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December 9, 2013

Ms. Angela Nugent  
U. S Environmental Protection Agency  
(Mailcode 1400R)  
1200 Pennsylvania Ave., NW  
Washington, DC 20460-4164  
nugent.angela@epa.gov

Dear Ms. Nugent:

As requested here are APPA's comments to the Science Advisory Board (SAB) regarding the questions pertaining to the demonstration of technology for geologic sequestration (storage) of CO<sub>2</sub> and whether the U.S. EPA has addressed cross-media environmental issues in peer review. These comments are submitted to you under the SAB Charter's scope and mission detailed in article 3 (a)(b)(c)(d)<sup>1</sup>.

The American Public Power Association (APPA) is the national service organization representing the interests of the more than 2,000, not-for-profit municipal and other state and local community-owned electric utilities that collectively provide electricity to approximately 47 million Americans. These utilities, are among the most diverse of the electric utility sectors, representing utilities in small, medium and large communities in 49 states (all but Hawaii). APPA's membership includes utilities in Puerto Rico, American Samoa, Guam, Northern Marianas Islands and the U.S. Virgin Islands. Seventy percent of public power systems are located in cities with populations of 10,000 or less. APPA was created in 1940 as a non-profit, non-partisan organization. Its purpose is to advance the public policy interests of its members and their consumers, and to provide member services to ensure adequate, reliable electricity at a reasonable price with the proper protection of the environment.

APPA has communicated with the U.S. EPA since June 2006 regarding the many obstacles to commercial demonstration of sequestration (storage) for power plants that are not located en situ or in very close proximity to oil and gas formations where that CO<sub>2</sub> is used for oil and gas recovery. APPA has met with the Office of Air and Radiation as well as Office of Water at least thirteen (see Attachment 1) times since 2006 on the sequestration aspects of Carbon Capture and Storage or CCS. Copies of APPA's comments are found in three EPA dockets for NSPS, the ANPR for regulating CO<sub>2</sub>, and regarding Underground Injection Control Program (UIC) regulation specifically for CO<sub>2</sub> sequestration.

EPA's proposed NSPS for New Power Plants sets a 1,100 lb/mwH standard for new coal plants (that typically emit 1950 lb/mwH). Attachment 2 provides an indication of the delta that would need to be bridged between CO<sub>2</sub> emissions from new power plants based upon the last seven years' emissions data from the most recently built coal-fired power plants in the United States. None of these 17 new coal-fired plants come close to meeting the 1,100 lb/mwH. *It is because the gap between 1,100 and 1950 lb/mwH is so wide that APPA has focused intently for almost seven years as to whether CCS is proven, demonstrated and fully legal.*

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<sup>1</sup> <http://yosemite.epa.gov/sab/sabproduct.nsf/WebBOARD/currentcharter?OpenDocument>

APPA wishes that there was some technology that was adequately demonstrated and the solution to address CO<sub>2</sub> emissions from power plants. To date, CCS looks worthy of continuous investigation and additional pilot studies but the sequestration or storage technology is not yet proven.

**Why EPA's Best System of Emission Reduction (BSER) makes the sequestration issues critical**

EPA asserted that the Best System of Emission Reduction (BSER) would be to use CCS to achieve the 1,100 lb/mwH. While CO<sub>2</sub> has been recycled in the oil and gas sector for almost forty years, the idea of permanently sequestering it is indeed novel. CO<sub>2</sub> has functioned like a solvent to move the oil and gas more effectively than water flooding. The CO<sub>2</sub> that is currently used in the oil and gas sector in U.S., Norway, Australia, and Canada is recycled not permanently stored. This is in sharp contrast to the idea of CO<sub>2</sub> storage for the power sector, the CO<sub>2</sub> used by the oil and gas sector has residence or holding time of only days, weeks or perhaps months.<sup>2</sup> The CO<sub>2</sub> is usually removed and transported by specialty pipeline for use in the next oil and gas recovery location.

The U.S. EPA has simply assumed that injection of CO<sub>2</sub>, under high pressure, would be simple, easily permitted, and inexpensive. EPA staff said at least four times during the December 4-5, 2013 meeting that CCS is no different from carbon sorbent technology for mercury control or scrubbers. EPA could not be more wrong. This letter will identify many examples of fundamental differences between scrubbers, activated carbon or other pollution control devices with the many new technologies or applications of other technologies into entirely uncharted geologic formations

**Understanding the fundamental difference between oil and gas locations and power plants**

APPA recognizes that the oil and gas sector have used CO<sub>2</sub> to get oil and gas from difficult formations—perhaps most commonly in the Permian Basin of Texas. The oil and gas industry use CO<sub>2</sub> in oil and gas locations where a natural caprock exists in nature to hold the CO<sub>2</sub> “downhole” just as nature held the oil and gas (and water) within the rock for millions of years. Because the CO<sub>2</sub> from the power sector exceeds the capacity for use in the oil and gas sector, the NETL has stated that deep saline aquifers would be other choice for injection. To date the U.S. EPA has not studied “caprock-like” functioning in deep saline aquifers.

However, the idea of injecting a buoyant acid gas, under intense pressure, into a deep saline aquifer for hundreds or perhaps thousands of years is entirely novel. Without naturally occurring caprocks, the injection companies (likely to be oil and gas production drilling companies) will need to find locations within deep saline aquifers that have something that can function like a caprock.

Deep saline aquifers have not been geologically assessed on a granular<sup>3</sup> level adequately to demonstrate that there are consistent caprock type formations to hold the CO<sub>2</sub> under pressure. Although the width and depth of deep saline aquifers are much larger than what is used for oil and gas extraction (oil, gas, coal, bauxite, or drinkable water), very little is known. The lack of knowledge is because saline aquifers have no extractive value They have been studied, but neither the private sector nor governmental have done so to the extent needed to demonstrate how CO<sub>2</sub> would be retained in the saline aquifers for hundreds and perhaps thousands of years.

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<sup>2</sup> The CO<sub>2</sub> is recycled many times because the CO<sub>2</sub> is expensive. Most CO<sub>2</sub> used in the oil and gas sector is naturally occurring from a naturally occurring carbon dome in Colorado or purchased from food grade industrial applications.

<sup>3</sup> For most states without extractive industries, the subsurface has not been really studied since the 1950s when the U.S. Department of Defense tried burying weapons wastes in the subsurface. Those military waste injections were abandoned after small but persistent seismic events near the weapons waste injection sites in Colorado.

There is no factual basis on which EPA may assert that sequestration technology, as used in pilot projects now, satisfies the three part test for demonstrating technology for an NSPS standard. The three part test is that the technology is widely usable, technically and economically feasible. APPA believes that the sequestration aspect of CCS meets none of these three parts of the test for all 50 states.

CCS has not been “adequately demonstrated” for any category of electric generating units (EGUs) and those emissions limits based upon the application of that technology would not be “achievable” for the industry as a whole. The EPA cited four “demonstrations” but these are pilot projects for CO<sub>2</sub> to be taken from power plants located in close proximity to oil and gas recovery areas in Mississippi, Texas and Canada. Those geologic formations are homogenous relative to the >1,000 power plant locations in the United States found atop karsk, granite, and nonsedimentary rock. The U.S. EPA has never even asked questions in its NSPS for New Plants (2012 and 2013) about how the sequestration would be accomplished in these non oil and gas geologic locations.

### **The Clean Air Act mandates review of the environmental consequences of Section 111 NSPS**

APPA notes that at the SAB meeting on December 4-5, 2013 three U.S. EPA employees said that they did not have to look at non-air or non-emissions issues or consequences from sequestration when they proposed the NSPS for New Plants. That is not correct.

Shortly after passage of the 1970 Clean Air Act and EPA’s creation, the federal courts were asked to decide the relationship between the Clean Air Act and the National Environmental Policy Act, and more to the point whether EPA in taking a final agency action, such as issuance of an NSPS, was required at the same time to issue an environmental impact statement (EIS) considering the effects of the NSPS on the environment. *See, e.g., Portland Cement Association v. Ruckelshaus*, 486 F.2d 375 (D.C. Cir., 1973) (“Portland Cement”). As Judge Leventhal, writing for the Court, pointed out “The policies against a NEPA exemption embrace the endemic question of “Who shall police the police?” He also noted that an important sponsor of the Act, Senator Henry “Scoop” Jackson (D-WA), underscored this concern by stating during debate on the new law “It cannot be assumed that EPA will always be the good guy.” (*See Portland Cement* at 383.) In the context of the proposed Portland cement NSPS, the Court reiterated that EPA “might wear blinders when promulgating standards protecting one resource as to effects on other resources, as is asserted in this case, that air standards may increase water pollution.” *Id.*

Addressing this issue, the Court held in this landmark case that EPA was exempt from the additional requirement of issuing a federal impact statement when it issued a CAA section 111 NSPS **because “[t]he reality [is] that, section 111 of the Clean Air Act, properly construed, requires the functional equivalent of a NEPA impact statement.** “ The Court explained –

*“Enlarging on our conclusion as to a narrower exemption, we note that section 111 of the Clean Air Act requires a “standard of performance” which reflects “the best system of emission reduction”, and requires the Administrator to take “into account the cost of achieving such reduction.” These criteria require the Administrator to take into account counter-productive environmental effects of a proposed standard, as well as economic costs to the industry. The Act thus requires that the Administrator accompany a proposed standard with a statement of reasons that sets forth the environmental considerations, pro and con which have been taken into account as required by the Act, and fulfillment of this requirement is reviewable directly by this Court.”*

*Portland Cement* at 385 (cit. omitted). *See also, American Trucking Ass’n v. EPA*, 175 F.2d 1027, 1043 (D.C. Cir. 1999), *rev’d on other grounds Whitman v. American Trucking Association*, 531 U.S. 457 (2001) (“compliance with NEPA’s . . . requirement[s] has not been

*considered necessary when the agency's organic legislation mandates procedures for considering the environment that are "functional equivalents" of the [NEPA] process").*

Given the 1973 and 1999 court decisions and Senator Jackson's statement as legislative history there can be no doubt as to the EPA's requirement that non-air and economic impacts be considered and fully reviewed in proposing NSPS for New Power Plants.

### **An Overview of Concerns That Were not Addressed in the 2012 NSPS for New Plants (withdrawn) or Responded to by EPA Response to Comments**

Although the U.S. EPA has received written and verbal communication on these issues, none of these issues have been responded to by EPA in the Agency's re-proposal of the New Plant NSPS (still to be published). In fact, in the September 20, 2013 pre-publication announcement of the proposed rule the U.S. EPA said it would not respond to all of the 2.5 million comments that it received. Those comments included APPA's 247 pages<sup>4</sup> (including six attachments addressing sequestration).

The following scientific, technical, feasibility and legal issues question must be answered before a new technology may be determined to be demonstrated under BSER:

#### **Scientific:**

- **Superfund:** EPA should legally affirm that injection and sequestration of CO<sub>2</sub>, an acid gas, is legally permitted in non-oil and non-gas recovery locations. Example: acid gas could change the pH of the soil or make other changes to the receiving environment. It is essential to know that this action cannot trigger a determination that it is a hazardous substance. If acid gas injections could trigger remediation under Community Emergency Response, Compensation and Liability Act (CERCLA) –commonly called Superfund -then clearly the technology cannot be demonstrated. See APPA's "Carbon Capture and Sequestration: Legal and Environmental Challenges Ahead", 2007 at <http://www.publicpower.org/files/HTM/ccs.html>
- **EPA's "CCS is based upon no new science" claim** U.S. EPA cannot point to any circumstance where a CCS project at a power plant has a performance guarantee for 90%, 75% or even 30% sequestration into one geologic formation over the lifetime of that power plant on a 24-hour day basis. By contrast scrubbers and other pollution control technologies have performance warranties and contractual agreements to guarantee that the pollution is captured, destroyed or eliminated to meet a specific performance level. APPA points out that one of the changes from the 2012 New Plant Source NSPS Proposed Rule was that the CCS requirements kicked in on the 11<sup>th</sup> year with the power plant having to meet a 30 year emissions average to that of natural gas equivalency. Oddly, the U.S. EPA changed this requirement in the re-proposal to require partial sequestration in the 85<sup>th</sup> month after building of a new coal-fired power plant. APPA wonders on what basis EPA knows how the sequestration can be accomplished in one location over the lifetime of a new coal-fired power plant.
- **Drinking water and Western Water Law:** EPA's peer review must resolve whether any upward migration of sequestered CO<sub>2</sub>, even if it did not affect the quality of drinking water, could limit access to water under Western Water Law where water rights for drilling are often drilling *depth restricted*.
- **Navigable waters:** Given that the U.S. EPA is also considering policies affecting Waters of the U.S., is there any chance that subsurface locations where CO<sub>2</sub> is sequestered could later be

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<sup>4</sup> APPA comments on 2012 proposed NSPS for New Coal-fired and Natural Gas-fired plants  
<http://www.publicpower.org/files/PDFs/APPA-NSPS-Comments-WithAttachments-Final.pdf>

determined to be injection of CO<sub>2</sub> into a navigable waterbody: (APPA has been told that a draft rule and a separate draft policy on Waters of the U.S. reside at OMB now).

- **Multiple state and city jurisdictions:** Which agency has primacy when injection of CO<sub>2</sub> is made into a deep saline aquifer that runs under as many as five different states? (The UIC program does not address the issues of adjacent lands or navigable waters so EPA cannot assert that UIC program can handle this question).
- **Costs of acoustic and 4D, 5D and 6D seismic readings in order to permit sequestration of CO<sub>2</sub>:** The U.S. EPA appears to believe that there are detailed and free acoustic and seismic readings conducted by oil companies and drilling companies in geologic locations where there has been no extractive industry. The U.S. EPA presumes that there is no cost involved with the multimillion dollar subsurface studies needed in order to conduct permit applications under UIC Class V, Class VI or Class II for injection of CO<sub>2</sub> by power plants. It is highly improbable that this data exists in the public domain or that it would be free. Apparently EPA does believe these injection research efforts would be free based upon its assessment that the NSPS would have no R and D costs associated with each sequestration project.

APPA believes that while the separation of CO<sub>2</sub> might be demonstrated, the sequestration of CO<sub>2</sub> is inherently location specific. This means that in each underground location detailed acoustic readings and seismic assessments must take place by bonded, licensed, and experienced companies to determine the carrying capacity and the injection rate into that rock formation for between 30 and 50 years. This company must also rule out any risks of inadvertent seismic events. The NETL Carbon Sequestration Atlas is informative but offers no indicators of the carrying capacity or storage retention capacity of those varied geologic formations. That is rock and location specific.

In fact, power plant owner/operators will be the 21<sup>st</sup> century equivalent of “wildcatters”<sup>5</sup> looking for the “sweet spot” for injection of CO<sub>2</sub> with little background. These enormous costs were completely ignored in EPA’s economic analysis. Large injection sites will cost millions just for the storage assessments for large power plants. That analysis must anticipate a 30 to 40 year injection and perhaps a 1,000 year sequestration period. This “location specific” geologic assessment required by each power plant for each injection location is another example that the that CCS is no more technology forcing than scrubbers or mercury sorbent technology as asked by EPA staff. The sequestration involves new and novel technology

- The U.S. EPA cannot state that a technology is demonstrated when it is under construction now (during the comment period) and the operations have not yet begun. Further, three of the four CCS projects are using lignite coal for new IGCC plants. To meet the demonstration test the technology must use many types of generation and all coal ranks.
- To use CCS, construction of significantly amounts of new high pressure specialty CO<sub>2</sub> pipeline is required. Currently the U.S. only has 6,000 miles of CO<sub>2</sub> pipelines. Conventional natural gas or other petrochemical pipelines will not move CO<sub>2</sub>. It took approximately five years to increase CO<sub>2</sub> pipelines from 3,000 to 6,000 miles for Wyoming, Texas and Colorado. The permitting and construction of CO<sub>2</sub> pipelines is probably the easiest part of the entire web of technological, legal, scientific issues to sort out for CCS, but it should be considered for feasibility
- Even for the few power plants that might be fortunate enough to be co-located in those oil and gas formations it is possible that CCS could work over the lifetime of the power plant (usually 40-50 years). Despite initial research by DOE’s NETL and office of Fossil Energy we don’t yet know

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<sup>5</sup> The actual term used by Schlumberger’s Mr. John Tombari when describing the new role for the electric utility sector when engaging in CCS. Schlumberger is one of the country’s most respected drilling companies for oil, gas and water.

about each state's carrying capacity. No one yet knows whether these formations can accept 10, 20, or 50 years of CO<sub>2</sub> based upon 24 hour utility operations.

- **ESA:** Did the U.S. EPA consult with the U.S. Fish and Wildlife under Section 7 of the Endangered Species Act (ESA) to determine that sequestration of CO<sub>2</sub> into deep saline aquifers is permitted given that many of the deep saline aquifers run either through or under ESA's Habitat Conservation Plans, Conservation Banks, Safe Harbor Agreement site, etc? If not, how might these ESA protected areas limit geologic locations for sequestration? Has EPA or the National Energy Technology Laboratory (NETL) attempted to reflect these limitations in EPA's assessment or in NETL's Carbon Sequestration Atlas<sup>6</sup> which gives its prediction of potential geologic sequestration sites. The DOE Carbon Sequestration Atlas does not indicate areas with other environmental restrictions such as National Parks, Wilderness Areas, etc where sequestration of CO<sub>2</sub> might not be allowed. Very little mapping has been done of deep saline aquifers on the granular level required to actually predict CO<sub>2</sub> storage on a gigatonne basis. Nor is there a body of knowledge for non-oil and gas formations as to how quickly the CO<sub>2</sub> may be injected to maintain pressure in the rock. (EPA failed to call for comments in the Proposed NSPS for New Power Plants for state Departments of Geology to express if they have the staff and resources available to do this under their own state governance. Most non-extractive industry states have only one or two employees in the department tasked with studying the state's geology). Few states have mapped deep saline aquifers

#### **Legal and Feasibility:**

- **How can a technology be demonstrated if it is not legal in all 50 states for a party to inject into the property owned by others?** Many states do not have separate surface or subsurface land ownership. In most states a property owner owns what is his land from the surface to "the heavens" and to the middle core of the earth. Only in extractive industry states are there separate ownership options to enable oil, gas and hard/soft rock mining. Where there are no options for "mineral rights" ownership, the geologic sequestration of CO<sub>2</sub> that might under another person's property is a legal trespass. U.S. EPA never looked at this critical legal issue before stating that CCS was commercially demonstrated. In fact, all three of the U.S. CCS pilot projects are in oil and gas recovery operations and those states have mineral right ownership of the subsurface. To be demonstrated and feasible, the technology(s) must be legal and feasible in all 50 states.
- **UIC:** The U.S. EPA Underground Injection Control Program (UIC) requires financial assurance for CO<sub>2</sub> injection. However, this financial assurance does not address long-term commercial liability issues under Products Liability Statutes<sup>7</sup>. To APPA's knowledge, there are no U.S. insurance companies that provide insurance policies to cover civil lawsuits or trespass claims for geologic sequestration. (Oil and gas companies self-insure, provide insurance for oil and gas operations or post corporate stock but municipal electric utilities have none of these assets). Until the U.S. EPA (or Congress) address whether CO<sub>2</sub>, as an acid gas, could trigger CERCLA remediation, no one knows how to calculate the potential risk in order to purchase insurance. Inability to obtain insurance is a major obstacle to feasibility.
- **Pore Space:** U.S. EPA ignored in its demonstration claim that pore space issues are not resolved in all 50 states. The surface property owner usually owns pore space in geology. Not all states have laws distinguishing between surface property and subsurface and have clarity on pore space ownership. APPA believes that this pore space question remains unanswered in most of the states

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<sup>6</sup> [http://www.netl.doe.gov/technologies/carbon\\_seq/refshelf/atlas/](http://www.netl.doe.gov/technologies/carbon_seq/refshelf/atlas/)

<sup>7</sup> See *Modesto, City of v. The Dow Chemical Co, et al*, No. 98-999345, Calif. Super., San Francisco Co. (liability based on products liability theories found for dry cleaning fluid off-site impacts). See *Lawrence v. Buena Vista Sanitation District*, 989 P.2d 254 (Colo. App. 1999)

east of Louisiana. That means a significant percentage of new coal-fired power plants potentially covered by the presumptive use of CCS technology operate in states with no commercial law dealing with pore space—and certainly no law explaining about the arcane questions of “between pore space”. Some states have pore space laws pertaining to lease or sale but they only pertain to the storage of natural gas. How can a technology be demonstrated or required if the law does not recognize pore space for CO<sub>2</sub>?

- **Eminent Domain:** U.S. EPA’s economic analysis failed to address the potential impacts of requiring sequestration in locations that require local or state governmental agencies to use the Power of Eminent Domain in order to sequester. The U.S. EPA’s economic and costs analyses sections of the Regulatory Impact Analysis fail to address this issue. This means the U.S. EPA did no economic analysis of loss of property by private citizens whose subsurface or surface might be required for CO<sub>2</sub> injection or for new CO<sub>2</sub> pipelines. This analysis is required under the NSPS as well as under the Unfunded Mandates Reform Act of 1995<sup>8</sup> and Executive Orders dealing with Federalism<sup>9</sup> and was not done.
- APPA is not aware of any performance guarantee or warranty for sequestration for one geologic injection location for the power sector

APPA believes that there are many cross-media environmental issues yet to be resolved before the sequestration technologies and activities may be demonstrated. APPA further believes that the U.S. EPA has had at least six years of communication by APPA along with those in academia<sup>10</sup> or at think tanks who have asked these many questions about the readiness of sequestration into the subsurface. The U.S. EPA has made many assumptions for non-oil and gas locations about geology based upon theories and no demonstrated sequestration. EPA also assumed the CO<sub>2</sub> would solidify in deep saline aquifers for hundreds or thousands of years with no proof.

While EPA’s representatives at the SAB meeting asserted that many of these issues “were new” to them, APPA finds this troubling since APPA has met with the agency at least 13 times in six years, testified twice, and submitted comments in three dockets. But even if APPA had not submitted comments and addressed these issues in detail over six years, the EPA did not follow its own requirements under the Clean Air Act, Unfunded Mandates Reform Act, or Executive Order 12866.

The U.S. EPA did not follow the Office of Management and Budget’s own Peer Review Handbook guidelines<sup>11</sup> with experts on oil and gas. Nor did it conduct a NEPA-like assessment on non-air issues

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<sup>8</sup> <https://www.govtrack.us/congress/bills/104/s1>

<sup>9</sup> Executive Orders 13132 and 13083

<sup>10</sup> Elizabeth Wilson, University of Minnesota’s Humphrey School of Public Affairs and Mark de Figueiredo, DOE NETL. See “The Impact of Liability on the Adoption and Diffusion of Carbon Capture and Sequestration Technologies, page 6.

<sup>11</sup> Office of Management Peer Review Handbook “In general, an agency conducting a peer review of a highly influential scientific assessment must ensure that the peer review process is transparent by making available to the public the written charge to the peer reviewers, the peer reviewers’ names, the peer reviewers’ report(s), and the agency’s response to the peer reviewers’ report(s). The agency selecting peer reviewers must ensure that the reviewers possess the necessary expertise. In addition, the agency must address reviewers’ potential conflicts of interest (including those stemming from ties to regulated businesses and other stakeholders) and independence from the agency. This Bulletin requires agencies to adopt or adapt the committee selection policies employed by the National Academy of Sciences (NAS) when selecting peer reviewers who are not government employees. Those that are government employees are subject to federal ethics requirements. The use of a transparent process, coupled with the selection of qualified and independent peer reviewers, should improve the quality of government science while promoting public confidence in the integrity of the government’s scientific products”

Ms. Angela Nugent

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under NSPS. APPA believes the myriad of scientific, technical and legal/feasibility issues associated with this important rulemaking would benefit from SAB review. APPA is not convinced that all of the individual technical issues in this rulemaking have been peer reviewed in a manner that is consistent with the OMB and EPA peer review requirements of highly influential scientific assessment. Moreover, APPA is concerned that even if individual scientific and technical issues have been peer reviewed separately, their combination and application in a rulemaking that will forever change the use of fuels in this country to generate electricity justifies SAB a peer review in a manner that is consistent with a highly influential scientific assessment.

Thank you for reading APPA's comments. Thank you also for allowing me to speak before the SAB on December 5, 2013.

Sincerely,

/s/ Theresa Pugh

Director, Environmental Services

[tpugh@publicpower.org](mailto:tpugh@publicpower.org)

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Attachment 1

**APPA Meetings Held With U.S. EPA Regarding Sequestration Aspects of CCS:  
Office of Air & Radiation**

- Two hour briefing arranged by Mr. Frank Princiotti, EPA, ORD before 35 EPA employees and contractors at EPA in Research Triangle Park, NC. (November, 2010)
- Mr. Rob Brenner (April, 2010 )
- Office of Air briefing on CCS and natural gas (July 7, 2010)
- Ms. Gina McCarthy, Mr. Joe Goffman, Ms. Janet McCabe (July 27, 2012)

**Office of Water:**

- Joint meeting with the American Water Works Association, Person from Office of Air & Radiation was included in the meeting (Summer 2009)
- Mike Shapiro, Outreach related to climate/adaptation,(Spring, 2009)
- Outreach meeting (Summer 2013)

**Comments Filed With U.S. EPA Regarding Sequestration Aspects of CCS:**

- New Plant NSPS (2012)  
<http://www.publicpower.org/files/PDFs/APPA-NSPS-Comments-WithAttachments-Final.pdf>
- Call for comments on regulating CO<sub>2</sub> (no docket number) spring, 2011.
- Underground Injection Control (UIC), December 4, 2006  
<http://www.publicpower.org/PDFs/APPA%20GuidanceComments%20Final%2012082006.pdf>

**Meetings With Other Agencies Regarding Sequestration Aspects of CCS:**

- APPA 4 minute presentation before DOE's NETL at the joint NETL/EPA meeting, EERE center, Beulah, ND and a site visit to North Dakota Gasification Power. During this meeting APPA met with Sask Power regarding logistics
- DOE's NETL's Mrrs. Cignini, Mr. Klara, and Mr. de Figueiredo following fall, 2009 NETL/EPA conference in Pittsburgh (and provided APPA's papers on sequestration by e mail later)
- DOE (July 2010)
- U.S. Geological Survey, August 2010 (with American Water Works Association)
- EPA-Small Business Administration SER meeting, June, 2012 with EPA staff present
- OMB/CEA/CEQ September 5, 2013
- SBA-EPA Roundtable on NSPS, October 25, 2013 panel discussion on sequestration with Mr. Kevin Culligan.



Attachment 3



### **Carbon Capture and Storage**

L.D. Carter, White Paper, "Retrofitting Carbon Capture Systems on Existing Coal-fired Power Plants," November 2007 [[pdf](#)]

L.D. Carter, White Paper, "Carbon Capture and Storage From Coal-based Power Plants: A White Paper on Technology for the American Public Power Association (APPA)," May 2007 [[pdf](#)]

Doug Carter, Presentation, "Parasitic Power for Carbon Capture" [[pdf](#)]

Timothy Gablehouse, White Paper, "Geologic CO<sub>2</sub> Issue Spotting and Analysis" July 2009 [[pdf](#)]

Marianne Horinko, White Paper, "Carbon Capture and Sequestration Legal and Environmental Challenges Ahead," August 2007 [[pdf](#)]

Jonathan Gledhill, Policy Navigation Group; James Rollins, Policy Navigation Group; Theresa Pugh, APPA, White Paper, "Will Water Issues/Regulatory Capacity Allow or Prevent Geologic Sequestration for New Power Plants? A Review of the Underground Injection Control Program and Carbon Capture and Storage," November 2007 [[pdf](#)]

Theresa Pugh Presentation, "Sober Thoughts About CCS for Retrofit or New Fossil Plants as a CO<sub>2</sub> Mitigation Measure from 2009-2029," Presented Nov. 3, 2009 [[PDF](#)]

Theresa Pugh Presentation, "Infrastructure Costs, Permitting Issues and Parasitic Energy Loss for Power Plants with CCS," Presented Jan 29, 2008 in Tucson, AZ [[Powerpoint](#)]

Carbon Capture and Storage: Analysis of Potential Liabilities Associated with Groundwater Contamination Due to Geological Sequestration Operations, September 10, 2008  
*Prepared by Fredric P. Andes and Kari A. Evans, members of the Barnes & Thornburg LLP Water Team, for the American Public Power Association (APPA)* [[pdf](#)]

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