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VIA E-MAIL

May 29, 2009

The Honorable John Boozman
Ranking Member
Subcommittee on Water Resources and Environment
House Transportation & Infrastructure Committee
Washington, DC 20515

Re: Coal Combustion Waste Storage and Water Quality Follow-up Questions

Dear Mr. Boozman:

Set forth below are my responses to the follow-up questions from the Subcommittee hearing held on April 30, 2009, entitled "Coal Combustion Waste Storage and Water Quality." On behalf of American Electric Power, the Edison Electric Institute, and the Utility Solid Waste Activities Group I would again like to thank the Subcommittee for the opportunity to present our views on this issue.

Please contact me at (614) 716-1268 or jmmcmanus@aep.com if you have questions regarding the answers set forth below.

Very truly yours,

John M. McManus
Vice President, Environmental Services

cc: Eddie Bernice Johnson
James L. Oberstar
John L. Mica
Jonathon Pawlow

Attachments (6)

1. What do the most up-to-date data tell us regarding the leaching and soil/groundwater mobility of arsenic, selenium, chromium, and similar constituents that could be released from coal combustion residual disposal facilities, landfills, and surface impoundments?

Recently, we have heard a lot about coal ash leaching and potential environmental impacts in newspaper, press releases, testimonies, etc. This is often presented as though it is new information. In fact, the U.S. Environmental Protection Agency (EPA), U.S. Department of Energy (DOE), the Electric Power Research Institute (EPRI) and others have been evaluating leaching, geochemistry, and environmental mobility of trace constituents in ash for decades, and there is a wealth of knowledge on their behavior. This research includes both extensive laboratory studies to evaluate coal ash leaching and attenuation mechanisms under controlled conditions, and field studies at many disposal sites to provide "ground truth" under actual management and environmental conditions.

Coal ash leaching is a function of many variables, including coal type and chemistry, combustion conditions, particulate collection equipment, ash handling methods, constituent speciation, and environmental conditions, particularly pH and oxidation-reduction potential. For example, arsenic is more commonly associated with eastern bituminous coal ash than western subbituminous, and selenium is more readily captured with cold-side electrostatic precipitators than with hot-side precipitators. Similarly, mobility in the soil and groundwater environment is controlled by an array of factors such as soil type and chemistry, constituent speciation, flow rates, oxidation-reduction conditions, and pH. The interplay of these various factors and how they affect leaching and environmental mobility is too complex to discuss in detail here, but EPRI and others have amassed a considerable amount of scientific knowledge on these topics since 1980. Therefore, it is important to view in a critical light the presentation of a few measurements, or one or two specific studies, as being representative of the risks posed by coal ash against the backdrop of the much larger information base in the published scientific literature.

It is well documented that arsenic, selenium, and chromium occur in coal ash, and their leaching and mobility in soils and groundwater have been extensively studied. EPRI has developed extensive information detailing the concentration, speciation, leaching and mobility of these three constituents, evaluating the potential for release and movement under actual environmental conditions.

Knowledge of the leaching characteristics and geochemistry of arsenic, selenium, and chromium, along with other constituents present in coal ash, is critical to the electric utility industry. The large body of scientific literature developed over the last 20 years provides a sound basis for engineering disposal sites suitable for coal combustion products, assessing environmental risks, and developing effective treatment technologies for wastewater discharges. EPRI continues to evaluate changes in leaching characteristics of coal combustion products (CCPs) as new air emissions control technologies are employed and as the scientific literature advances. They are also coordinating research with EPA Office of Research and Development (ORD). EPA ORD is currently developing a new set of laboratory leaching procedures, as well as a broad database of leaching characteristics for coal ash and FGD solids under variable pH conditions and liquid to solid ratios. The data developed under that study are being compared to the EPRI field leachate database for consistency.

Below is a list of representative reports and literature that may be helpful as background information.

Wang, T., J. Wang, Y. Tang, H. Shi, K. Ladwig, 2009, *Leaching Characteristics of Arsenic and Selenium from Coal Fly Ash: Role of Calcium,* Energy & Fuels, in publication.

EPRI 2008a, *The Leaching Behavior of Arsenic and Selenium From Coal Fly Ash,* 1015545.

EPRI 2008b, *Chemical Constituents in Coal Combustion Product Leachate: Arsenic,* 1015550.

EPRI, 2008c, *Impact of Air Emissions Controls on Coal Combustion Products,* 1015544.

U.S. EPA 2008, *Characterization of Coal Combustion Residues from Electric Utilities Using Wet Scrubbers for Multi-Pollutant Control,* EPA/600/R-08/077, July 2008.

Wang, T., J. Wang, J. Burken, H. Ban, K. Ladwig, 2007, *The Leaching Characteristics of Selenium from Coal Fly Ashes,* J. of Env. Quality, 36:1784–1792.

Huggins, F. C. Senior, P. Chu, K. Ladwig, G. Huffman, 2007*, Selenium and Arsenic Speciation in Fly Ash from Full-Scale Coal-Burning Utility Plants, Env. Science & Technology,*41:3284-3289.

EPRI 2007a, *The Leaching Characteristics of Selenium from Coal Fly Ashes,* E226748.

EPRI 2007b, *Arsenic Health and Ecological Effects: Soil and Water,* 1014015.

EPRI 2006a, *Characterization of Field Leachates at Coal Combustion Product Management Sites,* 1012578.

EPRI 2006b, *Chemical Attenuation Coefficients for Selenium Species Using Soil Samples Collected from Selected Power Plant Sites,* 1012585.

U.S. EPA 2006, *Characterization of Mercury-Enriched Coal Combustion Residues from Electric Utilities Using Enhanced Sorbents for Mercury Control,* EPA-600/R-06/008 February 2006.

EPRI 2005, Arsenic *and Selenium Speciation in Fly Ash and Wastewater,* 1005567.

EPRI, 2004, *Chemical Attenuation Coefficients for Arsenic Species Using Soil Samples Collected from Selected Power Plant Sites: Laboratory Studies,* 1005505.

EPRI 2000, *Environmental Chemistry of Arsenic: A Literature Review,* 1000585.

EPRI 1998, *Leaching of Inorganic Constituents From Coal Combustion By-Products Under Field and Laboratory Conditions: Volume 1,* TR-111773-V1.

EPRI, 1994, *Chemical Attenuation Reactions of Selenium,* TR-103535.

EPRI 1988, *Chromium Reactions in Geologic Materials,* EA-5741.

EPRI, 1987a, *Chemical Form and Leachability of Inorganic Trace Elements in Coal Ash,* EA-5115.

EPRI, 1987b, *Chemical Characterization of Fossil Fuel Combustion Wastes,* EA-5321.

EPRI, 1986a, *Geochemical Behavior of Chromium Species,* EA-4544.

EPRI, 1986b, *Mobilization and Attenuation of Trace Elements in an Artificially Weathered Fly Ash,* EA-4747.

2a. Please describe why the power industry believes its water discharges are protective of human health and the environment.

Regulations written to implement the Clean Water Act provide a very comprehensive and effective program that prohibits any point source discharges that are harmful to human health and the environment, whether from the power industry or other industries. Two major portions of the Clean Water Act program regulate discharges to surface waters: (1) effluent guidelines and (2) water quality standards. Each power industry facility permit application is required to contain information that allows the permit writer to evaluate the proposed discharges for compliance with both the applicable effluent guidelines (which provide industry-specific and wastewater-specific limits for discharges direct to surface waters or to public treatment systems)

and water quality standards (which consist of waterbody-specific criteria, use designations, and antidegradation policies).

The Clean Water Act requires the permit writer to evaluate the permit application from two perspectives. He or she must determine if the facility is in compliance with effluent guidelines specifically designed for the industry, and determine if the discharges from the facility will cause the waterbody to exceed water quality standards. Effluent guidelines for a specific industry must be applied to all permits issued to facilities of that industry. To protect the water quality standards, the permit writer will examine the effluent quality and the waterbody quality. From this information, the permit writer will issue water quality-based effluent limits that will ensure the protection of human health and the environment. Since water quality standards are designed to provide protection for designated uses of the waterbody (*e.g.,* fishing, recreation, or drinking water supply), and to prevent any degradation of the waterbody, water quality-based effluent limits are a very effective check on any harmful discharges that are not controlled by effluent guidelines.

Many power industry permits contain water quality-based effluent limits as well as effluent guidelines-based limits. At those facilities, the environmental agency permit writer found that a particular discharge contained a pollutant or pollutants that had a "reasonable potential" to exceed water quality criteria for those pollutants, and therefore set a water quality-based effluent limit for those pollutants. In setting such a limit, the permit writer applies a model to determine the assimilative capacity of the waterbody during low flow conditions at the location of the discharge for the pollutant of concern and back calculates the discharge limits based on this conservative model. At some power industry facilities, however, the permit writer has found no "reasonable potential" for any discharge to exceed any applicable water quality criterion, and therefore has not applied any water quality-based limit. In other cases the permit writer determines he or she has too little information and requires the permit holder to gather data on the concentration of pollutants in the effluent and report the results.

All power industry NPDES permits are reviewed at least every 5 years when they are subject to renewal and all are evaluated for application of both industry-specific effluent guidelines and waterbody-specific water quality standards. EPA has developed its water quality criteria based on existing scientific literature about the toxicity of individual pollutants (*e.g.,* copper) to a range of aquatic species. These criteria are applied conservatively by the environmental agency permit writers to ensure that no acute or chronic toxic effects to aquatic species occur. EPA

also has developed a separate set of human health criteria designed to prevent all toxic effects to humans. If they are needed, permit limits are based on the most stringent criteria, whether they are aquatic or human health-based. In this way, the Clean Water Act prevents harmful discharges to surface waters.

2b. Would you describe the requirements for NPDES permit applications applicable to the power industry, including the data and other information that are required?

All power industry facilities requesting permission to discharge to surface waters must file Federal Form 2D (for new sources) or Form 2C (for existing sources) or the state agency equivalent of these forms. I am attaching, for your information, blank copies of Forms 2C and 2D. State agencies use these same forms or nearly identical forms for permit applications. For each permit application, the applicant is required to test its discharges for many pollutants of concern. For example, Form 2C requires steam electric facilities to test for 15 metals (including arsenic, lead, mercury, and selenium), cyanide, dioxin, 28 volatile compounds (such as benzene and vinyl chloride) 11 acid compounds, and 45 base neutral compounds. The applicant must also report values for biochemical oxygen demand, chemical oxygen demand, total organic carbon, total suspended solids, ammonia, nitrogen, phosphorus, sulfate, sulfide, temperature and pH, to name a few of the typical "classical" pollutants required by the form. All tests for these substances must use U.S. EPA approved analytical methods and all results must be lab certified.

The form also requires information on plant operations, including a flow diagram, flow rates (both daily maximum and long-term average) for each discharge, and the exact location of each discharge (stated in longitude and latitude). For each discharge, the applicant must specify which plant operations contribute to the discharge and describe treatment processes employed for each discharge. The entire permit application must be certified to and signed by an authorized corporate representative.

After reviewing the initial permit application, the environmental agency permit writer may request any additional information he or she believes is warranted. For instance, if a facility is using a new process, the permit writer might request additional information characterizing the wastewater from that process, or he may ask for vendor information about the process. Once the permit writer has drafted a proposed permit, it is then subject to public notice and comment, and is subject to review by the EPA regional office. These layers of review help to ensure that

the permit adheres to the regulations in force and protects the environment and human health. All concerns raised by the Regional EPA office or the public must be addressed by either changing the permit or providing an explanation for not changing the permit. If the explanation is considered unsatisfactory, the Regions and the public have further avenues to challenge the explanation of the permitting agency.

2c. Would you provide details on the scope of pollutants normally covered in an NPDES permit, including whether (and where) there is ongoing monitoring required and the level of review that regularly occurs between state permitting authorities and individual power plants?

The steam electric effluent guidelines provide limits for specific discharges such as fly ash and bottom ash transport water (*i.e.,* discharges from ash impoundments), cooling tower blowdown, once-through cooling water, chemical metal cleaning wastes, and coal pile runoff. Each set of limits was developed by U.S. EPA based on the common characteristics of the wastewater in question. For instance, fly ash and bottom ash transport water has limits for total suspended solids and oil and grease. Each ash impoundment that discharges to a surface water must have permit limits for total suspended solids and oil and grease. Similarly, all discharges of once-through cooling water have limits for total residual chlorine. Therefore, the effluent guidelines specific to the steam electric industry are found in each permit and normally are subject to monthly monitoring and reporting.

As already noted, whenever the permit writer finds that a discharge has a "reasonable potential" to cause an exceedance of a water quality criterion, he must develop a water quality-based effluent limit for that discharge. A single discharge point may be subject to multiple water quality-based effluent limits. Whenever a water quality-based effluent limit is included in a permit, the facility must install new treatment or make other operational changes and then is required to monitor and report for that constituent, normally on a monthly or quarterly basis.

As to the level of review between the permit applicant and state regulators, normally there is considerable discussion between the facility and the permit writer, upper management within the state permitting agency, and the EPA regional office. The permit process also includes public notice and comment and can include a public hearing.

Once a permit is issued, coordination between the permit holder and the state regulator does not cease. The permit holder files monthly discharge monitoring reports. If discharge limits are

exceeded, the permitting agency has the legal authority to require corrective action on the part of the discharger and to levy fines. Also, when there are changes at the facility that may affect the characteristics of the discharge, the permit holder much notify its regulator. The regulator may reopen and modify a permit as needed to address changes in discharges.

2d. Would you discuss what states are doing to address flue gas desulfurization scrubber wastewater generated as a result of installing air pollution control equipment?

Wastewater from flue gas desulfurization (FGD) systems is not a new issue. In the 1970s and 1980s, some plants installed FGD systems with wastewater treatment systems. Some NPDES regulators, therefore, have experience in regulating FGD wastewater. In regulating this type of discharge, the NPDES regulators use their water quality criteria and standards to evaluate the particular needs of the receiving waterbody in light of the characteristics of the proposed discharge. After this evaluation, as with any other discharge, if an FGD wastewater discharge has a "reasonable potential" to exceed any water quality criterion, then it receives a water quality-based effluent limit and treatment is implemented to comply with the limit.

Since the 1970s, FGD technologies and wastewater treatment have advanced, and there are now many more types of FGD systems available to the power industry. In addition, in order to comply with new air regulations, power companies have accelerated the building of new FGD systems, committing tens of billions of dollars to construction of these systems.

Advanced FGD wastewater treatment systems exist in Florida, Ohio, West Virginia, Pennsylvania, North Carolina, Wisconsin, and many other states. In each of these states, the state regulators have worked with the permit applicant to ensure that the FGD wastewater discharge is properly limited and does not cause harm to human health or the environment.

In addition, NPDES regulators are forging ahead and sharing information about FGD wastewater and its treatment. In March, the Ohio River Valley Water Sanitation Commission (ORSANCO), a coalition of entities that set standards for the Ohio River, sponsored an FGD wastewater treatment workshop. In October, the International Water Conference will include a section on FGD wastewater treatment.

Due to different coal types, FGD system designs, treatment additives, and other varying factors, each FGD wastewater discharge is unique. No one set of limits may be universally applicable

to every FGD discharge. Therefore, regulation through the water quality-based effluent limits program is ideally suited to this situation. Each proposed discharge is evaluated based on the site-specific needs of the waterbody, and is limited based on those needs. The NPDES regulators are proving that the current system of regulation is appropriate and effective for FGD wastewater discharges.

3. One of the hearing witnesses, Mr. Eric Schaeffer of the Environmental Integrity Project (EIP), stated at the hearing that "discharges of toxic metals are generally not restricted under Clean Water Act permits at power plants and are often not even monitored." Is this an accurate statement or not? Please address this statement, based on your knowledge of the Clean Water Act permitting program and the electric utility industry.

This statement gives the mistaken impression that regulators are not monitoring industry discharges to determine if they contain toxic metals. Nothing could be further from the truth. Each power plant that intends to discharge to a surface water must file a permit application and go through a rigorous review process before being granted a permit. My answers to questions 2a and 2b more thoroughly explain how the Clean Water Act and EPA regulations prevent harmful discharges to the environment.

Significantly, to the extent the characteristics of discharges change due to any operational changes – such as installation of air emission control technologies – the permitting system ensures that the permit writer must be informed of the change and has an opportunity to determine whether further limits are necessary in light of the changes. See 40 C.F.R. 122.41(l) and 40 C.F.R. 122.62. Therefore, contrary to the impression left by Mr. Schaeffer's testimony, there is no danger of industry facilities pulling pollutants out of the air only to release them to water without any regulatory review. The existing water permit program already ensures that all discharges to surface water are subject to evaluation before the discharge begins and at least every five years thereafter when the permit is renewed, and also whenever there are modifications such that the character of the discharge is changed.

4a. Mr. Schaeffer acknowledged, in his supplemental submission, that discharges from ash or sludge systems at four plants (Big Bend, Roxboro, Cape Fear, and Kingston) "appear to mix with other effluent, such as cooling water, before final discharge to surface water," and that the "expanded volume of the combined

discharge will significantly reduce concentrations of these toxic metals, although it will not reduce their mass." He provided revised bar charts with a note indicating that concentrations are likely to be lower at these plants at the final point of discharge. Please provide your perspectives on the data, the clarifications that Mr. Schaeffer made, and the claims or assertions that Mr. Schaeffer made in his hearing testimony and subsequent submission.

The revised bar charts are still very misleading. The goal of the water quality standards program in the Clean Water Act is to reduce the concentration of pollutants in the receiving waterbody. The toxicity of a substance depends on its concentration and duration of exposure to the organism whether it be humans or aquatic life. Selenium, for instance, is an essential mineral that is intentionally added to many multi-vitamins. Clearly, it is the concentration and form of selenium and the length of exposure that sometimes renders selenium toxic.

Also, the bar chart contains some selenium data from *internal monitoring points* (*e.g.,* Big Bend, Roxboro). Comparing internal waste stream concentrations (*i.e.,* concentrations of a pollutant in process water inside a plant, before treatment or discharge) to a water quality criterion is totally inappropriate because it does not reflect how the water quality standards program is implemented, and leaves the false impression that facilities are in violation of water quality criteria. It is also totally inappropriate and misleading to compare selenium end-of-pipe concentrations with the water quality criterion. As explained earlier, the permit writer calculates the assimilative capacity of the waterbody for the criterion of interest and then back calculates the actual permit limit based on the modeling of the waterbody's assimilative capacity at low flow conditions. The resulting permit limit is <u>not</u> the water quality criterion, but a higher value that accounts for the assimilative capacity of the waterbody. By comparing internal waste streams and final discharge points to the water quality criterion, Mr. Schaeffer has created the false impression that these facilities are in violation of set limitations.

4b. He removed the Yates plant from the revised bar charts "as it appears that discharges from the scrubber system may undergo additional treatment prior to their final release," and a "lack of monitoring makes it difficult to determine the concentration at the final outfall." Please provide your perspectives on the data, the clarifications that Mr. Schaeffer made, and the claims or assertions that Mr. Schaeffer made in his hearing testimony and subsequent submission.

I have asked my colleagues at Southern Company to comment on this matter, since Plant Yates is owned and operated by Southern. They believe that Mr. Schaeffer still mischaracterizes Plant Yates. Yates has a closed-loop, recirculating FGD wastewater treatment system which, under normal operations, never discharges. The Yates wastewater sample reference in the original bar chart was collected from within an FGD scrubber, which is part of the air emission control system at Plant Yates. Metals are expected to be high within the scrubber itself, where sulfur dioxide and many other air pollutants are removed from the plant's emissions. But at Yates, wastewater from the scrubber is never discharged to a surface water under normal operations. Instead, it travels through a system of settling ponds and is recycled back into the scrubber system. Since this wastewater is never discharged under normal operating conditions, it is completely erroneous to claim that the Yates selenium data for the scrubber process water is a "release" of toxic metals in concentrations "hundreds of times higher than the water quality standards," as Mr. Schaeffer claimed in his original testimony. Process water samples from within a plant are not relevant to an assessment of the plant's compliance with applicable water quality standards.

This mistake is all the more egregious because the scrubber water sampling data, which was submitted to U.S. EPA at U.S. EPA's request, was accompanied by a cover letter which explicitly identified that sample data related to an internal sample from within the Yates scrubber. Attached is the May 4, 2007 cover letter from the U.S. EPA Effluent Guidelines Plan docket.

4c. He noted that a chart displayed in a May 3, 2009 *Washington Post* story indicated that EPA had established an arsenic water quality criterion of 10 micrograms per liter to protect saltwater aquatic life, and acknowledged that that criterion was incorrect. He noted that the 10 micrograms per liter figure is a drinking water standard, not an ambient water quality criterion. He also said that "some states (Tennessee) have also adopted the ten microgram standard to protect humans

from exposure during recreational use of rivers and streams."

Mr. Schaeffer's misleading bar chart used during the hearing led to the inaccurate reporting in the *Washington Post*. The *Washington Post* chart was apparently based on the arsenic chart Mr. Schaeffer presented during his testimony. It is unfortunate that the use of this incorrect data resulted in sensationalizing the report in the *Washington Post.* It is difficult to understand, especially in light of Mr. Schaeffer's past U.S. EPA enforcement background how such an egregious error could have occurred. He presented data comparing arsenic discharges with a standard that is not relevant (*i.e.,* drinking water standards) with the effect of artificially inflating the comparison but used a water quality criteria on the selenium bar chart.

4d. Mr. Schaeffer said he "tried to make clear in both written and oral testimony that water quality criteria apply to surface waters and do not necessarily legally limit what can be discharged at the end of the pipe, and advocated for further investigation by EPA and for EPA "to develop effluent limitation guidelines that limit both the concentration and mass of toxic metals discharges from power plants."

Mr. Schaeffer's statements imply that there is a disconnect between the existence of water quality criteria for metals and a legal mechanism to use those criteria in the setting of effluent limitations for power plants, with the inference that metals in power plant discharges have gone unregulated. As we have described in the responses to the previous questions, there in fact is a clear legal requirement for environmental agency permit writers to consider the levels of metals in discharges from all permittees with respect to water quality standards established for the protection of the receiving water bodies. As we have also described, permit writers have for years been incorporating effluent limits for metals in power plant discharges where their analysis dictates they are warranted. We should also point out that U.S. EPA has put significant effort into reviewing the effluent limitations guidelines for power plants, and continues to do so. Recent congressional testimony by USEPA representatives has also made mention of this work.

4e. Mr. Schaffer provided new charts "documenting selenium or arsenic concentrations in discharges from ash ponds or scrubber systems at 40 plants, which also identifies whether those discharges are direct (most cases) or may be mixed with other effluents before final release. The charts also provide an estimate of the mass associated with each discharge where that is possible to determine from flaw rate data. As noted in our testimony, many plants do not monitor discharges of arsenic, selenium, or other toxic metals at all."

The industry has not been able to comprehensively study all the data presented in Mr. Schaeffer's new charts and tables. However, the estimates of mass loadings based on maximum flows that Mr. Schaeffer supplies in both the selenium and arsenic tables are likely overestimates for many facilities. That is because maximum flows reported on a permit application typically are generated based on several years' prior data, and the maximum flow often represents the flow from a coal ash impoundment immediately after major precipitation events. Any calculation of loadings based on maximum flow rates is therefore likely to be biased high. For example, the maximum flow of 88.5 MGD for TVA Gallatin Outfall 001 was due to a massive storm event that occurred before the weekly flow reading was collected. The typical yearly maximum for this outfall is 43 MGD. Therefore, using a single concentration in combination with the maximum flow is not at all representative of Gallatin's typical discharge from that outfall.

Also, it is misleading that Mr. Schaeffer used system performance data for selenium *from the start up phase for Pleasant Prairie Station's new FGD system.* See page 8 of the table labeled "Selenium Monitoring Results at Select Facilities." During this startup period, We Energies was not discharging FGD wastewater to Lake Michigan, but was testing the wastewater within the plant and recycling it to ensure that the system was functioning properly. As is not uncommon during a startup phase for major new equipment, the performance data demonstrate that the system needed several adjustments before it operated according to its specifications. Therefore, use of this performance data for any purpose is misleading.

Additionally, there are some inaccuracies in the data. For TVA's Cumberland Station, the mean and maximum selenium concentration values listed for Outfall 001 are both 130 ppb. See page 7 of the selenium table. This is not correct. The long-term average concentration value for this

outfall is 44 ppb, as based on quarterly sampling and provided in the permit application referenced by Mr. Schaeffer.

For AEP's Cardinal Station, the arsenic mass loadings reported in Mr. Schaeffer's clarification are incorrect. The maximum flow of 77.09 MGD is clearly an error. The maximum daily flow, as stated in the permit application, is 17.75 MGD. The long-term average flow is 11.04 MGD. An appropriate maximum flow rate for this outfall is likely 17-18 MGD.

Monitoring of arsenic values at AEP's Mitchell Plant shows the highest value in October 2007 to be 110 ug/l. All other values are below 89 ug/l. We are uncertain the source of the 138 ug/l value reported by Mr. Schaeffer.

5. You noted in your testimony that an August 2006 EPA/Department of Energy report confirms the improving trend in the State regulation of coal combustion residuals, finding that, over the last decade, the amount and quality of environmental controls for coal combustion residual management units have increased and that there is a trend towards dry handling of coal combustion residuals. Please describe some of the ways that state controls have become more robust.

Coal Combustion Waste Management at Landfills and Surface Impoundments, 1994-2004 ("DOE/EPA Report" – copy attached), documents the pronounced improvement in the management of coal combustion waste (CCW) by utilities at new and expanded disposal facilities and strengthened regulatory oversight of CCW disposal by state regulatory agencies. The DOE/EPA Report confirmed an increase of regulatory controls for CCWs destined for disposal since 1988 and that the grants of variances from regulatory controls by state regulators had sound scientific support. It also found dramatic improvement in the management of CCWs in new or expanded disposal units, confirming the increasing trend to dry handling of CCWs, the use of liners and the monitoring of groundwater.

DOE/EPA reviewed data on state regulatory controls on CCW disposal to determine whether there had been improvements in state oversight since 1995. DOE/EPA also focused on the *implementation* of existing regulatory programs eleven states[1] and found that the vast majority

[1] Alabama, Florida, Georgia, Illinois, Indiana, Missouri, Ohio, Pennsylvania, Texas, Virginia, and Wisconsin.

of states exercise control over the disposal of CCW and that there has been a trend in recent years toward more stringent state requirements. DOE/EPA's review of the permitting requirements for CCW disposal in landfills and surface impoundments found that nearly all new CCW disposal units had installed liners, and nearly all new landfills were monitoring groundwater, thereby addressing groundwater protection concerns.

DOE/EPA also used the current regulatory requirements obtained from the eleven states and data obtained in 1988 (the latest useable set of data) to determine whether states had tightened or relaxed several regulatory requirements related to CCW disposal. DOE/EPA determined that significantly more states, accounting for the vast majority of the reviewed net CCW disposal capacity, had tightened their regulatory requirements than had relaxed their requirements. This was true for each of the eight sets of requirements examined: regulatory designation of CCWs, solid waste permitting, liners, groundwater monitoring, leachate collection, closure/post-closure care, siting, and financial assurance. DOE/EPA Report. at 49-51.

The DOE/EPA Report demonstrates that the vast majority of states rely on varying permit or other authorities to impose environmental controls on CCW disposal units. Furthermore, the DOE/EPA Report documents the trend showing that state regulatory requirements for CCW disposal have become more stringent in recent years. In fact, that trend continues to this day. As Secretary Wilson of the Maryland Department of the Environment testified, Maryland has issued regulations that would establish new requirements for generation, storage, handling, processing, of CCWs and recently announced it would develop regulations addressing disposal, recycling, beneficial use, or other uses of coal combustion byproducts.[2]

To assess actual implementation of these state program requirements, the DOE/EPA Report reviewed permits supplied for recently expanded or constructed units to identify all instances where a variance from state regulatory requirements was requested for a CCW disposal unit. The DOE/EPA Report categorized each of these requests by the type of requirement for which the variance was requested (*e.g.*, groundwater monitoring), determined whether the request had been granted, and identified the rationale for granting or rejecting the request. DOE/EPA found that variances from state regulations are granted only on the basis of sound technical justifications, demonstrating effective state regulation of CCW disposal and concluded that "State regulators have not issued variances unless a sound scientific basis supports the

[2] 35 Md. Reg. 2080 (Nov. 21, 2008), See Maryland Depart of the Environment Press Release at http://www.mde.state.md.us/PressReleases/1157.html

request. Variances are generally granted only when the underlying regulation was developed for settings unlike those of CCW units . . . or when the operator has demonstrated that an alternative approach or materials will achieve the same objective as intended by the regulation." *Id.* at 67.

The DOE/EPA Report accurately documents the overall tightening of state regulatory controls applicable to CCW disposal units. In addition, it demonstrates the seriousness with which state regulators administer their programs. States base their approval of regulatory requirements on technically-supported justifications. This record assembled by DOE and U.S. EPA manifestly puts to rest the myth that the absence of federal regulations amounts to no regulation. Plainly, the states take their regulatory responsibilities for overseeing CCW disposal seriously.

6. In what ways would regulating coal combustion residuals as a "hazardous waste" instead of as a non-hazardous solid waste impact on the management (including handling and disposal) and beneficial reuse of such materials? What would be the cost impacts? What would be the increased regulatory burdens?

In short, the regulation of coal combustion residuals (or coal combustion byproducts, "CCBs") CCBs as hazardous waste would kill beneficial use. In its April 1, 2009 letter to U.S. EPA (copy attached) the Association of State and Territorial Solid Waste Management Officials (ASTSWMO) made several important points. ASTSWMO stated that "many State regulations prohibit the beneficial use of CCB if it is declared hazardous." In addition, hazardous waste regulation would stigmatize the material in a way to adversely affect beneficial use. The American Coal Ash Association, in a March 25, 2009 letter to EPA (copy attached) states that hazardous waste regulation of CCBs would "have a devastating effect" on the CCB beneficial use. ACAA notes the "myriad new uncertainties and perceived risks associated with marketing, handling, transporting and utilizing" CCBS that would confront producers, marketers and users of the material. Much, if not all, of the 51 million tons of CCBs that are currently being beneficially used would have to be disposed, resulting in increased disposal costs and a loss of revenue from beneficial use. In sum, hazardous waste designation would have the unintended consequences of dramatically increasing the volumes of CCBs disposed and would eliminate the significant environmental, economic, and sustainability benefits accomplished by CCB beneficial use.

7. Please provide me with any supplemental or clarifying testimony, comments, and data that you may have regarding coal combustion residuals management and beneficial reuse.

The Subcommittee heard testimony calling for the closure of CCB impoundments. As I stated in my testimony, CCBs can be safely managed as non-hazardous wastes and the electric utility supports the development of performance-based regulations designed to protect the environment. The implications for closing all CCB impoundments, without regard to their operational safety, would have significant impacts. We estimate that the mandatory closure of surface impoundments used for the management of CCBs would affect a significant number of electric utility power plants. Based on representative engineering and cost data, we estimate that the present value cost to the electric utility industry of a regulation mandating the closure of CCB surface impoundments would be approximately $39 billion. Annualized over 20 years, this represents a cost of approximately $2.5 billion per year. In some cases, these costs could be sufficiently high to render a facility, or some smaller generating units at facilities, uneconomic and result in the closure of such facilities or generating units. Closure of this generating capacity could potentially affect system reliability as well as energy prices.