordinated with the Office of General Counsel (OGC) and Office of Air Quality Planning and Standards (OAQPS). However, this guidance does not adequately address the issue of ΔP monitoring, and the Proposed Rule may expand this periodic test requirement to additional engines; thus, it is more important than ever to address this issue and clarify the NESHAP requirements.

Three questions related to this issue were addressed in the OECA Memorandum (which is available on-line at http://www.epa.gov/ttn/atw/rice/riceq_a_9-30-05.pdf). Questions 20 – 22 discuss ΔP monitoring, but INGAA believes that the EPA responses are not consistent. For two of the responses (questions 20 and 21), EPA indicates that a monthly measurement must be completed unless the owner/operator has received approval for an alternative based on an application submitted according to 40 CFR Section 63.8(f). For the third response (question 22), EPA does not indicate that approval of an alternative is required, and indicates that the monitoring must be completed immediately upon startup of the unit. This third response reflects the logical conclusion that the unit should not be started solely to record the pressure drop. However, this rationale is not applied in the responses to the other two related questions. All three responses imply that sporadic operation, extended periods of inoperation, or reduced load operation are unusual or unplanned. This is contrary to the operational profiles that were clearly communicated to EPA during the development of the RICE MACT through the Industrial Combustion Coordinated Rulemaking process. In addition, INGAA does not understand why the first two responses indicate alternative monitoring approval is required, while the third does not.

INGAA members have experience where unreasonable test requirements have been imposed to complete the monthly test and also to ensure that high load is attained for the test. This results in unnecessary fuel use and emissions because engine start is required solely for the periodic test. In one case, a pipeline company operates an auxiliary power unit that runs sporadically but is not classified as an emergency engine. Typically, the ΔP test requires the engine to be started for the sole purpose of completing the test. In addition, to achieve full load, a load bank must be brought to the site at considerable expense, with annual cost over $20,000 for the monthly rental fee. For this engine, the periodic test results in unnecessary fuel use and emissions, because the engine would typically be idle. Clearly, this serves no useful purpose and alternative approaches should be allowed to address idle or low load units. In cases where the engine is a compressor driver and pipeline load demand is not available to reach high load, the situation can pose additional problems.

For the final rule, INGAA recommends EPA clarify the timing of monthly ΔP monitoring for no- or low-use operating months and provide a solution that considers:

- IC engines may operate at less than full load, and the owner/operator may have limited or no readily available method to increase load to 90% or higher for the ΔP measurement. As INGAA indicated in comments and through data provided in response to the original RICE MACT proposal, it is important to understand that testing at lower load effects the ΔP measurement and that the full load restriction is necessary to consistently meet the required operating limit (i.e., if the test is completed at a different load than the baseline test, the different exhaust flow alone could cause the ΔP different relative to the baseline to exceed the allowed 2 inches of water column).
- Shutdown of IC engines for an entire month is not unusual and should be properly addressed in Subpart ZZZZ.
- Sporadic or infrequent operation in a particular month is also very common and may present an issue for obtaining a ΔP measurement or require startup and operation solely to complete the test.
- Unmanned facilities pose an issue for completing a test "immediately upon startup" and that operational control remote from the facility may shutdown a recently started engine prior to it completing the startup cycle. Thus, high loads may not be achieved or exhaust temperatures may not reach the level necessary for catalyst performance.

INGAA believes that an interpretation and implementation approach similar to the response to question 22 in the OECA Memorandum is appropriate: If a unit is not operating or at full load, then the owner/operator shall complete the measurement as soon as practicable for the unit. To further clarify, the requirement should consider the practicality of completing the measurement for an unmanned or limited manned facility. INGAA believes that a reasonable solution should include:

- Owners/operators are expected to conduct monthly pressure drop monitoring as required by Subpart ZZZZ.
- If the RICE does not operate during a given month, does not achieve 100% load ±10%, or has limited operation in a month and is shutdown before the owner/operator completes the ΔP measurement, then the owner/operator is not required to startup the engine or take extraordinary actions to increase load solely to record the pressure drop.
- The owner/operator should record the pressure drop as soon as practical after startup of the RICE.
- The semi-annual report required in Section 63.6650 should identify the operational status of the affected engine to substantiate the basis for any calendar month that ΔP is not measured due to these operational limitations.
- If the delegated agency believes that the owner/operator may be attempting to circumvent the required continuous monitoring provisions of Subpart ZZZZ, the delegated agency may require that the owner/operator startup the RICE for the purpose of ensuring compliance with the operating limits.

INGAA believes that clarification to ΔP monitoring requirements should be addressed and it is remiss for EPA to ignore this compliance assurance issue. The INGAA recommendations result in a reasonable monitoring requirement that avoids unnecessary engine operation or pursuing the burdensome and time consuming process of alternative monitoring approval. In addition, INGAA understands that this solution was approved by EPA for at least one pipeline company in response to an alternative monitoring request. Review and approval of that request was very time consuming for both the company and EPA, and a more direct resolution to this issue should be provided by revising and clarifying rule requirements.

EPA should both clarify the schedule to complete a performance test after a catalyst is changed and indicate that this test fulfills the periodic test requirement for affected units (i.e., the regulations should provide that the schedule for periodic tests is "reset" when the catalyst change test is completed). EPA should also clarify that temporary catalyst replacement for washing or cleaning does not trigger a catalyst change test. Subpart ZZZZ and most Part 63 testing allows 180 days to complete the initial performance test, and 180 days is specified in §63.6610(a). When a catalyst is changed, Subpart ZZZZ requires a compliance test, but the timing is not specified. Since the 2004 RICE MACT was adopted, questions have occurred regarding this schedule. For consistency, INGAA recommends revising §63.6640(b) to indicate that 180 days is allowed to complete this test, or a revision to §63.6610(a) to indicate that 180 days applies to both the initial testing requirement and the schedule for completing the catalyst change test specified in §63.6640(b).

In addition, if periodic testing is required for an affected engine (e.g., semi-annual, annual, every 8760 operating hours), the Proposed Rule should be revised to clearly indicate that the catalyst change test addresses the periodic test requirement and re-starts the clock for completing the next periodic test.

Finally, clarification is also requested regarding requirements for a temporary catalyst when the original catalyst is removed for washing or cleaning. For example, periodic catalyst cleaning is sometimes completed offsite (e.g., by the catalyst vendor) and unit operability must continue so a temporary catalyst is used and the original is returned after cleaning. In this instance, a reasonable time period should be allowed for operation of the temporary catalyst without testing. INGAA recommends that 45 days be allowed for operating a temporary catalyst without testing as long as the original catalyst is re-installed after cleaning.