CONTENTS

REGULATORY UPDATE
2 EPA Proposes to Strengthen the Ozone NAAQS
5 New Requirements Finalized in RICE NESHAP
8 Enhanced LDAR in the Chemical Industry

CLIMATE CHANGE
10 GHG Regulation under the Clean Air Act – Recent Developments
12 Understanding GHG Verification Requirements

STAFF SPOTLIGHT
15 Environmental Veteran Provides Expertise for Power Producers

TRAINING
16 2010 Spring Environmental Courses
EPA Proposes to Strengthen the Ozone NAAQS

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On September 19, 2009, the U.S. EPA Administrator Lisa Jackson announced that EPA would take rulemaking action to reconsider the 2008 primary and secondary ozone national ambient air quality standards (NAAQS) of 0.075 parts per million (ppm), that was promulgated in March 2008. On January 6, 2010, Administrator Jackson announced that upon reconsideration of EPA’s original scientific advisory committee recommendations used to establish the March 2008 standards, EPA was proposing to further lower the primary and secondary ozone standards to ensure adequate protection of public health and the environment. The range of ozone standard under consideration in the January 2010 proposal represents a significant strengthening of the ozone NAAQS that may ultimately result in major portions of the U.S. being designated as nonattainment.

Why the Continued Focus on Ozone?

For decades, scientific evidence has indicated that adverse public health effects occur as a result of exposure to significant concentrations of ground-level ozone, particularly in children, the elderly, and adults with lung disease. In addition, cumulative ozone exposure can damage sensitive vegetation, reducing growth and increasing susceptibility to disease. Ongoing research regarding human health and ecological impacts indicates that lower ozone levels than first recognized have deleterious health effects, particularly on sensitive populations.

Section 109(b)(1) of the Clean Air Act (CAA) requires that primary NAAQS be established with an adequate margin of safety to protect human health and Section 109(b)(2) requires secondary NAAQS to protect the public welfare from any known or anticipated adverse effects. The primary NAAQS for any criteria pollutant, such as ozone, must be set without regard to costs to attain and maintain compliance (supported by the Supreme Court’s decision in Whitman v. American Trucking, 531 U.S. 457 - 2001); however, the anticipated costs and benefits of such standards are routinely evaluated when a NAAQS is established.

Long and Winding Path of the Ozone Standards

As scientific knowledge regarding the effects of ozone has progressed, EPA has set progressively more stringent standards. In 1971, EPA established the first ozone standard at 0.08 ppm, 1-hour average, which was revised to 0.12 ppm, 1-hour average, in 1978. In 1997, EPA strengthened the standard, reducing the level to a 0.08 ppm, 8-hour average (effectively, a 0.084 ppm standard, when considering rounding). Nonattainment designsations and the basic implementation rule for the 1997 standard were finalized in 2004 resulting in the designations currently in effect. A map depicting current ozone nonattainment areas is presented below.

In March 2008, both the primary and secondary ozone standards were reduced to 0.075 ppm, based on an 8-hour average. There was sharp disagreement by many in the scientific community and by public health advocates who believed that the standard did not comport with the level of stringency mandated by the CAA since EPA’s Clean Air Scientific Advisory Committee (CASAC) clearly indicated adverse impacts at lower levels.

EPA was poised to promulgate nonattainment designations under the March 2008 NAAQS in December 2009. These nonattainment designations would have become effective by March 12, 2010, impacting a considerable amount of the U.S. currently “in attainment” with the previous ozone NAAQS. A map depicting counties in the U.S. that have monitors indicating violation of the March 2008 standard is presented above. While the 322 counties shown in the figure above is substantial, the number of counties that would have actually been designated nonattainment would have been considerably higher. This would result from EPA guidance, issued on December 4, 2008, which requires not only counties with a monitor indicating violation of the standard be designated non attainment, but also one or more counties near violating monitors be included in the nonattainment area.
It should be noted that EPA is considering delaying designations and the subsequent implementation milestones for the secondary ozone standard until two years after promulgation, the maximum time allowed under the Clean Air Act.

**More Areas Headed Toward Nonattainment**

The estimated number of counties in the U.S. with monitoring data that currently exceeds the proposed 0.060 to 0.070 ppm 8-hour ozone NAAQS levels ranges from 515 to 650 counties, as shown in the figure below:

<table>
<thead>
<tr>
<th>Counties with Monitors Violating the Proposed Primary 8-hour Ozone Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Based on 2006 - 2008 Air Quality Data)</td>
</tr>
<tr>
<td>EPA will not designate areas as nonattainment on these data, but likely on 2008 - 2010 data which are expected to show improved air quality.</td>
</tr>
</tbody>
</table>

- 535 counties violate 0.070 ppm
- 93 additional counties violate 0.065 ppm
- 42 additional counties violate 0.060 ppm, for a total of 650

*Source: [www.epa.gov/air/ozonepollution/pdfs/20100104maps.pdf](http://www.epa.gov/air/ozonepollution/pdfs/20100104maps.pdf)*

A number of states across the U.S. will be dramatically impacted by a new primary ozone standard, especially states that are in attainment with current standards or have only a few counties violating existing standards. For instance, the entire state of Florida is in attainment with the 1997 ozone standards and would only have a few counties exceeding the 2008 standard. However, many more counties would exceed the proposed ozone standard even at the upper end of the proposed range (0.070 ppm). According to EPA, it is unclear how many areas will not comply with the secondary standard because the “W126” standard is an entirely new “form” of air quality standard (i.e., averaging period and method).
According to EPA staff currently working on the revised ozone standards, due to past legal precedent, EPA will not consider allowing states to develop “Early Action Plans” to avoid nonattainment designations in exchange for early commitments to reduce ozone.

Although the map presented on page 3 depicts a significant increase in the number of counties designated as nonattainment, this only partially conveys the impact of the standard. As was the case under the 2008 standard, future EPA designation guidance will likely require that counties meeting future-specified criteria that are near violating monitors also be considered part of a nonattainment area, thus drastically increasing the number of counties that will be designated nonattainment.

Another aspect of the proliferation of nonattainment areas across the country is that the current monitoring network is inadequate to determine attainment status in areas that do not have nearby monitoring sites. If a standard of 0.070 ppm or lower is promulgated, EPA will likely require additional monitoring sites to enhance the existing monitoring network. These additional monitoring sites could potentially detect further violations of the standards. Many such areas will likely be designated as “unnecessary” and avoid immediate impacts under the standards. However, once new monitoring sites have been operating the full three years required to assess compliance with the new ozone standard, many more counties throughout the country may be designated as nonattainment.

EPA has not developed preliminary plans regarding any of these “implementation” related issues, so there will be considerable uncertainty, until the revised standards are promulgated later this year.

### “Backstop” Ozone Standard

Although it appears likely that EPA will promulgate lower primary and secondary ozone NAAQS later this year, establishing the standards will be contentious. It is quite possible that revision of the 2008 ozone standards could be delayed. To offset the possibility that implementation of ozone standards more protective than the 1997 standards of 0.08 ppm will be delayed if the current reconsideration of the 2008 standard encounters delays, EPA has left in place the 2008 ozone standard of 0.075 ppm. If the current rulemaking effort to lower the standards is delayed, EPA intends to promulgate final designs under the 2008 standard by December 12, 2010 with an effective date of March 12, 2011. Under either scenario, the standards are being lowered, and additional nonattainment areas will be designated.

### Short and Long-Term Impacts to Industry

EPA, states, and industry are anticipating long-term challenges to meeting lower ozone standards. Although EPA may promulgate significant federal regulations with the intent of reducing ozone concentrations within the next few years (such as a revised Clean Air Interstate Rule), many states will face difficult decisions regarding the stringency of existing state regulations including reasonably available control technology (RACT) requirements in ozone nonattainment areas. Although reduction strategies at specific nonattainment areas are speculative at this time, it appears likely that many industrial facilities located in new nonattainment areas will eventually face tougher air pollution control requirements.

A more immediate impact to industry of upcoming nonattainment designations will be imposition of nonattainment new source review (NNSR) for new major sources and major modifications for ozone precursors, volatile organic compounds (VOC), and oxides of nitrogen (NOx). Depending on the “severity” of the nonattainment designation, NNSR will be triggered at different thresholds. In marginal and moderate areas, NNSR is triggered for new sources at 100 tons per year (tpy) and for existing sources at 40 tpy or less. Both of these thresholds are lower as the severity of the nonattainment designation increases. Once revised ozone designations are finalized (whether EPA designates under the 2008 standards or under the proposed ozone standards), NNSR will be triggered for any qualifying projects immediately upon the effective date of ozone nonattainment designations. Qualifying projects for which “complete” air quality construction applications have been submitted to permitting agencies, but for which final permits have not yet been issued, will be subject to NNSR requirements including construction and operation of lowest achievable emission rate (LAER) technology and obtaining emissions offsets.

In addition to significant impacts under the New Source Review program, the new ozone standard will impact the Title V program. Typically triggered in attainment areas at a potential to emit (PTE) of 100 tpy of VOC or NOx, if standards more stringent than the 2008 ozone standard are promulgated, the likelihood of areas being designated at “higher” severity levels increases. Title V applicability thresholds in higher severity nonattainment areas can be 50 tpy or less, depending upon severity.

There are a number of uncertainties regarding the eventual outcome and impacts of EPA’s current rulemaking efforts. However, if the ozone standards are reduced to levels currently under consideration (even at the high end of the ranges), the number of areas of the country likely to become nonattainment will increase dramatically and will have significant implications on pollution control requirements and permitting for industry for many years to come. ✤
New Requirements Finalized in RICE NESHAP

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On February 17, 2010, EPA finalized portions of the National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines (RICE NESHAP). The rule was promulgated into the existing RICE standards located in 40 CFR Part 63, Subpart ZZZZ on March 3, 2010. The newly incorporated standards were originally proposed on February 25, 2009 and apply only to stationary RICE. The proposed standards included provisions for RICE located at area sources of hazardous air pollutants (HAPs) and RICE with a site rating of $\leq 500$ brake horsepower (bhp) located at major sources of HAPs. In addition, the proposal included standards for existing non-emergency compression ignition (CI) engines with a site rating of $>500$ bhp at major sources and revised provisions related to Startup, Shutdown, and Malfunction (SSM) events for engines previously regulated under the rule.

Under the NESHAPs, a major source is defined as a site that emits $>10$ tons per year (tpy) of any single HAP or $>25$ tpy of combined HAPs. An area source is a site that emits HAPs, but is not considered a major source. A list of pollutants considered to be HAPs can be found at epa.gov/ttn/atw/orig189.html

Under these new regulations, many previously unregulated engines, including those designated for emergency use, are subject to federal regulation, including emission standards, control requirements, or management practices.

Following public comment on the proposed rule, EPA made a number of significant changes to the promulgated rule, including the following:

- EPA did not finalize the proposed provisions for spark ignition (SI) engines, with the exception of startup requirements. Although the original proposal included SI engines at area sources as well as those $\leq 500$ bhp located at major sources, EPA determined that additional data is needed prior to finalizing rules for these sources. The Agency expects to finalize the rules associated with SI engines by August 10, 2010.

- Existing emergency engines at area sources that are located at residential, commercial, or institutional facilities are not subject to the final rule. It is important to note that a definition for a residential/commercial/institutional facility has not been included in the final rule.

- Several numerical standards originally proposed for some categories of engines have been replaced with management practices.

- EPA revised the numerical emission limit for several engine categories based on a re-evaluation of the MACT floor. The new emission limits are less stringent than those included in the proposal.

- EPA added an option to the management practices to use an oil change analysis program to extend the oil change frequencies listed in the final rule.

- EPA eliminated the numerical standards originally proposed for periods of SSM, and instead promulgated operational standards that apply during startup. Additionally, the standards that apply during normal operation now also apply during periods of shutdown and malfunction.

- EPA included an additional requirement to reduce metallic HAP emissions for certain engine categories, including existing non-emergency CI $>300$ bhp. A closed crankcase ventilation system or open crankcase filtration system must be installed on these engines, if the engine is not already equipped with a closed crankcase ventilation system.

- An exclusion from the numerical emission limits has been included for existing non-emergency CI RICE $>300$ bhp located at area sources in Alaska that are not accessible by the Federal Aid Highway System. These engines must meet the management practices listed for non-emergency CI RICE $\leq 300$ bhp.

- A definition for emergency stationary RICE was added in the final rule. The majority of the requirements that apply to emergency stationary RICE listed in §63.6640(f) are identical to the proposed rule; however, the final rule allows an emergency unit to participate in an emergency demand response program as a part of a financial arrangement with another entity for up to 15 hours per year. Additional requirements also apply to units participating in emergency demand response programs. The detailed requirements are listed in §63.6640(f) of the final rule.

The compliance date for all applicable emission limitations and operating limitations for the affected units is three years from the effective date of the rule. The compliance date for the sources affected by the current revision to the rule is May 3, 2013. Following is a summary of the updated requirements for the existing stationary CI engines incorporated into the RICE NESHAP during this latest rule revision.

In addition to the requirements listed in the table on pages 6-7, EPA finalized startup requirements for the following stationary engines:

- Existing CI RICE $\leq 500$ hp at major sources
- Existing non-emergency CI RICE $>500$ hp at major sources
- Existing CI RICE at area sources
- New or reconstructed non-emergency two stroke lean burn (2SLB) $<500$ hp at major sources
- New or reconstructed non-emergency four stroke lean burn (4SLB) $\geq 500$ hp at major sources
- Existing, new, or reconstructed non-emergency four-stroke rich burn (4SRB) $>500$ hp at major sources
- New or reconstructed non-emergency CI $>500$ hp at major sources

(Continued on page 8)
### Updated MACT ZZZZ Requirements for Existing Stationary Reciprocating Internal Combustion Engines1,2,3

<table>
<thead>
<tr>
<th>AREA SOURCE</th>
<th>MAJOR SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Existing Non-Emergency CI &gt; 500 HP</strong></td>
<td></td>
</tr>
<tr>
<td><strong>During Startup</strong></td>
<td>Minimize engine idle time and startup to period needed for appropriate and safe loading, not to exceed 30 minutes</td>
</tr>
<tr>
<td><strong>Except during Startup</strong></td>
<td>• 23 ppmvd CO or less at 15% O₂ or 70% CO reduction</td>
</tr>
<tr>
<td></td>
<td>• Install a closed crankcase ventilation system that prevents crankcase emissions to the atmosphere or install an open crankcase filtration emission control system that reduces emissions by filtering oil mist, particulates and metal</td>
</tr>
<tr>
<td><strong>Operating Limitations</strong></td>
<td>• If equipped with oxidation catalyst, maintain catalyst so that pressure drop across catalyst does not change by more than 2 inches of water from the pressure drop that was measured during initial performance test and maintain temperature of exhaust so that catalyst inlet temp is between 450 and 1350 F, or if not using oxidation catalyst, comply with operating limitations approved by Administrator</td>
</tr>
<tr>
<td></td>
<td>• Follow manufacturer’s maintenance requirements for operating and maintaining the crankcase ventilation systems and replacing the crankcase filters</td>
</tr>
<tr>
<td><strong>Fuel Requirements (for engines with displacement &lt; 30 liters/cylinder)</strong></td>
<td>• Maximum sulfur content of 15 ppm</td>
</tr>
<tr>
<td></td>
<td>• Maximum aromatic content of 35% (volume) or minimum cetane value of 40</td>
</tr>
<tr>
<td><strong>Demonstrating Compliance</strong></td>
<td>Initial performance test and testing every 8,760 hours of operation or 3 years, whichever comes first.</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
<td>Initial performance test and testing every 8,760 hours of operation or 3 years, whichever comes first.</td>
</tr>
<tr>
<td><strong>Existing Emergency CI = 500 HP</strong></td>
<td></td>
</tr>
<tr>
<td><strong>During Startup</strong></td>
<td>Minimize engine idle time and startup to period needed for appropriate and safe loading, not to exceed 30 minutes</td>
</tr>
<tr>
<td><strong>Work Practice Standards</strong></td>
<td>• Change oil and filter every 500 hours of operation or annually, whichever comes first</td>
</tr>
<tr>
<td></td>
<td>• Inspect air cleaner every 1000 hours or annually, whichever comes first</td>
</tr>
<tr>
<td></td>
<td>• Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first</td>
</tr>
<tr>
<td><strong>Fuel Requirements (for engines with displacement &lt; 30 liters/cylinder)</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Operating Limitations</strong></td>
<td>• Maintenance and readiness checks limited to 300 hours/year</td>
</tr>
<tr>
<td></td>
<td>• Can operate engine for 50 hours/year for non-emergency purposes, but counted toward 100 hours above. The 50 hours cannot be used to generate income for a facility, except that 15 hours/year is allowed as part of an emergency demand response program.</td>
</tr>
<tr>
<td><strong>Demonstrating Compliance</strong></td>
<td>• Operate and maintain the stationary RICE according to the manufacturer’s emission-related operation and maintenance instructions, or implement your own maintenance plan which must provide to the extent practicable for the maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions</td>
</tr>
<tr>
<td></td>
<td>• Install a non-resettable hour meter</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Existing Non-Emergency CI &gt; 500 HP</strong></td>
<td></td>
</tr>
<tr>
<td><strong>During Startup</strong></td>
<td>Minimize engine idle time and startup to period needed for appropriate and safe loading, not to exceed 30 minutes</td>
</tr>
<tr>
<td></td>
<td>• 49 ppmvd CO or less at 15% O₂ or 70% CO reduction</td>
</tr>
<tr>
<td></td>
<td>• Install a closed crankcase ventilation system that prevents crankcase emissions to the atmosphere or install an open crankcase filtration emission control system that reduces emissions by filtering oil mist, particulates and metal</td>
</tr>
<tr>
<td><strong>Fuel Requirements (for engines with displacement &lt; 30 liters/cylinder)</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Operating Limitations</strong></td>
<td>• Maintenance and readiness checks limited to 300 hours/year</td>
</tr>
<tr>
<td></td>
<td>• Can operate engine for 50 hours/year for non-emergency purposes, but counted toward 100 hours above. The 50 hours cannot be used to generate income for a facility, except 15 hours/year is allowed as part of an emergency demand response program.</td>
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<td><strong>Demonstrating Compliance</strong></td>
<td>• Operate and maintain the stationary RICE according to the manufacturer’s operation and maintenance instructions or implement your own maintenance plan that provides to the extent practicable for maintenance and operation of the engine in a manner consistent with good air pollution control practice for minimizing emissions</td>
</tr>
<tr>
<td></td>
<td>• Install a non-resettable hour meter</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
<td>None</td>
</tr>
</tbody>
</table>

1. Requirements for existing stationary Reciprocating Internal Combustion engines
2. Except During Startup
3. During Start-Up Minimize engine idle time and engine startup to period needed for appropriate and safe loading, not to exceed 30 minutes.
4. Existing emergency CI > 500 HP
5. During Startup Minimize engine idle time and engine startup to period needed for appropriate and safe loading, not to exceed 30 minutes.
6. Testing
7. Demonstrating Compliance
8. Operating Limitations
9. Work Practice Standards
10. Fuel Requirements
11. The above requirements are subject to the provisions of the General Provisions included in Table B.
### Existing Non-Emergency CI 100 ≤ HP ≤ 300

<table>
<thead>
<tr>
<th><strong>Area Source</strong></th>
<th><strong>Major Source</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>During Startup</strong></td>
<td>Minimize engine idle time and engine startup to a period needed for appropriate and safe loading, not to exceed 30 minutes&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Work Practice Standards Except During Startup</strong></td>
<td>• Change oil and filter every 1,000 hours of operation or annually, whichever comes first&lt;br&gt;• Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first&lt;br&gt;• Inspect hoses and belts every 500 hours of operation or annually, whichever comes first&lt;br&gt;230 ppmvd CO or less at 15% O₂&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Fuel Requirements (for engines with displacement &lt; 30 liters/cylinder)</strong></td>
<td>None&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Operating Limitations</strong></td>
<td>None&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Demonstrating Compliance</strong></td>
<td>Operate and maintain the stationary RICE according to manufacturer's instructions or implement a maintenance plan that provides for the maintenance and operation in a manner consistent with good air pollution control practices for minimizing emissions&lt;br&gt;Initial performance test&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
<td>None&lt;br&gt;Initial performance test</td>
</tr>
</tbody>
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### Existing Emergency CI 100 ≤ HP ≤ 300

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</tr>
<tr>
<td><strong>Work Practice Standards</strong></td>
<td>• Change oil and filter every 500 hours of operation or annually, whichever comes first&lt;br&gt;• Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first&lt;br&gt;• Inspect hoses and belts every 500 hours of operation or annually, whichever comes first&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Fuel Requirements (for engines with displacement &lt; 30 liters/cylinder)</strong></td>
<td>None&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Operating Limitations</strong></td>
<td>• Maintenance and readiness checks limited to 100 hours/year&lt;br&gt;• Can operate engine for 50 hours/year for non-emergency purposes, but counted toward 100 hours above. The 50 hours cannot be used to generate income for a facility, except 15 hours/year is allowed as part of an emergency demand response program&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Demonstrating Compliance</strong></td>
<td>Operate and maintain the stationary RICE according to manufacturer's instructions or implement a maintenance plan that provides for the maintenance and operation in a manner consistent with good air pollution control practices for minimizing emissions&lt;br&gt;Install a non-resettable hour meter&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
<td>None&lt;br&gt;Same as area source</td>
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### Existing Non-Emergency CI < 100 HP

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<td><strong>Work Practice Standards</strong></td>
<td>• Change oil and filter every 1,000 hours of operation or annually, whichever comes first&lt;br&gt;• Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first&lt;br&gt;• Inspect hoses and belts every 500 hours of operation or annually, whichever comes first&lt;br&gt;Same as area source</td>
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<tr>
<td><strong>Fuel Requirements (for engines with displacement &lt; 30 liters/cylinder)</strong></td>
<td>None&lt;br&gt;Same as area source</td>
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<td><strong>Operating Limitations</strong></td>
<td>• Maintenance and readiness checks limited to 100 hours/year&lt;br&gt;• Can operate engine for 50 hours/year for non-emergency purposes, but counted toward 100 hours above. The 50 hours cannot be used to generate income for a facility, except 15 hours/year is allowed as part of an emergency demand response program&lt;br&gt;Same as area source</td>
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<tr>
<td><strong>Demonstrating Compliance</strong></td>
<td>Operate and maintain the stationary RICE according to manufacturer's instructions or implement a maintenance plan that provides for the maintenance and operation in a manner consistent with good air pollution control practices for minimizing emissions&lt;br&gt;Install a non-resettable hour meter&lt;br&gt;Same as area source</td>
</tr>
<tr>
<td><strong>Testing</strong></td>
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### Existing Emergency CI < 100 HP

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</tr>
<tr>
<td><strong>Testing</strong></td>
<td>None&lt;br&gt;Same as area source</td>
</tr>
</tbody>
</table>

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1. **Existing stationary emergency engines located at area sources that are residential, commercial, or institutional have been excluded from the final rule**
2. **Additional requirements apply to 4SRB engines greater than or equal to 500 HP**
3. **Recordkeeping and reporting requirements are not included in this table.**
4. **Non-emergency > 300 HP located in areas of Alaska not accessible by the Federal Aid Highway System (FAHS) must meet management practice requirements**
Owners and operators must minimize the engine’s startup period to the amount of time needed for appropriate and safe loading of the engine, not to exceed 30 minutes. After this time, the engine must meet the numerical emission standards, if applicable.

For those engines that require periodic oil changes, the schedule for changing engine oil can be extended if the oil is part of an oil analysis program. The program must include analyzing the following parameters in order to qualify: Total Base Number, viscosity, and percent water content. If certain limits are met during the analysis, then the owner or operator is not required to change the oil. However, if any of the limits are exceeded, the oil must be changed prior to continuing use of the engine. The limits are as follows:

- Total Base Number is < 30% of the Total Base Number of the oil when new; or
- Viscosity of the oil has changed by > 20% from the viscosity of the oil when new; or
- Water content is > 0.5% (by volume)

In addition, recordkeeping and reporting requirements for many engines are included in the final rule. All owners and operators of existing stationary RICE, with the exception of RICE < 100 hp, existing emergency stationary RICE, and existing stationary RICE that are not subject to numerical emission standards, must submit all applicable notifications as listed in the §63.6645 and NESHAP General Provisions (40 CFR Part 63, Subpart A).

Sources with affected RICE should review the final rule carefully to determine compliance requirements based on the promulgated standard. For more information or to view a copy of the final rule, go to the epa.gov/tnn/oarpg/new.html. For assistance in determining applicability and complying with the new standards, contact your local Trinity office at (800) 229-6655.

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**Enhanced LDAR in the Chemical Industry**

**INAAS DARRAT, PE**  
**SENIOR CONSULTANT—COLUMBUS**

As a result of recent leak detection and repair (LDAR) audits and the associated issues (as described in the Winter 2009 issue of Environmental Quarterly), EPA is initiating enhanced LDAR programs as part of the most recent consent decrees. The enhanced LDAR programs for chemical facilities are more stringent than the enhanced LDAR previously required for the petroleum refining industry. Starting in 2000, refineries were required by consent decrees to implement enhanced LDAR programs. Although enhanced LDAR programs include many elements, three main elements of the refinery enhanced LDAR are as follows:

- Leak definitions were lowered from NSPS VV levels (e.g., 10,000 ppm) to HON levels (e.g., 500 ppm)
- Initial attempts at repair were required at concentrations as low as 200 ppm (not a “leak” but a lowered action level)
- Periodic internal/third party audits were required

Recent consent decrees in the chemical industry are also requiring enhanced LDAR standards, similar to refinery enhanced LDAR with variations as well as additional requirements. The chemical industry enhanced LDAR programs also lowered the leak definitions, required annual audits, and required replacement or repacking at lower concentrations during maintenance turnaround. Other elements of the chemical industry enhanced LDAR requirements include the following:

- Certain technologies are required for repair of leaking valves and connectors
- Closure devices associated with open-ended lines must be monitored via Method 21 on a periodic basis
- More stringent delay of repair provisions were included
- Frequent periodic monitoring of certain valves, connectors, pumps, and agitators is required

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1 Please note that not all chemical facilities that received LDAR-related consent decrees have been required to initiate an enhanced LDAR program.

2 The frequency of third party audit requirements varies; it could be annual, biennial, every 5 years, etc.
Enhanced LDAR: Lower Leak Definitions

Similar to the enhanced LDAR programs for refineries, the leak definitions were lowered as follows:

- Pumps - lowered from 500 ppm to 200 ppm
- Agitators - lowered from 1000 ppm to 500 ppm
- All other components - lowered from 500 ppm to 250 ppm

Enhanced LDAR: Open-Ended Lines

As discussed above, LDAR regulations do not include leak definitions for open-ended lines. However, a new enhanced LDAR provision (not included in the refinery enhanced LDAR programs) is the requirement to conduct periodic monitoring (e.g., quarterly) via Method 21 monitoring on closure devices (i.e., plug, blind flange, cap, or second valve). Under some enhanced LDAR requirements, open-ended lines have a leak definition of 250 ppm.

Enhanced LDAR: Periodic Monitoring

Under the enhanced LDAR programs, EPA is requiring that Method 21 monitoring be conducted on specific periodic frequencies, excluding less frequent monitoring options under the MACT standards. Valves in gas/vapor service and in light liquid service must be monitored quarterly for the first two years, with no regard for good performance, as allowed under MACT standards. Depending on the MACT standard and the number of leaking components, good performance may allow valves to be monitored semiannually, annually, or biannually.

For connectors in gas/vapor service and in light liquid service, monitoring may range from annually to once every eight years.

For Pharma MACT facilities, pumps in light liquid service and agitators in gas/vapor service and in light liquid service may be required to be monitored monthly by enhanced LDAR, which is more stringent than MACT-related quarterly monitoring.

Enhanced LDAR: Valves in Gas/Vapor Service and in Light Liquid Service

As another example of the increased stringency of enhanced LDAR in the chemical industry as compared to the initial refining enhanced LDAR requirements, the enhanced LDAR requirements for the chemical industry require more technology and capital improvements. For example, new valves in gas/vapor service and in light liquid service added to process units must be “certified low-leaking valves” or fitted with “certified low-leaking valve packing technology.”

Additionally, some enhanced LDAR programs require that leaking valves must be either replaced or repacked with certified low-leaking valves or valve packing within 30 days of discovery, unless the replacement requires a process unit shutdown. If the valves also meet the leak definitions under the MACT standards, then the repairs must be completed within 15 days.

Valves with an instrument reading between 100 ppm and 250 ppm must be maintained in a list for potential repair during the next process unit shutdown. Those found to be leaking more often should have a higher priority for repacking/replacement with leakless technology. The determination may be based on a calculation to determine how many valves would need to be replaced, which considers the number of total valves, valves on delay of repair, and valves that have already been repacked or replaced with low-leaking valve or technology.

Some enhanced LDAR programs also allow facilities to take credit for replacing regular valves with leak-less valves. However, the elimination of regular valves must be for the purpose of reducing hazardous air pollutant (HAP) emissions. If the regular valves would be removed from service due to operational/process changes, facilities are not allowed to utilize the credit.

Enhanced LDAR: Connectors in Gas/Vapor Service and in Light Liquid Service

Enhanced LDAR requirements also include connector replacement and improvement provisions as follows:

- Flanged – replacement or improvement of the gasket
- Threaded – replacement of the connector
- Compression – replacement of the connector
- CamLock – replacement of the gasket
- Quick Connect – replacement of the gasket or connector, as applicable
- Any type – eliminate by either pipe replacement or welding, etc.

Additionally, enhanced LDAR programs are to include provisions so that new connectors added to a facility should be those that will least likely leak based on best engineering judgment.

Enhanced LDAR: Delay of Repair

Similar to refinery consent decrees, a valve cannot be put on delay of repair until “drill and tap” is utilized at least twice. Under the enhanced LDAR, delay of repair requires sign-off from the relevant process unit supervisor, as is required under NSPS VV but not under the MACT standards. In some cases, sign-off may be required by the plant manager or a corporate official responsible for environmental compliance or plant engineering management.

EPA will continue to conduct LDAR audits and require enhanced LDAR in the chemical industry, as applicable. As emphasized in our previous article on this topic, EPA, especially Region V, will focus on Miscellaneous Organic NESHAP (MON) facilities in 2010; therefore, chemical sectors that have not been affected thus far should consider the lessons learned from the refining and chemical sectors that have already been affected. ✖
GHG Regulation under the Clean Air Act – Recent Developments

AIMEE ANDREWS
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EPA's GHG Tailoring Rule and Senate Action

On October 27, 2009, EPA published the Prevention of Significant Deterioration (PSD) and Title V Greenhouse Gas (GHG) Tailoring Rule in the Federal Register, followed by a 60-day public comment period that ended on December 28, 2009. The proposed rule represents EPA’s effort to decrease the number of sources subject to major source permitting for GHGs under the Clean Air Act (CAA). On April 1, 2010, EPA finalized a light duty vehicle rule addressing GHGs, immediately making GHGs regulated pollutants under the Clean Air Act at the existing major source thresholds of 250/100 tons per year (tpy) for the PSD program and 100 tpy for Title V program versus the proposed levels under the Tailoring Rule at 25,000 tpy CO₂e.

EPA received many comments from regulated entities, state and local permitting agencies, and Congress over the implications of the PSD/Title V Tailoring Rule. The Agency attempted to address these comments and devise a practical solution to regulating GHGs under the CAA.

On February 22, 2010, EPA Administrator Lisa Jackson issued a letter to Senator Jay Rockefeller responding to a request by eight U.S. Senators asking about EPA’s greenhouse gas regulatory plans for 2010. In the letter, EPA outlined several decisions made for 2010-2011 regarding the proposed PSD/Title V Tailoring Rule, including the following:

- By April 2010, EPA will issue regulations to ensure that no facility will be required to address GHGs in CAA permitting of new construction or modifications before January 1, 2011.
- For the first half of 2011, only facilities that already must apply for CAA permits as a result of their non-GHG emissions (i.e., existing major sources) will need to address GHG emissions in their permit applications.
- For the second half of 2011 and 2012, EPA is considering increasing the proposed major source threshold to greater than 25,000 tpy CO₂e, potentially as high as 75,000 tpy of CO₂e or greater.

Additional details on these planned changes to the Tailoring Rule were revealed on March 3, 2010 when Administrator Jackson testified before the Senate Committee on Appropriations. Jackson stated that EPA may increase the PSD/Title V Tailoring Rule emissions threshold from 25,000 tpy to at least 75,000 tpy, or as much as 100,000 tpy for the 2011-2012 period, with possible reduction to 50,000 tpy after 2012. With these emissions thresholds, EPA estimates that 1,700 permits would be required by the end of 2011. By the end of 2013, EPA estimates 3,000 sources may need GHG permits (dependent on the emissions threshold in effect at that time).

In addition, Jackson stated that EPA may require larger sources such as utilities and refineries to obtain a GHG permit if a PSD or Title V application was submitted in the 2009/2010 timeframe. Several commenters urged EPA to refrain from requiring companies currently undergoing the permitting process to amend permit applications to address GHGs. However, Jackson has said that, while EPA would not purposely hold up the issuance of a new permit, since the permitting process for a large source can span years, there may be changes to the regulatory landscape during that time that could affect the permit content.1

Meanwhile, the Senate is taking separate action to delay initial regulation of GHGs by EPA. On March 4, 2010, the Rockefeller bill (or “Stationary Source Regulations Delay Act”) would delay implementing the PSD/Title V Tailoring Rule until January 1, 2012.2

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2 "Stationary Source Regulations Delay Act"
was introduced in the Senate. If signed, this bill would impose a 2-year delay on stationary source regulation of CO₂ and CH₄ under the CAA. However, passage of this bill would not prevent EPA from issuing motor vehicle GHG standards.

Additional action in the Senate was taken by Senator Lisa Murkowski. Her resolution (the “Murkowski” resolution) was introduced under the Congressional Review Act on January 21, 2010, seeking to block GHG regulation by overturning the EPA GHG endangerment finding. Unlike the Rockefeller bill, if the Murkowski resolution is passed in the Senate, it would permanently ban EPA from regulating GHGs under the CAA. On March 11, 2010, Murkowski stated that she would wait to see how the Rockefeller bill advances within the Senate before bringing the resolution forward for a floor vote.

**CAA C Addresses GHG B ACT**

Under the proposed Tailoring Rule, PSD regulation of GHGs under the CAA will generate associated requirements for new and modified GHG emissions sources. For example, with existing regulated pollutants, PSD permitting typically requires a Best Available Control Technology (BACT) analysis where technical and economically feasible controls are considered to establish the required emission rate, air dispersion modeling to demonstrate requirements with the NAAQS, netting, and other requirements. BACT analysis could become quite complex due to multiple pollutants that comprise GHGs and the inextricable link of GHGs to energy usage.

EPA’s Clean Air Act Advisory Committee (CAA C) met in Washington, DC on February 2-3, 2010 to discuss the initial findings of the subcommittee’s work on addressing BACT for GHGs. These findings were submitted to EPA for review as Phase I of the effort. Phase I work assumed EPA would continue to apply BACT in the same manner as other PSD-regulated pollutants (i.e., the “top-down” approach).

The subcommittee workgroup agreed that GHG BACT should apply to new and modified emission units that undergo PSD review for exceeding the significant emission rate (SER). The workgroup did not agree as to whether BACT can or should consider changes to the basic design of a proposed project (i.e., redesign of a fuel oil-fired unit to a natural gas-fired unit). This particular element is important for large power/utility projects – for example, at what point does BACT “redefine the source” or alter the “fundamental business purpose” or “basic design” of the facility? Or, should a natural gas-fired combined cycle power plant have to consider generating the same megawatts through wind, solar or biomass firing? This was tangentially addressed in the Calpine Russell Energy Center PSD permit, issued by the Bay Area Air Quality Management District (BAAQMD) in California (note that a GHG BACT review and a GHG emissions limitation was voluntarily requested by Calpine in the application). The agency determined that solar and wind represented a departure from the “fundamental business purpose” or “basic design” of the proposed power plant.

Additionally, the agency noted that the California Energy Commission had domain over selecting the type of power generation that was appropriate for California and that the BAAQMD would not rule on this aspect.²

Conversely, a recent remand of a Region 9 PSD permit for the Desert Rock power plant in New Mexico by the Environmental Appeals Board (EAB) stated that an integrated gasification combined cycle (IGCC) should have been considered in Step 1 of the BACT process and that IGCC does not “redefine the source” by changing the fundamental business operation.³

With regard to economic and technical feasibility, there was a great degree of discussion but little consensus. Perceptions of acceptable cost effectiveness for the BACT analysis ranged widely from $3 - $15 per ton CO₂e to $30 - $150 per ton CO₂e, the higher end representing the cost for carbon capture and sequestration (CCS).

With regard to CCS, the workgroup did not reach a consensus on feasibility and availability of such technology, particularly whether a site should be forced to consider alternative locations based on the availability of sequestration capacity. Likewise, there was no consensus on the extent or degree of availability before CCS is considered properly “demonstrated,” or which CCS technology can be transferred from one source type to another, and how similar an existing source with CCS must be to a proposed source for the CCS to be transferred. These issues will continually evolve as case-by-case CO₂ BACT determinations are issued, and as CCS technology continues to be applied to new sources.

Energy efficiency was considered in evaluating BACT alternatives and setting emission limits. The workgroup recognized that specific energy efficiency limits may be difficult to quantify continuously; therefore, there was no consensus on scope of the energy efficiency considerations. However, examples of energy efficiency requirements were suggested as an equipment specification, or as a monitoring and/or operational procedure that indicates the continual efficiency of a unit.

The workgroup also discussed the viability of “clean fuels” and agreed that EPA should provide guidance on how clean fuels should be considered in the BACT analysis. One area of non-consensus within the workgroup is a concern that using a clean fuel substitute as BACT would lead to redefining/redesigning the source, thus altering the “fundamental business purpose” or “basic design” of the proposed project.

Phase II of the efforts of the BACT workgroup is underway and a report is expected in the near future on the following items:

- Scope of applicability of PSD and BACT to GHG sources
- Appropriateness of “presumptive” BACT
- Appropriateness of using GHG averaging or trading as BACT
- Appropriateness of using supply chain reductions as BACT (such as reduced carbon intensity, increased efficiency and/or demand reduction)

² [http://tinyurl.com/yang77m](http://tinyurl.com/yang77m)
³ [http://tinyurl.com/ybryr7](http://tinyurl.com/ybryr7)

(Continued on page 14)
Understanding GHG Verification Requirements

VINEET MASURAH
PRINCIPAL CONSULTANT—IRVINE

Many organizations are required to report greenhouse gas (GHG) emissions to the U.S. EPA mandated by the Mandatory Reporting Rule (MRR). Effective December 29, 2009, large sources and suppliers in the United States will begin collecting data on January 1, 2010 and report GHG emissions to EPA by March 31, 2011. Similar to the EPA MRR, many states also have mandatory reporting requirements. The map below summarizes the current status of different state level GHG reporting requirements (reference: PEW Center on Global Climate Change, July 25th, 2009). The purpose of this article is to summarize verification requirements in the U.S. for different GHG reporting programs.

Mandatory reporting is intended to provide information that will assist agencies in development and implementation of strategies to gain a better understanding of where and in what quantities GHGs are emitted. This information will guide development of the best possible policies and programs to reduce emissions. Accurate quantification of GHG emissions becomes critical when the asset has a price, as carbon may have under future regulatory schemes such as cap and trade – whether that be a regional or federal program. In order to ensure accuracy, third party verification is required for some voluntary registries and mandatory reporting programs.

The U.S. EPA’s MRR does not require mandatory verification of reported GHG emissions. Instead, reporters will self-certify and submit emissions and activity data necessary for verification to EPA. Consistent with many other EPA reporting programs such as the Toxic Release Inventory (TRI), EPA will then perform verification on selected submitted reports. Consistent with Clean Air Act Section 114 and other existing requirements, EPA can initiate enforcement actions and inspections for non-compliance items for reporting, recordkeeping, and monitoring provisions. Therefore, the burden of compliance lies upon the reporter itself. Due to the importance of GHG emissions, EPA is expected to enforce strict compliance with the mandatory reporting and monitoring requirements. Elevated levels of enforcement actions can be expected from EPA.

Comparing Self-Certification with Third-Party Verification

Third-party verification programs generally allow three to six months for the verification process to be completed. The primary cost of third party verification is associated with contracting the services of third party verifiers. However, with third party verification, a high level of confidence and consistency is gained for the reported GHG emissions and value added enhancements to the inventory are often identified, such as use of correct emission calculations methodology and associated GHG emissions. Furthermore, the organization receives a confirmation that the data is accurate, potentially lessening compliance risk.

Enhancing Value with Third-Party Verification

Third party verification is not only useful when it is required. It can be a valuable addition to any GHG management program by providing the organization confidence that the inventory is free of material misstatements. Informal third party verification could certainly be used voluntarily by companies who want a “gut check” that their EPA MRR reports are accurate. Similarly, it could be used for public reporting of emissions to instill internal and stakeholder confidence in the reported data. Informal voluntary third-party verification of reported GHG emissions calculations, entity boundaries, data checks, sampling plans,
monitoring plans, reporting, recordkeeping, and inventory programs is highly recommended to minimize any uncertainty in the GHG emissions data reported to EPA and local or state agencies.

Environmental managers who have not utilized third party verification may wonder how the process would unfold. The verification process usually takes one or two weeks of intense review of emissions, methodology, and data checks. The third party verifiers review the inventory and certify whether it is accurate and free of material misstatement. For AB 32, a discrepancy is defined as “material” (significant) if overall reported emissions differ from emissions estimated by the verifier by 5% or more. To perform the verifications, the verifier reviews the company’s data collection and data management systems, the methodologies and factors used to estimate emissions, and the information being reported. While verifiers do not review all activity data or emissions measurement data records and calculations, they do review a sample and they typically conduct site visits to a subset of the company’s facilities. During site visits, the verifiers observe the facility’s operations and monitoring equipment, review documentation, and meet with staff.

General verification steps required by most programs such as The Climate Registry, the EU ETS, and CARB are summarized below.

1. Resolve and monitor Conflict of Interest (COI)
2. Assess conformance and completeness of reported data
3. Perform a risk assessment and identify areas with greatest potential for material misstatements
4. Review the methodologies used to calculate emissions
5. Review systems in place for data collection, data handling, and monitoring
6. Develop a verification plan
7. Develop a sampling plan
8. Perform site visits, interviews, and collect data
9. Review records (calibrations, fuel data, electricity transactions, etc.)
10. Verify emissions and data checks
11. Review, identify, and list all compliance and conformance gaps
12. Develop detailed verification report listing any compliance/conformance gaps
13. Perform an independent technical review
14. Provide an official verification opinion statement

**Accessing Third Party Verification Assistance**

As a recognized leader in industrial air quality issues, Trinity’s GHG Verification Services team is uniquely qualified to support our clients for mandatory or voluntary verification by identifying and verifying entity boundaries, emissions sources, emissions factors, electricity transactions, data reviews, measurements, and calculations to minimize any uncertainty in the GHG emissions data reported to agencies. Trinity’s AB 32 GHG Verification Unit is a CARB AB 32 and The Climate Registry (TCR)-accredited verification body with several accredited lead and sector specific verifiers. Our GHG Verification Services are conducted exclusively by accredited Trinity verifiers who have significant operational, emission calculations, and verification experience. We also perform many informal verification projects to help organizations in ensuring compliance with EPA’s mandatory reporting requirements. As an example, recently our verification team assisted a large paper mill with informal verification and ensured that the facility is ready to demonstrate compliance with EPA’s new reporting and monitoring requirements. For assistance, contact Vineet Masuraha at (949) 296-4100 or at vmasuraha@trinityconsultants.com, or call your local Trinity office at (800) 229-6655.

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**One Example of State-Based GHG Reporting**

In December 2007, the California Air Resources Board (ARB) promulgated AB 32 regulations requiring organizations to measure, calculate, report, and verify their greenhouse gas (GHG) emissions if they are in selected industry sectors (cement, electricity, refineries, cogeneration, and hydrogen plants) or are a general stationary combustion (GSC) source generating ≥ 25,000 metric tons of CO₂ per year. Starting 2009, operators of facilities subject to AB 32 mandatory reporting were required to submit their 2008 GHG inventory by April 1 or June 1 (June 1 for all facilities in 2009) and continue submitting the annual emissions data until the facility’s emissions drop below the prescribed thresholds for three consecutive years.

Third party GHG verification is required under the AB 32 regulations to ensure the reported emissions are accurate and independently verifiable. Under AB 32, each reporting entity selects a third-party private verification firm that reviews the GHG emission inventory and underlying documentation to verify whether reported GHG emissions are accurate within a certain de minimis materiality threshold (e.g., five percent). Third-party verification is required annually or triennially under AB 32. Verification opinions are due to ARB six months after the submission of the GHG emission reports (October 1 or December 1 each year, December 1 for all facilities in 2009).
GHG Regulation under the CAA – Recent Developments  (Continued from page 11)

Methods to encourage innovative GHG controls
- Evaluating energy efficiency process and practices

The CAAAC will reconvene during its next meeting around May/June 2010.

Planning a Path Forward

A path forward for dealing with the implications of the proposed Tailoring Rule and the findings of the BACT workgroup may be important for companies who are existing major sources (or who may become major sources due to GHGs) and are considering plans for growth or expansion. If a facility plans a major expansion in the next one to two years, and if the regulation of GHGs through the CAA/Tailoring Rule does not become effective until 2011 or later, it may be advisable to pursue the modified permit before the rule becomes effective. However, for facilities that are highly GHG intensive such as power plants, numerous appeals will likely impact the issuance of the permit and it may not be possible to receive the permit before the GHG rules are final.

Trinity highly recommends tracking Tailoring Rule developments and potential new major source emissions thresholds. Depending on when the Tailoring Rule comes into effect, companies will need to evaluate the impacts of a GHG BACT determination on their proposed or modified sources – will this involve fuel switching, additional controls or a requirement for offsets and is it possible to create an abatement cost curve to predict the impacts? Because these requirements may significantly impact the PSD permitting process for many industry sectors, creating regulatory scenarios and assigning potential costs and probabilities to the scenarios are a helpful first step in trying to prepare for constraints imposed by regulation of GHGs under the CAA.

Trinity Consultants, a leader in industrial air quality issues for 35 years, has been on the forefront of climate change strategy and carbon management for more than a decade. Our proven carbon advisory services include:

- GHG inventories and product carbon footprinting
- Regulatory and technology advisement
- Corporate carbon management strategies
- Energy optimization

For assistance, call (800) 229-6655 to reach your nearest Trinity office.

See You on the Road

Drop by the Trinity booth at any of these upcoming conferences. We look forward to seeing you!

- Pennsylvania Chamber’s 2010 Mid-Atlantic Environmental & Energy Conference and Trade Show
  April 13-14  Camp Hill, PA
- 2010 (OSBA) Ohio Environment, Energy, Resources Law Seminar
  April 29 - May 1  Newark, OH
- NCASI Northern Regional Meeting 2010
  May 12  Portland, ME
- Four Corners Oil and Gas Conference
  May 12-13  Farmington, NM
- NCASI Southern Regional Meeting
  June 23-25  Chattanooga, TN
- A&WMA’s 103rd Annual Conference and Exhibition
  June 22-25  Calgary, AB Canada
- NAEEM’s 18th Annual EH&S Management Forum 2010
  October 13-15  Indianapolis, IN

ON THE PATH TO EFFECTIVE CARBON MANAGEMENT,
YOU NEED A PROPER GUIDE WITH ALL THE RIGHT TOOLS

IN CONCLUSION
Environmental Veteran Provides Expertise for Power Producers

After completing his B.S. degree in chemical engineering from North Carolina State University, Joe Sullivan, PE, CM, began his career as a process development engineer in the chemical industry, later working on contract to the U.S. Environmental Protection Agency’s Emissions Standards Division assisting in development of federal air quality regulations. For the past 16 years, he has worked as an environmental consultant to industry, developing diverse skills that are proving a valuable resource in Trinity’s Raleigh office. According to Joe, “Environmental consulting is the perfect fit for me…I love the satisfaction of serving clients and collaborating with colleagues, the fast pace of consulting, and the limitless opportunity to learn and grow professionally.”

Particularly noteworthy is Joe’s experience assisting power companies. Over the past decade, he has managed numerous permitting and compliance-related projects for existing power clients, including many multi-media environmental projects for clients building new power plants. He is experienced at managing multiple resources to provide turn-key environmental assistance including all permitting requirements as well as biological and cultural assessment required under the National Environmental Policy Act (NEPA).

He also has considerable environmental consulting experience with a number of other industries including chemicals, fertilizers, polymers/fibers, bulk petroleum distribution, wood products, secondary metals, pharmaceuticals, pulp and paper, and general manufacturing.

Although Joe has broad environmental knowledge, his primary area of expertise is in air quality. He is an instructor for Trinity’s air quality regulations courses in North and South Carolina as well as the Advanced New Source Review Permitting Workshop. He is also a frequent author and presenter for emerging national and regional air quality developments. Since he joined Trinity in 2007, he has particularly enjoyed the great team atmosphere at Trinity, working together to provide superlative services to our clients.

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As the economy continues to improve, increased demand for high quality EH&S professionals can make it more difficult to find needed staff. With staffing assistance from On Demand Environmental, you will experience these important benefits:

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<table>
<thead>
<tr>
<th>Event</th>
<th>Dates</th>
<th>Locations</th>
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<tbody>
<tr>
<td>Introduction to Environmental Recordkeeping and Reporting</td>
<td>April 8-9</td>
<td>Houston, TX</td>
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<td>July 15-16</td>
<td>Minneapolis, MN</td>
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<tr>
<td>SPCC and Integrated Contingency Planning Workshop</td>
<td>April 28</td>
<td>Chicago, IL</td>
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<tr>
<td>Introduction to Air Quality Regulations</td>
<td>April 29-30</td>
<td>San Juan, PR</td>
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<td>June 2-3</td>
<td>St. Louis, MO</td>
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<tr>
<td>Compliance Workshop for Ozone Depleting Substances (½ day)</td>
<td>April 22</td>
<td>Pensacola, FL</td>
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<td>April 30</td>
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<td>June 22</td>
<td>Cincinnati, OH</td>
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<td>Fundamentals of Organizational GHG Accounting</td>
<td>May 7</td>
<td>Chicago, IL</td>
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<tr>
<td>NSR/PSD Compliance Workshop</td>
<td>May 19-20</td>
<td>Columbus, OH</td>
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<td>June 22-23</td>
<td>Beaver Creek, CO</td>
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<tr>
<td>Managing Title V Permits</td>
<td>May 21</td>
<td>Columbus, OH</td>
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<td>June 24</td>
<td>Beaver Creek, CO</td>
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<td>Air Compliance Auditing for Industrial Facilities</td>
<td>May 18</td>
<td>St. Louis, MO</td>
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<tr>
<td>Water Compliance Auditing for Industrial Facilities</td>
<td>May 20</td>
<td>St. Louis, MO</td>
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<tr>
<td>Compliance Management for Fugitive Emissions</td>
<td>June 8</td>
<td>Chicago, IL</td>
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<tr>
<td>Implementing Sustainable Development Programs</td>
<td>June 10</td>
<td>Beaver Creek, CO</td>
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<tr>
<td>Dispersion Modeling for Managers</td>
<td>June 23</td>
<td>Denver, CO</td>
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<tr>
<td>Clean Air Act Workshop for Natural Gas Production &amp; Transmission</td>
<td>June 24</td>
<td>Mobile, AL</td>
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