Steam Electric Power Generating Effluent Guidelines

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Reducing Toxic Water Pollution from Power Plants

Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category

August 20, 2013

United States Environmental Protection Agency

Overview of Action

- On April 19, 2013, EPA proposed a regulation that would strengthen the controls on discharges from certain steam electric power plants by revising technology-based effluent limitations guidelines and standards for the steam electric power generating point source category.
- Steam electric power plants contribute over half of all toxic pollutants discharged to surface waters by all industrial categories currently regulated in the United States under the Clean Water Act.
  - Metals, including mercury, arsenic, lead and selenium
  - Nutrients
- Toxic pollutants are linked to cancer, neurological damage, and ecological damage.
- Technology driven limits create uniform requirements based on demonstrated technologies and processes.
- For more information on these effluent guideline limitations and standards: water.epa.gov/scitech/wastetech/guide/steam-electric/proposed.cfm

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Clean Water Act

- 1972 Clean Water Act adopted a technology-forcing, increasingly stringent approach to water pollution control.
- Statute designed to increasingly elevate the technology floor for all dischargers in an industrial sector to match the performance of the best plants in the industry.
- Statute requires EPA to develop effluent limitations guidelines for direct dischargers and to promulgate pretreatment standards for indirect dischargers.
- Effluent limitations guidelines are prepared together with new source performance standards for new sources.
- The effluent limitations guidelines and standards (ELGs) are established by regulation for categories of industrial dischargers and apply nationally.
- Technology-based effluent limitations and standards are put into the permits issued to direct dischargers (NPDES permits); indirect dischargers, who discharge to Publicly Owned Treatment Works (POTWs), must comply with pretreatment standards.
- For toxic pollutants, EPA is to set the standard for the "best available technology economically achievable" (BAT).

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Revised Steam Electric ELG Overdue

- EPA promulgated the Steam Electric Power Generating effluent guidelines and standards (40 CFR Part 423) in 1974 and amended the regulation in 1977, 1978, 1980 and 1982.
- The Steam Electric ELG applies to discharges from approximately 1,100 fossil fueled and nuclear fueled power plants.
- The 1982 limits were based on settling ponds to control for suspended solids only. These ponds are ineffective for removing dissolved metals and nutrients.
- As part of EPA's ELG 304(m) Planning Process, EPA conducted a detailed study of the steam electric industry in 2009.
- Study showed that the outdated ELG has not kept pace with changes in electric power industry; technologies are available that can address new and higher-concentration wastewater pollutant discharges, either by installing treatment technologies to reduce the amount of pollutants discharged or by implementing process changes that completely eliminate the discharge.
- The majority of existing permits rely on the 1982 TSS limits only. Result is numerous documented impacts from daily, routine NPDES -permitted discharges of dissolved metals and nutrients.
- Based on the study, EPA initiated development of revisions to the Steam Electric ELG in 2009.

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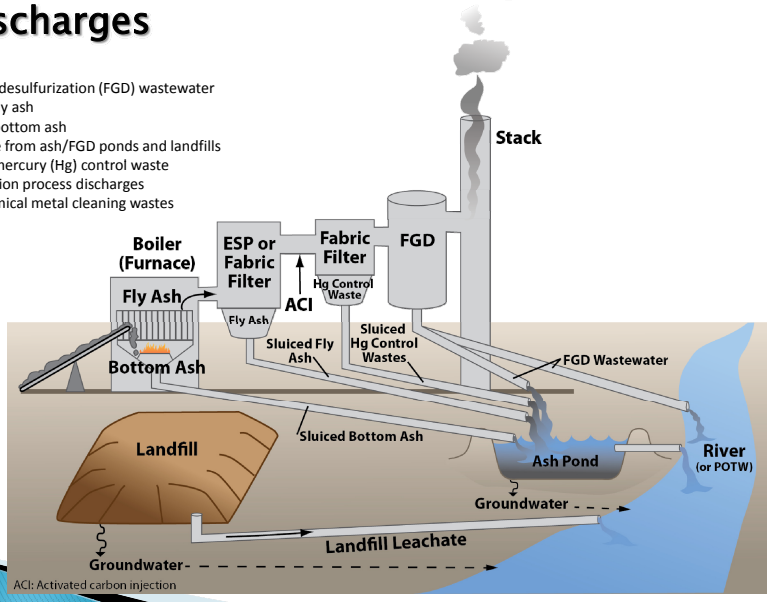
Key Wastestreams Contributing to Current Discharges

- Flue gas desulfurization (FGD) wastewater
- Sluiced fly ash
- Sluiced bottom ash
- Leachate from ash/FGD ponds and landfills
- Sluiced mercury (Hg) control waste
- Gasification process discharges
- Nonchemical metal cleaning wastes



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Overview of Key Revisions for Existing Generating Units

- EPA collected detailed plant level data from approximately 700 power plants through an Information Collection Request to inform this proposal. This plant specific data enabled EPA to evaluate feasibility, costs, and economic achievability of various technological approaches for each plant.
- Based on this data, EPA has proposed four preferred regulatory options that differ in the number of waste streams covered, size of the units controlled and stringency of controls.
- In particular, proposed options differ in their treatment of FGD (flue gas desulfurization) waste and bottom ash (see next slide).
- For some waste streams (e.g., FGD wastewater), water treatment technologies can be used to remove pollutants.
- For other waste streams (e.g., fly ash transport water), industry can achieve "zero discharge" by switching to dry handling or a closed loop system that recirculates the water.
- Depending on the preferred regulatory option, 66–200 facilities with coal fired units may incur compliance costs (approximately 6–19% of all steam electric power plants).
- Under all regulatory options, all gas, nuclear, oil, and small (50 MW or smaller) generating units will not incur compliance costs for the proposed revisions.
- Considering incentives for facilities that voluntarily go beyond the proposed discharge requirements.

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Summary of Proposed Requirements for Key Wastestreams at Existing Sources Under Preferred Options

Existing Sources Preferred Regulatory Options				
Wastestream	Option 3a	Option 3b	Option 3	Option 4a
Flue Gas Desulfurization	No additional control	Mercury, Arsenic, Selenium and Nitrate-Nitrite Limits for the Largest Units*	Mercury, Arsenic, Selenium and Nitrate-Nitrite Limits	Mercury, Arsenic, Selenium and Nitrate-Nitrite Limits
Fly Ash Transport Water	Zero Discharge	Zero Discharge	Zero Discharge	Zero Discharge
Bottom Ash Transport Water	No additional control	No additional control	No additional control	Zero Discharge (for units greater than 400 MW)
Flue Gas Mercury Control	Zero Discharge	Zero Discharge	Zero Discharge	Zero Discharge
Combustion Residual Leachate	No additional control	No additional control	No additional control	No additional control
Gasification	Mercury, Arsenic, Selenium and Total Dissolved Solids Limits	Mercury, Arsenic, Selenium and Total Dissolved Solids Limits	Mercury, Arsenic, Selenium and Total Dissolved Solids Limits	Mercury, Arsenic, Selenium and Total Dissolved Solids Limits
Nonchemical Metal Cleaning	Copper and Iron Limits	Copper and Iron Limits	Copper and Iron Limits	Copper and Iron Limits

*Facilities with a total wet scrubbed capacity of 2,000 MW or greater

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Facilities Can Achieve These Proposed Requirements

- The requirements are based on proven control technologies to reduce these discharges such as chemical precipitation, biological treatment, dry ash handling, or recycling of transport water that are widely available.
- Many existing units already use one or more of these technologies or other approaches that would allow them to meet these new proposed requirements. For example:
  - > 80% of coal plants have systems in place that would allow them to meet any proposed requirement for fly ash wastewater
  - > 40% of coal plants have systems in place that would allow them to meet any proposed limits for bottom ash wastewater
  - 25% of plants have systems in place that would allow them to meet any proposed limits for FGD wastewater

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Summary of Proposed Requirement for Key Wastestreams at New Sources Under Preferred Option

- Proposal includes one preferred regulatory option for new sources.
- As proposed, these requirements would also apply to small and oil fired generating units.

New Sources Preferred Regulatory Option	
Wastestream	Option 4
Flue Gas Desulfurization	Mercury, Arsenic, Selenium and Nitrate-Nitrite Limits
Fly Ash Transport Water	Maintain Existing Zero Discharge Requirement
Bottom Ash Transport Water	Zero Discharge
Flue Gas Mercury Control	Zero Discharge
Gasification	Mercury, Arsenic, Selenium and Total Dissolved Solids Limits
Combustion Residual Leachate	Mercury and Arsenic Limits
Nonchemical Metal Cleaning	Copper, Iron, TSS, and Oil and Grease Limits

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Benefits of the Steam Electric ELG Are Significant

- Significantly reduces pollutant discharges to U.S. Waters
  - Depending on the regulatory option, would annually reduce pollutant discharges by 0.47 billion to 2.62 billion pounds.
- Significantly reduces water withdrawals from U.S. Waters
  - Depending on the regulatory option, would annually reduce water withdrawals by 50 billion to 103 billion gallons.
- Reduce and/or eliminate the generation of wet coal ash, reducing volumes stored in surface impoundments for control of ash transport water and, as a result, the impacts that may occur from surface impoundment failures.
- Reduce the occurrence of concentrations in excess of human health criteria for consumption of water and organisms.
- Improve aquatic species habitats by reducing concentrations of toxic contaminants such as arsenic, cadmium, chromium, lead, mercury, nickel, selenium, and zinc in water.
- Reduce nitrogen concentrations. These improvements would be expected to enhance the quality and value of water-based recreation.

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Monetized Costs and Benefits

- Depending upon the preferred option, EPA estimates that annualized social costs will be between $185 million and $954 million per year.
- EPA was only able to monetize a portion of the benefits associated with the rule.
- EPA estimates monetized benefits of $139 million to $483 million per year.
- Potentially important categories of benefits that could not be fully estimated include:
  - downstream human health impacts (benefits are only estimated 1-10 km from the point of discharge);
  - non-IQ impacts of mercury and lead that interfere with children's ability to think and learn;
  - lung and bladder cancers due to arsenic exposure;
  - the effects of other pollutants such as boron, manganese, aluminum, vanadium, iron, nutrients, and total dissolved solids.

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The Proposal Is Affordable and Is Not Projected to Close Any Plants

- Historically, in determining affordability for the ELG program, EPA looks to whether the costs can be born by the industry in terms of facility closures and firm failures
- EPA's analysis, which assumes the industry will pass none of the costs on to its customers, indicates minimal to no impacts on electricity generating capacity from the preferred regulatory options. This analysis takes into account the cost of compliance for rules already in place such as the Mercury and Air Toxics Standard.
- Under the most stringent preferred regulatory option, EPA's projects no plants will close and at most a few units will retire. That equates to a net total of 0.32 GW out of the more than 1000 GW that make up the nation's electric generating capacity, or 0.03 percent of overall capacity.
- Under the other preferred regulatory options, EPA does not project any plant-level or unit-level retirements.

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The Proposal Will Have Limited Impact on Future Electricity Costs

- Historically, electricity costs vary. For example, in 1970 costs were about 7.5 cents per KW/hr and increased into the 1980s to a high of a little less 12 cents per KW/hr ($2007).
- EPA's analysis, which assumes the industry will pass 100% of the costs of this proposed rule on to its customers, indicates any effect on future electricity costs will be small and within normal historical fluctuations.
- Under the most stringent preferred regulatory option, EPA projects national average prices to increase minimally by only 0.025 cents/KW-hr, or 0.27 percent.
- EPA similarly looked at how these costs may be passed on to the average residential consumer. Under the most stringent preferred regulatory option and assuming 100% pass through of costs to consumers, EPA projects the average monthly electricity bill for residential consumer will increase by 22 cents, or 0.23%.

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Timing

- For those existing facilities that do not currently meet the proposed requirements, EPA expects most will comply with this rule through a range of strategies, including upgrades to existing wastewater treatment controls and eliminating wet sluicing of ash.
- EPA considered the magnitude and complexity of process changes and new equipment installations that would be required at these existing facilities to meet these requirements as well as the possible impact on reliability of power generation.
- Proposal allows for delayed implementation of up to 8 years
  - Allows time to raise capital, plan and design the system, procure equipment, and construct and then test the system.
  - Provides flexibility to install the pollution control technology during an otherwise planned shutdown or maintenance period.
  - Provides flexibility to coordinate outages at multiple facilities in one geographic areas to avoid any impacts on the reliability of power generation.

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Schedule for Public Comment Period and Final Rulemaking

- Notice of Proposed Rulemaking signed April 19, 2013 under a consent decree
- Notice of Proposed Rulemaking published in the Federal Register on June 7, 2013
- 60 day comment period after publication (August 7, 2013)
- Comment Period Extension Announcement on July 12, 2013 (to September 20, 2013)
- Final Rule scheduled to be signed May 22, 2014 under a consent decree

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Questions

Type your question in the text box located at the bottom of your screen, and click on the Ask button.

Questions Answered By:

- Jezebele Alicea-Virella, Engineer
- James Covington, Economist
- Ron Jordan, Project Manager
- Jan Matuszko, Branch Chief
- Bill Swietlik, Biologist

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Additional Information

- EPA's Proposed Rule website – Federal Register notice & supporting documents
  water.epa.gov/scitech/wastetech/guide/steam-electric/proposed.cfm
- Comments must be received no later than September 20, 2013. See the June 7 FR notice for instructions on submitting comments.
- Technical info:
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