Date: November 16, 2012

Subject: National Emission Standards for Hazardous Air Pollutants (NESHAP) Analysis of Control Technology Needs for Revised Proposed Emission Standards for New Source Coal-fired Electric Utility Steam Generating Units

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To: Docket No. EPA-HQ-OAR-2009-0234

Introduction

The EPA has evaluated the levels of control that would generally be needed to meet the proposed revised emission limits for new sources and has compared those to the levels of control needed to meet the new source emission limits that were promulgated in the final MATS rule. The EPA compared the level of control needed by analyzing requirements for a new model coal-fired 500 MW facility. The comparison has led the EPA to conclude that new units would need to be designed to use the same or very similar types of emission control technologies to meet the revised proposed new source limits as would have been required to meet the promulgated final MATS new source limits.

Controls for Mercury Emissions

For mercury (Hg) emissions from the subcategory of new EGUs not designed to burn low rank virgin coal, the model facility was assumed to burn coal with a Hg content of 11.1 lb/TBtu (the average Hg content of non low rank virgin coals sampled in the 2010 Utility Information Collection Request, ICR). An existing source, burning the same coal and subject to the promulgated existing source MATS limits, would need to remove a minimum of approximately 89.2 percent of the Hg (coal-to-stack) in order to meet the 1.2 lb/TBtu existing source standard. By comparison, the new model facility would have needed to remove a minimum of 99.8 percent of the Hg (coal-to-stack) in order to meet the final 2.0E-4 lb/GWh output-based emission limit. That same model facility, if subject to the proposed revised new source Hg emission limit of 3.0E-3 lb/GWh, would need to remove a minimum of 97.0 percent of the mercury (coal-to-stack).

Control technology providers, including some that petitioned for reconsideration, have indicated that facility operators normally target an operating level that is 25 to 50 percent lower than the emission limit in order to create a "margin of error." In petitions, the Institute of Clean Air Companies (ICAC) suggested a margin 25 to 50 percent below the limit, while Babcock & Wilcox suggested a margin of 20 to 30 percent below the limit. In that case, the new source would target a Hg removal of 97.6 to 98.5 percent (coal-to-stack). Any level of control above 95 percent at a new coal-fired EGU will certainly require advanced Hg control technology or optimized co-benefit control from other installed control equipment. The level of control for the proposed revised new source standards should be the same or very similar to the high performing

control technologies that would have been expected if the new unit was subject to the finalized MATS limit.

Controls for Filterable PM Emissions

For filterable particulate matter (fPM) emissions from coal-fired EGUs, the model facility was assumed to burn a coal with an ash content of 8.6 lb/MMBtu (approximately 10 percent, which is the upper range of typical bituminous coals). Some of the ash can be expected to be removed as bottom ash while a much greater fraction would be expected to exit the combustor with the flue gas as fly ash and would be captured using a particulate control device such as a fabric filter (FF) or high efficiency electrostatic precipitator (ESP). An existing facility that is burning the same fuel and subject to the promulgated existing source standard for fPM (3.0E-2 lb/MMBtu), would need to control fPM at a level of approximately 99.65 percent (coal-to-stack). In comparison, the new facility would have had to remove a minimum of 99.99 percent of the fPM (coal-to-stack) in order to meet the 7.0E-3 lb/MWh output-based emission limit. That same facility, subject to the revised new source fPM emission limit of 9.0E-2 lb/MWh, would need to remove a minimum of 99.88 percent of the fPM (coal-to-stack). However, again, if operators target an operating range that is 25 to 50 percent lower than the emission limit in order to create a "margin of error" as petitioners have claimed, then the new source would target a fPM removal of 98.91 to 99.94 percent (coal-to-stack). Any of these stated control levels would require modern, high-performing PM control technology such as high efficiency FF.

Controls for Hydrochloric Acid (HCl) Emissions

For HCl emissions from coal-fired EGUs, two analyses were done. In one, the model facility was assumed to burn a higher-chlorine (Cl) content coal of 0.064 lb/MMBtu. In the other analysis, the model plant was assumed to burn a lower-Cl coal with a Cl content of 0.0114 lb/MMBtu.[1] These values roughly correspond to 830 parts per million (ppm) in the higher-Cl coal and 125 ppm in the lower-Cl coal. The Cl content of coal tends to vary by coal rank and by geographic origin. Some western subbituminous coals have such low Cl content that little to no HCl control is needed to meet the existing source emission limit.

An existing facility burning the higher Cl bituminous coal (and choosing to show compliance by monitoring HCl rather than the alternative sulfur dioxide (SO_2)), would need to control HCl at a level of approximately 97.0 percent (coal-to-stack). This would likely require a wet-FGD scrubber or a good performing spray drier absorber (SDA). By comparison, an existing facility burning the lower Cl subbituminous coal would need to control HCl at a level of approximately 83.0 percent. Because the fly ash from most western subbituminous coals (and many lignites) contains natural alkalinity, many of those facilities get considerable native acid gas neutralization from the fly ash. Some may get sufficient native HCl capture such that no additional add-on control technology is needed.

A new facility would have needed to remove a minimum of 99.6 percent for the lower-Cl coal and a minimum of 99.9 percent for the higher-Cl coal in order to meet the final MATS output-

[1] These values are the average Cl contents of bituminous and subbituminous coals from the Utility ICR data.

based emission limit of 4.0E-4 lb/MWh. Those same facilities, subject to the proposed revised new source HCl emission limit of 2.0E-2 lb/MWh, would need to remove a minimum of 81.0 percent of the HCl when burning the lower Cl subbituminous coal and a minimum of 96.6 percent when burning the higher Cl bituminous coal. However, again, if operators target an operating range that is 25 to 50 percent lower than the emission limit in order to create a "margin of error," then the new source would target HCl removal in the range of 86 to 98 percent (coal-to-stack, depending on the coal that is burned).

It is important to note that in most cases, a new fossil fuel-fired EGU would be required to obtain a preconstruction permit under the New Source Review (NSR) program.[2] The NSR program, including both Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NNSR), applies to major new sources and major modifications at existing sources on a pollutant-specific basis depending on the attainment status of the area. NSR permit requirements include, among other things, the application of BACT (best available control technology) under PSD and Lowest Achievable Emission Rate (LAER) under NNSR. BACT and LAER control technology determinations and associated emission limit establishment involve case-by-case analyses and, for BACT, such analyses take into account site-specific factors such as energy, environmental and economic impacts. For that reason, it is impossible to strictly predict the outcome of such analyses. However, based on recent BACT determinations for SO_2 emissions from coal-fired EGUs, it is reasonable to expect that in most, if not all, cases, advanced flue gas desulfurization control technologies (such as wet-FGD scrubbers or high efficiency spray drier absorbers) would be required. For this reason the EPA has determined that it is cost effective to set a beyond-the-floor (BTF) emission limit for HCl. This is described in the Technical Support Document "MATS Reconsideration: Beyond-the-Floor Memorandum" (available in the rulemaking docket, EPA-HQ-OAR-2009-0234). In order to meet the BTF emission limit, a new facility would need to control HCl at a level of 90.5 percent to 98.3 percent (coal-to-stack, depending upon the coal). This level of control will require the use of an SDA system at a minimum.

Although an emission limit for HCl has been finalized and now re-proposed, affected sources may instead choose to meet an alternative emission limit for SO_2. A similar analysis was performed under the assumption that the model new unit would choose to meet the alternative SO_2 emission limit. For this case three analyses were done. In one analysis, the model facility was assumed to burn a low-sulfur coal with an equivalent SO_2 content of 0.60 lb/MMBtu. In another analysis, the model plant was assumed to burn a medium-sulfur coal with an equivalent SO_2 content of 1.67 lb/MMBtu). A third analysis had the model plant burning a high-sulfur coal with an equivalent SO_2 content of 2.5 lb/MMBtu.

An existing facility would need to control SO_2 at approximately 67 percent to 94 percent (coal-to-stack, depending on the type of coal burned) in order to demonstrate compliance for acid gas HAP emissions. This level of control would require a wet-FGD scrubber or a good performing

[2] We indicate that NSR is required in most cases because it is possible that a new fossil fuel-fired EGU constructed at an existing stationary source could "net out" of major NSR for one or more regulated pollutants if sufficient qualifying reductions are available (e.g., from the shutdown of an existing EGU at the same source).

SDA. A new facility would have had to remove SO_2 in a range of 93 percent to 99 percent (depending on the coal) in order to meet the 4.0E-1 lb/MWh output-based emission limit in the final MATS rule. That same facility, now subject to the revised new source SO_2 emission limit of 1.0 lb/MWh, would need to remove SO_2 in a range of 82 percent to 96 percent (depending on the coal – and even higher with high-S coals). This level of control would certainly require wet-FGD scrubber or SDA technology. And, as stated earlier, it is reasonable to assume that PSD BACT determinations for new fossil fuel-fired EGUs will result in a requirement to install modern, high performing FGD technology.