Environmental Regulatory Changes Potentially Affecting Coal Fired Facilities

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INTRODUCTION
An array of regulatory changes are in progress, or pending, that may affect coal fired power plants. They arise under the Clean Air Act (CAA), Clean Water Act (CWA) and the Resource Conservation and Recovery Act (RCRA). CAA changes include revision to the National Ambient Air Quality Standards (NAAQS) for criteria pollutants – sulfur dioxide (SO2), Ozone, Nitrogen dioxide (NO2) and particulate matter (PM2.5). In some cases NAAQS are being reduced by close to an order of magnitude. Rules governing the interstate transport of certain pollutants are being revised, further tightening requirements on Ozone and its precursors (NOx) and volatile organic compounds (VOCs) as well as particulates and precursors (SO2/NOx ). Greenhouse gases (GHGs) are being brought into new source review/ Prevention of Significant Deterioration (PSD) requirements such as Best Available Control Technology (BACT). The Environmental Protection Agency (EPA) is also developing maximum achievable control technology requirements for fossil-fuel fired boilers—industrial and utility— to impose stringent requirements on air toxic emissions – mercury, acid gases ( hydrochloric acid and SO2), particulates/trace metals, dioxins, and carbon monoxide (CO).

CWA changes include revision to requirements for cooling water systems under section 316b to require systems to have less impact on aquatic organisms. Discharge limits for NPDES permits are being revised to require restrictions on levels of pollutants such as arsenic, selenium, and mercury.

RCRA regulations are being revised to impose new, more restrictive requirements on management and disposal of coal combustion residue (CCR). The figure on the next page gives a potential timeline over which these requirements may be implemented.

Following is an overview of the changes and their status.
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March 2011

CLEAN AIR ACT

Sulfur Dioxide
The Environmental Protection Agency (EPA) is conducting its periodic review of the National Ambient Air Quality Standards (NAAQS) for criteria pollutants. This is required under the CAA every 5 years. In June 2010 EPA established a new one-hour primary standard for sulfur dioxide of 75 parts per billion (ppb). EPA eliminated the previous 24-hour standard of 140 ppb and the annual standard of 30 ppb. The new 1-hour standard is almost an order of magnitude lower than the existing 3-hour secondary standard (500 ppb) for sulfur dioxide which is being reviewed in a separate undertaking. Compliance with the new standard will be determined through updated monitoring requirements and dispersion modeling.

The figure below indicates potential nonattainment areas based on existing monitoring data.

The implications are that existing coal fired plants that do not have sulfur dioxide scrubbing systems will need to check their compliance situation through dispersion modeling and possibly install emission controls if they don’t meet the new standard.

See Attachment 1 for additional information.
Ozone

Another NAAQS in the process of being reconsidered is Ozone. EPA revised the primary and secondary ozone standards to .075 ppm in March 2008, on an 8-hour average. However, in September 2009 EPA published a notice that it would reconsider the standard and in January 2010 published a proposed revised standard between .060 and .070 ppm on an 8-hour average. This was to be finalized by August 2010 but this has been delayed, potentially to late July 2011.

The figures below indicate Ozone nonattainment counties under the current (1997) 8-hour ozone standard of .08 ppm and potential nonattainment counties under the proposed new standard.

Implications for coal fired facilities mainly arise from ramifications to NOx emissions since NOx is an ozone precursor and therefore can be affected under ozone control strategies.
Transport Rule

On Tuesday, July 6, 2010, EPA proposed the replacement for the Clean Air Interstate Rule (CAIR), which is now called the “Transport Rule.” The purpose of the Transport Rule is to help states meet ambient air quality standards for ozone (O₃) and fine particulate matter (PM2.5) by controlling utility emissions in upwind states. The proposed rule would do this by controlling emissions of nitrogen oxides (NOₓ) and sulfur dioxide (SO₂), which react in the atmosphere to form PM2.5. NOₓ also reacts to form O₃ far downwind of emissions points.

The graphic below highlights the states (plus DC) within which utility plants would be covered by this rule. Note that the new Transport Rule covers all the original CAIR states, plus Oklahoma, Kansas, and Nebraska. Note also that EPA is scheduled to finalize its revised NAAQS for ozone and has indicated it will likely revise the Transport Rule to tighten proposed emission budgets for the already affected states (and possibly additional states), sometime after the new ozone NAAQS goes into effect.

Some other key points from the rule:

- EPA has proposed, as a default, taking over implementation of this rule from states to speed implementation (Federal Implementation Plan), but is giving states the option of developing their own implementation plans, which could target more than just utilities at each state’s option.
- EPA has proposed specific NOx and SO2 emissions budgets for each affected state (with limited interstate trading in a very complex scheme – see rule preamble for details)
- NOx and SO2 reductions are required in all affected states by 2012
- Further SO2 reductions in "Group 1" states are required by 2014 (16 states from Iowa and Missouri east and southeast)
- Timeline may allow only for fuel switching, running already existing controls harder, or perhaps low-NOx burner installation (if already in planning/procurement?)

See Attachment 2 for more information.

Nitrogen Oxides
The EPA has also reviewed and revised the NAAQS for NO2. As of January 2010, EPA added a new 1-hour NO2 standard of 100 ppb in addition to the annual standard of 53 ppb. This is not expected to directly affect emissions controls or operations at coal fired facilities, but does establish an additional parameter to check for determining compliance. For more detailed information see attachment 3.
PM2.5
Another NAAQS under review is particulate matter (less than 2.5 microns in diameter). A proposal is anticipated in early 2011 for a new NAAQS in the 11.0 to 13.0 micrograms (ug)/cubic meter annual average. The current standard is 15 ug/cubic meter, annual average. Utilities may be affected primarily by way of the Transport Rule (see above) since NOx and SO2 can produce fine particulates.

Greenhouse Gases
While legislation governing regulation of greenhouse gases (GHG) is stalled in Congress, EPA is proceeding with some aspects of implementing greenhouse gas regulation under existing CAA programs such as Prevention of Significant Deterioration (PSD) permitting. In May 2010 EPA issued rules for implementing greenhouse gas elements of new source review under the PSD program. The initial phase would require any new or modified sources that are already major sources under the PSD program to apply PSD requirements, (Best Available Control Technology [BACT]) if the new source or modification would cause major increases in non-GHG regulated pollutants and increases in GHGs of 75,000 tons per year or more. This will take effect January 2, 2011. Such facilities will also become subject to Title V permitting requirements.

Phase 2 goes into effect as of July 1, 2011, and will require that new sources which produce 100,000 tons per year (tpy) of GHGs will need to apply PSD requirements even if they do not trigger PSD for other regulated pollutants. Modified sources which increase GHGs by 75,000 tpy or more will need to apply PSD even if they do not trigger PSD due to other increases in emissions.

Title V operating permits will be required for facilities which emit 100,000 tpy or more, even if they are not major as to other pollutants.

Rulemaking will be undertaken to develop Phase 3 requirements during 2011-2012. This is anticipated to affect sources or modifications emitting or increasing emissions of GHGs by 50,000 tpy or more.

See Attachments 4 and 5 for more information.

In November 2010 EPA issued guidance relative to GHG’s and PSD permitting, including how to develop Best Available Control Technology (BACT) determinations. This guidance does not specify specific BACT for certain types of facilities but does discuss the types of things which should be considered and the process to be used in the evaluation. For example carbon capture and sequestration should be considered but is not required since while it may be considered available it may not be technically or economically feasible for a given source. The BACT guidance does tend to encourage energy efficiency improvements as BACT relative to GHG’s

See Attachment 5a for more information.
MAXIMUM ACHIEVABLE CONTROL TECHNOLOGY (AIR TOXICS)
In April 2010 EPA proposed rules establishing maximum achievable control technology (MACT) requirements for coal/oil/gas-fired industrial boilers, establishing stringent emissions standards for mercury, dioxins, particulates, HCL, and carbon monoxide. These are anticipated to be finalized in early 2011. See Attachment 6 for more information. EPA has requested an extension to re-propose the Industrial boiler MACT rules in June 2011. Presumably this will delay the Utility MACT as well.

EPA is expected to propose comparable requirements for utility boilers in 2011.

CLEAN WATER ACT

316b – Cooling Water systems
Section 316(b) of the 1972 Clean Water Act requires that “the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse impact.” Adverse impact at cooling water intakes is typically the entrainment and impingement of fish associated with the withdrawal of cooling water. EPA promulgated rules for cooling water intakes and systems in 2004 and 2006. Litigation on those rules has led to a repromulgation of those rules.

In March of 2010, the states of New York and California issued policy statements making closed cycle cooling the benchmark technology for achieving reductions in impacts to fish. Closed cycle cooling, and its significant reduction in cooling water

March 2011
withdrawal, can achieve a 95 percent or greater reduction in impacts to fish. Both states’ policies allow for the use of alternative technologies such as variable speed pump drives, screening systems, intake relocations, and many other engineering solutions to achieve reductions in impacts, provided those technologies achieve reductions commensurate with closed cycle cooling.

EPA is anticipating that it will be issuing a new federal 316(b) proposed rule in early 2011 which will affect all existing cooling water intakes, including those at power generating stations, manufacturing facilities, offshore oil and gas facilities, and others that withdraw more than 2 million gallons per day and use at least 25 percent of the water for cooling purposes. The policies coming from those states that have been delegated authority to issue permits for cooling water intakes, and the larger umbrella federal ruling to be issued by EPA, have the potential to affect many hundreds of cooling water intake system owners throughout the country. A final rule is anticipated by late 2012.

**NPDES Effluent Guidelines**

Based on the findings from EPA’s multi-year study of the steam electric power generating industry, EPA plans to revise the current effluent guidelines for this industry. EPA’s decision to revise the current effluent guidelines is largely driven by the high level of toxic-weighted pollutant discharges from coal fired power plants and the expectation that these discharges will increase significantly in the next few years as new air pollution controls are installed. Over the course of the study, EPA identified technologies that can significantly reduce these pollutant discharges.

James Hanlon, Director of the Office of Wastewater Management issued an EPA interim guidance memo on NPDES permitting for steam electric generating facilities on June 7, 2010- (See Attachment 7) discussing approaches and technologies for dealing with wastewater.

EPA’s decision to proceed with a rulemaking was announced on September 15, 2009. EPA reviewed wastewater discharges from power plants and the treatment technologies available to reduce pollutant discharges, which demonstrated the need to update the current effluent guidelines (40 CFR 423). The current regulations, which were last updated in 1982, do not adequately address the pollutants being discharged and have not kept pace with changes that have occurred in the electric power industry over the last three decades. Steam electric power plants are responsible for a significant amount of the toxic pollutant loadings discharged to surface waters by point sources, and coal ash ponds and flue gas desulfurization (FGD) systems are the source of much of these pollutants.

Specifics on effluent guidelines are anticipated to be proposed in late 2012.
RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

Coal Combustion Residue Regulations
On June 21, 2010, EPA proposed two approaches for regulating disposal of coal combustion residues (CCRs) under the Resource Conservation and Recovery Act (RCRA) 75 FR 35128, June 21, 2010:

- Subtitle C approach
- Subtitle D approach

The EPA proposal covers CCRs generated from the combustion of coal at electric utilities and independent power producers.

Regulation under Subtitle C
- Listed as a “special waste” subject to existing Subtitle C requirements
- Single composite liner
- Surface impoundments have 5 years to comply with requirements; no requirement for annual dredging
- Structural stability requirements:
  - Existing landfills must install groundwater monitoring within 1 year of effective date of rule, but do not need to install composite liners.
  - New landfills or lateral expansions of existing landfills must install composite liners and groundwater monitoring before landfill begins operation.
  - Surface impoundments must meet land disposal restrictions (LDR) and liner requirements within 5 years of effective date of rule or close within an additional 2 years.
- LDR requirements have the practical effect of phasing out surface impoundments

Regulation under Subtitle D
- CCRs would remain classified as “non-hazardous” waste.
- National minimum criteria governing facilities disposing of CCRs.
- Many of the engineering requirements are very similar to the Subtitle C option, e.g., groundwater monitoring, liner, and structural stability requirements.
- Requirements are self implementing.
- Owner/operator required to:
  - Obtain certifications by independent professional engineers/minimum qualification requirements for those who make certifications.
  - Document how various standards are met. Must be kept in the operating record and the state notified.
  - Maintain a web site available to the public that contains the documentation showing the standard is met.
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<th>Subtitle C</th>
<th>Subtitle D</th>
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<tbody>
<tr>
<td><strong>Effective date</strong></td>
<td>Timing will vary from state to state, as each state must adopt the rule individually – can take 1-2 years or more</td>
<td>Six months after final rule is promulgated for most provisions.</td>
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<td><strong>Enforcement</strong></td>
<td>State and federal enforcement</td>
<td>Enforcement through citizen suits; states can act as citizens.</td>
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<td><strong>Corrective action</strong></td>
<td>Monitored by authorized states and EPA</td>
<td>Self-implementing</td>
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<td><strong>Financial assurance</strong></td>
<td>Yes</td>
<td>Considering subsequent rule using CERCLA 108 (b) authority</td>
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<td><strong>Permit issuance</strong></td>
<td>Federal requirement for permit issuance by states (or EPA)</td>
<td>No</td>
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<td><strong>Requirements for storage, including containers, tanks, and containment buildings</strong></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td><strong>Surface impoundments built before rule is finalized</strong></td>
<td>Remove solids and meet land disposal restrictions; retrofit with a liner within 5 years of effective date. Would effectively phase out use of existing surface impoundments.</td>
<td>Must remove solids and retrofit with a composite liner or cease receiving CCRs within 5 years of effective date and close the unit</td>
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<tr>
<td><strong>Surface impoundments built after rule is finalized</strong></td>
<td>Must meet Land Disposal Restrictions and liner requirements. Would effectively phase out use of new surface impoundments.</td>
<td>Must install composite liners. No Land Disposal Restrictions.</td>
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<td><strong>Landfills built before rule is finalized</strong></td>
<td>No liner requirements, but require groundwater monitoring</td>
<td>No liner requirements, but require groundwater monitoring</td>
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<td><strong>Landfills built after rule is finalized</strong></td>
<td>Liner requirements and groundwater monitoring</td>
<td>Liner requirements and groundwater monitoring</td>
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<td><strong>Requirements for closure and post-closure care</strong></td>
<td>Yes; monitored by states and EPA</td>
<td>Yes; self-implementing</td>
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March 2011
FACT SHEET
REVISIONS TO THE PRIMARY NATIONAL AMBIENT AIR QUALITY STANDARD, MONITORING NETWORK, and DATA REPORTING REQUIREMENTS for SULFUR DIOXIDE

SUMMARY OF ACTION

• On June 2, 2010, EPA strengthened the primary National Ambient Air Quality Standard (NAAQS) for sulfur dioxide (SO₂). The revised standard will improve public health protection, especially for children, the elderly, and people with asthma. These groups are susceptible to the health problems associated with breathing SO₂.

• EPA is revising the primary SO₂ standard by establishing a new 1-hour standard at a level of 75 parts per billion (ppb). EPA’s evaluation of the scientific information and the risks posed by breathing SO₂ indicate that this new 1-hour standard will protect public health by reducing people’s exposure to high short-term (5-minutes to 24-hours) concentrations of SO₂.

• The Agency is revoking the two existing primary standards of 140 ppb evaluated over 24-hours, and 30 ppb evaluated over an entire year because they will not add additional public health protection given a 1-hour standard at 75 ppb. Also, there is little health evidence to suggest an association between long-term exposure to SO₂ and health effects.

• EPA is not revising the secondary SO₂ NAAQS, set to protect public welfare (including effects on soil, water, visibility, wildlife, crops, vegetation, national monuments and buildings). EPA is assessing the need for changes to the secondary standard under a separate review.

• EPA estimates that the revised standard will yield health benefits valued between $13 billion and $33 billion, including reduced hospital admissions, emergency room visits, work days lost due to illness, and cases of aggravated asthma and chronic bronchitis, among other benefits.

• The revised SO₂ standard includes a new “form.” The form is the air quality statistic that is compared to the level of the standard to determine if an area meets the standard. The new form is the 3-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations.

• EPA is also revising the ambient air monitoring requirements for SO₂. States will need to make adjustments to the existing monitoring network in order to ensure that monitors meeting the network design regulations for the new 1-hour SO₂ standard are sited and operational by January 1, 2013.

• EPA is describing an anticipated approach for implementing the new 1-hour SO₂ standard.
that would use monitoring and refined dispersion modeling of SO2 sources to determine compliance with the new standard.

- This final rule also changes the Air Quality Index to include the revised SO2 standard.

**SO2 AND PUBLIC HEALTH**

- Current scientific evidence links health effects with short-term exposure to SO2 ranging from 5-minutes to 24-hours. Adverse respiratory effects include narrowing of the airways which can cause difficulty breathing (bronchoconstriction) and increased asthma symptoms. These effects are particularly important for asthmatics during periods of faster or deeper breathing (e.g., while exercising or playing).

- Studies also show an association between short-term SO2 exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses--particularly in at-risk populations including children, the elderly and asthmatics.

- EPA’s National Ambient Air Quality Standard for SO2 is designed to protect against exposure to the entire group of sulfur oxides (SOx). SO2 is the component of greatest concern and is used to represent the larger group of gaseous sulfur oxides. Other gaseous sulfur oxides (e.g., SO3) are found in the atmosphere at concentrations much lower than SO2.

- Emissions that lead to high concentrations of SO2 generally also lead to the formation of other SOx. Control measures that reduce SO2 can generally be expected to reduce people’s exposure to all gaseous SOx. Reducing SO2 emissions is expected to have the important co-benefit of reducing the formation of fine sulfate particles that pose significant public health threats.

- SOx can react with other compounds in the atmosphere to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. EPA’s NAAQS for particulate matter are designed to provide protection against exposures that cause these health effects.

**REVISING THE SO2 MONITORING NETWORK**

- In the final rule, EPA is requiring fewer monitors than proposed, because the Agency plans to use a hybrid approach combining air quality modeling and monitoring to determine compliance with the new SO2 health standard.

- For a short-term 1-hour SO2 standard, it is more technically appropriate, efficient, and effective to use modeling as the principal means of assessing compliance for medium to larger sources, and to rely more on monitoring for groups of smaller sources and sources not
as conducive to modeling. Such an approach is consistent with EPA’s historical approach and longstanding guidance for SO₂.

- EPA is setting specific minimum requirements that inform states on where they are required to place SO₂ monitors. Approximately 163 SO₂ monitoring sites nationwide are required by this rulemaking.

- The final monitoring regulations require monitors to be placed in Core Based Statistical Areas (CBSAs) based on a population weighted emissions index for the area. The final rule requires:
  - 3 monitors in CBSAs with index values of 1,000,000 or more;
  - 2 monitors in CBSAs with index values less than 1,000,000 but greater than 100,000; and
  - 1 monitor in CBSAs with index values greater than 5,000.

- During 2009, approximately 470 SO₂ monitors were operating in the network. Some of these existing SO₂ monitors meet the siting requirements of this rule. EPA currently estimates that 41 new monitoring sites will need to be established, nationwide. States may, with EPA approval, relocate some of the existing SO₂ monitors.

- All newly sited SO₂ monitors must be operational by January 1, 2013.

- EPA is also making changes to data reporting requirements for SO₂. State and local agencies are required to report two data values for every hour of monitoring conducted:
  - the 1-hour average SO₂ concentration; and
  - the maximum 5-minute block average SO₂ concentration of each hour.

- EPA Regional Administrators have the authority to require additional monitoring in certain circumstances, such as in areas with SO₂ sources that are not conducive to modeling, areas with multiple SO₂ sources with overlapping plumes, or in areas with susceptible and vulnerable populations.

ANTICIPATED APPROACH TO IMPLEMENTING THE NEW SO₂ STANDARD

- In addition to revising the SO₂ primary standard and finalizing associated ambient air quality monitoring requirements, EPA is providing initial guidance on its plan for implementing the new 1-hour SO₂ standard.

- EPA plans to use refined dispersion modeling to determine if areas with sources that have the potential to cause or contribute to a violation of the new SO₂ standard can comply with the standard. Dispersion modeling simulates how air pollutants spread throughout the atmosphere and is used to estimate the concentration of air pollutants from sources such as industrial plants or highways.
• EPA intends to complete designations within two years of promulgation of the revised SO2 standard (June 2012.)

• EPA anticipates initially designating areas based on 2008-2010 monitoring data, or refined dispersion modeling results if provided by the state. Areas which violate the standard would be designated as “nonattainment”. Areas that have both monitoring data and appropriate refined modeling results showing no violations would be designated as “attainment.” All other areas would be designated as “unclassifiable.”

• States with areas designated nonattainment in 2012 would need to submit state implementation plans (SIPs) to EPA by early 2014 outlining actions that will be taken to meet the standards as expeditiously as possible, but no later than August 2017.

• For all other areas, states would need to submit to EPA “maintenance” or infrastructure SIPs by June 2013, 3 years following the promulgation of the new SO2 standard. EPA expects these state plans would:
  ➢ demonstrate, through refined air quality modeling, that all sources contributing to monitored and modeled violations of the new standard, or that have the potential to cause or contribute to a violation, will be sufficiently controlled to ensure timely attainment and maintenance of the new SO2 standard;
  ➢ account for SO2 reductions that would result from compliance with national and regional regulations, including emissions controls for electric utilities and industrial boilers; and
  ➢ include as necessary, enforceable emissions limitations, timetables for compliance, and appropriate testing/reporting to assure compliance.
EPA believes that these areas should plan to demonstrate attainment and maintenance of the standard as expeditiously as possible, but no later than August 2017, the date nonattainment areas must meet the standard.

• EPA intends to issue guidance on conducting refined air quality dispersion modeling and implementing the new SO2 standard. Examples of the issues that this guidance will address include how to translate the modeling results into a form appropriate for comparison to the new standard, and how to identify and appropriately assess the air quality impacts of SO2 sources that may potentially cause or contribute to a violation of the new standard. EPA will provide an opportunity for public comment on the guidance before issuing it in final form.

• EPA will be making designations for all areas in the country, both for state lands and for Indian country. Unlike states, tribes are not obligated to submit designation recommendations but are invited to participate in the designations process by submitting a designation recommendation for Indian country and/or by engaging in formal or informal consultation with EPA and states.

• EPA also is finalizing a strategy for maintaining public health protection during the transition from the existing SO2 standard to the revised SO2 standard. In most areas, the 1-hour and annual SO2 standards will remain in effect for 1-year after designations for the new 1-hour standard take effect. For areas currently designated nonattainment for SO2 or with
unresolved issues relating to their plans to attain and maintain the standards, the existing standards will remain in effect until they submit and EPA approves a plan meeting the requirements of the new 1-hour standard.

- Areas that do not comply with the standard will likely use a combination of source-specific, statewide and national control measures to reduce SO₂ emissions.

BACKGROUND

- The Clean Air Act requires EPA to set national ambient air quality standards for especially widespread air pollutants listed by EPA, often called “criteria pollutants.” Currently, sulfur oxides and five other major pollutants are criteria pollutants. The others are ozone, lead, carbon monoxide, nitrogen oxides, and particulate matter. The law also requires EPA to review the standards periodically and revise them if appropriate to ensure that they provide requisite health and environmental protection, and to update those standards as necessary.

- Sulfur dioxide is one of a group of highly reactive gases known as “oxides of sulfur.” The largest sources of SO₂ emissions are from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent). Smaller sources of SO₂ emissions include industrial processes such as extracting metal from ore, and the burning of high-sulfur fuels by locomotives, large ships, and non-road equipment. SO₂ is linked with a number of adverse effects on the respiratory system.

- EPA first set NAAQS for SO₂ in 1971. EPA set a 24-hour primary standard at 140 ppb and an annual average standard at 30 ppb (to protect health). EPA also set a 3-hour average secondary standard at 500 ppb (to protect public welfare).

- The last review of the SO₂ NAAQS was completed in 1996 and the Agency chose not to revise the standards at that time.

- In the last review, EPA also considered, but did not set, a 5-minute SO₂ NAAQS to protect asthmatics at elevated ventilation rates from bronchoconstriction and other respiratory symptoms associated with 5-10 minute peak concentrations of SO₂.

- The decision not to set a 5-minute standard in 1996 was challenged successfully by the American Lung Association and remanded back to EPA in 1998; no formal action with regard to the remand has been taken until this final rule.

- Under a judicial consent decree, EPA completed this review of the primary SO₂ standard on June 2, 2010. The current review focuses only on the primary SO₂ standard. EPA is addressing the secondary standard for SO₂ as part of a separate review.

- Currently, there are several areas designated as nonattainment for the primary SO₂ NAAQS, although none of them currently exceeds the standards. There is also one area in Montana
that must revise its State Implementation Plan to address emissions that may be contributing to violations of the standard.

- This revised primary standard for SO$_2$ is consistent with the advice and recommendations of EPA’s principal independent science advisors on National Ambient Air Quality Standards: the Clean Air Scientific Advisory Committee.
Attachment 2
Proposed Transport Rule Would Reduce Interstate Transport of Ozone and Fine Particle Pollution

**ACTION**

On July 6, 2010 the US Environmental Protection Agency (EPA) proposed a rule that would protect the health of millions of Americans by helping states reduce air pollution and attain clean air standards. This rule, known as the Transport Rule would require 31 states and the District of Columbia to significantly improve air quality by reducing power plant emissions that contribute to ozone and fine particle pollution in other states.

The Clean Air Act requires EPA to address the problem of interstate transport of air pollution. EPA is proposing to put in place a new approach that helps states meet their obligations to reduce transported pollution and attain and maintain compliance with the national ambient air quality standards.

Specifically, this proposal would require significant reductions in sulfur dioxide (SO₂) and nitrogen oxide (NOₓ) emissions that cross state lines. These pollutants react in the atmosphere to form fine particles and ground-level ozone and are transported long distances, making it difficult for other states to achieve national clean air standards.

Emissions reductions will begin to take effect very quickly, in 2012 – within one year after the rule is finalized. By 2014, the rule and other state and EPA actions would reduce power plant SO₂ emissions by 71 percent over 2005 levels. Power plant NOₓ emissions would drop by 52 percent.
This proposed rule would replace EPA’s 2005 Clean Air Interstate Rule (CAIR). A December 2008 court decision kept the requirements of CAIR in place temporarily but directed EPA to issue a new rule to implement the Clean Air Act requirements concerning the transport of air pollution across state boundaries. This action responds to the court’s concerns.

Additional emission reductions will be needed for the nation to attain the existing ozone standard and any upcoming 2010 ozone standards. The Agency plans to propose a transport rule to address that standard in 2011 and finalize it in 2012. Each time EPA changes national ambient air quality standards, EPA will evaluate whether new emission reductions will be required from upwind states.

This rule would not disrupt a reliable flow of affordable electricity for American consumers and businesses.

The Agency will take public comment on the proposal for 60 days following publication in the Federal Register. EPA also plans to hold three public hearings on the proposed Transport Rule. The Agency will provide details on the timing and location for those hearings shortly in a separate Federal Register Notice.

The proposed rule would yield more than $120 to $290 billion in annual health and welfare benefits in 2014, including the value of avoiding 14,000 to 36,000 premature deaths. This far outweighs the estimated annual costs of $2.8 billion.

KEY ELEMENTS OF PROPOSAL

For the 31 states and the District of Columbia:

- Twenty-eight states would be required to reduce both annual SO₂ and NOₓ emissions. By reducing the emissions from the upwind states, the proposal would help downwind states attain air quality standards, specifically the 24-hour PM₂.₅ standards established in 2006 and the 1997 annual PM 2.5 standards.

- Twenty-six states would be required to reduce NOₓ emissions during the hot summer months of the ozone season because they contribute to downwind states’ ozone pollution. By reducing the emissions from the upwind states, the proposal would help downwind states’ attain air quality standards, specifically the 1997 ground-level ozone standard.
The following table identifies the states covered by the proposed rule and the emissions they would need to control:

<table>
<thead>
<tr>
<th>State</th>
<th>Reducing Emissions of SO$_2$ and NO$<em>x$ (2006 and/or 1997 PM$</em>{2.5}$ Standards)</th>
<th>Reducing Emissions of NO$_x$ during the Ozone Season (1997 Ozone Standards)</th>
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<tbody>
<tr>
<td>Alabama</td>
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EPA is proposing one approach for reducing SO₂ and NOₓ emissions in states covered by this rule and taking comment on two alternatives:

- In EPA’s preferred approach, EPA is proposing to set a pollution limit (or budget) for each of the 31 states and the District of Columbia. This approach allows limited interstate trading among power plants but assures that each state will meet its pollution control obligations.

- In the first alternative, EPA is proposing to set a pollution limit or budget for each state. This option allows trading only among power plants within a state.

- In the second alternative, EPA is proposing to set a pollution limit for each state and to specify the allowable emission limit for each power plant and allow some averaging.

To assure emissions reductions, EPA is proposing federal implementation plans, or FIPs, for each of the states covered by this rule. These plans would reduce air pollution that significantly affects another state.

- The federal implementation plans put in place requirements necessary to reduce pollution in the covered states that significantly contributes to non attainment of or interferes with maintenance of the national ambient air quality standards in other states.

- A state may choose to develop a state plan to achieve the required reductions, replacing its federal plan, and may choose which types of sources to control.

This proposal would clarify state obligations to reduce pollution affecting other states under the Clean Air Act by defining “significant contribution” and “interferes with maintenance.” In defining these obligations, the Agency proposes to consider the magnitude of a state’s contribution, the air quality benefits of reductions, and the cost of controlling pollution from various sources.

**BENEFITS AND COSTS**

The emissions reductions from this proposed rule would lead to significant annual health benefits. In 2014, this rule would protect public health by avoiding:

- 14,000 to 36,000 premature deaths,
- 21,000 cases of acute bronchitis,
- 23,000 nonfatal heart attacks,
- 26,000 hospital and emergency room visits,
- 1.9 million days when people miss work or school,
- 240,000 cases of aggravated asthma, and
- 440,000 cases of upper and lower respiratory symptoms.
Pollution reductions would lead to improvements in visibility in national and state parks, and increased protection for sensitive ecosystems including Adirondack lakes and Appalachian streams, coastal waters and estuaries, and sugar maple forests.

EPA anticipates that power plants may use the following to achieve emission reductions:
- operate already installed control equipment more frequently,
- use low sulfur coal, or
- install control equipment such as low NO\textsubscript{X} burners, Selective Catalytic Reduction, or scrubbers (Flue Gas Desulfurization).

Compared to 2005, EPA estimates that by 2014 this proposal and other federal rules would lower emissions by:
- 6.3 million tons per year of SO\textsubscript{2}
- 1.4 million tons per year of NO\textsubscript{X}
  - including 300,000 tons per year of NO\textsubscript{X} during the ozone season.

The annual direct costs to the power sector of complying with this proposal (e.g., the cost of installing and operating advanced pollution control equipment or switching fuels) is $2.8 billion (2006 $).

The overall societal cost (an alternative way of calculating costs) is $2.2 B annually. Social cost is the overall cost of the regulation to the U.S. This cost includes the amount borne by consumers that is passed through from industries incurring the compliance costs of the regulation.

The projected benefits range from $120-290 billion (2006 $) annually, significantly outweighing the costs of the proposed rule.

**BACKGROUND**

When final, this Transport Rule will replace the 2005 Clean Air Interstate Rule (CAIR).

EPA issued CAIR on May 12, 2005 and the CAIR federal implementation plans (FIPs) on April 26, 2006.

In 2008, the US Court of Appeals for the DC Circuit remanded CAIR to the agency. This proposed Transport Rule will replace CAIR using new approaches consistent with the court’s opinion.

The CAIR requirements for pollution reductions remain in effect and the CAIR regional control programs are operating while EPA works to complete this Transport Rule.
Under the Clean Air Act, states are required to submit plans (state implementation plans, or SIPs) to prohibit emissions that interfere with another state’s ability to comply with national air ambient quality standards, called NAAQS.

When states do not submit the plans, EPA provides a federal implementation plan, or FIP, through rulemaking to achieve the required emissions reductions.

SO$_2$ and NO$_x$ contribute to the formation of fine particles. NO$_x$ reacts with volatile organic compounds to form ground-level ozone. Both of these pollutants cause a series of human health effects and environmental damages, including premature mortality, chronic and acute bronchitis, heart attacks, hospitalizations, emergency room visits, asthma attacks, lost days at work and school, acid deposition (acid rain), damage to sensitive forests and nitrogen-sensitive coastal waters, and impaired visibility at national parks and wilderness areas.
FACT SHEET
FINAL REVISIONS TO THE NATIONAL AMBIENT AIR QUALITY STANDARDS
FOR NITROGEN DIOXIDE

SUMMARY OF ACTION

• On January 22, 2010, EPA strengthened the health-based National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO₂). The new standard will protect public health, including the health of sensitive populations – people with asthma, children and the elderly.

• EPA is setting a new 1-hour NO₂ standard at the level of 100 parts per billion (ppb). This level defines the maximum allowable concentration anywhere in an area. It will protect against adverse health effects associated with short-term exposure to NO₂, including respiratory effects that can result in admission to a hospital.

• In addition to establishing an averaging time and level, EPA also is setting a new “form” for the standard. The form is the air quality statistic used to determine if an area meets the standard. The form for the 1-hour NO₂ standard, is the 3-year average of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations.

• EPA also is retaining, with no change, the current annual average NO₂ standard of 53 ppb.

• This suite of standards will protect public health by limiting people’s exposures to short-term peak concentrations of NO₂ – which primarily occur near major roads – and by limiting community-wide NO₂ concentrations to levels below those that have been linked to respiratory-related emergency department visits and hospital admissions in the United States.

• To determine compliance with the new standard, EPA is establishing new ambient air monitoring and reporting requirements for NO₂.
  • In urban areas, monitors are required near major roads as well as in other locations where maximum concentrations are expected.
  • Additional monitors are required in large urban areas to measure the highest concentrations of NO₂ that occur more broadly across communities.
  • Working with the states, EPA will site a subset of monitors in locations to help protect communities that are susceptible and vulnerable to NO₂-related health effects.

• The addition of a new 1-hour NO₂ standard and changes to the NO₂ monitoring network are consistent with the recommendations of the majority of the Clean Air Scientific Advisory Committee (CASAC). CASAC provides independent advice to the EPA Administrator on the relevant scientific and technical information and on the standards.

• These changes will not affect the secondary NO₂ standard, set to protect public welfare. EPA is considering the need for changes to the secondary standard under a separate review.
NO₂ AND PUBLIC HEALTH

• Current scientific evidence links short-term NO₂ exposures, ranging from 30 minutes to 24 hours, with an array of adverse respiratory effects including increased asthma symptoms, more difficulty controlling asthma, and an increase in respiratory illnesses and symptoms.

• Studies also show a connection between short-term exposure and increased visits to emergency departments and hospital admissions for respiratory illnesses, particularly in at-risk populations including children, the elderly, and asthmatics.

• NO₂ concentrations near major roads are appreciably higher than those measured at monitors in the current network. Concentrations in heavy traffic or on freeways can be twice as high as levels measured in residential areas or near smaller roads. Monitoring studies indicate that near-road (within about 50 meters) concentrations of NO₂ can be 30 to 100 percent higher than concentrations away from major roads.

• EPA’s NAAQS for NO₂ is designed to protect against exposure to the entire group of nitrogen oxides (NOₓ). NO₂ is the component of greatest concern and is used as the indicator for the larger group of NOₓ. The sum of nitric oxide (NO) and NO₂ is commonly called NOₓ. Other nitrogen oxides include nitrous acid and nitric acid.

• Emissions that lead to the formation of NO₂ generally also lead to the formation of other NOₓ. Control measures that reduce NO₂ can generally be expected to reduce population exposures to all gaseous NOₓ. This may have the co-benefit of reducing the formation of ozone and fine particles both of which pose significant public health threats.
  - NOₓ react with ammonia, moisture, and other compounds to form small particles. These small particles penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease, such as emphysema and bronchitis, and can aggravate existing heart disease, leading to increased hospital admissions and premature death. EPA’s NAAQS for particulate matter (PM) are designed to provide protection against these health effects.
  - NOₓ react with volatile organic compounds to form ozone. Children, the elderly, people with lung diseases such as asthma, and people who work or exercise outside are at risk for adverse health effects from ozone. These effects include reduced lung function and increased respiratory symptoms, more respiratory-related emergency department visits and hospital admissions, and increased risk of premature death from heart or lung disease. EPA’s NAAQS for ozone are designed to provide protection against these health effects.

REVISING THE NO₂ MONITORING NETWORK

• EPA is setting new requirements for the placement of new NO₂ monitors in urban areas. These include:
  - **Near Road Monitoring**
    - At least one monitor must be located near a major road in any urban area with a population greater than or equal to 500,000 people. A second monitor is required
near another major road in areas with either:

1. population greater than or equal to 2.5 million people, or
2. one or more road segment with an annual average daily traffic (AADT) count greater than or equal to 250,000 vehicles.

These NO2 monitors must be placed near those road segments ranked with the highest traffic levels by AADT, with consideration given to fleet mix, congestion patterns, terrain, geographic location, and meteorology in identifying locations where the peak concentrations of NO2 are expected to occur. Monitors must be placed no more than 50 meters (about 164 feet) away from the edge of the nearest traffic lane.

- EPA estimates that the new NO2 monitoring requirements will result in a network of approximately 126 NO2 monitoring sites near major roads in 102 urban areas.

**Community Wide Monitoring**

- A minimum of one monitor must be placed in any urban area with a population greater than or equal to 1 million people to assess community-wide concentrations.
- An additional 53 monitoring sites will be required to assess community-wide levels in urban areas.
- Some NO2 monitors already in operation may meet the community-wide monitor siting requirements.

**Monitoring to Protect Susceptible and Vulnerable Populations**

- Working with the states, EPA Regional Administrators will site at least 40 additional NO2 monitors to help protect communities that are susceptible and vulnerable to NO2-related health effects.

- All new NO2 monitors must begin operating no later than January 1, 2013.

- EPA Regional Administrators have the authority to require additional monitoring in certain circumstances, such as in areas impacted by major industrial point sources or a combination of sources where there is an indication that the standards may be exceeded. The Regional Administrators also have the authority to require additional near-road monitoring in urban areas where multiple peak concentration areas may be caused by a variety of mobile source factors including fleet mix, traffic congestion patterns, or terrain.

**IMPLEMENTING THE NEW NO2 STANDARD**

- In this final rule, EPA is outlining the Clean Air Act requirements that states must address to implement the new NO2 air quality standard.

- The new standard must be taken into account when permitting new or modified major sources of NOx emissions such as fossil-fuel fired power plants, boilers, and a variety of other manufacturing operations.

- EPA expects to identify or “designate” areas as attaining or not attaining the new standard by January 2012, within two years of establishing the new NO2 standard. These designations
will be based on the existing community-wide monitoring network. Areas with monitors recording violations of the new standards will be designated “nonattainment.” EPA anticipates designating all other areas of the country “unclassifiable” to reflect the fact that there is insufficient data available to determine if those areas are meeting the revised NAAQS.

• Once the expanded network of NO₂ monitors is fully deployed and three years of air quality data have been collected, EPA intends to redesignate areas in 2016 or 2017, as appropriate, based on the air quality data from the new monitoring network.

BACKGROUND

• The Clean Air Act requires EPA to set national ambient air quality standards for pollutants considered harmful to public health and the environment. National standards exist for six pollutants: nitrogen dioxide, ozone, particulate matter, carbon monoxide, sulfur dioxide, and lead.

• For each of these pollutants, the Clean Air Act requires EPA to set the health-based or “primary” standards at a level judged to be “requisite to protect the public health with an adequate margin of safety” and establish secondary standards that are “requisite” to protect public welfare from “any known or anticipated adverse effects associated with the pollutant in the ambient air” including effects on vegetation, soils, water, wildlife, buildings and national monuments, and visibility. EPA is considering the need for changes to the secondary NO₂ standard under a separate review.

• The law also requires EPA to review the standards and their scientific basis every five years to determine whether revisions are appropriate.

• Nitrogen dioxide is one of a group of highly reactive gasses known as “oxides of nitrogen.” NO₂ forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone and fine particle pollution, NO₂ is linked with a number of adverse effects on the respiratory system.

• EPA first established standards for NO₂ in 1971, setting both a primary standard (to protect health) and a secondary standard (to protect the public welfare) at 53 ppb, averaged annually. Prior to the current review, the Agency reviewed the standards twice since 1971, but chose not to revise the standards at the conclusion of each review.

• All areas presently meet the 1971 NO₂ NAAQS, with annual NO₂ concentrations measured at community-wide monitors well below the level of the standard (53 ppb). Annual average ambient NO₂ concentrations, as measured at community-wide monitors, have decreased by more than 40 percent since 1980. Currently, the annual average NO₂ concentrations range from approximately 10-20 ppb.

• EPA expects NO₂ concentrations to continue decreasing as a number of mobile source regulations take effect. Tier 2 standards for light-duty vehicles began phasing in during 2004, and new NOₓ standards for heavy-duty engines are phasing in between 2007 and 2010.
model years. Current air quality monitoring data reflect only a few years of vehicles entering the fleet that meet these stricter NO\textsubscript{x} tailpipe standards.
Attachment 4
Reconsideration of Interpretation of Regulations that Determine Pollutants Covered by Clean Air Act Permitting Programs

Fact Sheet

ACTION

- On March 29, 2010, the U.S. Environmental Protection Agency (EPA) completed its reconsideration of a December 18, 2008 memorandum entitled “EPA’s Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program.” A PSD permit is required before a new industrial facility can be built or an existing facility can expand in a way that significantly increases emissions.

- This interpretive memo, from then-EPA Administrator Stephen L. Johnson to the EPA Regional Administrators, addressed when the Clean Air Act (CAA) PSD program would cover a pollutant, including greenhouse gases (GHGs) such as carbon dioxide (CO₂).

- The memo indicated that the PSD Permitting Program would apply to pollutants that are subject to either a provision in the CAA or a regulation adopted by EPA under the CAA that requires actual control of emissions of that pollutant. The memo further explained that pollutants for which EPA regulations only require monitoring or reporting, such as the provisions for CO₂ in the Acid Rain Program, are not subject to PSD permitting.

- In its October 7, 2009 reconsideration proposal, EPA requested comment on several interpretations of when a pollutant is “subject to regulation” under the CAA for the purposes of triggering the requirements to get a PSD permit, including:
  - A final EPA rule requiring control of emissions of a pollutant;
  - Inclusion of regulatory requirements for a pollutant in an EPA-approved State Implementation Plan;
  - An EPA rule requiring monitoring or reporting of emissions of a pollutant;
  - An “Endangerment Finding” for a pollutant under the CAA; and
  - EPA’s granting of a Clean Air Act section 209 waiver, such as the “California Waiver.”

- After carefully reviewing comments on the proposal, EPA is taking the following actions:
  - Affirming our existing position that PSD permitting is not triggered for a pollutant such as GHGs until a final nationwide rule requires actual control of emissions of the pollutant.
  - Interpreting that PSD permitting requirements are triggered when the control requirement of the nationwide rule “takes effect” – rather than at signature,
Federal Register publication, or effective date for the rule after publication in the Federal Register.

- Explaining that for GHGs, "takes effect" means when the first national rule regulating GHGs takes effect. If finalized as proposed, the rule limiting GHG emissions for cars and light trucks would trigger these requirements in January 2011 -- the earliest 2012 vehicles meeting the standards can be sold in the United States.

- Explaining that this interpretation of “subject to regulation” applies for Title V permitting as well.

- Confirming that there is no “grandfathering” of pending permit applications. If a permit is issued after Jan 2, 2011 (the earliest possible “takes effect” date for the proposed GHG light duty vehicle rule) it will have to address GHG emissions, even if applications were filed (and determined complete) prior to that date.

- Reinforcing the fact that new and modified large stationary sources must already consider energy efficiency when selecting the best available control technology (BACT) for non-GHG pollutants. Greater energy efficiency results in lower GHG emissions.

**LEADING UP TO TODAY’S ACTION**

- On April 2, 2007, the Supreme Court found that GHGs, including carbon dioxide, are air pollutants covered by the CAA. *Massachusetts v. EPA*, 549 U.S. 497 (2007). The case arose from EPA’s denial of a petition for rulemaking filed by environmental, renewable energy, and other organizations requesting that EPA control emissions of GHGs from new motor vehicles and new motor vehicle engines under section 202(a) of the CAA.

- The Court found that the Administrator was required to determine whether or not emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. This determination is known as an “endangerment finding.”

- On August 30, 2007, EPA issued a PSD permit to Deseret Power Electric Cooperative, authorizing it to construct a new waste-coal-fired electric generating unit near its existing Bonanza Power Plant, in Bonanza, Utah. The permit did not include emissions control requirements known as best available control technology (BACT) limits for CO2. EPA acknowledged the *Massachusetts* decision but found that decision alone did not require PSD permits to include limits on CO2 emissions.

- Sierra Club challenged the Deseret permit. On November 13, 2008, the Environmental Appeals Board (EAB) remanded the permit to EPA to reconsider “whether or not to impose a CO2 BACT limit in light of the ‘subject to regulation’ definition under the CAA.” The remand was based in part on EAB’s finding that
there was not an established EPA interpretation of the regulatory phrase “subject to regulation.

• On December 18, 2008, then-Administrator Johnson issued a memorandum that established an interpretation of this regulatory phrase.

• On December 31, 2008, Sierra Club and 14 other environmental, renewable energy, and citizen organizations petitioned EPA to reconsider the PSD interpretative memo issued by then-Administrator Johnson.

• On February 17, 2009, Administrator Jackson granted the Petition for Reconsideration of the December 18, 2008 memorandum and indicated that EPA would utilize a rulemaking process to solicit comment on Administrator Johnson’s memorandum and related considerations reflected in the opinion of EPA’s Environmental Appeals Board in the Deseret decision.

• On April 17, 2009, EPA proposed to find under the CAA that greenhouse gases in the atmosphere endanger the public health and welfare of current and future generations. The Agency also proposed to find that the combined emissions of GHGs from new motor vehicles and new motor vehicle engines are contributing to this mix of greenhouse gases in the atmosphere, and thus the climate change problem.

• On September 15, 2009, EPA and the Department of Transportation’s National Highway Traffic Safety Administration (NHTSA) issued a joint proposal to establish a national program consisting of new standards for model year 2012 through 2016 light-duty vehicles that will reduce greenhouse gas emissions and improve fuel economy. EPA expects to complete this rule shortly.

• On September 30, 2009, EPA proposed new thresholds for GHG emissions that define which sources would need to obtain Clean Air Act permits under the New Source Review and Title V operating permits programs. The proposed thresholds would tailor these permit programs to limit which facilities would be required to obtain permits. EPA intends to complete this rule in the near future.

• On September 30, 2009, EPA issued its reconsideration proposal in this action, as discussed above.

• On December 7, 2009, EPA finalized its finding under Clean Air Act that greenhouse gases in the atmosphere endanger both the public health and the environment for current and future generations. The agency also found that the combined emissions of greenhouse gases from new motor vehicles are contributing to the buildup of greenhouse gases in the atmosphere, and thus to the climate change problem. This action provides the legal basis for the final emissions requirements for new cars and trucks.
BACKGROUND

- Congress established the NSR program as part of the 1977 Clean Air Act Amendments and modified it in the 1990 Amendments. NSR is a preconstruction permitting program that serves two important purposes:

  1. Ensures the maintenance of air quality standards or, where there are not air quality standards, it ensures that air quality does not significantly worsen when factories, industrial boilers, and power plants are modified or added. In areas that do not meet the national ambient air quality standards, NSR assures that new emissions do not slow progress toward cleaner air. In areas that meet the standards, especially pristine areas like national parks, NSR assures that new emissions fall within air quality standards.

  2. Ensures that state-of-the-art control technology is installed at new plants or at existing plants that are undergoing a major modification.
Attachment 5
Final Rule: Prevention of Significant Deterioration
and Title V Greenhouse Gas Tailoring Rule

FACT SHEET

ACTION

• On May 13, 2010, the U.S. Environmental Protection Agency (EPA) issued a final rule that establishes a common sense approach to addressing greenhouse gas emissions from stationary sources under the Clean Air Act (CAA) permitting programs. This final rule sets thresholds for greenhouse gas (GHG) emissions that define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and title V Operating Permit programs are required for new and existing industrial facilities.

• This final rule “tailors” the requirements of these CAA permitting programs to limit which facilities will be required to obtain PSD and title V permits. Facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation’s largest GHG emitters—power plants, refineries, and cement production facilities.

• Emissions from small farms, restaurants, and all but the very largest commercial facilities will not be covered by these programs at this time.

• The rule establishes a schedule that will initially focus CAA permitting programs on the largest sources with the most CAA permitting experience. The rule then expands to cover the largest sources of GHG that may not have been previously covered by the CAA for other pollutants. Finally, it describes EPA plans for any additional steps in this process.

• The CAA permitting program emissions thresholds for criteria pollutants such as lead, sulfur dioxide and nitrogen dioxide, are 100 and 250 tons per year (tpy). While these thresholds are appropriate for criteria pollutants, they are not feasible for GHGs because GHGs are emitted in much higher volumes.

• Without this tailoring rule, the lower emissions thresholds would take effect automatically for GHGs on January 2, 2011. PSD and title V requirements at these thresholds would lead to dramatic increases in the number of required permits —tens of thousands of PSD permits and millions of title V permits. State, local, and tribal permitting authorities would be overwhelmed and the programs’ abilities to manage air quality would be severely impaired.

• EPA will phase in the CAA permitting requirements for GHGs in two initial steps.
### Step 1. (January 2, 2011 – June 30, 2011)

- Only sources currently subject to the PSD permitting program (i.e., those that are newly-constructed or modified in a way that significantly increases emissions of a pollutant other than GHGs) would be subject to permitting requirements for their GHG emissions under PSD.

- For those projects, only GHG increases of 75,000 tpy or more of total GHG, on a CO₂e basis, would need to determine the Best Available Control Technology (BACT) for their GHG emissions.

- Similarly for the operating permit program, only sources currently subject to the program (i.e., newly constructed or existing major sources for a pollutant other than GHGs) would be subject to title V requirements for GHG.

- During this time, no sources would be subject to Clean Air Act permitting requirements due solely to GHG emissions.

### Step 2. (July 1, 2011 to June 30, 2013)

- Step 2 will build on Step 1. In this phase, PSD permitting requirements will cover for the first time new construction projects that emit GHG emissions of at least 100,000 tpy even if they do not exceed the permitting thresholds for any other pollutant. Modifications at existing facilities that increase GHG emissions by at least 75,000 tpy will be subject to permitting requirements, even if they do not significantly increase emissions of any other pollutant.

- In Step 2, operating permit requirements will, for the first time, apply to sources based on their GHG emissions even if they would not apply based on emissions of any other pollutant. Facilities that emit at least 100,000 tpy CO₂e will be subject to title V permitting requirements.

- EPA estimates that about 550 sources will need to obtain title V permits for the first time due to their GHG emissions. The majority of these newly permitted sources will likely be solid waste landfills and industrial manufacturers. There will be approximately 900 additional PSD permitting actions each year triggered by increases in GHG emissions from new and modified emission sources.

### Additional Step 3 Outlined in this Rule

- In this final rule, EPA commits to undertake another rulemaking, to begin in 2011 and conclude no later than July 1, 2012. That action will take comment on an additional step for phasing in GHG permitting, and may discuss whether certain smaller sources can be permanently excluded from permitting. EPA also plans to explore a range of opportunities
for streamlining future GHG permitting that have the potential to significantly reduce permitting burdens. EPA will propose viable streamlining options in the “Step 3” rulemaking.

- Step three, if established, will not require permitting for sources with greenhouse gas emissions below 50,000 tpy.

- EPA will not require permits for smaller sources in step three or through any other action until at least April 30, 2016.

**Other Steps Outlined in this Rule**

- By the end of April 2015, EPA will complete a study on remaining GHG permitting burdens that would exist if we applied the program to smaller sources. We will consider the results of the study to complete a rule by April 30, 2016 further addressing Clean Air Act permitting for these facilities. In that rule we may decide that successful streamlining will allow us to phase in more sources, but we may also decide that certain smaller sources need to be permanently excluded from permitting.

**Implementation**

- Step 1 of this final rule will take effect on January 2, 2011. The final rule asks states to inform EPA whether they must make rule changes to implement the new GHG emissions thresholds, and when such changes will be adopted. If there are cases where this cannot happen by January 2, 2011, EPA will take appropriate action to ensure that the existing CAA permitting rules do not apply to sources excluded by today’s rule.

- EPA also plans to develop supporting guidance and other information to assist permitting authorities as they begin to address permitting actions for GHG emissions for the first time. EPA will be actively working with states on technical information and data needs related to identifying BACT requirements for PSD permits. The guidance would first cover source categories that typically emit GHGs at levels exceeding the thresholds established through this rulemaking.

**Covered Pollutants**

- On April 1, 2010, EPA and the Department of Transportation’s National Highway Safety Administration issued the first national rule limiting GHG emissions from cars and light trucks. The requirements of the GHG light duty vehicle rule take effect on January 2, 2011, the earliest date that 2012 vehicles meeting the standards can be sold in the United States. On that date, CAA permitting program requirements will apply to stationary sources of these pollutants.
• The final rule addresses emissions of a group of six GHGs:

1. Carbon dioxide (CO₂)
2. Methane (CH₄)
3. Nitrous oxide (N₂O)
4. Hydrofluorocarbons (HFCs)
5. Perfluorocarbons (PFCs)
6. Sulfur hexafluoride (SF₆)

• Some of these GHGs have a higher global warming potential than others. To address these differences, the international standard practice is to express GHGs in carbon dioxide equivalents (CO₂e). Emissions of gases other than CO₂ are translated into CO₂e by using the gases’ global warming potentials. Under this rule, EPA is using CO₂e as the metric for determining whether sources are covered by permitting programs. Total GHG emissions will be calculated by summing the CO₂e emissions of all of the six constituent GHGs.

BACKGROUND

• On April 2, 2007, the Supreme Court found that GHGs, including carbon dioxide, are air pollutants covered by the CAA. *Massachusetts v. EPA*, 549 U.S. 497 (2007).

• The Court found that EPA was required to determine whether or not emissions of GHGs from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. In April 2009, EPA responded to the Court by proposing a finding that greenhouse gases contribute to air pollution that may endanger public health or welfare. On December 7, 2009, the Administrator signed two distinct findings regarding GHG under section 202(a) of the CAA:

  **Endangerment Finding:** The Administrator found that the current and projected atmospheric concentrations of the six, key, well-mixed GHGs— CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆ --threaten the public health and welfare of current and future generations.

  **Cause or Contribute Finding:** The Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

• These findings, which were published December 15, 2009, do not impose any requirements on industry or other entities. However, they were a prerequisite to finalizing the GHG standards for light-duty vehicles.

• On December 18, 2008, EPA issued a memorandum, "EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program" (known as the “Johnson Memo” or the “PSD Interpretive Memo”).
Whether a pollutant is “subject to regulation” is important for the purposes of determining whether it is covered under the CAA permitting programs. The PSD Interpretive Memo established that a pollutant is “subject to regulation” only if it is subject to either a provision in the CAA or regulation adopted by EPA under the CAA that requires actual control of emissions of that pollutant. On February 17, 2009, EPA granted a petition for reconsideration of this memorandum.

- On March 29, 2010, the Administrator signed a notice conveying the agency’s decision to continue applying the PSD Interpretive Memo’s interpretation of “subject to regulation.” EPA concluded that the “actual control interpretation” is the most appropriate interpretation. The agency established that CAA permitting requirements apply to a newly regulated pollutant at the time a regulatory requirement to control emissions of that pollutant “takes effect” (rather than upon promulgation or the legal effective date of the regulation containing such a requirement). Based on the anticipated promulgation of the light duty vehicle rule, the notice stated that the GHG requirements of the vehicle rule would trigger CAA permitting requirements for stationary sources on January 2, 2011.

- On April 1, 2010, EPA finalized the light duty vehicle rule controlling GHG emissions. This rule confirmed that January 2, 2011 is the earliest date that a 2012 model year vehicle meeting these rule requirements may be sold in the United States.

- Congress established the NSR program as part of the 1977 Clean Air Act Amendments and modified it in the 1990 Amendments. NSR is a preconstruction permitting program that serves two important purposes:

  1. Ensures the maintenance of air quality standards or, where there are not air quality standards, it ensures that air quality does not significantly worsen when factories, industrial boilers, and power plants are modified or added. In areas that do not meet the national ambient air quality standards, NSR assures that new emissions do not slow progress toward cleaner air. In areas that meet the standards, especially pristine areas like national parks, NSR assures that new emissions fall within air quality standards.

  2. Ensures that state-of-the-art control technology is installed at new plants or at existing plants that are undergoing a major modification.

- New major stationary sources and major modifications at existing major stationary sources that meet emissions applicability thresholds outlined in the CAA and in existing PSD regulations must obtain a PSD permit outlining how they will control emissions. The permit requires facilities to apply BACT, which is determined on a case-by-case basis taking into account, among other factors, the cost and effectiveness of the control.

- The 1990 Amendments required that all states develop operating permit programs. Under these programs, known as title V Operating Permits programs, every major industrial source...
of air pollution (and some other sources) must obtain an operating permit. The permits,
which are reviewed every 5 years, contain all air emission control requirements that apply to
the facility, including the requirements established as part of the preconstruction permitting
process.
Attachment 5-A
Clean Air Act Permitting for Greenhouse Gases: Guidance and Technical Information

FACT SHEET

Action

- On November 10, 2010, the U.S. Environmental Protection Agency (EPA) made available important resources and guidance to assist state and local permitting authorities as they implement their Clean Air Act (CAA) permitting programs for greenhouse gas (GHG) emissions. These tools include guidance on implementing the Prevention of Significant Deterioration (PSD) and Title V Operating Permit Programs for GHGs and technical resources to assist states and sources in identifying control measures for GHG emissions.

- EPA’s GHG Tailoring Rule, issued in May 2010, established a common sense approach to permitting GHG emissions. Under the rule, permitting will focus on the largest industrial sources, those emitting nearly 70 percent of the greenhouse gas pollution from stationary sources, while shielding millions of small businesses that make up the vast majority of the U.S. economy. EPA’s guidance and technical resources are the next step in the agency’s common-sense approach to identifying cost-effective emissions control options for these large emitters.

- Permitting authorities have long-standing experience working together with large industrial facilities, including electric generating units, cement production facilities, and petroleum refineries, and are best suited to issue Clean Air Act permits to sources of GHG emissions.

- EPA is working closely with permitting authorities and will take any necessary actions to ensure that by January 2011:
  - permitting agencies have the authority to permit GHGs,
  - only the largest emitters of GHGs, as outlined in the GHG Tailoring Rule, will need to obtain permits,
  - necessary guidance, technical information, and support are available, and
  - the states have the mechanisms in place to ensure permitting can occur without any interruptions.
GHG Permitting Tools

- **Permitting Guidance for GHGs** – EPA’s “PSD and Title V Permitting Guidance for Greenhouse Gases” provides the basic information that permit writers and applicants need to address GHG emissions in permits. The guidance:
  
  - applies long-standing PSD and Title V permitting requirements and processes to GHGs;
  - reiterates that BACT determinations will continue to be a state, and project specific decision;
  - does not prescribe GHG BACT for any source type;
  - emphasizes the importance of BACT options that improve energy efficiency;
  - points out that Carbon Capture and Sequestration (CCS) is a promising technology in the early stage of demonstration and commercialization. While it should be identified as an available control measure in the first step of BACT, it is currently an expensive technology and unlikely to be selected as BACT in most cases;
  - clarifies that EPA does not intend to require GHGs to be addressed in permits issued before January 2, 2011 that do not become effective until after this date;
  - notes that biomass could be considered BACT after taking into account environmental, energy and economic considerations and state and federal policies that promote biomass for energy-independence and environmental reasons.
  - provides flow charts and examples that illustrate the key points of the traditional five-step process for determining BACT for GHGs; and
  - identifies technical resources related to GHG emissions and controls.

- This guidance does not establish a new approach for selecting BACT for GHG emissions. Rather, permitting authorities may continue to use the five-step process that EPA has recommended and that they they have used for over 30 years. The process starts by looking at all available emission reduction options and narrows the options by taking into account technical feasibility, cost, and other economic, environmental and technical considerations. The five-steps include:
  
  - Step 1: Identify all available control technologies.
  - Step 2: Eliminate technically infeasible options.
Step 3: Evaluate and rank remaining control technologies based on environmental effectiveness.

Step 4: Evaluate cost effectiveness of controls and energy and other environmental impacts

Step 5: Select the BACT.

- The public may view and provide feedback on the GHG permitting guidance at http://www.epa.gov/regulations/guidance/byoffice-oar.html. EPA will publish a notice in the Federal Register announcing the availability of the GHG permitting guidance and the opportunity for public comment. The Agency welcomes public feedback on the guidance over the next few weeks on any aspect that contains technical or calculation errors or where the guidance would benefit from additional clarity.

- **White Papers on GHG Control Measures** – These technical “white papers” focus on the industrial sectors listed below that emit the highest amounts of GHGs. They provide basic information on GHG control options to assist states and local air pollution control agencies, tribal authorities and regulated entities implementing measures to reduce GHGs, particularly in the assessment of Best Available Control Technology (BACT) under the PSD permitting program. These papers provide basic technical information that may be useful in a BACT analysis but they do not define BACT for each sector. The industrial sectors covered include:
  - Electric Generating Units
  - Large Industrial/Commercial/Institutional Boilers
  - Pulp and Paper
  - Cement
  - Iron and Steel Industry
  - Refineries
  - Nitric Acid Plants

- **Enhancements to the Control Technology Clearinghouse (known as the RACT/BACT/LAER Clearinghouse, or the RBLC)** – This website provides access to information and decisions about pollution control measures required by air pollution emission permits that will be issued for GHGs by state and local permitting agencies. The information is accessible to all permitting agencies working on similar projects. The expanded RBLCS includes GHG control and test data, and a GHG message board for permitting authorities.
• **GHG Mitigation Strategies Database** – EPA expects technology capable of reducing GHG emissions in various major industrial sectors will evolve. Recognizing the importance of tracking these developments, EPA has developed a new online tool which includes specific performance and cost data on current and developing GHG control measures. It also provides available data on other potential environmental impacts a GHG control measure may have. Currently, the database includes information on GHG controls for electric generating and cement production.

• **GHG Permitting Action Team** – EPA has formed this team to help permitting authorities respond to GHG permitting questions. The GHG Permitting Action Team, comprised of experienced senior staff and permitting managers from EPA, will work together to provide a smooth transition to GHG permitting. Team members for each region and their contact information are listed on EPA’s GHG Permitting Webpage: [www.epa.gov/nsr/ghgpermitting.html](http://www.epa.gov/nsr/ghgpermitting.html)

• **Background** – The Clean Air Act Advisory Committee (CAAAC) provides advice and counsel to EPA on a variety of important air quality policy and technical issues. In October 2009 the CAAAC established a Climate Change Work Group which included representatives from state and local governments, a variety of industries and environmental and public health non-profit organizations.

  ○ In connection with it efforts, the Work Group issued two reports. The reports recommended that EPA develop a number of technical tools and resources, including GHG specific guidance to be used to assist permitting agencies in determining BACT for GHGs. The tools EPA is making available today respond to the recommendations and suggestions of the CAAAC Work Group. The recommendations are listed on: [http://www.epa.gov/air/caaac/climatechangewg.html](http://www.epa.gov/air/caaac/climatechangewg.html)

**Background**

• On April 2, 2007, the Supreme Court found that GHGs, including carbon dioxide, fit within the definition of air pollutant in the CAA. *Massachusetts v. EPA*, 549 U.S. 497 (2007). The Court found that when responding to a rulemaking petition under section 202(a) of the CAA, EPA was required to determine whether or not GHG emissions from new motor vehicles cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision.

• On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under section 202(a) of the CAA:
Endangerment Finding: The Administrator found that the current and projected atmospheric concentrations of the six, key, well-mixed GHGs—CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆—threaten the public health and welfare of current and future generations.

Cause or Contribute Finding: The Administrator found that the combined emissions of these well-mixed GHGs from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution which threatens public health and welfare.

- These findings, which were published December 15, 2009, do not impose any requirements on industry or other entities. However, they were a prerequisite to finalizing the GHG standards for light-duty vehicles.

- On December 18, 2008, EPA issued a memorandum, "EPA's Interpretation of Regulations that Determine Pollutants Covered by Federal Prevention of Significant Deterioration (PSD) Permit Program" (known as the “Johnson Memo” or the “PSD Interpretive Memo”). Whether a pollutant is “subject to regulation” is important for the purposes of determining whether it is covered under the CAA permitting programs. The PSD Interpretive Memo established that a pollutant is “subject to regulation” only if it is subject to either a provision in the CAA or regulation adopted by EPA under the CAA that requires control of emissions of that pollutant. On February 17, 2009, EPA granted a petition for reconsideration of this memorandum.

- On March 29, 2010, the Administrator signed a notice conveying the Agency’s decision to continue applying the PSD Interpretive Memo’s interpretation of “subject to regulation.” EPA concluded that the “actual control interpretation” is the most appropriate interpretation. The Agency established that CAA permitting requirements apply to a newly regulated pollutant at the time a regulatory requirement to control emissions of that pollutant “takes effect” (rather than upon promulgation or the legal effective date of the regulation containing such a requirement). Based on the anticipated promulgation of the light-duty vehicle rule, the notice stated that the GHG requirements of the vehicle rule would trigger CAA permitting requirements for stationary sources on January 2, 2011.

- On April 1, 2010, EPA finalized the light-duty vehicle rule controlling GHG emissions. This rule confirmed that January 2, 2011, is the earliest date that a 2012 model year vehicle meeting these rule requirements may be sold in the United States.

- GHG emissions from the largest sources will, for the first time, be covered by the PSD Program on January 2, 2011 and by the Operating Permit Program on July 1, 2011. These permitting programs, required under the Clean Air Act, are proven tools for
protecting air quality and can be used to control GHG emissions. But the thresholds established in the Act for other air pollutants, 100 and 250 tons per year, were based on traditional pollutants and were not designed to be applied to GHGs.

- On May 13, 2010, EPA issued the final GHG Tailoring Rule. This rule effectively raised the thresholds for GHG emissions that define when permits under the PSD and Title V Operating Permit programs are required for new and existing industrial facilities. Without the GHG Tailoring Rule, the thresholds established in the CAA for other pollutants would apply to GHGs. The phased in approach, established in the Tailoring Rule, provides time for large industrial facilities and state governments to develop the capacity to implement permitting requirements for GHGs.

  - Starting in January 2011, large industrial facilities that must already obtain Clean Air Act permits for non-GHGs must also include GHG requirements in these permits if they increase are newly constructed and have the potential to emit 75,000 tons per year of carbon dioxide equivalent (CO₂e) or more or modify and increase GHG emissions by that amount.

  - Starting in July 2011, in addition to facilities described above, all new facilities emitting GHGs in excess of 100,000 tons of per year CO₂e and facilities making changes that would increase GHG emissions by at least 75,000 tpy CO₂e, and that also exceed 100/250 tons per year of GHGs on a mass basis, will be required to obtain construction permits that address GHG emissions (regardless of whether they emit enough non-GHG pollutants to require a permit for those emissions.)

  - Operating permits will be needed by all sources that emit at least 100,000 tons of GHG per year on a CO₂e basis beginning in July 2011.

  - Sources less than 50,000 tons of GHGs per year on a CO₂e basis will not be required to obtain permits for GHGs before 2016.

- Congress established the NSR program as part of the 1977 Clean Air Act Amendments and modified it in the 1990 Amendments. NSR is a preconstruction permitting program that serves two important purposes:

  1. Ensures the maintenance of air quality standards or, where there are not air quality standards, ensures that air quality does not significantly worsen when factories, industrial boilers, or power plants are modified or added. In areas that do not meet the national ambient air quality standards, so-called nonattainment NSR assures that new emissions do not slow progress toward cleaner air. In areas that meet the standards, especially pristine areas like national parks,
NSR’s PSD program assures that new emissions fall within air quality standards.

2. Ensures that state-of-the-art control technology is installed at new plants or at existing plants that are undergoing a major modification. New major stationary sources and major modifications at existing major stationary sources that meet emissions applicability thresholds outlined in the CAA and in existing PSD regulations must obtain a PSD permit outlining how they will control emissions. The permit requires facilities to apply best available control technology, which is determined on a case-by-case basis taking into account, among other factors, the cost and effectiveness of the control.

**Additional Information**

- The GHG technical information and guidance materials are accessible on EPA’s website at: [www.epa.gov/nsr/ghgpermitting](http://www.epa.gov/nsr/ghgpermitting).

- For more information on the permitting guidance for GHG, please contact Dave Svendsgaard at 919-541-2380, or [svendsgaard.dave@epa.gov](mailto:svendsgaard.dave@epa.gov).

- For more information on the GHG control measures white papers, please contact David Solomon at 919-541-5375, or [solomon.david@epa.gov](mailto:solomon.david@epa.gov).

- For more information on the enhancements to the RACT/BACT/LAER Clearinghouse, please contact Iliam Rosario at 919-541-5308, or [rosario.iliam@epa.gov](mailto:rosario.iliam@epa.gov).

- For more information on the GHG mitigation strategies database, please contact Nick Hutson at 919-541-2968, or [hutson.nick@epa.gov](mailto:hutson.nick@epa.gov).
Attachment 6
FACT SHEET

PROPOSED AIR TOXICS STANDARDS FOR INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL BOILERS AND PROCESS HEATERS AT MAJOR SOURCE FACILITIES

ACTION

- On April 29, 2010, the Environmental Protection Agency (EPA) issued a proposed rule that would reduce emissions of toxic air pollutants from new and existing industrial, commercial, and institutional boilers and process heaters at major source facilities. A major source facility emits or has the potential to emit 10 or more tons per year (tpy) of any single air toxic or 25 tpy or more of any combination of air toxics.

- The proposed rule would reduce emissions of a number of toxic air pollutants, including mercury, other metals, and organic air toxics, which include polycyclic organic matter (POM) and dioxins.

- This rule will apply to two types of units, neither of which burn solid waste:
  - Boilers, which burn natural gas, fuel oil, coal, biomass (e.g., wood), refinery gas, or other gas to produce steam. The steam is used to produce electricity or provide heat.
  - Process heaters, which heat raw or intermediate materials during an industrial process.

- Boilers and process heaters are used at industrial facilities such as refineries, chemical and manufacturing plants, and paper mills and may stand alone to provide heat for commercial facilities such as shopping malls or institutional facilities such as universities. Most major source boilers and process heaters are located at industrial facilities.
  - EPA has identified 11 different subcategories of boilers and process heaters based on the design of the various types of units. The proposed rule would include specific requirements for each subcategory.

- This rulemaking will reduce toxic air pollutants, also known as hazardous air pollutants or air toxics. These pollutants are known or suspected to cause cancer and other serious health and environmental effects.
  - In 2013, EPA estimates 1,900 to 4,800 premature deaths would be avoided by implementing this proposed rule.
  - The rule would cut emissions of pollutants that are of particular concern for children. Mercury and lead can adversely affect developing brains – including effects on IQ, learning, and memory.
  - The rule would also reduce emissions of other pollutants including cadmium, dioxin, furans, formaldehyde and hydrochloric acid. These pollutants can cause cancer or other adverse health effects in adults and children.
  - Mercury, lead, dioxin, and furans can build up in the environment, causing serious environmental effects and harm to the food chain as well.
• EPA will accept comment on the proposal for 45 days after publication in the Federal Register. Also, EPA will hold a public hearing on this rule. Details will be posted at www.epa.gov/airquality/combustion as they become available.

PROPOSED REQUIREMENTS
• For all new and existing natural gas- and refinery gas-fired units, the proposed rule would establish a work practice standard instead of emission limits. The operator would be required to perform an annual tune-up for each unit.

• For all existing units with a heat input capacity less than 10 million British thermal units per hour (MMBtu/hr), the proposed rule would establish a work practice standard instead of emission limits. The operator would be required to perform a tune-up for each unit once every two years.

• Existing major source facilities would also be required to conduct an energy assessment to identify cost-effective energy conservation measures.

• The proposed rule would establish emission limits for all other existing and new boilers and process heaters located at major sources. The proposal would establish emission limits for:
  o mercury,
  o dioxin,
  o particulate matter (PM) (as a surrogate for non-mercury metals),
  o hydrogen chloride (HCl) (as a surrogate for acid gases), and
  o carbon monoxide (CO) (as a surrogate for non-dioxin organic air toxics)

BENEFITS AND COSTS
• EPA estimates that there are approximately 13,555 boilers and process heaters at major sources in the United States and that approximately 46 new units would be installed over the next 3 years.

• EPA estimates that implementation of the rulemaking, as proposed, would reduce nationwide emissions from major source boilers and process heaters by:
  o 15,000 pounds per year of mercury,
  o 3,200 tpy of non-mercury metals,
  o 37,000 tpy of HCl,
  o 50,000 tpy of PM,
  o 340,000 tpy of SO2, and
  o 722 grams per year of dioxin
  o 1,800 tpy of volatile organic compounds

• These emissions reductions would lead to the following annual health benefits. In 2013, this rule will protect public health by avoiding:
  o 1,900 to 4,800 premature deaths,
  o 1,300 cases of chronic bronchitis,
  o 3,000 nonfatal heart attacks,
  o 3,200 hospital and emergency room visits,
• 3,000 cases of acute bronchitis,
• 250,000 days when people miss work,
• 33,000 cases of aggravated asthma, and
• 1,500,000 acute respiratory symptoms.

• The value of the benefits ranges from $17 billion to $41 billion in 2013 – outweighing the costs by at least $14 billion.

• EPA estimates the total national capital cost for the final rule to be approximately $9.5 billion in the year 2013, with a total national annual cost of $2.9 billion in the year 2013. The annual cost, which considers fuel savings, includes control device operation and maintenance as well as monitoring, recordkeeping, reporting, and performance testing.

THREE SEPARATE BUT RELATED ACTIONS
• EPA has proposed a rule that would reduce emissions of toxic air pollutants from new and existing industrial, commercial, and institutional boilers and process heaters located at area source facilities. An area source facility has the potential to emit less than 10 tpy of any single air toxic or less than 25 tpy of any combination of air toxics. (http://epa.gov/airquality/combustion/actions.html)

• EPA has proposed a definition of solid waste. The definition could potentially affect some units currently considered boilers by moving them into category of commercial and industrial solid waste incinerators if they burn solid waste. (http://www.epa.gov/wastes/nonhaz/definition.htm)

• EPA has also proposed a rule to reduce air toxics from Commercial and Industrial Solid Waste Incinerators (CISWI). This proposed rule reflects the Agency’s proposed definition of solid waste. (http://epa.gov/airquality/combustion/actions.html)

BACKGROUND
• The CAA requires EPA to develop rules to reduce air toxics emissions from categories of facilities that emit one or more of 187 listed toxic air pollutants. These rules require the application of strict emissions controls known as maximum achievable control technology.

• EPA identified industrial boilers, commercial and institutional boilers, and process heaters as categories of major sources for which emission standards must be developed.

• The schedule for completing this rule is part of a court order, which requires the EPA Administrator to complete a final rule by December 16, 2010.
  o On September 13, 2004, EPA promulgated national emission standards for hazardous air pollutants for new and existing industrial/commercial/institutional boilers and process heaters.

• On June 19, 2007, the United States Court of Appeals for the District of Columbia Circuit vacated and remanded the 2004 standards. The court held that EPA incorrectly included boilers that combust solid waste in the development of the standards. The court stated that
any unit that combusts solid waste may not be included in the development of standards for boilers.
Attachment 7
MEMORANDUM

SUBJECT: National Pollutant Discharge Elimination System (NPDES) Permitting of Wastewater Discharges from Flue Gas Desulfurization (FGD) and Coal Combustion Residuals (CCR) Impoundments at Steam Electric Power Plants

FROM: James A. Hanlon, Director
Office of Wastewater Management

TO: Water Division Directors, Regions 1 – 10

The purpose of this memorandum is to provide you with interim guidance to assist National Pollutant Discharge Elimination System (NPDES) permitting authorities establish appropriate permit requirements for wastewater discharges from Flue Gas Desulfurization (FGD) systems and coal combustion residual (CCR) impoundments at Steam Electric Power Plants.

In October 2009, the Environmental Protection Agency (EPA) completed a study of wastewater discharges from the steam electric power generating industry. EPA’s Office of Water evaluated wastewater characteristics and treatment technologies, focusing to a large extent on wastewater from flue gas desulfurization (FGD) air pollution control systems and CCR impoundments because these sources comprise a significant fraction of the pollutants discharged by steam electric power plants. Based on this study, EPA decided to begin a rulemaking to address pollutants and wastestreams not covered by existing Effluent Limitations Guidelines (40 CFR Part 423). EPA expects to complete this rulemaking and promulgate revised effluent guidelines in late 2013. The attached technology-based permitting guidance (Attachment A) provides State and EPA permitting authorities with information on how to establish technology-based effluent limits for flue gas desulfurization (FGD) wastewater at steam electric facilities in NPDES permits issued between now and the effective date of revised effluent guidelines.

2 The Steam Electric Power Generating effluent limitations guidelines and standards (referred to in this report as “effluent guidelines”) apply to a subset of the electric power industry, namely those plants “primarily engaged in the generation of electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium.” The effluent guidelines are codified in the Code of Federal Regulations (CFR) at Title 40, Part 423 (40 CFR Part 423).
In December 2008, an impoundment failure released 5.4 million cubic yards of coal ash at the Tennessee Valley Authority’s (TVA) Kingston Fossil Plant in Tennessee and a subsequent release at TVA’s Widow Creek Fossil Plant in Alabama brought CCR storage and disposal into the national spotlight. These spills, as well as others that have occurred, highlight an area that has received little attention in the NPDES program and made us aware of the need to better protect water quality and human health from impoundment discharges. In response to the TVA spills, we also examined existing discharges from impoundments that manage CCRs and found that they have a potential to impact water quality. Many NPDES permits do not fully address water quality impacts of the discharges, and some pollutants of concern are not required to be reported in current permit applications. A detailed description of the reasonable potential analysis and development of limits necessary to ensure compliance with applicable water quality standards is an important component of all NPDES permit Fact Sheets. While a detailed and well documented reasonable potential analysis helps to demonstrate that permits are consistent with the requirements of State and Federal law, it also makes the permitting process transparent to the regulated community and the public. The attached water quality permitting guidance (Attachment B) is intended to assist State and EPA permitting authorities to better address water quality impacts associated with discharges from impoundments that manage CCRs.

The establishment of appropriate NPDES permitting requirements for these discharges is an important effort to better protect the environment and human health. You should work with authorized state programs to encourage them to utilize this guidance in their permit decision making process. In cases where State permitting authorities do not consider the attached guidance in developing permit conditions, you should work with the States to make appropriate changes. After working with States you should consider using objection authorities in cases where permits do not address appropriate technology-based or water quality-based permit limits to address FGD or CCR discharges consistent with 40 CFR 122.44. In accordance with the principles of good guidance, the public can provide comments to EPA for the Agency’s benefit and consideration.

If you have questions concerning this memorandum or the permit language, please contact Linda Boornazian, Director of the Water Permits Division, at 202-564-0221 or have your staff contact Scott Wilson of the Industrial Permit Branch at 202-564-6087 or Wilson.js@epa.gov.

cc: NPDES Branch Chiefs Regions 1 – 10

Attachments
Attachment A
Technology-based Effluent Limits
Flue Gas Desulfurization (FGD) Wastewater at Steam Electric Facilities

I. Background

In October 2009, the Environmental Protection Agency (EPA) completed a study of wastewater discharges from the steam electric power generating industry. EPA’s Office of Water evaluated wastewater characteristics and treatment technologies, focusing to a large extent on wastewater from flue gas desulfurization (FGD) air pollution control systems and coal ash ponds because these sources comprise a significant fraction of the pollutants discharged by steam electric power plants. Based on this study, EPA decided to begin a rulemaking to address pollutants and wastestreams not covered by existing regulations issued in 1982 (40 CFR Part 423). EPA expects to complete this rulemaking and promulgate revised effluent guidelines in late 2013. This document addresses how to establish technology-based effluent limits for flue gas desulfurization (FGD) wastewater discharged from steam electric facilities in NPDES permits issued until such time a revised effluent guideline is promulgated.

II. Requirement to Include Technology-Based Effluent Limitations in NPDES Permits

National Pollutant Discharge Elimination System (NPDES) permits must include effluent limitations as required by Clean Water Act (CWA) Section 301. 33 USC § 1342(a)(1). CWA section 301 requires that permits include limitations based on the application of statutorily-prescribed levels of technology (“technology-based effluent limitations”). 33 USC §§ 1311(b)(1)(A), 1311(b)(2)(A). Technology-based limitations constitute a minimum floor of controls that must be included in a permit, irrespective of the discharger’s effect on the quality of the receiving water. American Petroleum Inst. v. EPA, 661 F.2d 340, 344 (5th Cir. 1981).

The CWA requires EPA to establish technology-based effluent guidelines that reflect levels of technology control for certain categories of point sources. 33 USC §§ 1311(b), 1314(b). These effluent guidelines, where applicable, form the basis for the technology-based effluent limitations that must be incorporated into NPDES permits for individual dischargers. 33 USC § 1342(a)(1)(A).

Where EPA has not promulgated technology-based effluent guidelines for a particular class or category of industrial discharger, or where the technology-based effluent guidelines do not address all wastestreams or pollutants discharged by the industrial discharger, EPA must establish technology-based effluent limitations on a case-by-case basis in individual NPDES permits.

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2 The Steam Electric Power Generating effluent limitations guidelines and standards (referred to in this report as “effluent guidelines”) apply to a subset of the electric power industry, namely those plants “primarily engaged in the generation of electricity for distribution and sale which results primarily from a process utilizing fossil-type fuel (coal, oil, or gas) or nuclear fuel in conjunction with a thermal cycle employing the steam water system as the thermodynamic medium.” The effluent guidelines are codified in the Code of Federal Regulations (CFR) at Title 40, Part 423 (40 CFR Part 423).
permits, based on its best professional judgment or “BPJ.” EPA establishes such limitations pursuant to its authority under CWA section 402(a)(1) which authorizes EPA to include in permits “such conditions as the Administrator determines are necessary to carry out the provision of [the CWA]”. 33 USC § 1342(a)(1)(B). Because Section 301 of the CWA requires technology-based effluent limitations as a minimum level of control, such case-by-case technology limitations are “necessary to carry out the provision of this chapter” prior to the development of an applicable effluent guidelines and therefore must be included in any NPDES permit issued under section 402(a), as provided in EPA’s implementing regulations. See 40 CFR 125.3(a) (“Technology-based treatment requirements under section 301(b) of the Act represent the minimum level of control that must be imposed in a permit issued under Section 402 of the Act”). See also 40 CFR 122.44(a)(1); 125.3(c) and (d).

States authorized to implement the NPDES program act in the place of EPA for the purpose of issuing NPDES permits to dischargers. 33 USC § 1342(b). Although authorized states may include more stringent restrictions than the federal program, an authorized state must comply with specific minimum federal requirements of the NPDES program, 40 CFR 123.25. Therefore, an authorized state must include technology-based effluent limitations in its permits for pollutants not addressed by the effluent guidelines for that industry. 33 USC § 1314(b); 40 CFR 122.44(a)(1), 123.25,, 125.3. In the absence of an effluent guideline for those pollutants, the CWA requires permitting authorities to conduct the “BPJ” analysis discussed above on a case-by-case basis for those pollutants in each permit.

III. FGD Wastewater from Steam Electric Facilities

Wastewater Characteristics

The FGD system works by contacting the flue gas stream with a liquid slurry stream containing a sorbent. The contact between the streams allows for a mass transfer of sulfur dioxide as it is absorbed into the slurry stream. Other pollutants in the flue gas (e.g., metals, nitrogen compounds, chloride) are also transferred to the scrubber slurry and leave the FGD system via the scrubber blowdown. Depending upon the pollutant, the type of solids separation process and the solids dewatering process used, the pollutants may partition to either the solid phase (i.e., FGD solids) or the aqueous phase. FGD wastewaters generally contain significant levels of pollutants, including bioaccumulative pollutants such as arsenic, mercury, and selenium. The FGD wastewaters also contain significant levels of chloride, total dissolved solids (TDS), total suspended solids (TSS), and nitrogen compounds.

Many of the pollutants found in FGD wastewater cause environmental harm and can potentially present a human health risk. These pollutants are of particular concern because they can occur in quantities (i.e., total mass released) and/or concentrations that cause or contribute to in-stream excursions of EPA recommended water quality criterion for aquatic life or human health protection. In addition, some pollutants in the FGD wastewater present an ecological threat due to their tendency to persist in the environment and bioaccumulate in organisms. Several constituents present in FGD wastewater (e.g., arsenic, mercury, selenium) can readily bioaccumulate in exposed biota. This bioaccumulation is of particular concern due to the potential for impacting higher trophic levels, local terrestrial environments, and transient species
in addition to the aquatic organisms directly exposed to the wastewater. Aquatic systems with long residence times and exposure to bioaccumulative pollutants often experience persistent environmental effects and suffer from long recovery times.

The Steam Electric Power Generating effluent limitations guidelines and standards promulgated in 1982 include wastewater from wet FGD systems under the “catch-all” category of “low-volume wastes.” 40 C.F.R. 423.11(b). However, the 1982 rulemaking did not establish best available technology economically achievable (BAT) limits for FGD wastewaters because EPA lacked the data necessary to characterize pollutant loadings from these systems. See the Development Document for the 1982 effluent guidelines at p. 248 (noting that “[a]dditional studies will be needed to provide this data and to confirm the current discharge practices in the industry”). Accordingly, EPA determined that BAT limits for the FGD wastestream were outside the scope of the rulemaking, and explicitly reserved the development of such limits for a future rulemaking. See the Federal Register preamble for the 1982 effluent guidelines, 47 Fed. Reg. at 52291 (Nov. 19, 1982); Development Document at pp. 3, 7.

Technologies for Treating FGD Wastewater

Addressing the variety of pollutants present in FGD wastewater typically requires several stages of treatment to remove the suspended solids, particulate and dissolved metals, and other pollutants present. Historically, power plants have relied on settling ponds to treat FGD wastewater because NPDES permits generally focused on controlling suspended solids for this waste stream. In recent years, physical/chemical treatment systems and other more advanced systems have become more widely employed as effluent limits for metals and other pollutants have been included in permits. However, many power plants continue to employ settling ponds as their treatment technology, and often commingle the pond effluent with waste streams of significantly higher flows (e.g., ash transport water and cooling water).

Settling ponds use gravity to remove solid particles (i.e., suspended solids) from the wastewater. Metals in FGD wastewater are present in both soluble (i.e., dissolved) and particulate form. The metals that are present mostly in particulate form can usually be removed by a well-operated settling process that has a sufficiently long residence time. However, other pollutants such as selenium, boron, and magnesium, are present mostly in soluble form and are not effectively and reliably removed by wastewater settling ponds. For metals present in both soluble and particulate forms (such as mercury), the settling pond will not effectively remove the dissolved fraction. Technologies more advanced than settling ponds are available and more effective at removing both soluble and particulate forms of metals, and for removing other pollutants such as nitrogen compounds and total dissolved solids. Therefore, although each permit is case-specific, EPA expects as a general matter that settling ponds are unlikely to represent the BAT for control of pollutants in FGD wastewater, given that more effective treatment technologies have been demonstrated to reduce pollutants in FGD wastewater.

Physical/chemical treatment (i.e., chemical precipitation) is used to remove metal compounds from wastewater. Chemicals are added to the wastewater in a series of reaction

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tanks to convert soluble metals to insoluble metal hydroxide or metal sulfide compounds, which precipitate from solution and are removed along with other suspended solids. An alkali, such as hydrated lime, is typically added to adjust the pH of the wastewater to the point where metals precipitate out as metal hydroxides. Coagulants and flocculants are often added to facilitate the settling and removal of the newly-formed solids. Plants striving to maximize removals of mercury and other metals will also include sulfide addition (e.g., organosulfide) as part of the process. Adding sulfide chemicals in addition to the alkali provides even greater reductions of heavy metals due to the very low solubility of metal sulfide compounds, relative to metal hydroxides. Sulfide precipitation has been widely used in Europe and is being installed at multiple locations in the United States. Approximately thirty U.S. power plants include physical/chemical treatment as part of the FGD wastewater treatment system; about half of these plants employ both hydroxide and sulfide precipitation in the process. This technology is capable of achieving low effluent concentrations of various metals and the sulfide addition is particularly important for removing mercury; however, physical/chemical treatment systems are not effective at removing selenium, nitrogen compounds, and certain metals that contribute to high concentrations of total dissolved solids in FGD wastewater (e.g., calcium, magnesium, sodium).

Seven power plants in the U.S. are operating or constructing treatment systems that follow physical/chemical treatment with a biological treatment stage to supplement the metals removals with substantial additional reductions of nitrogen compounds and/or selenium. Three of these systems use a fixed film anoxic/anaerobic bioreactor optimized to remove selenium from the wastewater. The bioreactor alters the form of selenium, reducing selenate and selenite to elemental selenium which is then captured by the biomass and retained in treatment system residuals. The conditions in the bioreactor are also conducive to forming metal sulfide complexes to facilitate additional removals of mercury, arsenic, and other metals. In addition, the anoxic conditions in the bioreactor remove nitrates by denitrification, and if necessary the bioreactor can be modified to include a step to nitrify and remove ammonia. Four power plants operate the treatment system with the biological stage optimized for nitrogen removal by using a sequencing batch reactor to nitrify and denitrify the wastewater and produce very low concentrations of both ammonia and nitrates. This bioreactor design can also be operated to change the chemical form of selenium to promote its removal, but selenium removal by these systems has not yet been quantified.

Physical/chemical treatment systems can achieve low effluent concentrations for a number of pollutants, and reduce concentrations even further when combined with biological treatment systems, as described above and in EPA’s October 2009 report. However, these technologies have not been effective at removing substantial amounts of boron and pollutants such as sodium and magnesium that contribute to high concentrations of total dissolved solids. Another FGD wastewater treatment technology that can address these pollutants, as well as removing the pollutants treated by physical/chemical and biological technologies, is vapor-

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4 Two other power plants (in addition to the seven biological treatment systems) operate treatment systems that incorporate similar biological treatment stages, but with the biological stage preceded by settling ponds instead of a physical/chemical treatment stage. Although the primary treatment provided by such settling ponds at these plants is less effective at removing metals than physical/chemical treatment, these plants nonetheless further demonstrate the availability of the biological treatment system and its effectiveness at removing selenium and nitrates.
compression evaporation. This technology uses an evaporator to produce a concentrated wastewater stream and a reusable distillate stream. The concentrated wastewater stream is either disposed of or further processed to produce a solid by-product and additional distillate. The distillate stream can be reused as makeup water by the plant. One U.S. plant and six Italian plants are using this technology to treat FGD wastewater from their coal-fired generating units. Additional treatment systems of this design are projected to begin construction soon. The operation of the vapor-compression evaporation technology, which is commonly referred to by the term zero liquid discharge, is described in more detail in EPA’s October 2009 report.

Additional information about the characteristics and treatment of FGD wastewater and EPA’s environmental assessment of these wastes is presented in Chapters 4 and 6, respectively, of the October 2009 report.

IV. Effluent Limits for Internal FGD Waste Streams

Under 40 CFR part 122.45(h), in situations where an NPDES permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible, effluent limitations or standards may be imposed on internal waste streams before mixing with other waste streams or cooling water streams. Limitations on internal waste streams may be necessary, such as in situations where the wastes at the point of discharge are so diluted as to make monitoring impracticable, or the interferences among pollutants would make detection or analysis impracticable.

Many power plants combine FGD wastewater with ash transport wastewater and/or cooling water prior to discharge, which can result in FGD wastewaters being diluted by several orders of magnitude prior to the final outfall. In addition, ash ponds typically contain a variety of wastes (e.g., ash transport water, coal pile runoff, landfill/pond leachate, etc.) that when mixed with the FGD wastewater may make the analysis to measure compliance with FGD wastewater technology-based effluent limits impracticable. Because of the high degree of dilution and the number of waste stream sources containing similar pollutants, NPDES permits may need to include effluent limits and monitoring requirements on the internal FGD waste stream to ensure effective control of the pollutants present in FGD wastewater.

V. Use of Sufficiently Sensitive Analytical Methods

EPA’s October 2009 study demonstrated that the use of sufficiently sensitive analytical methods is critically important to detecting, identifying and measuring the concentrations of FGD pollutants. Where EPA has approved more than one analytical method for a pollutant, the Agency expects that applicants and permittees would select methods that are able to quantify the presence of pollutants in a given discharge at concentrations that are low enough to determine compliance with Water Quality Criteria. NPDES permit applicants should not use a less sensitive or less appropriate method, thus masking the presence of a pollutant in the discharge, when an EPA-approved method is available that can quantify the pollutant concentration at the lower levels needed for permit decision making. For purposes of permit applications and compliance monitoring, a method is “sufficiently sensitive” when (1) the method quantitation level is at or below the level of the applicable water quality criterion for the pollutant or (2) the
method quantitation level is above the applicable water quality criterion, but the amount of pollutant in a facility’s discharge is high enough that the method detects and quantifies the level of pollutant in the discharge.

It is essential that the Director make permitting decisions based on sufficiently sensitive data and, thus, sound science. The use of insufficiently sensitive analytical methods could lead the Director to make an incorrect determination about the presence or absence of a pollutant in an applicant’s discharge. These assumptions, in turn, could result in the Director making an incorrect permitting decision. Additionally, requiring insufficiently sensitive analytical methods in permits for compliance monitoring purposes could result in an undetected exceedance of permit limits.

Due to advances in instrumentation since a method was developed and the benefit of experienced analysts, an analyst may achieve detection limits (MDLs) and minimum levels (MLs) lower than the published values. Thus, the Director should not rely solely on sensitivity measures, such as MDLs or MLs, in published methods. These measures only give an upper, not a lower, bound on capabilities. In addition, EPA provides analysts the flexibility to modify an approved method without EPA review. This flexibility allows a laboratory to demonstrate performance better than the published MDL or ML.

VI. Disclaimer

This guidance document does not change or substitute for any legal requirements, though it does provide clarification of some regulatory requirements. While EPA has made every effort to ensure the accuracy of the discussion in this document, the obligations of the regulated community are determined by the relevant statutes, regulations, or other legally binding requirements. This guidance document is not legally enforceable and does not confer legal rights or impose legal obligations upon any member of the public, EPA, states, or any other agency. In the event of a conflict between the discussion in this document and any statute or regulation, this document would not be controlling. The word “should” as used in this guidance document does not connote a requirement, but does indicate EPA’s strongly preferred approach to assure effective implementation of legal requirements. This guidance may not apply in a particular situation based upon the circumstances, and EPA, states and Tribes retain the discretion to adopt approaches on a case-by-case basis that differ from the recommendations of this guidance document where appropriate. Permitting authorities will make each permitting decision on a case-by-case basis and will be guided by the applicable requirements of the CWA and implementing regulations, taking into account comments and information presented at that time by interested persons regarding the appropriateness of applying these recommendations to the particular situation. In addition, EPA may decide to revise this guidance document to reflect changes in EPA’s approach to implementing the regulations or to clarify and update text.

VII. Contacts

If you have questions concerning this guidance, contact Linda Boornazian, Director of the Water Permits Division, at 202-564-0221 or your staff may contact Scott Wilson of the Industrial
Branch at 202-564-6087 or Wilson.js@epa.gov. For additional technical information about the pending rulemaking, contact Mary Smith, Director of the Engineering and Analysis Division, at 202-566-1056. For information about the characteristics or treatment of FGD wastewater, your staff may contact Ronald Jordan of the Engineering and Analysis Division at 202-566-1003 or jordan.ronald@epa.gov.
Attachment B
Water Quality-Based Effluent Limits
Coal Combustion Waste Impoundments

I. Background

Recent Coal Combustion Residual Impoundment Spills

On December 22, 2008, a coal combustion residual (CCR) ash impoundment dam collapsed at the TVA Fossil plant located at Kingston, Tennessee. The breach released 5.4 million cubic yards of coal combustion residuals into tributaries of the Tennessee River, the Clinch and Emory Rivers, as well as surrounding areas. A second incident at a CCR impoundment at the TVA Widows Creek plant on January 9, 2009, added further attention to this issue. At 10,000 gallons, that second spill was dwarfed by the Kingston spill; however, the two incidents, as well as others that have occurred, highlighted the need for better management of CCR impoundments and the potential water quality impacts associated with the discharges. This document discusses potential water quality impacts associated with discharges from CCR impoundments and provides guidance on the methods to control them through water quality analysis and permit conditions.

Waste Streams and Wastewater Discharges

The Steam Electric Power Generating Category Effluent Limitations Guidelines (ELGs) found at 40 CFR Part 423 contain technology-based limits for most wastewater streams expected at facilities subject to that guideline. The ELGs apply to discharges from generating units located at establishments primarily engaged in the generation of electrical power for distribution and sale. The ELGs do not address discharges from steam electric generating units at facilities that are not primarily engaged in the production of electricity for distribution or sale. Steam electric facilities not covered by the ELGs typically supply electricity to industrial facilities such as paper mills. The waste streams discharged by either type of coal-fired steam electric plant include: fly ash and bottom ash transport water, metal cleaning wastes, once through cooling water, cooling tower blowdown, coal pile runoff, and low volume waste (a broadly-defined term that includes wastes such as boiler feedwater treatment waste water and flue gas desulfurization (FGD) wastewater). Discharges from both types of coal fired steam electric facilities are covered by this guidance. This guidance does not address other process related pollutants that are discharged from the industrial generating facilities described above. For those industrial facilities, permit writers must examine the specific process related waste streams and determine the need for permit limits applicable to the industry being regulated.

Treatment of wastewater at coal fired steam electric facilities varies significantly from plant to plant. Coal pile runoff is typically treated in settling ponds and is often segregated from other waste streams. In addition to fly ash and/or bottom ash, ash ponds often contain commingled wastes such as cooling tower blowdown, metal cleaning wastes, coal pile runoff, and low volume waste (including treated or untreated FGD wastewater).
Point Source Discharges of Seepage

In addition to traditional coal combustion effluent discharges, facilities with combustion waste impoundments are likely to discharge wastewater via seepage. Seepage can be collected via seepage interception systems that may be built into impoundments and are intended to manage seepage and prevent internal erosion of the structure. Wastewater from these systems is either pumped back into the impoundment or discharged. If the seepage is discharged directly to waters of the U.S., it is likely discharged via a discrete conveyance and thus is a point source discharge. Seepage discharges are expected to be relatively minor in volume compared to other discharges at a facility and could be inadvertently overlooked by permitting authorities. Although little data are available, seepage consists of CCRs including fly ash and bottom ash transport water and FGD wastewater and is likely to contain the same pollutants found in bottom ash and fly ash transport water and FGD wastewater. If seepage is discharged directly via a point source to a water of the U.S., the discharge must be addressed under the NPDES permit for the facility.

Permitting authorities will need to conduct a reasonable potential analysis and develop appropriate permit limits and other conditions similar to discharges from the ash pond and other sources at the facility as discussed below. Seepage discharges to surface water through a shallow ground water hydrologic connection have been controlled in a number of cases through NPDES permit requirements to either use lined impoundments to prevent seepage or to install seepage interception systems. Permitting authorities should examine the need for these types of requirements for hydrologically connected discharges that cannot be regulated through traditional NPDES outfalls. If effluent pollutant data for point source discharges of seepage are not included in the permit application, permitting authorities will need to request information from permittees.

II. Pollutants Present in CCR Impoundments

Application reporting requirements

The current NPDES application form 2C requires permittees to submit data for metals, GC/MS volatile and acid fraction compounds, and other parameters, such as nitrogen compounds that could be present in coal combustion effluent. Permittees typically submit this required data once every five years when they apply for permit renewal. For most parameters only one sample is collected and analyzed. However, permittees are required to provide daily maximum, monthly average and long term average data in the application for pollutants required to be monitored in the permit. Long term monitoring data for CCR discharges are required for pollutants including Total Suspended Solids (TSS) and Oil and Grease, which are limited by the ELG. Other long term monitoring data are required in the application if water quality based limits and/or monitoring requirements were included in the previous permit.
**Effluent data**

Effluent data shown below in Appendix A were collected by EPA as part of the ELG detailed study of steam electric plants. EPA began a detailed review of steam electric facilities in 2005 as a result of the Clean Water Act section 304(m) review process.

**Effluent Variability and Pollutants of Concern**

As shown below in Appendix A, effluent pollutant concentrations vary significantly between dischargers. The pollutant concentration variability is the result of factors such as the type of coal used. Note that none of the plants listed in Table 1 utilizes air emissions controls specific for mercury. Implementation of additional emissions controls for mercury or other pollutants would likely result in increased concentrations of those pollutants in CCR and the associated discharges. The current degree of effluent variability and the increasing use of emissions controls provide additional evidence supporting the need for permitting authorities to require site specific effluent data as part of permit applications.

**III. Water Quality Permitting Issues**

**Pollutants Potentially Exceeding Water Quality Criteria**

Appendix A shows that metals in CCR effluent are variable and have the potential to exist in relatively high concentrations. For reference, selected national recommended water quality criteria are shown in Appendix A. Based on information presented in Table 1, the following pollutants may be expected to be found in CCR effluent at concentrations that are greater than water quality criteria: Aluminum, Arsenic, Cadmium, Chromium, Copper, Iron, Manganese, Nickel, Selenium, Thallium, Chloride, and Nitrate/Nitrite. Barium, Lead, Mercury, and Silver also can exceed water quality criteria as measured at internal outfalls; however, due to dilution received through mixing the CCR waste stream with other effluents, they do not appear to exceed the criteria at the final outfall. Although water quality criteria were shown to be exceeded, the reasonable potential for a discharge to cause or contribute to an excursion of applicable Water Quality Standards in the receiving water will depend on site-specific conditions, the amount of in-stream dilution available, and the in-stream ambient pollutant concentration, as discussed below. While this comparison does not indicate that there is reasonable potential to exceed applicable water quality standards for each such discharge, it does demonstrate the need to collect data required by the application form 2C and to conduct a reasonable potential analysis for such discharges and establish water quality-based effluent limits where appropriate.

Other parameters shown in Table 1, such as Total Dissolved Solids and Sulfate are present in concentrations which could potentially cause or contribute to water quality impacts. Those parameters are not required to be monitored for the permit application Form 2C. Many states have not established numeric water quality criteria for parameters such as Total Dissolved Solids or Sulfate. Permit writers should be aware of this potential impact on the achievement of applicable narrative water quality criteria and may need to require that effluent data are submitted so that such impacts can be appropriately addressed by the permit. While permitting...
authorities have the option of requiring monitoring in the permit to obtain such data, it is preferable to request the information during the permit reissuance process. In cases where the reissued permit requires data to be collected, actions to address impairments may be unnecessarily delayed until the subsequent permit is issued. In cases where the previous permit did not require whole effluent toxicity testing, the permitting authority should consider requesting that data also be submitted with the application.

**Determining the Need for Water Quality Based Permit Limits**

Permitting authorities need to examine the impacts of a discharge relative to both numeric and narrative criteria. Most States have adopted implementation guidance to address the reasonable potential (RP) for a discharge to cause or contribute to an exceedance of numeric criteria. That guidance includes statistical tools and methods for permit writers to determine the RP for a discharge to exceed Water Quality Standards (WQS). A reasonable potential determination as to whether a discharge causes or contributes to an excursion of applicable water quality criteria is required for every discharge (see 40 CFR 122.44(d)).

Most State permitting authorities derived their specific implementation plan for determining RP and establishing water quality based permit limits using EPA’s Technical Support Document for Water Quality Based Toxics Control (TSD) (EPA 1991). In general, RP analysis compares the reasonable maximum in-stream pollutant concentration with water quality criteria to determine the need for effluent limits.

An initial part of the RP process is the determination of available in-stream dilution. Methods used to determine dilution in the mixing zone vary by state and are prescribed by WQS and the State’s mixing zone policy.

Using the available dilution, permitting authorities make a statistical comparison of in-stream effluent pollutant concentrations after mixing and water quality criteria to determine whether there is a reasonable potential to exceed the criteria. This is typically done by comparing the calculated 95th or 99th percentile of the effluent data with criteria. The TSD includes methodology that can be used to conduct that analysis and to derive the resulting permit limits.

Examination of the potential for a discharge to exceed the narrative criteria is a more difficult task that is complicated by a lack of clearly prescribed implementation guidance. CCR can contain fairly high concentrations of parameters that have the potential to impact water quality, such as Total Dissolved Solids, Sulfate, and Calcium that can cause excursions of narrative water quality standards. Since most states have not established numeric criteria for those parameters, permit writers must rely on narrative criteria when addressing potential water quality impacts. One tool states commonly use to address narrative criteria is whole effluent toxicity (WET) monitoring and limits. Chronic WET testing, which include measurement of sub-lethal effects of growth and fecundity, is used in most cases. However, in situations where a discharge is made to a larger waterbody permitting authorities often require acute WET testing based on an acute to chronic ratio. Most states have adopted procedures to determine which test methods and species are used as part of their implementation plans. The TSD also includes
guidance that is intended to assist with implementation of water quality based permit limits. WET testing measures the toxic effects of the complete mix of pollutants in a discharge and is a useful tool for measuring the impacts to aquatic life. Permit writers also have the option of requiring bioassessments to determine whether discharges are causing impacts and understand the specific causes. Another option is for the permitting authority to target CCR discharges in their stream surveillance activities and address impacts under the Total Maximum Daily Load program. State stream assessment programs may also utilize other tools to analyze the water quality of surface waters. State established tools that are used to translate narrative standards based on numeric data may be useful to permit writers attempting to protect water quality.

Use of Ambient Pollutant Data

Permit limits that fully protect water quality cannot be developed without taking into account the ambient pollutant concentration, also known as the background concentration. However, permit writers typically do not have access to defensible ambient pollutant data. In the absence of data, permit writers have often established water quality based permit limits using the assumption that the background concentration is zero.

The equation used to calculate waste load allocations for water quality based limits follows, as shown in the NPDES permit Writers Manual (EPA 1996)

\[ \frac{(Q_d C_d + Q_s C_s)}{Q_r} = C_r \]

Where:

- \( Q_d \) = waste discharge flow in million gallons per day (mgd) or cubic feet per second (cfs)
- \( C_d \) = pollutant concentration in waste discharge in milligrams per liter (mg/l)
- \( Q_s \) = background stream flow in mgd or cfs above point of discharge
- \( C_s \) = background in-stream pollutant concentration in mg/l
- \( Q_r \) = resultant in-stream flow, after discharge in mgd or cfs
- \( C_r \) = resultant in-stream pollutant concentration in mg/l in the stream reach (after complete mixing occurs)

This equation or a variation thereof is used by permitting authorities as part of the process to derive water quality based limits. If a value of zero is used for the ambient concentration for a pollutant \( C_s \) in the equation, the permit writer would be able to establish a limit that would give the entire pollutant allocation to the discharger. The resulting limit would not account for any upstream discharges or any natural background concentration of the pollutant, and it would not protect the Water Quality Standard. Since it is highly unlikely that the background concentration is ever zero, the limit would not prevent an in-stream excursion of criteria.

Since it is not realistic to assume that the ambient pollutant concentration is zero, permit writers must develop a method to adequately protect water quality. A number of options exist for that task. Some states have adopted a policy of assuming that the ambient concentration is equal to one half of the water quality criteria when no ambient data exist. While this is a
somewhat conservative approach, the permittee could be given the opportunity to collect data during the comment period for the permit if they believed that the approach resulted in an overly stringent limit. Other options available to the permitting authority include requiring submittal of ambient data with permit applications, developing permit requirements to collect data, or establishing default ambient concentrations using literature values. Any approach chosen by the permitting authority to estimate background pollutant concentrations will result in more realistic water quality based limits and improved compliance with state standards.

IV. Use of Sufficiently Sensitive Analytical Test Methods

The use of sufficiently sensitive analytical methods is critically important to detecting, identifying and measuring the concentrations of pollutants in CCW wastestreams. For further discussion of sufficiently sensitive methods, see Part V of Attachment A of this memo, and the memo on Analytical Methods for Mercury in NPDES Permit, dated August 23, 2007 in Appendix C.

V. Disclaimer

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VI. References


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<th>Analyte</th>
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<td>Widows Creek – Effluent from Combined Ash Pond</td>
<td>Mitchell – Effluent from Fly Ash Pond</td>
<td>Cardinal – Effluent from Fly Ash Pond</td>
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<td>Cardinal – Effluent from Fly Ash Pond a,b</td>
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<td>15.0</td>
<td>6.00</td>
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Source: [ERG, 2008l; ERG, 2008m; ERG, 2008k; ERG, 2008o].

Note: EPA used several analytical methods to analyze for metals during the sampling program. For the purposes of sampling program, EPA designated some of the analytical methods as “routine” and some of them as “low-level.” EPA designated all of the methods that require the use of clean hands/dirty hands sample collection techniques (i.e., EPA Method 1669 sample collection techniques) as “low-level” methods. Note that although not required by the analytical method, EPA used clean hands/dirty hands collection techniques for all low-level and routine metals samples.

a – The concentrations presented have been rounded to three significant figures.
b – The ash pond effluent results represent the average of the ash pond effluent and the duplicate of the ash pond effluent analytical measurements.
< – Average result includes at least one non-detect value. (Calculation uses the report limit for non-detected results).
E – Sample analyzed outside holding time.
L – Sample result between 5x and 10x blank result.
NA – Not analyzed.
ND – Not detected (number in parenthesis is the report limit). The sampling episode reports for each of the individual plants contains additional sampling information, including analytical results for analytes measured above the detection limit, but below the reporting limit (i.e., J-values).
Appendix B: National Recommended Water Quality Criteria

EPA National Recommended Water Quality Criteria

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<th>2006 National Recommended Water Quality Criteria</th>
<th></th>
<th></th>
<th>Human Health (Water + Organism) (ug/l)</th>
<th>Human Health (Organism only) (ug/l)</th>
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1 [http://www.epa.gov/waterscience/criteria/wqctable/index.html](http://www.epa.gov/waterscience/criteria/wqctable/index.html)
Appendix C: Mercury Analytic Test Method Memorandum
signed: August 23, 2007

MEMORANDUM

SUBJECT: Analytical Methods for Mercury in National Pollutant Discharge Elimination System (NPDES) Permits

FROM: James A. Hanlon, Director
Office of Wastewater Management

TO: Water Division Directors, Regions 1 - 10

The purpose of this memorandum is to inform you of EPA’s March 12, 2007, approval of Method 245.7 for measurement of mercury and modified versions of approved analytical methods for mercury as well as the impact of their approval on the NPDES permitting process. While several different methods are currently approved under 40 CFR Part 136 for the analysis of mercury, some of these methods have much greater sensitivities and lower quantitation levels than others. This memorandum clarifies and explains that, in light of existing regulatory requirements for NPDES permitting, only the most sensitive methods such as Methods 1631E and 245.7 are appropriate in most instances for use in deciding whether to set a permit limitation for mercury and for sampling and analysis of mercury pursuant to the monitoring requirements within a permit.

BACKGROUND

Section 301 of the Clean Water Act (CWA) requires NPDES permits to include effluent limitations that are as stringent as necessary to meet water quality standards. Thus, under the Act and EPA regulations, each permit must include, as necessary, requirements in addition to or more stringent than technology-based effluent limitations established under section 301 of the CWA in order to achieve water quality standards. 40 C.F.R. § 122.44(d)(1). The regulations require limitations to control all pollutants that the NPDES program director determines are or may be discharged at a level that “will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard,” including both narrative and

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1 This memorandum is based on existing legal requirements and authorities. It does not impose any new, legally binding requirements on EPA, states, or the regulated community.
numeric criteria. 40 C.F.R. § 122.44(d)(1)(i). If the program director determines that a discharge has the reasonable potential to cause or contribute to such an excursion, the permit must contain water quality-based effluent limitations for the pollutant. 40 C.F.R. § 122.44(d)(1)(ii). Thus, a prospective permittee may need to measure various pollutants in its effluent at two stages: first, at the permit application stage so that the program director can determine whether "reasonable potential" exists and establish appropriate permit limits; and second, where a permit limit has been established, to meet the monitoring requirements within the permit. The following discussion explains which analytical methods permit applicants and permittees should use to make these measurements when mercury is the pollutant at issue.

Approved Analytical Methods

Measurements included on NPDES permit applications and on reports required to be submitted under the permit must generally be made using analytical methods approved by EPA under 40 CFR Part 136. See 40 CFR 136.1, 136.4, 136.5, 122.21(g)(7), and 122.41(j). For mercury, there are three methods commonly used in the NPDES program that EPA has approved under Part 136: Method 245.1, Method 245.2, and Method 1631E. Methods 245.1 and 245.2 were approved by EPA in 1974 and can achieve measurement of mercury down to 200 parts per trillion (ppt). Additionally, EPA approved Method 1631 Revision E in 2002. Method 1631E has a quantitation level of 0.5 ppt, making it 400 times more sensitive than Methods 245.1 and 245.2. In fact, the sensitivity of Methods 245.1 and 245.2 are well above the water quality criteria now adopted in most states (as well as the criteria included by EPA in the Final Water Quality Guidance for the Great Lakes System) for the protection of aquatic life and human health, which generally fall in the range of 1 to 50 ppt. In contrast, Method 1631E, with a quantitation level of 0.5 ppt, does support the measurement of mercury at these low levels.

In addition to Methods 245.1, 245.2, and 1631E listed above, EPA approved Method 245.7 as well as modified versions of other EPA-approved methods on March 12, 2007. See 72 FR 11200. Method 245.7 has a quantitation level of 5.0 ppt, making it 40 times more sensitive than Methods 245.1 and 245.2. Additionally, modified versions of EPA-approved methods may also be used for the measurement of mercury. Methods approved under Part 136, such as 245.1 and 245.2, may be modified to achieve lower quantitation levels than can be achieved by the method as written. Modifications to an EPA-approved method for mercury that meet the method

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2 Many states have adopted mercury water quality criteria of 12 ppt for protection of aquatic life and 50 ppt for the protection of human health, and for discharges to the Great Lakes Basin, the applicable water quality criteria for mercury are 1.3 ppt for the protection of wildlife and 1.8 ppt for the protection of human health. In 2001, EPA issued new recommended water quality criteria guidance for the protection of human health. This new guidance recommends adoption of a methylmercury water quality criterion of 0.3 milligrams of methylmercury per kilogram (mg/kg) in fish tissue. EPA is currently developing implementation guidance to assist states in implementing the criterion, and Draft Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion (EPA-823-B-04-001) was released for public comment in August 2006.

3 Examples of such modification may include changes in the sample preparation digestion procedures such as the use of reagents similar to those used in the approved method, changes in the equipment operating parameters such as the use of an alternate more sensitive wavelength, adjusting the sample volume to optimize method performance, and changes in the calibration ranges (provided that the modified range covers any relevant regulatory limit).
performance requirements of Part 136.6 are considered to be approved methods and require no further EPA approval. See 72 FR 11239-40 (March 12, 2007). For analytical method modifications that do not fall within the flexibility of Part 136.6, the modified methods may be approved under the alternate test procedure program as defined by Parts 136.4 and 136.5.

**ACTIONS RESULTING FROM THE MARCH 12, 2007, RULEMAKING**

To implement the March 12, 2007, rule, the Office of Wastewater Management (OWM) provides the following guidance:

**Monitoring Data Submitted as Part of NPDES Permit Applications**

As noted, most states have adopted water quality criteria for the protection of aquatic life and human health that fall in the range of 1 to 50 ppt, and Methods 245.1 and 245.2, as written, do not detect or quantify mercury in this range. A “did not detect” result using Method 245.1 or Method 245.2 would show only that mercury levels are below 200 ppt but would not establish that they are at or below the applicable water quality criterion. Therefore, when a permit writer receives a permit application reporting mercury data analyzed with Method 245.1 or Method 245.2 as “did not detect” results, the permit writer in reality may lack the information needed to make a “reasonable potential” determination. In contrast, Method 1631E is able to detect and quantify mercury concentrations at these low levels.

EPA therefore expects, in general, that all facilities with the potential to discharge mercury will provide with their NPDES permit applications monitoring data for mercury using Method 1631E or another sufficiently sensitive EPA-approved method. For purposes of permit applications, a method for mercury is “sufficiently sensitive” when (1) its method quantitation level is at or below the level of the applicable water quality criterion for mercury or (2) its method quantitation level is above the applicable water quality criterion, but the amount of mercury in a facility’s discharge is high enough that the method detects and quantifies the level of mercury in the discharge. Accordingly, EPA strongly recommends that the permitting authority determine that a permit application that lacks effluent data analyzed with a sufficiently sensitive EPA-approved method such as Method 1631E is incomplete unless and until the facility supplements the original application with data analyzed with such a method. See 40 CFR 122.21(e) (a permit application is determined to be complete at the discretion of the permitting authority) and 40 CFR 122.21(g)(13) (the applicant shall provide to the Director, upon request, such other information as the Director may reasonably require to assess the discharge). Such data would allow the permitting authority to characterize the effluent to determine whether the discharge causes, has the reasonable potential to cause, or contributes to an excursion of state water quality standards for mercury and would consequently allow the permitting authority to determine whether a water quality-based effluent limit for mercury is necessary in the permit.

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4 To illustrate the latter, if the water quality criterion for mercury in a particular state is 2.0 ppt, Method 245.7 (with a quantitation level of 5.0 ppt) would be sufficiently sensitive where it reveals that the level of mercury in a facility’s discharge is 5.0 ppt or greater. In contrast, Method 245.7 would not be sufficiently sensitive if it resulted in a level of non-detect for that discharge because it could not be known whether mercury existed in the discharge at a level between 2.0 and 5.0 (less than the quantitation level but exceeding the water quality criterion).
Monitoring Requirements in Permits

Where a permit authority establishes a permit limit for mercury, it also needs to consider specifying an analytical method that the permittee must use to monitor for mercury during the term of the permit. Methods 245.1 and 245.2, as written, are not likely to be sensitive enough to detect or quantify the concentration of mercury in the discharge at a level that matches the limitation for mercury in the permit. EPA therefore expects the permitting authority to require the use of a sufficiently sensitive EPA-approved method for monitoring under the permit in order to ensure that the sampling and measurements required are “representative of the monitored activity” (as required by 40 CFR 122.41(j)(1)). For purposes of monitoring under a permit, a method for mercury is “sufficiently sensitive” when (1) its method quantitation level is at or below the level of the mercury limit established in the permit or (2) its method quantitation level is above the mercury limit in the permit, but the amount of mercury in a facility’s discharge is high enough that the method detects and quantifies the level of mercury in the discharge.5

EPA Permit Review and Objection to State Issued Permits

For NPDES-authorized states, EPA regions are expected to review state permits and should strongly consider objecting to permits that are issued based on analytical data collected and analyzed using an EPA-approved method that is not sufficiently sensitive or that do not require use of a sufficiently sensitive EPA-approved method for monitoring when the permit includes a limit for mercury. OWM is expecting to undertake a permit quality review of a small representative number of permits with respect to mercury limitations and other conditions.

If you have questions concerning the content of this memorandum, please contact Linda Boarnazian, Director of the Water Permits Division, at 202-564-0221 or have your staff contact Marcus Zobrist of the State and Regional Branch at 202-564-8311 or zobrist.marcus@epa.gov.

cc: NPDES Branch Chiefs Regions 1 – 10

5 See footnote 4.