EQ
ENVIRONMENTAL QUARTERLY
A Trinity Consultants Publication
WINTER 2011
Issue No. 8

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Trinity Consultants

EPA Issues GHG BACT Guidance

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Beginning in 2011, major sources of greenhouse gas (GHG) emissions that trigger Prevention of Significant Deterioration (PSD) permitting must implement Best Available Control Technology (BACT) for GHG emissions from new and modified sources. EPA has issued a variety of guidance in an attempt to clarify the BACT determination process for GHG emissions from common stationary sources:[1]

- EPA's "PSD and Title V Permitting Guidance for GHGs," which provides general guidance for the evaluation of BACT for GHG emissions
- White Papers on GHG Control Measures, which focus on sector-specific BACT considerations for industries with high GHG emissions
- Enhancements to the Control Technology Clearinghouse (i.e., the RBLC), which allows access to GHG control technology determinations issued by air permitting agencies
- GHG Mitigation Strategies Database, which includes performance and cost data on current and developing GHG control strategies
- GHG permit training materials, including archived video of prior webcasts covering EPA's general guidance on GHG BACT determinations and BACT examples for certain source types

While EPA's guidance recommends using the standard five-step top-down BACT evaluation process, which has traditionally been used within the PSD program for criteria pollutants, the guidance also identifies several considerations that are specific to evaluating BACT for GHG emissions. The following paragraphs summarize EPA's guidance to date on each of the five steps of the BACT evaluation process for GHGs.

Step 1 – Identify All Control Technologies

As with a traditional BACT assessment for criteria air pollutants, Step 1 of the analysis should identify all control technologies that are available to the GHG emissions source under consideration, including inherently lower-emitting processes and designs, add-on technologies, and control methods applied at similar emissions sources (available through technology transfer). Furthermore, a BACT assessment must consider feasible combinations of those technologies.

According to EPA's GHG BACT guidance issued to date, the control technologies identified in Step 1 need not consider options that would fundamentally redefine the nature of the source or, for a modification, fundamentally redefine the project that is under review. However, EPA has not issued clear guidance to identify control technologies that would redefine the nature of the source. Rather, this determination is left to the discretion of the permitting authority. Based on recent guidance, a permittee preparing a GHG BACT assessment as part of a permit application should begin by considering the fundamental business purpose of the project, as described in the permit application. For example, EPA's guidance indicates that cleaner versions of the primary fuel used in a source should be considered an available BACT option in Step 1. Increased usage of secondary fuel in a source should also be included in the BACT assessment. Alternatively, the use of an alternative fuel for which the source is not already configured may fundamentally redefine the source and is not part of the BACT evaluation.

Biofuels

EPA has received numerous questions regarding whether the use of biofuels should be considered as a GHG control option in Step 1 of a BACT assessment. In addition to EPA's recent BACT guidance for GHG emissions, a recent rulemaking announcement from EPA will affect the treatment of biogenic GHG emissions under the Tailoring Rule.

On January 12, 2011, EPA announced plans to defer PSD permitting requirements for biomass and other biogenic CO_2 emissions for three years. According to EPA, the rulemaking establishing this deferral will be completed by July 1, 2011, which is the first date that a source may trigger pre-construction permitting requirements under the PSD program solely because of GHG emissions. Following an evaluation to consider the technical issues associated with biogenic CO_2 emissions during the three-year deferral period, EPA expects to issue a second rulemaking to address the manner by which GHG emissions associated with biomass combustion and other biogenic sources should be addressed in the PSD permitting program.

Sources that are expected to be affected by this deferral and corresponding interim guidance include biomass combustion sources, wastewater treatment and livestock management facilities, landfills, and fermentation processes for ethanol production. As of January 2, 2011, large stationary sources that become subject to PSD for other regulated pollutants must address pre-construction permitting requirements for emissions of CO_2 and other GHGs as part of the PSD permit application. If such permits are issued before the deferral is finalized, then existing regulations may require that the permits meet the BACT requirement for GHG emissions during an interim time period.

[1] http://www.epa.gov/nsr/ghgpermitting.html

To assist with BACT evaluations for biogenic GHG emissions during this interim period, EPA intends to concurrently issue interim BACT guidance along with the proposed deferral. According to EPA's announcement, this guidance will "provide a basis that permitting authorities may use to support the conclusion, during the interim period, that BACT for CO_2 at such sources is simply the combustion of biomass fuel." In other words, based on the anticipated BACT guidance for PSD permits issued during this interim period, the GHG BACT determination for biomass combustion sources "is simply combustion of biomass fuel."

While EPA's announcement clarifies BACT expectations for proposed biomass combustion sources, it does not address whether biomass should be identified as a GHG control option in a BACT assessment for a proposed fossil-fuel fired combustion source. In the absence of new guidance, it is assumed that the biomass considerations in EPA's recent BACT guidance remain valid. According to this guidance, since CO_2 emission rates from biofuels are similar to fossil fuels at the facility level (i.e., based on current guidance, CO_2 emissions from the combustion of biofuels are not considered carbon neutral), and because Step 1 of a BACT assessment does not consider off-site impacts, the biofuel must result in an emissions reduction at the facility level to be considered a viable GHG BACT control option in Step 1.

Energy Efficiency Improvements

Improved energy efficiency is expected to be the primary control technology option for combustion-related GHGs. Because combustion efficiency is frequently improved through numerous small energy saving measures, which are impractical to evaluate individually as BACT options, it may be necessary to evaluate these measures collectively by benchmarking the efficiency of new units of a similar design. If the unit under consideration is a poor performer relative to the benchmark, then the analysis would highlight the need to determine whether additional energy efficiency measures are achievable.

EPA's guidance references a variety of resources to support a benchmarking analysis, including EPA's ENERGY STAR program. For example, ENERGY STAR developed sector-specific "Energy Guides" for a number of industrial sectors that detail processes and technologies to improve efficiency. Additionally, it established sector-specific benchmarking tools, called Energy Performance Indicators (EPIs), which assist with evaluating the energy performance of an entire facility. For a new facility that will generate its own energy (thermal or electric), the GHG BACT assessment should consider energy efficiency improvements, even in the design and operation of non-emitting energy-consuming units, as these considerations reduce overall facility emissions.

Carbon Capture and Storage

One of the primary distinctions between a traditional criteria pollutant BACT assessment and a GHG BACT assessment is the consideration of carbon capture and storage (CCS) technology as a viable control option. According to EPA's guidance, CCS should be considered in Step 1 of a BACT assessment for certain source categories that are considered large CO_2 emitters and sources with high-purity CO_2 streams emitted to the atmosphere such as "hydrogen production, ammonia production, natural gas processing, ethanol production, ethylene oxide production, cement production, and iron and steel manufacturing.[2]"

Sector-Specific White Papers

EPA issued white papers that identify available and emerging control technologies for reducing GHG emissions, for the following industrial sectors:

- Electric Generating Units
- Large Industrial/Commercial/ Institutional Boilers
- Pulp and Paper
- Cement
- Iron and Steel Industry
- Refineries
- Nitric Acid Plants

Although these documents do not define BACT for a given industrial sector, the information provided for a given sector should be considered in identification of control technologies in Step 1 of a case-by-case BACT assessment for the corresponding source categories.

Step 2 – Eliminate Technically Infeasible Options

EPA's guidance indicates that a control option is considered technically feasible if it has been successfully demonstrated in practice at the same type and size of facility, or at a facility with similar process streams. The absence of a commercial guarantee for GHG emissions is not considered sufficient justification to identify a control technology as infeasible.

To determine whether CCS is technically feasible, the assessment must consider all three aspects of the control technology (i.e., capture, transport, and storage). If any of these aspects is infeasible for the facility, then CCS technology may be considered technically infeasible and eliminated from further consideration. A permittee should demonstrate the difference between CCS considerations at its facility (e.g., space, right-of-ways, access to storage reservoir, etc.) and technologies already demonstrated at other sources in order to eliminate CCS technology from further consideration in Step 2.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

In Step 3 of the GHG BACT assessment, the metric used for ranking of the remaining control technologies by effectiveness may vary. For example, this analysis may be presented as percent pollutant removal, emission rate, or reduction in emissions over time. The appropriate basis should depend on case-specific considerations. If plant-wide efficiency measures are considered (e.g., for a new facility that generates its own thermal or electric energy), it may be preferable to rank the technologies by the overall net emissions impact of alternative measures. It should also be noted that Step 3 must include the ranking of logical combinations of the technologies (but not every possible variation).

[2] *PSD and Title V Permitting Guidance for Greenhouse Gases,* EPA's Office of Air and Radiation, November 2010.

GHG Industry-Specific BACT Examples

Source/Facility Type		
Natural Gas-Fired Boiler	**Coal-Fired Electricity Generating Plant**	**Gas Turbine Electricity Generating Plant**
New 250 MMBtu/hr natural gas (NG)-fired boiler at existing PSD major source	New Greenfield 500 MW NG-fired combined cycle power plant with combustion turbines, heat recovery steam generators (HRSGs) with supplemental firing and steam turbines	New Greenfield subbituminous coal boiler and steam turbine facility (design includes economizer, steam reheater, air preheater, feed water heater, and condensate recovery/reuse)
Step 1 – Identify All Control Technologies		
Natural Gas-Fired Boiler	**Coal-Fired Electricity Generating Plant**	**Gas Turbine Electricity Generating Plant**
• Permit applicant identifies four GHG control options: 1) Oxygen Trim, 2) Economizer, 3) Blowdown Heat Recovery (HR), 4) Steam Recovery • Agency requests consideration of Air Preheater • Public comment requests evaluation of Combined Cycle Gas Turbine (CCGT), but agency rules this would redefine source, so not included in Step 1 (i.e., turbine would not satisfy two primary business purposes of boiler: Generating steam (not electricity) and varying steam demand).	• Permit applicant identifies two GHG control options: 1) High Thermal Efficiency System Design, and 2) Carbon Capture and Storage (CCS) • Public comment requests evaluation of biofuels but agency agrees that this would redefine source, so not included in Step 1 • Based on benchmarking assessment, agency requests evaluation of other turbines, and varying rates of gas/steam turbine power generation	• Permit applicant identifies the following GHG control options: 1) Supercritical Boiler and Turbine Design; 2) Coal Drying; 3) Optimized Combustion with Continuous Control; and 4) CCS • Public comment requests evaluation of natural gas as fuel, but agency agrees that this would redefine the source • Agency requests assessment of 5) Ultra Supercritical Design; 6) Integrated Gasification Combined Cycle (IGCC) system; and 7) Motor Efficiency Improvements (e.g., variable speed motors)
Step 2 – Eliminate Technically Infeasible Options		
Natural Gas-Fired Boiler	**Coal-Fired Electricity Generating Plant**	**Gas Turbine Electricity Generating Plant**
All technologies identified in Step 1 (except for CCGT) are demonstrated, available, and applicable.	Applicant demonstrates that CCS is not "commercially available" for a gas turbine, and that an appropriate sequestration site not demonstrated. Agency agrees.	All options identified by Step 1 are considered technically feasible and available
Step 3 – Rank Remaining Control Technologies by Control Effectiveness		
Natural Gas-Fired Boiler	**Coal-Fired Electricity Generating Plant**	**Gas Turbine Electricity Generating Plant**
Technologies ranked by their impact o boiler's thermal efficiency. Analysis indicates: • Oxygen Trim - most effective single control • Most effective combination of controls - Oxygen Trim + Economizer + Condensate HR + Blowdown HR • Economizer more efficient than Air Preheater in exhaust heat recovery	Technologies ranked based on "CO_2e/MWh". Analysis shows that alternative gas turbine will provide higher overall efficiency, but that varying rates of gas/steam turbine power generation do not impact efficiency over range of operational conditions considered.	Applicant proposed to rank technologies based on CO_2e emissions per unit fuel, but agency required that ranking be based on CO_2e emissions on a net output basis. The most effective combination of controls identified was either Ultra Supercritical Design with CCS or IGCC with CSS, where Coal Drying and Motor Efficiency Improvements were included in both design options.
Step 4 – Evaluate Most Effective Controls and Document Results (considering costs, expressed as "$/ton CO_2e reduced")		
Natural Gas-Fired Boiler	**Coal-Fired Electricity Generating Plant**	**Gas Turbine Electricity Generating Plant**
• Blowdown HR not cost effective because of facility size/layout • Recovery and reuse of condensate has several environmental benefits (reduces use of feedwater treatment chemicals, reduces generation of wastewater and other related wastes)	• CCS technically infeasible • Permittee committed to higher efficiency turbine design (only technically feasible option), so no further analysis of costs and collateral impacts is required	Economic considerations associated with CCS include CO_2 capture, construction and operation of a CO_2 pipeline, security rights for the geologic reservoir, and operation of a CO_2 sequestration facility. CCS eliminated from consideration under Step 4 because of cost per ton controlled GHG, cost of CCS as a percentage of the project costs, and the impact cost of CCS on the economic viability of the project. Without CCS, Ultra Supercritical Design better than IGCC for CO_2 control.
Step 5 – Select BACT		
Natural Gas-Fired Boiler	**Coal-Fired Electricity Generating Plant**	**Gas Turbine Electricity Generating Plant**
• BACT identified as Oxygen Trim + Economizer + Condensate HR (Blowdown HR eliminated under Step 4) • Emission limit expressed as "lbs CO_2e/lbs steam produced (30-day rolling average)" • Related BACT conditions include: a) Calculate emissions using standard EFs and fuel consumption rate; b) Use gauge to monitor steam production; c) install boiler as described in permit application (design std); d) Perform preventative maintenance on air-to-fuel ratio controller; and e) periodically calibrate gas meter and steam flow analyzer.	• BACT determination includes: a) Mass emission limit for CO_2e emissions on 30-day rolling average; b) Efficiency limit in terms of "Btu/kWh"; and c) annual compliance test	• Ultra Supercritical Design with a high efficiency steam turbine is selected as BACT, along with all the energy efficiency measures identified (e.g., control of boiler air to fuel ratio, coal dryer uses low grade waste heat, and high efficiency variable speed motors for electricity drivers).

Step 4 – Evaluate Most Effective Controls and Document Results

Step 4 of a BACT assessment may consider the economic, environmental, and energy-related impacts of a control technology. While this step is typically focused on economic considerations, EPA's guidance indicates that other collateral impacts are expected to play an increasing role in a permitting authority's GHG BACT determination process.

Economic Considerations

According to EPA's guidance, the economic impacts of a control technology should be evaluated on a per ton of CO_2 equivalent (CO_2e) emissions basis, rather than per ton of individual GHGs. The Step 4 evaluation should consider both the average cost effectiveness of the control technology as well as the incremental cost of adding another compatible control technology to the original option.

EPA's recent guidance fails to provide specific guidance on a cost effectiveness threshold ($/ton CO_2e removed) above which a technology or combination of technologies should be considered economically infeasible. Available guidance on this issue is limited to the *Interim Phase I Report of the Climate Change Work Group*, which identifies a range of cost effectiveness recommendations from $3 to $150 per ton CO_2e. Furthermore, a control option may be considered economically infeasible if the cost of a control technology is high relative to the project cost, if the control strategy would impact the resulting product's cost, or if the control option would cause local job losses.

Other Considerations

An applicant **may** evaluate the impact of a control technology on both direct (e.g., combustion sources) and indirect (e.g., purchased electricity) energy usage. Additionally, the on-site and off-site environmental implications of control options should be considered. For CCS technology, Step 4 should consider energy use associated with the high parasitic load and related emissions (on-site and off-site, GHGs and criteria pollutants). Although it does not affect the Step 1 evaluation, the carbon neutrality of biofuels may be considered as an off-site impact in Step 4 of the assessment for a control option involving the use of biofuels.

Step 5 – Select BACT

BACT is selected based on the most efficient control option or combination of options identified in Step 3 that was not eliminated in Step 4 of the evaluation process. The basis for a permitted BACT standard varies and may include but is not limited to emission limits and averaging time periods, equipment specifications, and work practices, as well as associated monitoring, recordkeeping, and reporting provisions.

For GHGs, it may be preferable to express BACT limits on an output basis to reflect numerous energy efficiency measures. In addition to an output-based numerical limit, the permit may include conditions that require the implementation of certain work practices such as an Environmental Management System (EMS) focused on energy efficiency. EPA's ENERGY STAR program provides guidance and recommendations for an EMS. According to EPA's guidance, one outcome of a BACT assessment might be all suggested efficiency improvement measures identified by the EMS that result in a net energy savings be implemented.

EPA guidance states that longer averaging periods may be appropriate to address GHG emissions and the load variations inherent in certain combustion equipment. The guidance also provides a variety of GHG BACT assessment and determination examples for sources including a new municipal solid waste (MSW) landfill, a new natural gas-fired boiler at an existing major source, the addition of a new hydrogen plant at an existing petroleum refinery, a Greenfield coal-fired electricity generating facility, a new kiln at a cement plant, the expansion of a natural gas compressor station (new compressors and associated engines installed), and a Greenfield gas-fired combined cycle power plant. The table on page 4 summarizes several of EPA's example BACT assessments.

Permittees undergoing GHG BACT evaluations should be familiar with relevant EPA guidance including example BACT assessments, sector-specific white papers, and guidance from EPA's ENERGY STAR program on energy efficient control strategies.

2011's Big Four Clean Air Act Challenges

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Industry faces unprecedented environmental challenges in 2011 driven by EPA's Clean Air Act regulatory initiatives over the last year. In particular, EPA has undertaken four rulemakings that impact the majority of large stationary sources in the United States. These four initiatives (the "Big Four") relate to: 1) the quantification and reporting of greenhouse gas (GHG) emissions, 2) the permitting of GHG emissions, 3) increasing the stringency of ambient air quality standards, and 4) comprehensive emission control requirements for boilers and process heaters. While the approximately 15,000 "major" stationary sources of air emissions will bear the majority of the burden associated with these new regulations, more than 200,000 smaller stationary sources (area sources) are also anticipated to be affected by these new rules. These new requirements will influence how and where industry expands operations and builds new capacity. In addition, many existing and new sources will be required to install additional air pollution control equipment to meet the standards. EPA estimates that costs to comply with these new regulations will exceed $20 billion over the next 10 years.

The new regulations dictate a mix of one time compliance requirements and ongoing periodic compliance activities. The majority of initial compliance requirements for these new regulations have deadlines between 2011 and 2014. However, industry will be dealing with lasting impacts of these regulations for decades. Based on the complexity and anticipated costs associated with these new regulations, organizations should develop a structured approach to compliance that is specific to their operations and future growth plans. This article discusses the elements of a structured approach that can be used by industry to comply with the new requirements and applies this approach to each of the Big Four initiatives.

Regulatory Overview

GHG Emissions Reporting

The requirements to quantify GHG emissions from stationary sources are codified in EPA's Mandatory Reporting of Greenhouse Gases rule (MRR) contained in 40 CFR Part 98. Approximately 10,000 facilities will be required to annually report under the MRR, comprising 85% of all stationary source GHG emissions in the U.S. The majority of facilities subject to the MRR must begin submitting reports on March 31, 2011, covering the previous year's annual emissions. For a complete list of industry sectors subject to regulation under the MRR, as well as the detailed technical requirements of rule, refer to Trinity's Federal News web page at *trinityconsultants.com/News/* as well as EPA's Web page *at epa.gov/climatechange/emissions/ghgrulemaking.html.*

EPA estimates that costs to comply with these new regulations will exceed $20 billion over the next 10 years.

Permitting of GHGs

Permitting of criteria air pollutants from stationary sources in the U.S. has been regulated for decades under the New Source Review (NSR) program and the Federal Operating Permits (Title V) program. The regulation of GHGs began on January 2, 2011 under EPA's PSD and Title V GHG Tailoring Rule which incorporates GHG emissions in the two existing permitting programs. Organizations constructing or modifying stationary sources must evaluate the applicability of NSR to emissions of GHGs beginning in January 2011. Facilities that are major sources of GHG emissions, and not previously required to have a Title V permit for other criteria pollutants, must submit initial Title V permit applications by July 1, 2012. The Tailoring Rule is expected to subject 1,500 facilities per year to the NSR program for GHG emissions and result in 250 additional facilities requiring a Title V permit. For a detailed overview of the Tailoring Rule, refer to the following Trinity articles on the Tailoring Rule and EPA's subsequent BACT guidance.

Air Quality Standards

EPA has promulgated new and updated National Ambient Air Quality Standards (NAAQS) over the last two years at the fastest pace in its 40 year history. These include new or revised standards for lead, nitrogen dioxide, sulfur dioxide, and proposed revisions to the ozone standard. These changes have far-reaching implications for industry, from more stringent air permitting requirements for new and modified sources to additional emissions controls for existing sources located in areas not meeting these new and more stringent air quality standards. Some of these new standards are already in effect, while others required additional time for states and local agencies to assess existing air quality in comparison to the standards. NAAQS apply across the U.S. and have potential implication to stationary sources of air emissions. The timeline for the implementation of these new standards, and requirements for compliance with the standards, stretch out over the next two decades. For more information, read Trinity's articles on new SO_2 standards and NO_2 standards.

Boiler Rules

The CAA requires EPA to propose and promulgate national emissions standards for hazardous air pollutants (NESHAP) from stationary sources. The largest category of emission units regulated under the NESHAPs is boilers and process heaters. EPA proposed NESHAPs for boiler and process heaters at

major sources as well as smaller sources in 2010. The rules are expected to be promulgated in 2011 or 2012, and will require the installation of additional pollution controls on over 10,000 units at major sources by 2015. An additional 200,000 units at minor sources will also be covered by the rules and will be subject to operational and recordkeeping requirements. For complete applicability and requirements contained in the proposed NESHAP, read the Trinity articles on the proposed Boiler MACT and related proposed solid waste definition.

Structured Approach to Compliance

Trinity recommends following a structured approach to minimize the impacts and costs associated with these four initiatives. Following this approach will lead to greater operational flexibility and potential competitive advantage in the marketplace. The recommended approach should contain the following six elements: 1) Strategy, 2) Advocacy, 3) Human Resources, 4) Project Planning, 5) Data Management, and 6) Compliance Scheduling. Each of these six elements is described in further detail below.

Step 1 - Strategy Development
In general, developing a strategy is the first step in a structured approach to compliance. Strategy consists of understanding the rule, the rule's applicability to your organization's facilities, and potential implications for operations. What are the available compliance options, and how will those options impact the future operational flexibility of your organization? Estimating initial and annual costs for each compliance option is key in evaluating the trade-offs between costs and flexibility. Involving engineering, plant operations, sales and marketing, and senior management in this step of the process is critical to success. Start early so that estimated costs can be included in long term projections and budgeting.

Step 2 - Advocacy
Where does the regulation currently stand in the rulemaking process, and what can your organization do to influence the requirements of the final regulation? All rules proposed by EPA are open to public notice and comment before finalization and promulgation. EPA must consider every comment received during the notice and comment period, prior to the issuance of final regulation, and frequently amends proposed rules based on input received. This is your opportunity, either as an organization or more broadly as part of an industry group, to ensure that the final regulation does not unfairly or disproportionately impact your business.

Step 3 - Human Resource Needs
The complexity and far-reaching nature of these four initiatives will require the involvement of multiple functions within your organization to effectively craft and execute a compliance plan. It is typically a plant or corporate environmental professional who has the responsibility of determining what areas of expertise are required and pulling together the team needed for the project. This includes both internal resources as well as external expertise. External experts can include equipment vendors, engineering and construction companies, consulting firms, and legal counsel.

The (Boiler MACT) rules are expected to be promulgated in 2011 or 2012, and will require the installation of additional pollution controls on over 10,000 units at major sources by 2015.

Step 4 - Project Planning
Breaking the compliance requirements into discrete activities, assigning responsibilities, and building in contingencies are all part of the planning phase. Project planning is important for budgeting purposes and to ensure that adequate resources are in place to comply. Identifying which tasks can be completed in parallel, and which must be completed sequentially, allows for compression of the project schedule if timing becomes an issue.

Step 5 - Data Management
Given the large amount of data required to demonstrate initial and ongoing compliance with EPA's newest regulations, determining your data management needs is increasingly important for environmental compliance. This includes data associated with initial stack testing, parametric monitoring, continuous emissions monitoring, data conversion and averaging, and all associated recording and reporting requirements contained in the regulation. Depending on the level of complexity, facilities often select and implement an off-the-shelf software solution or develop a customized solution to fit their specific needs. An early evaluation of data management options is necessary to ensure that the system is in place prior to the compliance deadline.

Step 6 - Compliance Scheduling
This step involves creating an organization's roadmap for complying with the rule by the regulatory deadline. It brings together the other five elements of the approach into a chronological set of tasks with milestones and responsibilities clearly delineated. An organization's environmental staff takes ownership of the development and execution of this document to drive the project to completion.

This structured approach can be applied to each of the four initiatives, although differing levels of effort and emphasis on the six elements will be required. The following highlights some of the key elements most critical to each of the four initiatives.

STRUCTURED APPROACH TO REGULATORY COMPLIANCE

1 Mandatory Reporting Rule

With an initial submittal date of March 31, 2011, organizations should have already developed a compliance strategy for the MRR. The final rule has been promulgated, so there is little opportunity for further advocacy. Human resources should be identified, and a project team set in place. The remaining elements in a structured approach to compliance are data management and scheduling. What tools will your organization use to manage the data recorded in 2010, calculate GHG emissions, and upload that data into EPA's electronic greenhouse gas reporting tool (e-GGRT)? That decision should be made at least two months prior to the reporting deadline to allow adequate time for system integration, testing, and populating the system with the required data for 2010 reporting.

2 Tailoring Rule

Facilities that are considered major sources of GHG emissions, and are planning on modifying their operations within the next five years, must evaluate the applicability of the NSR program as defined in the Tailoring Rule. The regulation of GHG emissions under the NSR program has significant implications on the permitting of proposed projects, as the timeline associated with obtaining the necessary construction authority will likely by increased for projects subject to GHG NSR. As part of a forward-looking compliance strategy, organizations should incorporate applicability analyses and impact assessments into their business and financial evaluation of future projects. For those projects that are identified as likely triggering PSD review for GHGs, companies can follow the structured approach outlined in this article to efficiently and efficiently achieve compliance. Organizations should also evaluate existing minor sources under the Title V program to determine if emissions of GHGs will affect their minor source status. For newly major Title V sources, organizations will have the option of either limiting emissions of GHGs below the major source threshold level and avoiding Title V permitting requirements or submitting the required initial Title V permit application by the July 2012 deadline. Strategic analyses should weigh the pros and cons of these two alternatives. Although the human resource, project planning, and data management aspects of compliance are relatively straightforward, companies that are affected by this rule will need to develop a compliance schedule and identify the resources for the preparation and submittal of any required permit applications by the required deadlines.

3 New NAAQS

EPA's recent push to promulgate more stringent air quality standards has far reaching consequences for industry. Organizations with facilities located in areas of the country that are projected not to attain these new standards (referred to as non-attainment areas) will face additional scrutiny in the years ahead. Local and state environmental agencies are required to develop plans to bring these non-attainment areas into attainment with the standards by a specific date. Emissions reductions from existing mobile as well as stationary sources within (and nearby) these non-attainment areas will likely be required to install controls to reduce emissions of pollutants contributing to the adverse conditions. Furthermore, construction of new facilities and the expansion of existing facilities in these non-attainment areas will be extremely difficult, requiring companies to purchase "emissions offsets" and overcome additional permitting hurdles in order to obtain authorization for construction. Companies may want to avoid building new facilities or expanding existing facilities in these areas, and instead focus on alternative locations in other parts of the country.

Organizations should begin developing strategies to minimize the impact of the new NAAQS on their existing operations. The first step involves identifying facilities located in projected non-attainment areas. This information is an important input into long term planning. For existing facilities located in projected non-attainment areas, organizations should closely work with local and state agencies as they craft regulations to reduce emissions from stationary sources. Affected facilities are often an integral part of the rulemaking process in non-attainment areas, including commenting on and/or assisting in the development of control strategies. If additional controls are required, organizations should follow a structured approach to ensuring that appropriate resources are secured, plans are developed, and a compliance schedule is in place to meet regulatory deadlines for their affected facilities.

4 Boiler MACT

Organizations should be focused on developing strategies for compliance with the Boiler MACT - assessing unit applicability, evaluating compliance options, and estimating compliance costs based on the 2010 proposed rule. The anticipated costs of the proposed Boiler MACT are over $10 billion, with the majority of those costs associated with additional emission control equipment on an estimated 13,500 existing units. That equates to approximately $700,000 in control equipment costs per affected unit. With an expected compliance deadline in 2014, and the final rule yet to be promulgated, organizations still have an opportunity to influence the rulemaking process. Although the public notice and comment period associated with the 2010 Boiler MACT proposal has closed, it is likely that the EPA will re-propose the rule due to the significant changes that are anticipated between the 2010 proposal and the final rule. Therefore, organizations affected by this rule may still have an opportunity to influence the scope and requirements of the final regulation. Given the potential magnitude of this rule, early strategy development and project planning are essential to minimizing compliance costs. For facilities required to install control equipment, the resources required will be significant. Initial and on-going compliance with the regulation will involve the collection and processing of a large volume of information, necessitating the need for a sound data management system. The overall compliance effort should include robust scheduling to deal with potential contingencies such as equipment procurement and construction delays.

For these and any new regulations, a systematic approach is critical to analyze applicability, minimize costs of compliance, and maximize operational flexibiity. ✥

A New Approach to SSM Emissions Management

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On October 16, 2009, the United States Court of Appeals for the District of Columbia Circuit (DC Circuit) mandated the vacatur of the "Startup, Shutdown, and Malfunction (SSM) exemption" allowed under General Provisions in Subpart A of the National Emission Standards for Hazardous Air Pollutants (NESHAP).[1] Under the SSM exemption, NESHAP Subpart A previously stipulated that an affected source must minimize emissions during SSM events, but it did not require the affected source to comply with the emission limits specified in the relevant NESHAP Subpart.[2] As a result of the vacatur, facilities subject to a NESHAP Subpart that directly references the SSM exemption under Subpart A are required to be in compliance with emission limits at all times, even during SSM events. If a particular NESHAP Subpart explicitly exempts applicable sources from meeting emission limits during SSM events, then the specific SSM exemption continues to apply.[3] The U.S. Environmental Protection Agency (EPA) issued a memorandum dated July 22, 2009 discussing impacts of court rulings on listed NESHAP Subparts that have no specific SSM exemptions and rely upon Subpart A requirements.[4]

Since the Subpart A SSM exemption vacatur, a number of NESHAPs have been promulgated, updated, or proposed by EPA. In all cases, EPA addressed SSM events as part of the rulemaking process. Depending on the NESHAP, EPA provided different scenarios that apply during SSM events, as follows:

- Affected sources may be required to comply with emission limits at all times including during startup (SU) and shutdown (SD) events,
- Affected sources may be required to comply with separate emission limits and/or work practices specifically set for SU and SD events, and/or
- Affected sources may be required to provide an "affirmative defense" of why an emission limit was exceeded during a malfunction event in order to avoid civil penalties.

Each NESHAP Subpart includes a table that outlines what parts of NESHAP Subpart A are applicable to the subject source category; this table is known as the "General Provisions Table." Since the SSM exemption vacatur, the General Provisions Table in each promulgated, updated, or proposed NESHAP Subpart specifically states that the Subpart A SSM exemption citations (e.g. 40 CFR 63.6(e)(1)(i), (f)(1), and (h)(1)) do not apply.

EPA's Strategy to Set Emission Limits for SU and SD Events

Consistent with the SSM exemption vacatur, EPA has set emission limits for recently proposed and final NESHAP Subparts that apply at all times (i.e., there is no exclusion from

[1] 40 Code of Federal Regulations (CFR), Part 63
[2] As noted at 40 CFR 63.6(e)(1)(i), 40 CFR 63.6(f)(1); 40 CFR 63.6(h)(1). As of the date of this article, 40 CFR 63.6 has not been updated to reflect the vacatur of the SSM exemption.
[3] Note that the requirements of Subpart A apply unless superseded by a source category subpart.
[4] Memorandum from Adam M. Kushner, Director, Office of Civil Enforcement, EPA, dated July 22, 2009 *www.epa.gov/oecaerth/civil/caa/ssm-memo080409.pdf*

the emission limits for periods of SSM). EPA reviewed available data from each relevant source category in order to determine if it is appropriate to establish emission limits or work practices during SU and/or SD events that are different from steady-state emission limits. In some cases, EPA determined it was justifiable to require the source category to comply with the previously set "norml operating" emission standards at all times, even during SU and SD events. EPA concluded that this was appropriate because of the length of the averaging period to demonstrate compliance with the emission limitation, or because higher levels of emissions were not expected during SU or SD events.

Additionally, EPA has eliminated the SSM Plan requirement in updated and proposed NESHAP Subparts, but affected sources must continue to operate, including operation of associated air pollution control equipment and monitoring equipment, in a manner consistent with safety and good air pollution control practices for minimizing emissions at all times including SSM events.

Malfunction Events and the Affirmative Defense

Under 40 CFR 63.2, a malfunction is defined as a "sudden, infrequent, and not reasonably preventable failure of air pollution control and monitoring equipment, process equipment or a process to operate in a normal or usual manner." EPA believes "that a malfunction should not be viewed as a distinct operating mode, and therefore, any emissions that occur during malfunctions do not need to be factored into development of… standards, which, once promulgated, apply at all times."[5] As such, EPA sets NESHAP emission limits by analyzing emissions data that occurs during SU, SD, and/or normal operations.

EPA has included the concept known as the "affirmative defense," that can be used if an affected source exceeds an emission standard during a malfunction event, in a number of updated NESHAP Subparts, EPA has included a concept known as the "affirmative defense" that can be used if an affected source exceeds an emission standard during a malfunction event." Affirmative defense is defined as "in the context of an enforcement proceeding, a response or defense put forward by a defendant, regarding which the defendant has the burden of proof, and the merits of which are independently and objectively evaluated in a judicial or administrative proceeding."[6] The concept of "affirmative defense" is meant to offer the source some possible protection from civil penalties for emission limit exceedances during malfunction events. If a malfunction occurs that causes emission limits to be exceeded, the source can use the affirmative defense if the following criteria are met:

1. Notify the Administrator by telephone or fax as soon as possible, but no later than two business days after the initial occurrence of the malfunction, with an additional written report due to the Administrator within 30 days of the initial occurrence of the exceedance of the standard;
2. Demonstrate that the excess emissions were caused by a sudden, short, infrequent, and unavoidable failure of air pollution control and monitoring equipment, process equipment, or a process to operate in a normal or usual manner;
3. Prove that excess emissions could not have been prevented through careful planning, proper design or better operation and maintenance practices and did not stem from any activity or event that could have been foreseen and avoided, or planned for;
4. Show that the malfunction(s) were not part of a recurring pattern indicative of inadequate design, operation, or maintenance;
5. Repair the equipment as expeditiously as possible when the applicable emission limitations are exceeded;
6. Minimize the frequency, amount, and duration of the excess emissions (including any bypass) to the maximum extent practicable;
7. If the excess emissions resulted from a bypass of control equipment or a process, show that the bypass was unavoidable to prevent loss of life, severe personal injury, or severe property damage;
8. Take all possible steps to minimize the impact of the excess emissions on ambient air quality, the environment, and human health;
9. Keep all emissions monitoring and control systems in operation if at all possible;
10. Document that all actions in response to the excess emissions were properly signed in contemporaneous operating logs;
11. Demonstrate that at all times, the affected source operated in a manner consistent with good practices for minimizing emissions; and
12. Prepare a written root cause analysis to determine, correct, and eliminate the primary causes of the malfunction and the excess emissions resulting from the malfunction event at issue. The analysis shall also specify, using best monitoring methods and engineering judgment, the amount of excess emissions that were the result of the malfunction.

Even if a claim of affirmative defense is prepared by a source, excess emissions resulting from malfunctions must be reported in semiannual reports. The reports must include the number, duration, and a brief description for each type of malfunction that occurred during the reporting period and that caused or may have caused any applicable emission limitation at an affected source to be exceeded. The reports must also include a description of actions taken by an owner or operator during a malfunction of an affected source to minimize emissions, including actions taken to correct a malfunction.

[5] Federal Register, Volume 75, Number 203, page 65074, dated October 21, 2010.
[6] 40 CFR 63.1341

Recently Proposed and Final NESHAP Rules

Table 1 summarizes several NESHAP Subparts that have been proposed or finalized since October 16, 2009, following the vacature of the SSM exemption under Subpart A. EPA has taken several different approaches to align updated NESHAP Subparts with the SSM vacatur, thereby requiring an affected source to comply with emission limits or work practice standards at all times. A select number of approaches are further described below:

- In the Portland CEMENT Manufacturing Industry NESHAP and the Chemical Manufacturing Area Source NESHAP, separate emissions limits and averaging periods were set for SU events, SD events, and normal operations. In these instances, EPA determined that SU and SD events were characterized by activities and/or production rates that were not typical of normal operation. Therefore, EPA defined SU and SD periods, and set separate emission limits. In the case of the Portland Cement NESHAP, the SU and SD emission limits are in different units (concentration limits) as compared to the emission limits during normal operation (limits normalized to production). EPA provided facilities with the option to claim the affirmative defense when a malfunction occurs at a Portland Cement source.
- The RICE NESHAP does not include emission limits for SU/SD periods. However, as a work practice requirement, facilities must minimize engine idle time and minimize engine SU to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which the normal operating emission limitations apply.
- The Asphalt Processing and Asphalt Roofing Area Source NESHAP contains production-based emission limits that apply at all times. Despite requiring the same production-based emission limits at all times, the averaging period for operations that include a SU/SD event is 24 hours, rather than the 3 hour averaging period for normal operation, in order to account for the decreased production

Table 1. NESHAP Subparts Addressing SSM Events

Source Category	Subpart	Subpart applies to Area Sources or Major Sources?	Status	SU/SD Emission Limits	Affirmative Defense
Portland Cement Manufacturing Industry	LLL	Area and Major Sources	Final	Separate Limits and Averaging Periods for SU/SD	X
Reciprocating Internal Combustion Engines (RICE)	ZZZZ	Area and Major Sources	Final	Work Practice Requirements for SU	
Chemical Manufacturing	VVVVVV	Area Sources	Final	Separate Limits for SU/SD	
Asphalt Processing and Asphalt Roofing Manufacturing	AAAAAAA	Area Sources	Final	Different Averaging Period for SU/SD	
Chemical Preparations Facilities	BBBBBBB	Area Sources	Final	Same as Normal Operation Limits	
Paints and Allied Products Manufacturing	CCCCCCC	Area Sources	Final	Same as Normal Operation Limits	
Prepared Feeds Manufacturing	DDDDDDD	Area Sources	Final	Same as Normal Operation Limits	
Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks (Residual Risk)	N	Area and Major Sources	Proposed	Same as Normal Operation Limits	X
Group 1 Polymers and Resins Production (Residual Risk)	U	Major Sources	Proposed	Same as Normal Operation Limits	X
Marine Tank Vessel Loading Operations (Residual Risk)	Y	Major Sources	Proposed	Same as Normal Operation Limits	X
Shipbuilding and Ship Repair (Surface Coating) (Residual Risk)	II	Major Sources	Proposed	Same as Normal Operation Limits	X
Wood Furniture Manufacturing Operations (Residual Risk)	JJ	Major Sources	Proposed	Same as Normal Operation Limits	X
Printing and Publishing Industry (Residual Risk)	KK	Area and Major Sources	Proposed	Same as Normal Operation Limits	X
Steel Pickling - HCl Process Facilities and Hydrochloric Acid Regeneration Plants (Residual Risk)	CCC	Major Sources	Proposed	Same as Normal Operation Limits	X
Pharmaceuticals Production (Residual Risk)	GGG	Major Sources	Proposed	Same as Normal Operation Limits	X
Industrial, Commercial and Institutional Boilers and Process Heaters	DDDDD	Major Sources	Proposed	Same as Normal Operation Limits	
Industrial, Commercial and Institutional Boilers	JJJJJ	Area Sources	Proposed	Same as Normal Operation Limits	
Gold Mine Ore Processing and Production Area Sources	EEEEEEE	Area Sources	Proposed	Same as Normal Operation Limits	

during SU/SD events. Facilities must include emissions during SU/SD events in the calculations of lb/ton emission factor rates for comparison to the emission standards.

- In the proposed residual risk and technology review (RTR) determination for six previously promulgated NESHAP Subparts, EPA did not propose new emission limits for SU or SD events. However, EPA is accepting emissions information from SU and/or SD events to update the residual risk analysis. EPA also proposed to provide facilities with the option to claim the affirmative defense when a malfunction occurs at an affected source.
- The proposed Boiler and Process Heater Major Source and Area Source NESHAP Subparts do not set separate emission limits for periods of SU and SD. However, a small portion of the data collected by EPA to set the proposed emission limits include emissions from SU and SD events. Furthermore, in the development of the proposed emission limits, EPA used daily or 30-day rolling compliance periods, which are intended to encompass periods of SU and SD.

Conclusions

EPA is required to perform RTR determinations for NESHAP Subparts every eight years, depending on when the NESHAP was originally promulgated. As such, all NESHAP Subparts will be reopened in the future, and facilities should expect that EPA will address how an affected source should comply with emission limits during SSM events. Additionally, updated NESHAP Subparts will likely provide facilities with protection against civil penalties by including the affirmative defense option if an emission exceedance occurs at an affected source as a result of a malfunction event.

For facilities currently subject to a NESHAP Subpart that references the vacated SSM exemption in Subpart A, the emission limits in the relevant NESHAP Subpart apply at all times, even during SSM events. Facilities subject to these NESHAP Subparts should keep the required documentation necessary to use the affirmative defense in case an emission exceedance occurs during a malfunction event.. Following the same logic that EPA used in the recently updated NESHAP Subparts, this may protect the facility from civil penalties even if the NESHAP Subpart does not currently address the affirmative defense option. It is important to note that the affirmative defense has not been established for non-malfunction types of events such as planned SU, SD, or maintenance.

In conclusion, facilities are required to monitor and document emissions at all times to demonstrate that NESHAP Subpart emission limitations are not exceeded. A facility must also develop a good system for tracking excess emissions (planned vs. unplanned SU and SD, malfunction, and other events). Should an exceedance occur, facilities should clearly document all events (and causes of these events) in order to mitigate the risk of incurring a civil penalty. Affected sources complying with NESHAP Subparts that explicitly exempt SSM events should stay informed about proposed or updated NESHAPs to prepare strategies for continuous compliance with emissions limits, including periods of SSM.

New FLAG Guidance for Class I Area Modeling

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In October 2010, final guidance was issued for assessing the impacts of new and modified sources of air pollution on Air Quality Related Values (AQRV) in Class I areas, consisting of visibility (including plume impairment and regional haze), ozone effects, and nitrogen and sulfur deposition. This guidance, which was issued in draft form on July 8, 2008, makes technical revisions to the previous guidance issued in December 2000. The new guidance addresses key regulatory updates affecting air resource management and how Class I area impacts are assessed. These regulatory developments included EPA's promulgated revisions to Appendix W of 40 Code of Federal Regulations (40 CFR) Part 51 (*Guidelines on Air Quality Models*) in which CALPUFF was adopted as the preferred long range transport model and EPA's 2005 Best Available Retrofit Technology (BART) guidelines for the Regional Haze Rule. In addition, agencies have redefined their assessments of AQRVs.

Background

The Clean Air Act Amendments of 1977 gave Federal Land Managers (FLMs) an "affirmative responsibility" to protect the natural and cultural resources of Class I areas from the adverse impacts of air pollution. Class I areas are afforded special protection under the Clean Air Act and are defined as certain national parks (over 6,000 acres), wilderness areas (over 5,000 acres), national memorial parks (over 5,000 acres), and international parks that were in existence on August 7, 1977. The **F**ederal **L**and Managers' **A**ir Quality Related Values Work **G**roup (FLAG) was formed to provide a consistent and objective approach for evaluating air pollution effects on AQRVs and to provide a consistent methodology for State permitting authorities and permit applicants to assess the impacts of new and existing sources on AQRVs, primarily those in Federal Class I areas, but in some instances, in Class II areas. FLAG members include representatives from the National Park Service (NPS), in cooperation with the U.S. Fish and Wildlife Service (FWS) and the U.S. Department of Agriculture Forest Service (FS).

New Guidance

The new guidelines, *The Federal Land Managers AQRV Workgroup (FLAG) Phase I Report – Revised* (FLAG 2010) make specific technical revisions while retaining the background material and general information provided in the Phase I document issued in 2000. The 2010 guidance incorporates recent scientific studies and methodologies for conducting visibility analyses based on knowledge developed through implementation of the Regional Haze Rule. Key elements of the new guidance include the following:

Initial Screening Criteria for Requiring AQRV Analyses for Sources Greater than 50 km from a Class I Area

The most substantial change to the guidelines is the setting of a threshold ratio of emissions distance, below which AQRV review is not required for new or modified sources located greater than 50 km from a Class I area. Specifically, if:

Q (tpy)/d (km) < 10, no AQRV analysis is required

Q is the combined emissions increase from a source of sulfur dioxide (SO_2), oxides of nitrogen (NO_x), particulate matter less than 10 microns (PM_{10}), and sulfuric acid mist (H_2SO_4) in tons per year (tpy) based on 24-hour maximum allowable emissions (which are annualized) is the nearest distance to a Class I area in kilometers (km) from the source. This approach is limited to sources that operate year round. Emissions from sources that operate intermittently or seasonally must be adjusted to account for year round operation if the applicant uses the Q/d Initial Screening approach.

First Level Screening Model

FLAG 2000 included a Screening option (CALPUFF "Lite") whereby applicants could use meteorological data from a single station as an initial analysis. This approach is no longer recommended as a first step for Class I area modeling. Instead, applicants should use the CALPUFF Modeling System with a minimum of three years of gridded meteorological data.

Model Settings

A number of recommended model settings were updated in FLAG 2010 including but not limited to the following:

- *Background Visibility Conditions.* The threshold for an adverse impact is relative to the "natural" background. FLAG 2010 provides updated background values for all Class I areas based on annual average natural conditions and 20% best natural conditions. Unless otherwise recommended by the FLM or permitting agency, FLAG 2010 prefers the use of the annual average natural background values.

- *Relative Humidity Adjustment Factors.* The relative humidity adjustment factors impact the sulfate and nitrate components of the visibility extinction coefficient, i.e., as water droplets are added, the scattering of light is enhanced. FLAG 2010 recommends the use of monthly average relative humidity adjustment factors versus hourly factors. The latter reduces

potential "spikes" in visibility impairment due to short-term weather events.

- *Visibility Assessment Criteria.* The previous 2000 guidance compared the highest daily visibility change to the adverse impact threshold (5% extinction change). FLAG 2010 uses the 98th percentile of the daily values over a year, allowing for seven days per year to be above the threshold before additional review of impacts is required.
- *Refined Analyses for Visibility.* FLAG 2010 allows for additional refined analyses to be conducted using fundamental aerosol and visibility theory to assess impacts when an adverse impact is predicted using the standard prescribed methods. These analyses are to be conducted in close consultation with the reviewing authority.
- *Deposition Analysis Thresholds.* FLAG 2010 provides specific nitrogen and sulfur deposition analysis thresholds (DATs) that are recommended as screening level values, below which impacts are deemed negligible. These values were not included in the 2000 FLAG document, but instead were defined in a separate NPS memo. This update in FLAG 2010 consolidates the guidance into a single document.

As PSD Class I modeling undergoes another transition with the final FLAG 2010 guidelines, affected permit applicants must be aware of the new guidelines and familiar with the extensive modeling requirements that accompany them.

OSHA Increases Enforcement Pressure

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Most in the EH&S community are aware of the increase in OSHA enforcement activity over the past five years. This has been particularly noticeable since the Obama administration took office in 2008. While this increase has been apparent, what has not been as clear are the reasons this is happening or the effect on worker safety.

The Occupational Safety and Health Administration (OSHA), is part of the U.S. Department of Labor and was formed in 1971 as a result of the Williams-Steiger Occupational Safety and Health Act of 1970. Today, OSHA has approximately 2,000 employees including 1,000 enforcement officers. As a government agency, OSHA is not particularly large. For example, OSHA's budget is approximately $500 million, only 1/16 that of EPA's budget. Despite its size, OSHA has been increasing its enforcement efforts in recent years. This, in turn, has been driving companies toward increased internal auditing to ensure they are in compliance with regulations

The reason for OSHA's increased enforcement focus has been its commitment to reduce worker fatalities. In 2009, there were 4,340 job related deaths in the U.S., including these high profile incidents:

- West Virginia mine disaster – 29 killed (Handled by MSHA but OSHA was involved)
- Louisiana oil rig explosion – 11 killed
- Washington refinery explosion – 7 killed
- Connecticut power plant explosion – 6 killed

What is far less apparent are the fatalities that occur daily, one lost life at a time. On average, in 2009, there were 87 job related fatalities per week or 14 per day (on Monday through Friday with lower numbers over the weekends.) OSHA has been responding to that statistic in an effort to drive the number down.

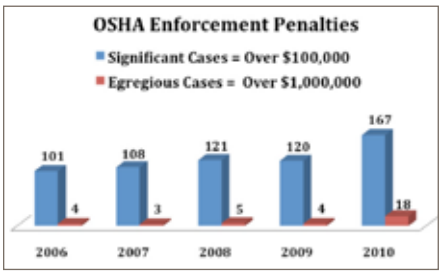
Since 2006 the number of OSHA inspections each year has increased from 38,579 to a projected 43,000 for 2010, a 12% increase. The nature of those inspections has also changed. In 2006, 56% of the inspections were "programmed," meaning that OSHA planned and carried out the inspections without a complaint or knowledge of an injury. In 2010, the percentage of programmed inspections has increased to 61%. Clearly OSHA is trying to be more proactive rather than waiting to respond to a problem. As might be expected, OSHA's increased number of inspections has resulted in an increased number of issued violations. Compared to 2006, when OSHA issued 82,804 violations, there will likely be more than 100,000 violations issued in 2010. The nature of these violations is also changing. In 2006, 73% of violations issued by OSHA were classified as "serious." According to the OSHA's Field Inspection Reference Manual,

"A serious violation shall be deemed to exist in a place of employment if there is a substantial probability that death or serious physical harm could result from a condition which exists, or from one or more practices, means, methods, operations, or processes which have been adopted or are in use, in such place of employment unless the employer did not, and could not with the exercise of reasonable diligence, know of the presence of the violation."

Additionally, the percentage of "willful & repeat" violations was 4% in 2006. A willful violation is defined as,

"A willful violation exists under the Act where the evidence shows either an intentional violation of the Act or plain indifference to its requirements."

In 2010, the percentage of "serious" violations will increase to approximately 78% and "willful & repeat" violations will increase to 5%. The fines for violations have also been



increasing. In 2006, there were 101 cases considered to be "significant" by OSHA. "Significant" cases are those cases with penalties exceeding $100,000. In 2010 there will most likely be close to 170 "significant" cases, a 67% increase. The number of "egregious" cases is going up as well. "Egregious" cases are those cases with penalties over $1,000,000. In 2006, there were only 4 "egregious" cases. We can expect about 18 of these cases in 2010. While "egregious" cases are still few in number, consider that this represents a 450% increase.

OSHA is also expending more of its efforts on substantive topics. Below is a list of the "Top Ten Most Cited Standards" from OSHA inspections:

1. Scaffolding
2. Fall Protection
3. Hazard Communication
4. Respiratory Protection
5. Ladders
6. Lockout/Tagout
7. Electrical, Wiring Methods
8. Powered Industrial Trucks
9. Electrical, General Requirements
10. Machine Guarding

What is most remarkable about this list is the reduced emphasis on recordkeeping as a primary source of citations. While each of the Standards above would involve some recordkeeping and lack of records could result in violations, the General Recordkeeping Standard (29 CFR 1904) has dropped off the list as one of the most cited Standards.

Over the last few years, OSHA has steadily ramped up its enforcement efforts by increasing inspections, being more proactive, increasing violations issued, increasing the serious nature of the violations and increasing the penalties. What has been the result of this increased activity? In 2006, OSHA completed 1,081 fatality investigations compared to 797 in 2009. This is a remarkable 26% decrease in four years.

The number of fatality investigations is less than the number of actual fatalities due to a number of factors. In 2006, there were 5,702 fatalities. This compares to 4,340 fatalities in 2009. This roughly parallels the reduced number of on the job fatality investigations. One contributing factor to the reduction of fatalities has been the effect of the recession. OSHA acknowledges that reduced industrial activity has likely contributed to the decline in fatalities. A fortunate result of the weaker economy is reduced injuries due simply to less work occurring. On the other hand, it is clear from the pre-recession 2007 and 2008 data that the trend toward reduced fatalities started prior the recession. Further, this has been

accomplished with 10% less OSHA staff and a lower budget over the period. It could be argued that it was actually individual companies that lowered the number of fatalities over the period. It is also true; however, that OSHA's more proactive approach has motivated companies to carefully examine how they conduct their operations.

There is every indication that these trends will continue in 2011. EH&S Managers should look for increased OSHA inspections, issued violations, and penalties. OSHA policy has recently changed resulting in seriously increased enforcement penalties.

In 2010, OSHA announced that the average enforcement penalty would increase by three to four-fold. The review window for repeat violations has also increased to five years. Penalties for repeat violations have increased by ten-fold on average. Additionally, "severe" and "willful" violations require other facilities owned by the same company to receive inspections.

One way a company can be proactive is to conduct an EH&S audit of its activities. This should include an analysis of past history including accidents that resulted in injuries and near misses. An audit can help detect OSHA violations and identify conditions that are becoming dangerous before they become serious problems. Audits can also provide recommendations for improvements that will prevent future problems from occurring and reduce total costs.

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