

**OVERSIGHT HEARING ON THE
TENNESSEE VALLEY AUTHORITY
AND THE RECENT MAJOR COAL ASH SPILL**

HEARING
BEFORE THE
**COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE**
ONE HUNDRED ELEVENTH CONGRESS

FIRST SESSION

JANUARY 8, 2009

Printed for the use of the Committee on Environment and Public Works



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ONE HUNDRED ELEVENTH CONGRESS
FIRST SESSION

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C O N T E N T S

Page

JANUARY 8, 2009

OPENING STATEMENTS

Boxer, Hon. Barbara, U.S. Senator from the State of California	1
Inhofe, Hon. James M., U.S. Senator from the State of Oklahoma	10
Lautenberg, Hon. Frank, U.S. Senator from the State of New Jersey	12
Isakson, Hon. Johnny, U.S. Senator from the State of Georgia	18
Merkley, Hon. Jeff, U.S. Senator from the State of Oregon	18
Alexander, Hon. Lamar, U.S. Senator from the State of Tennessee	19
Udall, Hon. Tom, U.S. Senator from the State of New Mexico	20
Carper, Hon. Thomas R., U.S. Senator from the State of Delaware	21

WITNESSES

Kilgore, Tom, President and Chief Executive Officer, Tennessee Valley Authority	22
Prepared statement	25
Responses to additional questions from:	
Senator Boxer	30
Senator Udall	64
Senator Inhofe	72
Smith, Stephen A., DVM, Executive Director, Southern Alliance for Clean Energy	117
Prepared statement	120
Response to an additional question from Senator Boxer	262
Responses to additional questions from:	
Senator Udall	263
Senator Inhofe	267
Rose, William "Howie," Director of Emergency Management Services, Roane County, Tennessee	269
Prepared statement	273
Responses to additional question from:	
Senator Boxer	277
Senator Udall	277
Senator Inhofe	277

ADDITIONAL MATERIAL

Statement of the U.S. Environmental Protection Agency	287
Statement of Tetra Tech, Inc.	296

**OVERSIGHT HEARING ON THE TENNESSEE
VALLEY AUTHORITY AND THE RECENT
MAJOR COAL ASH SPILL**

THURSDAY, JANUARY 8, 2009

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
Washington, DC.

The full committee met, pursuant to notice, at 10 a.m. in room 406, Dirksen Senate Building, Hon. Barbara Boxer (chairman of the committee), presiding.

Present: Senators Boxer, Inhofe, Lautenberg, Isakson, Carper, Alexander, Merkley, Udall.

**OPENING STATEMENT OF HON. BARBARA BOXER,
U.S. SENATOR FROM THE STATE OF CALIFORNIA**

Senator BOXER. Good morning, everyone. I would like to begin today's hearing by acknowledging and welcoming some of the people who live in the area devastated by the coal ash spill in Tennessee. And I know Senator Alexander has just greeted you all extensively. I had the privilege of meeting some of you in my office yesterday. And I see how this disaster has forever changed your lives, and we hope not forever, but for now, certainly. They are farmers, ranchers, nurses, and parents. And I would like to ask Bridget, Melinda, Ron, Teresa and Terry to please stand and be recognized so people understand what we are talking about here is about real people's lives.

The beautiful place where they lived was instantly transformed by a wall of ash, water and debris. They are anxious about the spill's potential effects on health, especially to children, and they are anxious about their livelihoods. They sent me personal statements that I would like to enter into the record, and I will do so if there is no objection at this time.

[The referenced material follows:]

Bridget Daugherty:

I Have been a Roane County resident all of my life. I live on the lake, as do many of my friends, and my mother. December 22 was a life-altering day for my friends, family, and community. We have been impacted in so many ways I have almost lost count. My 11-year-old son has not slept a night in his own bed since the ash spill and he asks frequently "Am I going to die?" I worry about the long-term affects to his health from heavy metal contamination.

We have not received any answers from TVA except that fly ash is not detrimental to your health. My husband and I have been told that TVA is going to dam the river and that they cannot control the Emory River's water flow and it has a real possibility of flooding. We are facing loosing our home to TVA so that they can attempt to clean up the destruction that they created. TVA has wreaked havoc with my life but more importantly, my whole community. We will possibly be dealing with their fallout for many years to come.

Gone are the carefree days spent building sand castles and swimming in a lake with no worries about my health. Gone are the days of planning on boating, swimming and cookouts during my retirement years. Without any answers from TVA we are all left hanging in a perpetual state of mistrust and confusion. My short-term concern is where will my family live? And my long-term concern is will we be healthy when we get there?

Bridget Daugherty
396 Emory River Rd.
Harriman, TN 37748

Melinda Hillman:

My name is Melinda Hillman and I live on Emory River Road in Harriman, TN. My husband, Ron, and I have our 2-year-old granddaughter, Sage Hillman, in our full-time care. About 15 years ago Ron and I began to dream of living on a beautiful lake in a valley surrounded by mountains, working at jobs we loved and building our dream home. Four years later, I was able to get a job at Roane State Community College. Our search for a place to build our dream home

began about a year after I took the job at Roane State. By April of 2001, we had moved into our home on the lake with a view of the smoky mountains. We love the diversity of plants and wildlife, the dark and starry skies and most of all, the lake. Our families gather here often for swimming, canoeing, hiking, fishing and boating.

Now, we have a panoramic view of the massive spill of dark gray goop and a light gray rim of dust around our cove. The noise is constant from helicopters, traffic, heavy equipment, and river traffic from the cleanup. My dogs can no longer go in the water; we can't go near the shoreline for fear of tracking arsenic-laced ash into our home. To make matters worse, my husband is a realtor who almost exclusively sells lakefront properties on Watts Bar Lake. We are now facing significant loss of family income and potential financial disaster because lake properties will not be selling in this area in the near future. In addition, our home, the largest personal asset we have, is unsellable. My community is now viewed as "that place where the big ash spill occurred" – not the place that offers natural beauty and water sports for all to enjoy.

I am very concerned about our health – especially our granddaughter's. When will we know how this will affect our health? With no warning, our entire lifestyle that we have worked for most of our careers has been destroyed.

My heart hurts for what has been done to our beautiful lake. This quiet, beautiful little piece of heaven is now a wasteland. Will it ever really be cleaned?

Melinda Hillman
540 Emory River Road
Harriman, TN 37748
865-607-4114
mkhillman@comcast.net

Ron and Joanie Smith

Our names are Ron and Joanie Smith and we moved to 1309 Swan Pond Circle Road, Harriman TN in October 2007 with our three daughters, two dogs and four horses. We loved the country setting of Swan Pond and the convenience to the interstate and town with modern

conveniences. Our goal from the time we moved in has been to build a riding lesson business on our four acres of land. In August of 2008 we finished the arena and put up signs for riding lessons and were surprised by how fast our business grew. By the end of November we had 19 students. Even with the cold weather of winter we have 15 students that currently come for lessons on a weekly basis, at least until December 26, 2008.

On December 26, 2008 my students were not allowed past the check-point at Emory Heights. I had already received a few calls from parents saying that they were not comfortable coming out for lessons with the ash all over the place. We contacted TVA to explain about the students' situation and that water was backing up on our property. We met our liaison Jason Weaver and Beverly Kelley later that same day.

Sunday December 27, 2008 they did come and take a water sample, which we have still not heard the results of. They also fenced off a major portion of the field to keep the horses out of the water.

The water has and is still rising and is about twelve feet from the fence that TVA put up. We have contacted Jason on several occasions and he just tells us everything is ok and we shouldn't worry.

The fact that we haven't heard about the water test in almost two weeks makes us wonder if there is something they don't want us to know which leads us to our biggest concern - health issues, cancer, asthma, long-term and short term issues, especially for our children. Ron has been sneezing and coughing for about a week now. Joanie has been having trouble sleeping and has had a headache for the past 6 days. Our daughter Stephanie has also complained of a headache for several days.

The loss of lessons is affecting us adversely financially and relocating the horses to a boarding facility adds to the stress of an already stressful situation. The lack of answers and the feeling of helplessness are becoming overwhelming.

Thanks,
Joanie Smith
Soggy Bottom Farm
1309 Swan Pond Circle
Harriman, TN 37748

865-591-0551

Home of Eddie The Wonder Horse!

"Where riding is more than a passion, it's an obsession."

Teresa H. Riggs:

My husband and I bought our lake front property in 1992 as our retirement home. We couldn't afford to build a house that year, but we could afford to build a boathouse/dock with an attic loft in which we camped out every weekend. We built our home on the Emory River in Harriman in 1993 and moved into our house February 1994, fifteen years ago. My husband and I, both, moved to this area as children when our fathers worked to build the Kingston Steam Plant years ago. We love this area and our children and grandchildren have played and fished in these waters for 15 years. We are grateful to TVA for its purpose as a Public Utility employer, for affording us the opportunity to enjoy and utilize the rivers, lakes, and lakeshores, and the beauty and serenity of the vast waterway system.

In the early hours on the morning of December 22, 2008, the beauty and serenity of the Emory River was shattered with broken ice chunks, debris, and a tsunami-type wave estimated to crest at about 10 or 12 feet into our yard and completely pulled our boathouse/dock up and left it at the end of our cove.

We had no idea this was fly ash, or that fly ash had been allowed to build up as an earthen berm, not to mention that the fly ash was acting as a dam for used coal ash deposits. When the ash slide occurred, the wall gave way and water was pushed to the path of least resistance, but all the way across the bay. .

I have two nodules on my left lung and I have been under doctor's orders to have chest x-rays done for the last four years at six month intervals, beginning in 2004. We have been meeting with TVA reps and they cannot do enough to help us, bringing us HEPA filters and alerting TVA management of the still-swirling fly ash requesting it to be watered to prevent ash particulates (quartz) and silica to be swept to our shore. Ray and I have allergies, but now our throats and noses are raw, our eyes water, and our nose burns and drips.

We told, Sunday, that the Emory River will be closed for nine months during the cleanup. We also learned that TVA plans to take the

water level to the 500-year flood plain, much higher than the 100-year flood plain or 750 foot sea level. This could bring a bigger problem of having our septic tanks underwater.

We are grateful that the local and national news has telecast this disaster; and at the same time we hate that local and national news has telecast this disaster because no one will want to live here and no one will buy our home. Our property values have forever been destroyed. We want TVA to compensate us for the value of our lake homes/land at the value on December 21, 2008. We now add anger, hurt and depression when we thank TVA. We ask for assistance in oversight for cleanup of the lake and that it be brought back to an even better condition, that fly ash can no longer be stored in this same manner, that our homes and land value be compensated. Everyone has a boss, why doesn't TVA?

Teresa H. Riggs
teresa.riggs@comcast.net
Cell Phone 865-250-3968

Terry Gupton

Our world changed as we knew it on December 22, 2008. We were awoken by an urgent call at 2 a.m., and since then we have been trying to cope with the most massive change in landscape anyone can imagine. Our lives have been impacted because of the health concerns raised by this spill, water issues, loss of income, and possible permanent damage to our environment.

We operate a 240-acre Beef Cattle Farm. We sell breeding stock and cattle to the commodity market. The spill caused contaminated water to cover the spring that furnishes water to our 100 head of cattle. The water is unusable for livestock. The flooded area is still growing and covers about 20+ acres of pasture. This land may be unusable after the water is drained, due to heavy metals left behind. The fly ash filled the cove at the South end of our farm, where we once fished and camped. TVA says that they will not remove the ash from this cove but only cover it over and leave it. This is not acceptable. We are fearful that the clean-up efforts will bring more air pollution and settle

on our land.

We have worked many years and invested thousands of dollars to make this farm business successful. Now our land is devalued, and our customers hesitate to buy products produced near the ash spill. Our hay supply has been affected. We produced hay on a neighbor's field. The ash has covered part of the field and a temporary road has been cut through it. The field had been seeded in the fall at a cost of \$1300. It is a total loss. Also, another field I used for hay is flooded, fearing that it will not be usable.

We fear that it may be unhealthy to remain so near the fly ash spill. We are concerned about the short and long term affects on our health. Also, we are concerned about the long-term health of our livestock.

Swan Pond Road
Harriman, TN

Senator BOXER. I would also like to take a moment to say that our thoughts go out to all the people affected by the spill.

We have two new colleagues who are sitting in on this meeting, Senator Udall, Senator Merkley. And they are headed to this Committee once we get the formal committee resolutions done. And I know Senator Inhofe was anxious for me to introduce you and I think you are going to, as we saw yesterday, be very interested in the work that we do here. Welcome.

Let me for a moment describe what happened at 1 a.m. on Monday, December 22d, 2008 near the Kingston TVA coal-fired power plant. An earthen wall failed on a 40-acre surface impoundment holding coal ash. More than one billion gallons of waste rushed down the valley like a wave, covering more than 300 acres. The volume of ash and water was nearly 100 times greater than the amount of oil spilled in the *Exxon Valdez* disaster. Let me mention that again. The volume of ash and water was nearly 100 times greater than the amount of oil spilled in the *Exxon Valdez* disaster.

We have an image to show you the scale of this enormous coal ash spill. It looks like a giant mudslide. You can just get the sense of the power of that mud.

I would like to show you a few examples of the devastation left behind in the wake of this disaster, what happened to some of the homes. The flow of toxic ash and water impacted 42 parcels of property, destroyed 3 homes, damaged 9 others, covered roads and railroads, harmed fish, and polluted the Emory River. Thankfully, no serious injuries were reported. This disaster happened while the community slept. And yesterday in my meeting, Senators, the good people from the community said that this is what they said, they shudder to think of what could have happened if this wall had failed on a summer's day, when parents and children were playing on the shore, swimming, and fishing in boats. Because the coves that are the main attraction to the community, where the kids play and they fish, were instantly covered in this horrible polluted mess.

Senator Alexander, I look forward to working with you on the recovery efforts. Anything that you need from me, you have. I will work with my colleagues and I know they feel the same.

Today, I would like to explore several key questions, including: How did this spill happen? What are the impacts? How is the area going to be cleaned up? How do we ensure events like this do not happen again?

Now, TVA officials say they are investigating why the dam surrounding the ash collapsed. So far, they have said that heavy rains and freezes may have triggered the disaster. But the Nashville Tennessean reported on January 4th that the same earthen wall had smaller blowouts in 2003 and 2006. The people that I met yesterday said that they knew that the impoundment had problems.

Following the 2003 event, TVA rejected several recommendations for retrofitting the impoundment because they deemed them too costly, with estimates up to \$25 million. We must find out why this wall failed. Because to clean this up, Senators, makes \$25 million just look like pennies. That is going to be the cost of this cleanup.

What are the spill's impacts? This depends on what was in the coal waste. I have a jar of the sludge, I asked them to bring it, and I am going to pass it around to everybody. I just want you to take

a sense of this, just a tiny little bit of this. I will give it to Senator Inhofe and ask the staff if they want to view it, while I talk, just pass this around. And what I would like to do is tell you what is in this coal ash that you will be taking a look at.

We have a chart that shows you this. This is the contaminants that exist in coal ash. And Senators, I beg you to take a look at this, because this is why the community is so up in arms. This isn't harmless mud. Arsenic, beryllium, cadmium, chromium, lead and mercury. And I need to read to you what we know about these elements. Arsenic, cancer of the lungs, bladder, skin, liver, kidneys, harms the liver, kidneys and cardiovascular system. Beryllium, cancer of the lungs, harms the respiratory and immune system. Cadmium, cancer of the lungs, harms the liver, kidneys and bones. Chromium, cancer of the lungs, harms the liver and kidneys and circulatory and nervous systems. Lead, harms the nervous system, especially in children and reproductive and developmental systems. And some of the people who visited me talked about the pregnant women who live in this area. Mercury harms the nervous system, especially in children, impairs thinking, language and motor skills. So that is what is in this.

And the irony of all this is that the reason we have this waste, there is a good reason why we have it, we want to get that waste out of the air. That is why we have these ponds. So the huge irony here is, under the Clean Air Act we are keeping this out of the air because it is dangerous. And now, it is spilled. So that is what you have to think about. We worked hard and long, and so did TVA, to get those elements out of the air and keep it safe, and this is what has happened.

At the spill site, the U.S. EPA has found river water with arsenic, and I mentioned all of these elements, these pollutants. The longer this ash stays on the ground, and this is another point, the more it can dry out and blow around. Some of the heavy metals in ash can harm people when inhaled.

We have to get a complete picture of contaminants in different parts of the coal spill. Some types of coal have more contaminants than others, and TVA used this impoundment to hold coal that was combusted over a number of years, different kinds of coal. So it's not just a one size fits all analysis here. Hot spots of contamination could be buried just beneath the surface of the spill.

This raises another very important question: how is this disaster going to be cleaned up, how is this area going to be restored? Seeding the ground with grass, which is what TVA has said thus far, maybe today they will have another solution, is not a permanent solution. A cleanup can be done right, or it can be a ticking time bomb. This area must be cleaned up to address the potential long-term threats to the families who live there.

And we must ensure that this type of disaster does not happen again. We need to have standards in place to make sure that coal ash is managed and disposed of properly, including the use of dry storage rather than wet storage, which the Kingston Plant used.

Over 130 million tons of coal combustion waste is produced in the U.S. every year. This is the equivalent of a train of boxcars stretching from Washington, DC. to Melbourne, Australia. A 2007 EPA report found 67 ash impoundments or landfills in 23 States

that have caused or were suspected of causing contamination, including to ground and surface waters. EPA knew of dozens of other sites, but lacked sufficient information to single out the cause.

For three decades, EPA has been looking at the issue of how to regulate combustion waste. The Federal Government has the power to regulate these wastes, and inaction has allowed this enormous volume of toxic material to go largely unregulated. State efforts are very inconsistent, and as more and more toxic material is removed from coal combustion, it is critically important that protective standards for coal ash waste be established.

I intend to ask Lisa Jackson, our EPA nominee, about her feelings on this matter. And I do intend to work with all of my colleagues on this Committee and in the Senate, across party aisles and with the incoming Administration to ensure that the necessary action is taken to protect our public health and the environment.

The disaster in Tennessee proves the point that we cannot avoid the costs associated with managing coal ash. It is far better to invest in preventing disasters like this than spending more to clean them up.

And the last thing I want to show you is the mission statement of the TVA. I want to read part of the mission statement. The Tennessee Valley Authority's authorizing statute provides that the TVA's mission includes "being a national leader in technological innovation, low-cost power and environmental stewardship." Now, I just want to put my own mea culpa out here. We didn't really do much in the first 2 years I held this gavel on looking at TVA. I am sorry. I am really sorry. I should have. I assumed a lot that I shouldn't have assumed.

Well, that day is over. We are going to work with TVA, we are going to make sure it lives up to this, low-cost power. I would add environmental stewardship means alternative ways of getting power. We are going to work together. It is going to be a good relationship.

But I have to say, I assumed too much about their environmental stewardship, and I really do apologize about it. We had a lot of oversight. That was one area I didn't pick up on.

So I want to thank again everyone who is here. I really want to thank TVA for coming, the community for coming. And we are going to have an excellent hearing, and I will turn it over now to Senator Inhofe.

**OPENING STATEMENT OF HON. JAMES M. INHOFE,
U.S. SENATOR FROM THE STATE OF OKLAHOMA**

Senator INHOFE. Thank you, Madam Chairman.

Of far greater significance, I think everyone here should know that a great event happened last night, Senator Boxer had her third grandchild. I have 12, so you have a target out there.

I want to welcome Senators Udall and Merkley, both here. I have heard so many good things about you, I am getting anxious to get to know you better. And I think your western influence on this Committee will be very helpful, too, because there are a lot of huge issues that are out there.

I probably am not going to be here for the whole hearing, Madam Chairman, because I know that Senator Alexander and Senator

Isakson are geographically a little closer to some of these things that we will be talking about during the course of this hearing than I am from Oklahoma. I want to welcome you, Mr. Kilgore, and also Bill Sansom. Back when Republicans were relevant, I was the Chairman of this Committee, and when we confirmed Bill, at that time I think I commented you had probably the best credentials of anyone who was ever confirmed in that position.

I agree with the Chairman that what happened at Kingston was a tragedy, plain and simple. It was just, the magnitude is great, and I think those slides that you showed demonstrate that very clearly. We don't yet know the cause of the failure of the retaining wall that released over a billion gallons of coal combustion waste sludge into the surrounding area, including the Emory River, as I understand it. Thankfully, there were no injuries, but three homes were rendered uninhabitable.

I want to say to the five victims who are here today that there isn't anyone up here that isn't totally in sympathy with you and wanting to do everything we can to preclude something like this from happening again. And so we just want to wish you the very best for the future and see how much help we can be to getting your lives back to normalcy.

I want to make sure that the people are taken care of and I think we all feel that way. I think to the extent the incident has caused harm to public health and the environment, TVA is committed to take the necessary steps to address these problems. We will hear about that today. It is essential that TVA remains committed to this community long after the media has packed up and left town.

I am pleased the results of air, water and soil testing meet EPA standards. I hope, Mr. Kilgore, that you elaborate on these and planned future testing as you deliver your remarks. In light of this, as would be expected, certain extremist groups are exploiting this to further their own political objectives, namely to eradicate the use of coal in this Country. We go through this all the time in this Committee. And I would hope that we would just concentrate on the two things that are important, that is taking care of the victims and trying to preclude something like this from happening again. Coal is absolutely necessary to keep this machine called America running. Right now we are 53 percent dependent upon coal. So I know there are those who want to use any tragedy for their own political purposes. So I just hope that doesn't happen, and I look forward to this hearing, Madam Chairman.

[The prepared statement of Senator Inhofe follows:]

STATEMENT OF HON. JAMES M. INHOFE,
U.S. SENATOR FROM THE STATE OF OKLAHOMA

What happened at Kingston was a tragedy, plain and simple. We do not yet know what caused the failure of the retaining wall that released over a billion gallons of coal combustion waste sludge into the surrounding area, including the Emory River. Thankfully, there were no injuries, but three homes were rendered uninhabitable and there was some additional property damage.

I want to make sure that these people are taken care of and that this spill is cleaned up. My first concern is for the victims, some of whom I understand are here today. My heart goes out to you and I will work to make sure you are treated fairly.

I believe that, to the extent the incident has caused harm to public health and the environment, TVA is committed to take the necessary steps to address these problems. It is essential that TVA remains committed to this community long after the media has packed up and left town.

I am pleased the results of air, water and soil testing meet EPA standards. I hope, Mr. Kilgore, that you elaborate on these and planned future testing in your remarks.

In light of this, I also hope that certain extremist groups refrain from exploiting this incident to further a political objective, namely to eradicate the use of coal in this country. We all know that would be a disaster for energy security, for jobs, and for the health of our economy. We know how to use coal in a clean manner. And as new technologies continue to advance, we can use coal to power the American economy while maintaining a clean, healthy environment.

Senator BOXER. Thank you.
Senator Lautenberg.

**OPENING STATEMENT OF HON. FRANK LAUTENBERG,
U.S. SENATOR FROM THE STATE OF NEW JERSEY**

Senator LAUTENBERG. Thank you very much, Madam Chairman. Welcome to our friend from the TVA, a very important agency.

One of the things that happens here with a new Congress, I can tell you, now with the strong representation that is in the majority, that environment is a major issue for us. We heard here yesterday that global warming is threatening the lives, and these aren't lives 100 years from now or 200 years from now, these are, I was pleased to know that Barbara Boxer, who is a dear friend, was blessed with a third grandchild. Though Senator Inhofe and I are friends, I want him to know that I have 11 grandchildren.

Senator INHOFE. You are probably still working on it.

Senator LAUTENBERG. I am begging, I can tell you.

[Laughter.]

Senator LAUTENBERG. The thing that happened is that this spill, this ugly material was allowed to cover areas of residence and community and that we wind up, though this spill was nearly 50 times bigger than the *Exxon Valdez* oil spill, I was up there very shortly after the ship went aground, and saw the devastation that was rendered, and can't imagine what something that is 50 times larger is like.

We heard from our Chairman about what happened to the houses as this material seeped into the Tennessee River. And one of the pictures had a Christmas wreath on the front of the house. That is when people usually enjoy life at a very high point, families in particular. And to see it with that threatening material almost on the front porch is certainly not a sight that any of us like to see.

And the thing that shocks me, I have to say, that TVA, in charge of this facility, should have been alarmed, and I am sure they were. But their reaction was that coal ash is not harmful and here I quote a spokesman there, does have some heavy metals within it, but it is not toxic or anything. Well, how would you feel about it if it is your child who breathes some of that dust or it penetrated your house walls? Not very good.

I am not suggesting that TVA doesn't care. But the fact that anyone can make a statement like that when the plaques that the Chairman held up here shows the various elements that are in that ash, they are some of the most threatening things to life and health that you can find, arsenic, lead, others. Terrible. We fight like the devil, and I come from a very crowded State, New Jersey, and boy, these chemicals are chased down like the most ruthless bandits.

So we hope that the EPA and TVA can coordinate their efforts better, because I think EPA initially also said that some of the testing showed that while there were some heavy metals in there that it wasn't something to really be alarmed about. We challenge that view, and we want to hear from EPA, which we will do, and ask that TVA and EPA get the story straight, make sure that what we hear is what is developed as a result of serious study and investigation.

I thank you, Madam Chairman, for calling this hearing. It is a very, very important issue.

Senator BOXER. Thank you. I want to place in the record three documents here, because Senator Inhofe said that the tests looked like the standards were being kept. Now, these are EPA samples. The first one, the EPA results of the sediment showed levels of arsenic, cadmium, exceeded cleanup goals. That is one.

And the second, which goes on for two pages, and everyone is—I am happy to pass these around, the surface water in the Emory River, arsenic and other heavy metals violated Safe Drinking Water standards. Now, that is not in the drinking water at this time. But this is the danger in why we need to do a cleanup here, so they don't get in. And some of those heavy metals are, in addition to arsenic, beryllium, cadmium, chromium, lead, and thallium.

So I am going to place these in the record so the record is clear. The testing is not showing that everything is golden in any way, shape or form. These are serious problems.

Senator Isakson.

[The referenced materials follow:]

LABORATORY ANALYTICAL RESULTS FOR SEDIMENT SAMPLES

Sample Designation:	Region IX	TT-SS01
Sample Collection Date:	Preliminary	12/25/2008
Field Quality Control:	Remediation Goals	
Percent Moisture (percent)	NL	27.7
BTEX (µg/kg, dry weight)	640	1.3 U
Benzene	400600	1.3 U
Ethylbenzene	270	1.3 U
m,p-Xylenes	270	1.3 U
p-Xylene	520600	1.3 U
Toluene		1.3 U
Total Metals (mg/kg, dry weight)	76000	26400
Aluminum	31	127 J
Arsenic	0.39	443
Barium	1400	864
Beryllium	150	625
Cadmium	17	1870 J
Chromium	210	1870
Cobalt	400	17.7
Copper	31000	59.9
Iron	230000	120000
Lead	400	30.3
Magnesium	NL	3900
Manganese	1800	66.9
Mercury	23	0.0875 J
Nickel	1600	29.4
Potassium	NL	3280
Selenium	390	3.13 J
Silver	390	2.81 U
Sodium	NL	672
Thallium	5.2	4.36 J
Vanadium	78	107
Zinc	230000	55.6

Notes:
 Positive results are listed in **BOLD**.
 Highlighted results exceeded the Region IX Preliminary Remediation Goals
 NL = Not listed
 BTEX = Benzene, toluene, ethylbenzene, and xylenes
 mg/kg = Milligrams per kilogram
 µg/kg = Micrograms per kilogram
 J = The analyte was positively identified, the associated value is the approximate concentration of the analyte in the sample.
 U = The analyte was analyzed for, but was not detected at or above the associated value.



LABORATORY ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES

Sample Designation:	Maximum	KIF-KWTP1	KIF-CRM 4.0	KIF-ERM 0.1	KIF-CRM 5.5	KIF-ERM 2.1
Sample Collection Date:	Contaminant	12/23/2008	12/23/2008	12/23/2008	12/23/2008	12/23/2008
Field Quality Control:						
Levels						
Total Suspended Solids (mg/L)						
Total Suspended Solids	NL	NA	NA	14700	NA	NA
Dissolved Metals (mg/L)						
Aluminum	NL	NA	NA	0.164 J	NA	NA
Antimony	0.006	NA	NA	0.02 U	NA	NA
Arsenic	0.01	NA	NA	0.0116 J	NA	NA
Barium	2	NA	NA	0.0345	NA	NA
Beryllium	0.004	NA	NA	0.01 U	NA	NA
Cadmium	0.005	NA	NA	0.005 U	NA	NA
Calcium	NL	NA	NA	9.38	NA	NA
Chromium	0.1	NA	NA	0.01 U	NA	NA
Cobalt	NL	NA	NA	0.02 U	NA	NA
Copper	1.3	NA	NA	0.00170 J	NA	NA
Iron	NL	NA	NA	0.187	NA	NA
Lead	0.015	NA	NA	0.01 U	NA	NA
Magnesium	NL	NA	NA	2.20	NA	NA
Manganese	NL	NA	NA	0.153	NA	NA
Mercury	0.002	NA	NA	0.0002 U	NA	NA
Nickel	NL	NA	NA	0.02 U	NA	NA
Potassium	NL	NA	NA	1.28	NA	NA
Selenium	0.05	NA	NA	0.00749 J	NA	NA
Silver	NL	NA	NA	0.01 U	NA	NA
Sodium	NL	NA	NA	5.65	NA	NA
Thallium	0.002	NA	NA	0.00774 J	NA	NA
Vanadium	NL	NA	NA	0.00341 J	NA	NA
Zinc	NL	NA	NA	0.00772 J	NA	NA
Total Metals (mg/L)						
Aluminum	NL	0.388	1.53	121	0.986	1.13
Antimony	0.006	0.02 U	0.02 U	0.00655 J	0.02 U	0.02 U
Arsenic	0.01	0.05 U	0.00392 J	1.49	0.00501 J	0.05 U
Barium	2	0.0234	0.0430	1.47	0.0385	0.0405
Beryllium	0.004	0.01 U	0.01 U	0.0119	0.01 U	0.01 U
Cadmium	0.005	0.005 U	0.005 U	0.0155	0.005 U	0.005 U
Calcium	NL	16.1	30.8	38.2	35.0	8.04
Chromium	0.1	0.01 U	0.01 U	0.127	0.01 U	0.01 U
Cobalt	NL	0.02 U	0.02 U	0.0768	0.02 U	0.02 U
Copper	1.3	0.01 U	0.01 U	0.225	0.01 U	0.01 U
Iron	NL	0.386	1.08	67.0	0.733	0.660
Lead	0.015	0.01 U	0.00461 J	0.0754	0.01 U	0.01 U
Magnesium	NL	4.16	8.51	12.4	9.94	2.14
Manganese	NL	0.0487	0.0938	1.89	0.0453	0.0738
Mercury	0.002	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel	NL	0.02 U	0.02 U	0.103	0.02 U	0.02 U
Potassium	NL	1.95	2.44	32.1	2.45	1.52
Selenium	0.05	0.02 U	0.02 U	0.0180 J	0.02 U	0.02 U
Silver	NL	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium	NL	8.77	5.85	4.85	6.83	2.56
Thallium	0.002	0.00619 J	0.02 U	0.02 U	0.00430 J	0.02 U
Vanadium	NL	0.01 U	0.00243 J	0.465	0.01 U	0.00255 J
Zinc	NL	0.02 U	0.00404 J	0.266	0.02 U	0.00461 J

Notes:

- Positive results are listed in **BOLD**.
- Highlighted results exceeded the federal Maximum Contaminant Level.
- NL = Not listed
- mg/L = Milligrams per liter
- J = The analyte was positively identified, the associated value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for, but was not detected at or above the associated value.
- NA = The sample was not analyzed for this analyte.

LABORATORY ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES

Sample Designation:	Maximum	KIF-ERM 4.0	TT-ERM 1.9	DUPLICATE	KIF-TRM568.5	KIF-CRM 0.0
Sample Collection Date:	Contaminant	12/23/2008	12/23/2008	12/23/2008	12/23/2008	12/23/2008
Field Quality Control:	Levels			Field Duplicate		
Total Suspended Solids (mg/L)						
Total Suspended Solids	NL	NA	NA	NA	10.5	14.5
Dissolved Metals (mg/L)						
Aluminum	NL	NA	NA	NA	0.2 U	0.0268 J
Antimony	0.006	NA	NA	NA	0.02 U	0.02 U
Arsenic	0.01	NA	NA	NA	0.05 U	0.05 U
Barium	2	NA	NA	NA	0.0176 J	0.0189 J
Beryllium	0.004	NA	NA	NA	0.01 U	0.01 U
Cadmium	0.005	NA	NA	NA	0.005 U	0.005 U
Calcium	NL	NA	NA	NA	13.8	14.8
Chromium	0.1	NA	NA	NA	0.01 U	0.01 U
Cobalt	NL	NA	NA	NA	0.02 U	0.02 U
Copper	1.3	NA	NA	NA	0.01 U	0.01 U
Iron	NL	NA	NA	NA	0.1 U	0.1 U
Lead	0.015	NA	NA	NA	0.01 U	0.01 U
Magnesium	NL	NA	NA	NA	3.52	3.80
Manganese	NL	NA	NA	NA	0.00464 J	0.00944 J
Mercury	0.002	NA	NA	NA	0.0002 U	0.0002 U
Nickel	NL	NA	NA	NA	0.02 U	0.02 U
Potassium	NL	NA	NA	NA	1.57	1.78
Selenium	0.05	NA	NA	NA	0.02 U	0.02 U
Silver	NL	NA	NA	NA	0.01 U	0.01 U
Sodium	NL	NA	NA	NA	7.48	8.04
Thallium	0.002	NA	NA	NA	0.02 U	0.00463 J
Vanadium	NL	NA	NA	NA	0.01 U	0.01 U
Zinc	NL	NA	NA	NA	0.02 U	0.02 U
Total Metals (mg/L)						
Aluminum	NL	0.338	2.20	2.58	0.291	0.265
Antimony	0.006	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic	0.01	0.05 U	0.0208 J	0.0337 J	0.05 U	0.00351 J
Barium	2	0.0304	0.0565	0.0643	0.0218	0.0215
Beryllium	0.004	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cadmium	0.005	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Calcium	NL	7.81	9.11	9.26	16.2	15.9
Chromium	0.1	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Cobalt	NL	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Copper	1.3	0.01 U	0.00406 J	0.00508 J	0.01 U	0.01 U
Iron	NL	0.262	1.37	1.77	0.255	0.234
Lead	0.015	0.01 U	0.00625 J	0.00492 J	0.01 U	0.01 U
Magnesium	NL	1.78	2.20	2.27	4.17	4.09
Manganese	NL	0.0368	0.0898	0.0970	0.0288	0.0248
Mercury	0.002	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
Nickel	NL	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Potassium	NL	1.35	1.71	1.80	1.97	1.92
Selenium	0.05	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Silver	NL	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Sodium	NL	2.53	2.63	2.68	8.90	8.67
Thallium	0.002	0.00413 J	0.02 U	0.02 U	0.02 U	0.02 U
Vanadium	NL	0.01 U	0.00741 J	0.0108	0.01 U	0.01 U
Zinc	NL	0.02 U	0.0371	0.0350	0.02 U	0.02 U

Notes:

- Positive results are listed in **BOLD**.
- Highlighted results exceeded the federal Maximum Contaminant Level.
- NL = Not listed
- mg/L = Milligrams per liter
- J = The analyte was positively identified; the associated value is the approximate concentration of the analyte in the sample.
- U = The analyte was analyzed for, but was not detected at or above the associated value.
- NA = The sample was not analyzed for this analyte.

LABORATORY ANALYTICAL RESULTS FOR SURFACE WATER SAMPLES

Sample Designation:	Maximum	KIF-CRM 2.0
Sample Collection Date:	Contaminant	12/23/2008
Field Quality Control:	Levels	
Total Suspended Solids (mg/L)		
Total Suspended Solids	NL	79.5
Dissolved Metals (mg/L)		
Aluminum	NL	0.0302 J
Antimony	0.006	0.02 U
Arsenic	0.01	0.05 U
Barium	2	0.0311
Beryllium	0.004	0.01 U
Cadmium	0.005	0.005 U
Calcium	NL	22.9
Chromium	0.1	0.01 U
Cobalt	NL	0.02 U
Copper	1.3	0.01 U
Iron	NL	0.0481 J
Lead	0.015	0.01 U
Magnesium	NL	6.30
Manganese	NL	0.0149 J
Mercury	0.002	0.0002 U
Nickel	NL	0.02 U
Potassium	NL	1.58
Selenium	0.05	0.02 U
Silver	NL	0.01 U
Sodium	NL	4.50
Thallium	0.002	0.02 U
Vanadium	NL	0.01 U
Zinc	NL	0.02 U
Total Metals (mg/L)		
Aluminum	NL	0.905
Antimony	0.006	0.02 U
Arsenic	0.01	0.00310 J
Barium	2	0.0436
Beryllium	0.004	0.01 U
Cadmium	0.005	0.005 U
Calcium	NL	27.3
Chromium	0.1	0.01 U
Cobalt	NL	0.02 U
Copper	1.3	0.01 U
Iron	NL	0.607
Lead	0.015	0.01 U
Magnesium	NL	7.57
Manganese	NL	0.0512
Mercury	0.002	0.0002 U
Nickel	NL	0.02 U
Potassium	NL	2.14
Selenium	0.05	0.02 U
Silver	NL	0.01 U
Sodium	NL	5.43
Thallium	0.002	0.02 U
Vanadium	NL	0.00237 J
Zinc	NL	0.02 U

**OPENING STATEMENT OF HON. JOHNNY ISAKSON,
U.S. SENATOR FROM THE STATE OF GEORGIA**

Senator ISAKSON. Thank you, Madam Chairman, and congratulations on your latest grandchild.

And welcome to Senator Udall, who I had the privilege of serving with in the House, and Senator Merkley. We are glad to have you on the Committee as well.

I would like to thank Lamar Alexander for calling together the TVA Caucus to meet with TVA and for the first time for me, to be able to see those who were damaged by this spill. I would like to welcome, although I know welcome is probably not an appropriate word to use for an incident like this, but Tom Kilgore is a terrific public servant. I think the Committee needs to remember that it was 2005 that this Committee and the Congress reorganized the governance of TVA to a working board of directors and a CEO. It previously was a three-member committee, if I am not mistaken, that pretty much ran TVA up until 2005, if I am not mistaken.

So Tom has come on, he used to be in Georgia, he is an outstanding business person, and from the conversation we had earlier today with the other members, I am going to applaud his early actions in this tragedy.

As a Georgian, and as a TVA State, I am extremely interested in this, because we have 10 such retention areas in our State, although none of them are TVA retention areas. They are other utilities that operate within the State. And although this is a tragedy of immense proportion, it is also a chance for us to learn and see to it that it never happens again. I am delighted that a person of Tom's stature and ability is there, because I know one of his goals is not just to clean up to see to it that the citizens are protected and restored and reimbursed and made whole, but also to see, too, that this doesn't happen anywhere else again in the United States of America.

So, Tom, I appreciate your commitment to that. And as a representative of the people of Georgia, where 10 such retention areas reside, I am going to work very closely with you to make sure we provide that information to other utilities, so we do prevent this from happening anywhere else in the United States, most appropriately anywhere else in Georgia.

Thank you very much, Madam Chairman.

Senator BOXER. Thank you so much, Senator.
Senator Merkley.

**OPENING STATEMENT OF HON. JEFF MERKLEY,
U.S. SENATOR FROM THE STATE OF OREGON**

Senator MERKLEY. Thank you very much, Madam Chair.

It is clear from the pictures and the statistics the scope of the current disaster. I am struck by the numbers of 45,000 pounds of arsenic, more than a million pounds of barium, 91,000 pounds of chromium, and that the immediate cleanup is so important, given both the concern about immediate contamination of water and the dry dust down the road.

But I am also very interested in the thoughts about how we monitor and regulate the 1,300-some other similar sites around this Country to avoid such a disaster in the future.

Thank you for your testimony today.
Senator BOXER. Thank you.
Senator Alexander.

**OPENING STATEMENT OF HON. LAMAR ALEXANDER,
U.S. SENATOR FROM THE STATE OF TENNESSEE**

Senator ALEXANDER. Thanks, Madam Chairman, and thank you for having this hearing calling attention to this.

I think we are unanimous that what should happen, TVA should cleanup this mess, make whole the people who were hurt, clean it up quickly and do everything possible to make sure it doesn't happen again in the TVA region. And we should help make sure it doesn't happen anywhere else.

But I want to take a long-term view. I hope my contribution can be a long-term view in two ways. First to those who are hurt. We visited for a little while this morning in my office. Among the several things that were said is they hoped that I would stay interested after the media left, and after the Country went on to another issue.

I will do that. And I think all of us have a responsibility to do that, and I will work with Governor Bredeson, who has been on the site. I will work with Mr. Kilgore and with this Committee to make sure that this does not get lost in the shuffle, that we set clear goals, that we imagine what we want Roane County to be 5 years from now, we want it to be a place where people are happy to live, where children play where the water is clean.

I live not far from there myself, and I know how beautiful it is. We want that to be our goal. That is a long-term goal that involves each of you on the front row and everybody in Roane County. I pledge myself to that.

The second thing I would like to do, and I would enjoy working with Senator Boxer on this, or others, is turn a short-term regulatory and management failure into a long-term technology development story. What we really need here, and I suggested this in an address at the Oak Ridge Laboratory in the spring, is a series of mini-Manhattan projects on how we can safely and cleanly use coal in this Country to make electricity for however long we need to do that, whether it is 20 or 25 years, while we move to different kinds of energy, or whether it is a longer period of time.

Today, for example, Tennessee gets 60 percent of its electricity from coal. And that is very important to us. When I was Governor, I used to recruit Saturn and Nissan. I know Governor Bredeson has recruited Volkswagen and more recently, one of the largest new plants to make the material that will create solar cells, poly—well, I don't exactly have the name of it here. But it is in Clarksville, Tennessee, a \$1.2 billion investment. It is polysilicon, is the material. The interesting thing about it is it takes a substation for electricity of 128 megawatts. In other words, if we hadn't had TVA's coal-burning capacity, we wouldn't be able to make the material that we hope will create the solar energy.

So what I would like for us to do is to look at each of the elements of coal-burning for electricity that creates an environmental problem for us and get on a fast-track, I say mini-Manhattan project, to solve the problem. The National Academy of Engineering

has suggested that that be done in terms of recapture of carbon, either from sequestration or in some other form.

Another way to do it would be to make solar power equally competitive with fossil fuels, as they are doing in the plant in Clarksville. Obviously we need to find better ways to deal with coal ash. I have put in legislation a little different from the legislation that senator Boxer proposed, but still, it was to require, Senator Carper and I did, that we have strict controls on mercury, on nitrogen, on sulfur and on carbon.

So if we as a Committee made a massive effort over the next 5 years to be able to turn this environmental tragedy into a technology success story, then maybe at the end of 5 years, we could burn coal in a clean way. And it may force us from conventional coal plants into a second generation of coal plants once we find out what the true cost of burning coal in conventional plants is.

So my commitment is long-term, first to the victims, and second to the technology. I look forward to working with the Chairman on that, and thank you for the time.

Senator BOXER. Well, Senator, thank you for your statement. It is very heartening to me.

Senator Udall, then followed by Senator Carper.

**OPENING STATEMENT OF HON. TOM UDALL,
U.S. SENATOR FROM THE STATE OF NEW MEXICO**

Senator UDALL. Thank you, Madam Chair. And let me thank the other members of the Committee, the Ranking Member, for the very kind welcoming comments. I did serve with Senator Isakson over in the House and I look forward to a good relationship with all of you.

To the victims, this is something that we see in the west, these kinds of disasters in a variety of different areas. And I want to commit, like Senator Alexander did, to make sure that the victims are made whole on this. That is very important.

I also believe that we need to look at the bigger picture, Senator Alexander, in terms of the costs and whether or not we should be regulating more here or less. That is, I think, a very important part of this debate. The EPA has been looking at a number of situations on regulating this type of waste, and they haven't done so. Apparently it is the cost is my understanding, from the articles, the reason they haven't regulated it is because of the cost.

So when we look at all the energy that is out there, we have to look at what are the full costs, what are the externalities. Here we are creating huge dumps of coal ash waste that aren't really paid for, that aren't worked into the system. And I think it is tremendously important that when we look at the cost of coal or renewable energy or nuclear we look at the full costs that are out there, because we see that those costs are big and significant and they add to that picture.

So I hope as we move down the road that we take our regulatory responsibilities seriously and make sure that the TVA is doing its job. They say their mission is environmental stewardship. In this case, that stewardship has not been very good. And I hope we look at the full costs here in terms of all of our energy sources, because

I think that will guide us into the future and to where we need to go.

I thank you, and look forward to hearing from both of our panels today.

Senator BOXER. Senator, you are so right on the costs. And we have to factor in the cost of this type of spill, too.

Senator UDALL. That is right.

Senator BOXER. Senator Carper.

**OPENING STATEMENT OF HON. THOMAS R. CARPER,
U.S. SENATOR FROM THE STATE OF DELAWARE**

Senator CARPER. Chairman Boxer, thank you for bringing us together today as promptly as you have on the heels of this tragedy.

To our new colleagues, Tom and Jeff, we are delighted that you are here, and I am very pleased that you have chosen to serve on this Committee. I think that is great for us, for your States and for our Country.

For our friends from Tennessee who are here today, in the New Testament there is a parable about the Good Samaritan. The question that is answered in the story of Good Samaritan is who is my neighbor, who is my neighbor. You are our neighbors, whether you happen to be from Oregon or from New Mexico or California or Tennessee or Georgia or Delaware, you are our neighbors. We are going to try to do our best to make sure that you are treated fairly going forward.

Mr. Kilgore, I don't know you, I have met you before, but I don't know you well. Whatever Johnny Isakson speaks as highly of someone as he has of you, I listen to that. I have a lot of respect for him and his judgment. If he says that you are that good a person, then I generally take that to the bank.

TVA needs a very good person, a very strong leader. Some of my colleagues have heard me say any number of times, particularly when we are holding hearings of the subcommittee that I lead, along with Senator George Voinovich, the subcommittee that deals with clean air and nuclear safety. And I won't say that I lecture the nuclear industry, but I say to them often, everything that I do I can do better. I think that is true for all of us. And when I was Governor of my State, I used to tell my cabinet secretaries, if it isn't perfect, whatever operation we are talking about, in their office, in their department, if it isn't perfect, make it better. And you have a big operation to run. Clearly, some things aren't perfect.

We are here today to focus largely on the tragedy that has brought these folks on the front row to our hearing. But as Senator Boxer and others have suggested, TVA ought to be a role model for us. You should be the gold standard. And in too many ways, you are not. That is not your fault. You haven't been the leader of this company forever. It is a Federal corporation, and because it is a Federal corporation, we think you need to adhere to higher standards than others. We as elected officials, we are expected to adhere to higher standards of personal behavior and so forth, and a similar kind of performance level should be, or standard, should be set for TVA.

Within the subcommittee that I have been privileged to chair, TVA is one of any number of issues or items for us to hold jurisdic-

tion over. I just want you to know, and I say this not in a threatening way, but just in a very forthright way, we are going to be looking closely at what you are doing, and the leadership that you are providing and the direction you are taking, not just with respect to this instant problem, but with the bigger issues.

I thought Senator Alexander spoke very well, he usually does, almost always does. Except when he can't remember the word, polysilicon. That is the only time I have ever heard him hesitate in 6 years or whatever it has been.

[Laughter.]

Senator CARPER. But I thought he spoke very well. We want you to be a leader. We want you to be the leader in figuring out how do we deal with sequestration of CO₂, we want you to be the leader in helping us to find ways to reduce SO_x, NO_x and mercury discharges and to meet an aggressive schedule. We want you to be the leader in terms of identifying alternative forms of energy and supporting that. We want you to be the leader in terms of helping the folks that are using your electricity to be able to be smarter consumers, whether it is smart grid, smart metering, we want you to be the leader in all those respects.

We welcome you here today. We look forward to hearing your testimony and look forward to having the opportunity to ask questions of you.

Madam Chairman, I have a statement for the record that I would like to append to what I have just said. Thank you very much.

[The prepared statement was not received at time of print.]

Senator BOXER. Without objection, so ordered.

What we are going to do is go to, we have two panels, Mr. Kilgore is the only one on this first panel. I would like to give you about 8 minutes. If you need to go over, that is fine, to 10, but no more than that. Then we will have our second panel, who will also have similar rules. So go right ahead, Mr. Kilgore.

**STATEMENT OF TOM KILGORE, PRESIDENT AND CHIEF
EXECUTIVE OFFICER, TENNESSEE VALLEY AUTHORITY**

Mr. KILGORE. Chairman Boxer and Ranking Member Inhofe, Senator Alexander, Senator Isakson and other members of the Committee, thank you for the opportunity for letting me appear and discuss our ongoing work about recovery and cleanup of the release of ash at one of TVA's power plant sites.

The release, as has been noted, followed the failure of a retention wall for coal ash that was at our Kingston fossil plant in East Tennessee. We are focused on cleaning up the release and setting right the things for the people of the Kingston community. That is our first focus. We have said we will clean it up, and we will start with people first and the environment comes right after that.

I want to assure you that TVA will do a first-rate job of correcting the problem caused by the spill. Let me give you just a few minutes of chronology. When I was first notified about this spill, shortly after midnight on December 22d, I of course got out and I was at the site about 45 minutes later. And the initial response by the Roane County folks, who are here in the room, Howie Rose, the emergency management personnel and the county executive there, was tremendous. The only good news I had in that whole week was

when Howie came in about 5 o'clock and told me that everybody was accounted for and there was no serious injury. We will always be grateful for their prompt and professional response.

And of course, our first concern was for the safety of our neighbors in the area. It was that good news that there were no injuries requiring medical attention. Our first priority was to reach out to the people immediately impacted, especially to the three families who lost their homes. We then assigned teams of employees and retirees to be the points of contact for every affected family. In the Kingston community, we opened an outreach center that is open 7 days a week for anyone with property damage, a claim, a question or a concern. And our executives are out there regularly, our CFO was out there yesterday, our senior executives.

On the operation side, we began work that day to place barriers to minimize the movement of ash and begin the cleanup. We are using the National Incident Management System approach and a number of Federal, State and local agencies are onsite sharing information and monitoring our work. These agencies are also conducting their own water, air, soil testing and sharing their findings. We fully realize that if there is a difference, that EPA and the Tennessee Department of Environment and Conservation, their results trump ours, that if there is a difference, they are the ones that have the official data.

These agencies are all sampling the results for drinking water and it shows that the municipal water in the area continues to be safe. Mobile air testing showed that particulate levels in the area are far below applicable standards. That is good, but it doesn't mean that we can rest, we have to keep it that way.

While the ash material deposited offsite is not classified as a hazardous waste under the standards of the Environmental Protection Agency, it is meant to be contained, and I don't want to minimize that. We are working 24 hours a day, 7 days a week to clean this up.

It is an important recovery phase for the impacted areas of about 275 acres. We are working on an independent analysis of the cause and the long-term plan for full recovery and restoration. We have tried to do this, we have tried to focus on outreach to the community, containment, recovery and prevention. We have, like Senator Isakson mentioned, we also have other dikes that are not like this, but we are inspecting those to make sure that we don't have problems there.

As you know, TVA is a corporate agency of the United States, the Nation's largest public power provider, working with 158 local power distributors. TVA is funded by the ratepayers and receives no appropriations. To supply electricity to our region, TVA uses a mix of generating sources. About half of our Nation's electricity is generated from coal and TVA has a similar situation.

While we are working to increase our renewable and carbon-free generation, about 60 percent of TVA's generation this year will be from coal. And like utilities around the Nation, we must manage the ash that is a byproduct of that coal-fired power production.

TVA has been a part of the Kingston community since the plant was built in the 1950s. It is our intent to stay there and finish the job of cleaning this up and do it right. The Kingston plant was

built in accordance with congressional authorization, primarily to meet the defense needs of the Nation at the time. Specifically, Kingston met the need to provide power for the production of atomic defense materials at Oak Ridge, Tennessee.

The 300 TVA employees who live and work in the area care deeply about their community, as I do and as we all do. And as I said at the beginning of my comments, we will do a first-rate job of correcting the problems caused by the spill. It is not a time when we hold our head high, but it is a time when we will look our neighbors in the eye and say, we will stay on the job until it is finished. We are going to do this and do it right.

Thank you, and I look forward to any questions you might have.
[The prepared statement of Mr. Kilgore follows.]

**Testimony of
Tom Kilgore, President and Chief Executive Officer
Tennessee Valley Authority
Before the
Environment and Public Works Committee
January 8, 2009**

Opening Statement

Chairwoman Boxer, Ranking Member Inhofe, and members of the Committee. Thank you for this opportunity to appear before you to discuss TVA's work on recovery and clean up of the release of ash at one of TVA's power generating plants in East Tennessee. Here with me today is Bill Sansom, Chairman of the Board of Directors of TVA.

The release followed a failure of a retention wall for a coal ash containment area at TVA's Kingston Fossil Plant.

We will diligently work to determine the cause of this failure, but as I have told the members of the public in that area and our employees, our focus right now is on cleaning up the spill. I want to assure you that TVA will do a first-rate job of remediation of the problems caused by the spill.

About TVA

As you know, TVA is a corporate agency of the United States and the nation's largest public power provider. In partnership with 158 wholesale distributors, TVA provides reliable, competitively priced electricity to about 9 million people and 650,000 businesses in seven southeastern states. TVA also provides power directly to about 60 large industrial customers and federal installations. TVA is more than a power company. When Congress established TVA in 1933, it set our mission to include managing the nation's fifth-largest integrated river system, providing environmental stewardship, and being a catalyst for economic development in its 80,000-square-mile service area. TVA is funded primarily by its ratepayers and receives no appropriations.

The incident being discussed today occurred at TVA's Kingston coal plant. The Kingston plant was built in the early 1950s, in accordance with congressional authorizations, primarily to meet the defense needs of the nation – specifically, the need to provide power for the production of atomic defense materials at Oak Ridge, Tennessee.

Currently, Kingston is one of the mix of generating resources that TVA uses to supply electricity to our region. About half of our nation's electricity supply comes from coal, and the TVA region is in a similar situation. While we are working to increase the amount of carbon-free generation we use, about 60 percent of TVA's generation comes from coal. And like utilities around the nation, we must manage the ash that is a by-product of coal-fired power production.

Kingston Fossil Plant

At the Kingston plant, ash material that remains after the coal is burned is stored in a wet ash pond. Six of TVA's eleven fossil plants use wet fly ash storage cells. The other five plants use a dry fly ash storage method. All of TVA's ash disposal sites are engineered facilities and follow the permit requirements for the states in which they are constructed. They are surrounded by dikes, and they incorporate engineered drain systems and water runoff controls.

At all of our fossil plants, these areas undergo a formal inspection annually and other inspections on a quarterly and a daily basis. The storage cells at Kingston are visually checked daily by plant personnel. In addition, TVA plant personnel inspect the cell for seepage on a quarterly basis. Annually, TVA engineering staff members perform a comprehensive inspection and document the findings and recommendations in a report. Kingston's most recently completed report is dated February 2008 for the inspection conducted in December 2007. That report is currently posted on the TVA Web site. Kingston's most recent inspection was in October 2008, and the report was being compiled at the time of this incident. Initial reports from that inspection indicated no noticeable increases in seep flow were observable during the 2008 inspection.

Outreach to the Public

In the early morning hours of Monday, December 22, I received the call about the failure of the retention wall shortly after 1 a.m. and arrived at the plant within the hour. The initial response by the Roane County, Tennessee, Emergency Management personnel, along with the Tennessee Emergency Management Agency, was excellent; and we will always be grateful for their swift and professional response. Other agencies also were notified, including the National Response Center.

Of course, our first concern on hearing the news was for the safety of the neighbors in the area around the plant. Frankly, the only good news in the week was when we learned about five o'clock that morning that there was no loss of life and no injuries that required medical attention. We also made visual inspections of the ash retention dikes at our other plants to note any changes in conditions and will continue to do so.

Our first priority was to reach out to the people immediately impacted, especially the three families who lost their homes, to ensure that they were safe and that they had temporary housing, meals, and other necessities. We established a team of TVA employees and retirees to provide one point of contact for each family impacted to ensure their needs are met and concerns addressed. These support teams are continuing to work with the families.

We also have set up a 1-800 number and a local facility that is open seven days a week for residents to go to if they have a property-damage claim, question, or concern. This is in addition to the telephone line we began staffing around the clock shortly after the incident for the public to call with any concerns, questions, or requests for the State to test private drinking-water wells.

Environmental Impacts

After seeing that our first objective – the safety of the public and our employees – was

addressed, we immediately began dealing with potential public health issues and the containment and stabilization of the ash material.

Consistent with Homeland Security Directives, we are using the National Incident Management System (NIMS) approach for the onsite emergency response. This means that an onsite Command Center with a Unified Command has been established and is staffed by federal, state, and local response organizations that sit side-by-side, share the same information, and staff a Joint Information Center where information is provided to the public in a timely and coordinated manner. A number of agencies, including the Roane County Emergency Management Agency, Tennessee Department of Environment and Conservation, Tennessee Department of Health, the Tennessee Emergency Management Agency, and the federal Environmental Protection Agency are with us at the site to respond to the event and to monitor our work. The agencies are conducting their own water, air, and soil testing, and sharing all findings among the Unified Command. I would like to discuss that testing next.

In addition to the agencies listed, the United States Fish and Wildlife Service (USFWS) also responded to this incident. Service staff surveyed the affected area and assessed effects to natural resources, mainly migratory birds. USFWS's main concerns are effects on fish and wildlife from habitat loss, suspended fly ash, and metals in the water and sediment of the Emory River.

Water Quality

Within hours of the event, TVA, the Tennessee Department of Environment and Conservation, and the Environmental Protection Agency began water quality testing. Sampling is also being done at water treatment facilities closest to the site. Each agency is using certified labs for the analyses, and the data among all agencies is consistent. The results of water sampling to-date show that municipal drinking water continues to be safe. I will note that the Kingston City Water intake is actually upstream of the confluence where any suspended ash would float by. Our River Operations staff is monitoring the water flow to maintain a positive flow in the correct direction, past the water treatment plant, in order to protect the water supply. The State is also sampling private groundwater wells within a four-mile radius of the plant.

While most of the fly ash deposited in the water sank, there was a lighter, inert part of the fly ash that floated. It is a hollow, sand-like material that is actually collected and sold for use in a variety of products, including cosmetics, bowling balls, and fillers. We have dispatched more than 12,000 feet of boom skimmers to collect and dispose of this material.

Soil quality

Our next focus was on the material deposited offsite. The ash material is not classified as a hazardous waste under the standards of the Environmental Protection Agency. It is not classified as a carcinogen and it is not combustible, but it does contain trace amounts of metals. Regardless of the inert nature of fly ash, however, it is meant to be contained, and we are committed to cleaning it up.

One of our first actions was to test and characterize exactly what was in the material that moved offsite and compare it to historic data on the content of storage cells. Preliminary

testing of the offsite soil samples shows, as was expected, that metals are well below the limits for classification as a hazardous waste. They are 10 to 100 times below the limits for metals. The trace concentrations of metals in the offsite material sampled are consistent with and generally lower than that of the historic sampling results from the storage cell. The data shows that the concentrations of most metals in the deposited ash are not dramatically different from concentrations found in natural, non-agricultural soils in Tennessee, with the exception of arsenic. Total arsenic results were above the average that occurs naturally, but well below levels found in soils that are well-fertilized and significantly below the limits to be classified as a hazardous waste.

Air Quality

Now that I've addressed the water and the soil, let me turn to the air we breathe. Breathing particulates – fly ash or any other airborne particulates – over long periods of time can, however, irritate the respiratory system. For that reason, we are taking measures to keep the ash residue damp and monitor the air quality in the area. We have begun spreading grass seed and fertilizer over the area as part of our immediate actions to minimize dust and erosion. This process is similar to the one used by highway departments to provide ground cover. Prior to this action, we began real-time, hand-held monitoring of air quality and established fixed air monitoring locations. More than 700 real-time monitoring points have been logged, and air monitoring takes place 24 hours a day at five fixed stations located in residential areas near the plant and on-site. The most recent results show that concentrations of air particulates remain below levels established by the National Ambient Air Quality Standards.

I know that technical data and monitoring equipment do not make the human emotions and the physical effects of this incident go away. But I hope that the results of the preliminary environmental data and the objectivity provided by multiple agencies and certified labs will help reassure members of the public and address their concerns. We are sharing the information with the public as it becomes available.

Recovery Efforts

On the operations side, we have moved into the important recovery phase. About 275 surface acres were impacted, and cleanup and recovery efforts are under way. These efforts are being conducted under the watch and with the assistance of other concerned Federal and state agencies.

Starting on the day of the incident, we put equipment and personnel in place to immediately begin placing barriers to minimize the movement of ash and to begin clean up. Those crews have been working around the clock since then. Each day, we make progress on removing the ash from two local roads. One road is still closed to public traffic but has been cleared sufficiently for use by construction equipment. We are creating a 100-foot buffer between the road and the remaining fly ash. The damaged rail track has been removed, and reconstruction on the track has begun.

We are also constructing two weirs, one underwater and one above water, in the affected area to let water flow continue while trapping the ash material so it does not move down stream. The first weir is underwater and is almost complete. It spans approximately 615 feet across the Emory River, just downstream of the failure, to further contain the ash. The second weir is in design and is essentially a dike; it will be

approximately 2,000 feet long and located at the site of the failure. When complete, it will confine the largest body of the ash and keep it from entering the river during the process of dredging the river. Dredging may occur wherever there is ash; the U.S. Army Corps of Engineers will approve the dredging plan while TVA is responsible for the dredging. The Corps also provides underwater river mapping contour information and has provided new contour information to us subsequent to the failure. For public safety while recovery operations are under way, the U.S. Coast Guard has closed approximately 4 miles of the Emory River to navigation, except for vessels involved in the sampling and recovery operations.

Now that we have entered the recovery phase, we are turning our attention to a long-term plan for full recovery and restoration. I cannot tell you at this point how long this might take, but we are planning to work with area residents and public officials to develop sound plans and to keep them informed as we move forward. We are beginning an independent, in-depth root-cause analysis to determine why the ash pond dike failed. And, as our work continues, public safety and the safety of our employees at work on the job are paramount.

Continuing Commitment

TVA has been part of the Kingston and Roane County community since 1951, and for its first decade of operation the Kingston plant was the largest of its kind in the world. The 300 TVA employees who live and work in the area care deeply about their community. We will continue to reach out to Roane County residents over the coming weeks, keeping them informed of our activities, and making sure they have the information they need. We will continue working, as well, with federal, state, and local elected officials and agencies, and with you and other members of Congress.

Since being established by Congress in 1933, TVA has served the people of the Tennessee Valley region and our nation, generating and delivering the electricity required for a stronger economy and brighter future.

At TVA, we take seriously our mission of providing electricity, environmental stewardship, and economic development to the Tennessee Valley region. The quality of life in the Valley region and the natural beauty of the region and its rivers are special to all of us at TVA, and we are committed to restoring and protecting these resources.

As we make progress toward restoration, we will also share information and lessons learned with those in regulatory roles and with others in our industry, for everyone's benefit.

As I stated at the beginning of my comments here, TVA will do a first-rate job of containment and remediation of the problems caused by the spill. We are going to be able to look our neighbors in the eye and say that TVA is doing the right thing.

Thank you for the opportunity to provide this report on our continuing recovery efforts, and I look forward to your questions.

#

January 8, 2009
Follow-Up Questions for Written Submission
Questions for Kilgore

Questions from Senator Barbara Boxer

Question # 1

Mr. Kilgore, during the Committee hearing you said that the Tennessee Valley Authority (TVA) was conducting an investigation into the causes of the dike failure that spilled 1 billion gallons of toxic fly ash at the Kingston Fossil Plant. A January 2008 dike stability report for the plant states that impoundment walls failed in 2003 and 2006 due to "excessive seepage." A January 4th Tennessean article states that TVA has known about "some seeps along the toe of the dike since the early 1980s."

1. Has TVA known about seeps along the toe of the dike since the early 1980s?

A summary of what TVA knew about the dikes at Kingston and when they were made aware is summarized in the table under Part 2 of this question.

2. If TVA is currently conducting a review of past or current seeps, wall failures or any other problems with the structural integrity of this impoundment, please provide in initial or final form:

- A. The date of discovery of each seep or failure and a description of the seep or failure and its location,
- B. A description of any remedial or corrective action taken to address the seep or failure,
- C. The date of each such remedial or corrective action, and
- D. Whether any seeps or problems occurred in the same area more than once. If so, please describe the current state of the area.

The following table is provided to address items 2A through 2D regarding dredge cell and ash pond dike seepage and stability reporting, based on information collected and analyzed to date:

2A. Date(s) of Condition	2Bi. Brief Description of Condition	2Bii. Description of Corrective Action	2C. Date of Repairs	2D. Multiple Event
10/1969	Soil loss in dike above Ash Pond Spillway Pipe	Excavation to expose and replace 30-inch ID concrete pipe and performed interior grouting of spillway pipe to seal joints. No leakage or soil movement detected after repairs	10/69 to 1970	No, Pipe inlets plugged. Spillway pipes abandoned in 1976
1976	Dike C penetration for six (6) spillway pipes that were placed on soft ash dike fill. Pipes settled and joint spread.	Rockfill placed over soft ash fill to serve as stable foundation for six (6) spillway pipes	1976	No

1978, 1983, 1984, 1985, 1986, 1987, 1988, 1990, 1993, 1994, 1995, 1996, 1997, 2000 thru 2007	Red water seepage noted along East Dike next to condenser intake channel	Seepage observed with no evidence of slope instability.	1985 Excavated seepage collection trench Constructed engineered wetland in 1987	Yes
1979, 1980, 1982, 1983, 1984, 1985, 1987, 1988, 1990, 1993 and 1997	Surface wetness at toe at southeast end of Dike "C" known as "wet area No. 1"	Seepage observed, reportedly seepage or concentrated surface water runoff. TVA Operations to monitor condition	1984 TVA explorations along Dike "C" 1986 repair designs prepared	Yes
8/3/1984	Internal divider dike failure due to dredging that undermined the new divider dike	Filled in ash pond back in with ash and abandoned Dike "D" construction until 1986	1984 Raised all divider dikes to match perimeter Dikes	No
1984, 1985, 1986, 1987, 1997, and 1998 (no change)	Pooled water at base of north end of Dike "C" known as "wet area No. 3"	TVA perform stability analyses of Dike "C"	1985 TVA stability analyses performed	Yes
3/1987 (seepage present, no changes)	Seepage "water boils" and "water piping" at south Toe of Cell 1	Stopped filling above Cell 1, Reduce water head in Cell 1	1987 reduce water head and maintain 4 feet of freeboard between dike crest and cell pond	None along south side of Cell 1
1993 and 1994	Three wet areas along Dike "C" noted known as "wet area No. 2"	Observe wet areas appear stable.	No Action	Yes
1993, 1994, and 1996	Shallow sloughs (slide) and wetness at toe Dike "C" within 150 feet of Swan Pond Road. Slide was 50 feet wide.	Inspection required and performed. No remediation requested	1994 and 1996, the sloughs were reported not to be a stability problem	Yes
1996 and 1997	Shallow 25 foot long slough (slide) on south dike of ash pond	The TVA reported the slough does not appear to be a threat to dike stability. No remediation recommended	Future monitoring recommended	Yes
1998, 1999, and 2000	Water ponded on ash between Dike "C" and dredge cell at north side of site	Drainage trench and cut-tails proposed	Trench installed	Yes
1997 and 1998	Toe of Stage A lift adjacent to Dike "C" has a few areas of standing water	Area to be over seeded and fertilized so that lush cover is established on dike	1998	Yes

1999 and 2000	Recent heavy rains saturated several hundred feet at north end of ash disposal Dike "C"	No remedial actions recommended	Monitor condition in future	Yes
11/6/2003	Shallow slide along west toe of Dike at Cell 2/3 next to Swan Pond Road. The ash pond slopes were fully saturated on 11/1/03 There were two (2) seeps above ash slide area	Stopped dredging into Cells 1 and 2. Geotechnical analyses by Geosyntec and Parsons. Explorations and instrumentation by Mactec. Repair designs by Parsons. Seepage overlay blanket constructed by TVA. Started dredging into Cell 1 on 11/10/2005	11/2003 Initial repairs Involved placement of 100 tons of riprap on geotextile over wet ash dike material at seep area. Final seepage under drainage trench drains under the two lower most benches. Work done between 6/7/2005 and 9/15/2005	Yes – surface treatment manages seepage
1/2004	Seepage along toe of Dike "C" southeast side of "C" along intake channel No active dredging into Cells 1, 2 and 3 during 2004, Interim cell active starting 1/20/04	Noted by special TVA inspection to observe ash pond and dredge cell conditions	Monitor condition in future Dike "C" seeps dry in 2005	No
11/1/2006	Shallow slide with ash and seepage exiting slope along west slope Cell 2/3 next to Swan Pond Road, south of 2003 slide. The 2 nd failure was next to 2003 seep location.	Stopped dredging into Cells 1 and 2 between 11/1/06 to 4/09/07. Geotechnical analyses by Geosyntec. Designs by Geosyntec. Seepage overlay blanket and 30 piezometer instrumentation and dewatering wells constructed by TVA.	Installed spring boxes and 2 nd cell slope seep remediation completed 1/26/2007 2006, Installed non-woven geo-composite drainage layer over west slope of Cells 1, 2, and 3 from Elev. 760 up to 775 feet with 1 foot of soil cover.	Yes – surface treatment manages seepage
2007	Dike drains discharge onto saturated dike slope of Cells 1, 3 and 2. No sloughs or	Geosynthetic designed blanket drain system and conveyance to collect dike drainage waters.	Designs done in 2007, bench drains along west side of Cells 1, 3	Yes – surface treatment manages seepage

	slides reported	TVA constructed surface water down drain system along west side of dredge cells	and 2.	
2008	Potential increase for dredge water seepage break out on west slope	TVA and Geosyntec recommended stop dredging into Cell 1 from 11/19/07 to 3/31/08 to place bench drains Recommendations for 3 rd spring box on the side of the dredge cells next to Swan Pond Road	Installed Cell 1,3 and 2 bench drains January 2008 thru February 2008	No
2008	Seep at mid-dike level northeast corner of Dredge Cell 2	Excavation found running clear water from old underdrain	February 2008	No

3. Has the TVA examined whether the above-ground design of the Kingston impoundment contributed to its failure, and if so, what were the conclusions?

TVA retained AECOM Technology Corporation (AECOM) in early January 2009 to conduct an independent Root Cause Failure Analysis (RCA) of the Kingston dike failure. AECOM is a global provider of professional technical and management services in the energy, environmental, transportation and facilities sectors, with more than 41,000 employees worldwide. Its geotechnical services practice group comprises more than 200 geotechnical engineers, geologists, technicians and drillers supporting North American projects, and it possesses substantial experience in design, construction quality management, and forensic failure analyses of dikes, containment ponds, landfills, and dams.

AECOM's RCA study is ongoing and no definitive conclusions have been reached at this time. The RCA is currently well into the process of reviewing records and conducting field and laboratory studies. AECOM is coordinating its RCA work with the Tennessee Department of Environment and Conservation and with TVA's Office of Inspector General. The conclusions regarding the root cause are expected in summer 2009.

A. Were the walls of the dike built from coal combustion waste?

The impoundment boundaries encompassing the failed dredge cells were composed of earth, bottom ash, and fly ash.

B. If so, is that being examined as a factor in the failure?

Yes.

C. What other factors are being considered as a cause of the failure?

Other possible failure modes identified by AECOM include:

- Slope stability of compacted dike slopes
- Dike slide out stability
- Seepage break-out stability
- Intermediate depth sliding stability of dredge cell
- Deep sliding stability of dredge cell
- Foundation soil sliding stability with dredge cells above
- Static liquefaction of ash
- Artesian groundwater conditions
- Karstic limestone or bedrock instability
- Vandalism or sabotage
- Progressive failure after initial breach

Question # 2

The release of more than 1 billion gallons of coal combustion waste from the Kingston Fossil Plant affected more than 40 properties. Information provided to the Committee indicates that dredging of the river may soon commence. However, the comprehensive clean up of the land area impacted by the spill has yet to begin. A first step in such a process is TVA gaining access rights to affected properties. Please describe TVA activities in obtaining access agreements from all of the impacted landowners in order to fully assess the ash on their respective properties.

The released ash covered approximately 300 acres, of which 8 acres are land not owned or managed by TVA. TVA has purchased all but 1 acre.

TVA has obtained property owners' permission via releases to clean up boat dock debris, as well as trees and other debris that washed up onto property following the spill.

Any resident whose property may need to be accessed during the dredging process will be notified in person, and a release will be obtained from them should TVA need to access their property.

Question # 3

The Kingston Plant impoundment release spilled roughly 100 times the amount of material as the Exxon Valdez disaster. This spill covered about half of a square mile of area in coal combustion waste. This type of waste is known to be contaminated with arsenic, beryllium, cadmium, chromium, lead, mercury, and radionuclides. Tests by the Environmental Protection Agency and independent tests have found elevated levels of heavy metals and radioactive material, including arsenic and thorium, both of which are known to cause cancer.

1. Please describe the steps that TVA is taking to identify and utilize the most protective federal, state and local cleanup standards or guidance values, including screening levels and

cleanup goals, for the response action, including TVA's work with the Tennessee Department of Environment and Conservation and the Environmental Protection Agency, and

2. Please provide any list of such standards or goals to the Committee.

TVA, in response to the Tennessee Department of Environment and Conservation (TDEC) Commissioner's Order Case No. OGC09-0001 issued January 12, 2009, prepared a corrective action plan (CAP) that includes plans for a comprehensive assessment that will provide the data to evaluate alternatives and make decisions for the overall ash spill cleanup. The CAP is posted on TVA's website.

The comprehensive assessment will address:

- How to obtain structured public and stakeholder input
- How to get an interagency technical advisory group for remediation efforts
- What to do with the ash in Swan Pond Embayment,
- How to close the failed dredge cell,
- What to do with residual ash/contamination in the rivers or on land (left behind after short-term dredging actions),
- To what level and how to restore affected environmental media such as surface water/sediments, groundwater, and soil, and
- How to finally dispose of released ash.

With oversight by the appropriate regulatory agencies, TVA will comply with all applicable regulations that set cleanup levels for impacted areas of the environments as well as additional well-established, risk-based goals that are used to protect human health and the environment. Data initially will be screened against the most protective levels from this set of standards and goals to identify potential impacts. Then, through the process of evaluating remediation alternatives and determining the final remedial actions, the cleanup levels against which progress will be judged will be selected with the regulatory agencies.

Question # 4

The Kingston Fossil Plant impoundment failure released more than 1 billion gallons of coal combustion waste over half a square mile, including into the Emory River and onto land surrounding the river. Please answer the following questions to the best of TVA's knowledge at this time:

1. Could this release have caused an initial pulse of coal combustion waste to migrate from the spill site down the river?

Yes, ash did migrate from the spill site.

2. Could this initial release have caused the deposition of ash downstream from the site beyond five miles?

Yes. However, based on river depth measurements, most of the volume has been contained in the Emory River.

3. Does TVA intend to map out the entire area where ash could have been deposited from the spill to determine the extent of any environmental impacts?

Yes, TVA has surveyed the Emory, Clinch and Tennessee Rivers on January 26 using a sampling dredge to determine the extent of ash migration. While the bulk of the release material remains near the spill site, some ash has migrated both downstream and upstream from the spill site. The extent of fly ash migration downstream ranges from the Emory River mile (ERM) 2.5 to ERM 0.0. On the Clinch River ash can be found from the confluence from Clinch River mile (CRM) 4.5 to CRM 0.0. On the Tennessee River limited amounts of ash were found between river miles 564.0 and 563.0. Upstream of the site thin deposits of ash were found up to ERM 6.0

Question # 5

On January 28, 2009 a press report indicated: "High levels of arsenic and elevated levels of radioactive radium have been found in the sludge released in a massive coal ash spill at a Tennessee power plant, Duke University scientists reported Wednesday." TVA responded by saying that the Authority has "in place measures to prevent the ash from becoming airborne such as coating the top of the ash, watering the roads and planting grass." Please answer the following questions regarding this topic:

1. Does TVA have any assessment on the adequacy of its current measures to fully protect public health, including by preventing airborne exposures during the dry summer months?

TVA has prepared and implemented plans for air monitoring and dust suppression activities. These TVA plans were developed with regulatory oversight by TDEC and EPA. The dust suppression plan is being updated to reflect additional suppression techniques. Both agencies have visited the site to monitor TVA's progress in implementing the plans. The air monitoring results are a measure of the efficacy of dust suppression efforts. Air monitoring results to date indicate airborne particulate levels (PM10 and PM2.5) within daily National Ambient Air Quality Standards. Metals analysis of the airborne dust indicates levels in the range of normal background levels and not at a level of a health concern. TVA has installed new PM2.5 air monitors (previous PM2.5 monitors were demobilized on February 3, 2009. The first of the new PM2.5 monitors were placed in service on February 12, 2009). All results are posted on TVA's website.

A. If so, please provide any documents demonstrating that these measures will fully protect public health.

All air monitoring results are posted on the TVA website.

2. Does TVA currently have any in-door air monitoring program to assess levels of exposure to coal combustion waste being tracked indoors by working individuals, pets, children and other individuals?

TVA has monitored for particulate matter indoors upon request.

A. If so, please provide any documents describing such monitoring.

TVA's contractor, Center for Toxicology and Environmental Health (CTEH), has been conducting residential air monitoring as requested by residents since shortly after arriving on site December 28, 2008. Twenty separate residences have been sampled. Most residential indoor sampling included multiple measurements in multiple rooms. PM10 sampling equipment was used. Except for three residents all of the indoor air quality measurements were within National Ambient Air Quality Standards. Notable exceptions were in three residents where cigarette smoke odor was detected. In those cases indoor air quality was significantly worse than the outdoor air quality. The documents associated with such monitoring are individual residential reports developed after each visit by CTEH and provided to the residential contact. They contain names, addresses, and other personal information of the residents.

B. If not, does TVA plan to establish any such monitoring system? If so, please provide documents describing this monitoring system and any timeline for creating the monitoring system.

Please see above

C. If TVA does not plan to establish any such monitoring process, please describe TVA's reasons for failing to assess such exposures.

Please see above

D. Please describe whether TVA will monitor for potentially dangerous exposure to coal ash that could occur over the course of months or years, rather than just over a short-term period of time.

TVA's contractor, CTEH, has in place an ambient air monitoring network in the adjacent community around the spill site. This network was designed and implemented in collaboration with EPA and the Tennessee Department of Environment and Conservation (TDEC). It is designed to measure air quality at the locations of highest potential impact from the ash spill, thus ensuring if harmful levels of airborne dust develop, they will be detected so appropriate corrective actions can be taken. This monitoring network will remain in place for the duration of the spill recovery effort. Residential air monitoring will also continue to be conducted as requested for the duration of the spill recovery effort. Long-term monitoring and sampling will be established as part of the comprehensive assessment plan described in the answer to Question 3.1 below.

3. Will TVA fully characterize the entire coal combustion waste spill from the impoundment at the Kingston Fossil plant including for all potential contaminants of concern such as heavy metals and radionuclides?

Yes. TVA, in response to the Tennessee Department of Environment and Conservation (TDEC) Commissioner's Order Case No. OGC09-0001 issued January 12, 2009, prepared a corrective action plan (CAP) that includes plans for a comprehensive assessment that will provide the data to evaluate alternatives and make decisions for the overall ash spill cleanup.

As part of the comprehensive assessment, TVA will work with an Interagency Team comprised of representatives from TDEC, the Environmental Protection Agency (EPA), the Tennessee Department of Public Health, the Tennessee Wildlife Resources Agency (TWRA), the U.S. Fish and Wildlife Service (FWS), the U.S. Army Corps of Engineers, Roane County, and other appropriate agencies to develop the sampling and analysis plans for further characterization of the spill.

TVA and the Interagency Team will utilize EPA's Data Quality Objectives (DQO) process in the development of sampling and analysis plans. The DQO process provides a systematic approach for defining the criteria that a data collection design should satisfy, including the determination of the contaminants of concern for all affected media. In concert with the Interagency Team, TVA will perform a data quality assessment of all existing data collected to date and identify data gaps that exist for future decision making. Sampling and analysis plans will be developed for air, surface water/sediments, soil, groundwater, and biota. The collected data will be utilized to evaluate restoration alternatives and/or identify the need for further characterization.

4. Will TVA fully investigate the coal combustion waste spill's potential to contaminate ground water in the area over a time period that captures the ability of heavy metals and radionuclides to leach out of the waste and into the surrounding environment?

Yes. According to the Tennessee Department of Health, public drinking water supplies continue to meet state and federal drinking water standards, and private wells and springs tested within 4 miles of the site are not impacted by the coal ash release. TVA will continue to work with TDEC to monitor the water quality at private wells and springs in the vicinity of the ash release to ensure their protection. As discussed in Section 4.2 of the CAP, periodic monitoring of private wells and springs located within approximately 0.25 mile of ash-impacted property bordering the Emory River and its tributaries will be performed. Some 47 land parcels having inferred well or spring water supplies are indicated within the designated monitoring region. Further discussion of the basis for the designated groundwater monitoring region is provided in CAP Section 2.1.4. Early-warning groundwater monitoring wells will be installed, as needed, at selected locations to ensure protection of water supplies deemed by TDEC to be at potential risk. Sampling frequency will vary from quarterly to semiannually during the first year depending on proximity of each well or spring to ash deposits. The frequency and ultimate duration of off-site wells and springs will be re-evaluated annually by TVA and TDEC based on monitoring results and perceived risks. Water samples will be analyzed for the constituents listed in

Table 4.1 of the CAP. While radionuclides are not specifically included in the analyte list of Table 4.1 radiological monitoring of groundwater samples will be performed periodically and, also, if future radiological analysis of ash or ash leachate warrants or if TDEC requires. Recent radiological analyses of KIF ash samples and ash leachate samples have not exceeded health-based limits. Protocols for evaluating and reporting monitoring results are outlined in CAP Section 4.3. Guidelines for replacing well or spring water supplies affected by the ash release are provided in CAP Section 4.4.

5. Will TVA use the most protective federal, state and local standards to screen for potential contaminants related to the coal combustion waste spill at the Kingston Fossil Plant, and to assess the adequacy of clean up actions at the spill site?

Yes. With oversight by the appropriate regulatory agencies, TVA will comply with all applicable regulations that set cleanup levels for impacted media as well as additional well-established, risk-based goals that are used to protect human health and the environment. Data initially will be screened against the most protective levels from this set of standards and goals to identify potential impacts. Then, through the process of evaluating remediation alternatives and determining the final remedial actions, the cleanup levels against which progress will be judged will be selected with the regulatory agencies.

Once the agreed-to final cleanup actions are completed, verification or confirmation sampling and analysis will be performed to confirm and document that the final cleanup levels were met.

Question # 6

Coal combustion waste is generally stored using two types of methods, "dry storage" or "wet storage". The United States Department of Energy has information demonstrating wet storage impoundments present risks to public safety, health, and the environment:

"[W]et impoundment systems require substantially greater disposal site volumes than dry systems, greater capital costs for construction of diked walls, and possibly increased operating costs for maintenance of the structural stability and wet discharge sluicing (Le., transport) structures. Also, the presence of free liquid increases the possibility of leachate (Le. a combination of ash solids and water) creation and its potential for migration into underlying soils and groundwater." ICF Resources Incorporated, Prepared for U.S. Department of Energy, Office of Fossil Energy, Coal Combustion Waste Management Study, Chapt. 1, pg. 9-10 (1993).

- 1. Please describe the number and location of TVA's coal combustion waste holding ponds.*
- 2. Please describe the number and location of each of TVA's "wet" and "dry" coal combustion waste disposal facilities.*

**TVA Coal Combustion By-products
Handling Methods**

Plant	Location	Water Body	Handling Methods			
			Fly Ash	Bottom Ash	Gypsum	Boiler Slag
Allen	Memphis, TN	McKellar Lake, Mississippi River	Pond			Pond
Bull Run	Clinton, TN	Clinch River	Dry Stack	Pond	Wet Stack	
Colbert	Tuscumbia, AL	Tennessee River	Dry Stack	Pond		
Cumberland	Cumberland City, TN	Cumberland River	Dry Stack	Dry Stack	Wet Stack	
Gallatin	Gallatin, TN	Cumberland River	Pond	Pond		
Johnsonville	New Johnsonville, TN	Tennessee River	Pond	Pond		
John Sevier	Rogersville, TN	Clinch River	Dry Stack	Pond		
Kingston	Kingston, TN	Tennessee River, Emory River	Wet Stack	Pond		
Paradise	Drakesboro, KY	Green River	Pond		Wet Stack	Pond
Shawnee	Paducah, KY	Ohio River	Dry Stack	Pond		
Watts Bar (Inactive)	Spring City, TN	Tennessee River	Inactive Pond	Inactive Pond		
Widows Creek	Bridgeport, AL	Tennessee River	Pond	Pond	Wet Stack	

3. Has TVA assessed the potential for metals to leach from any of its existing "dry" disposal or "wet" disposal facilities or holding ponds? If so, please provide:

- A. Copies of any reports or memos assessing the potential for metals to leach.
- B. The results of any data from monitoring or tests done in relation to such assessments, and
- C. A description of any known and potential releases to groundwater from any impoundment, landfill or holding pond.

Routine monitoring of TVA ash disposal areas, have been performed over the past several decades. Several studies have been completed of leaching and subsequent

groundwater transport of metals derived from coal ash disposal facilities. One such study, "Effects of Coal-ash Leachate on Ground Water Quality" (EPA-600/7-80-006, March 1980), was conducted in conjunction with EPA at ash ponds located at TVA's Kingston and Widows Creek Fossil Plants. Recently three facilities (John Sevier, Gallatin, and Cumberland) have received notice to begin the Groundwater Assessment Monitoring based on recent increases of one or more constituents over statistical background levels. TVA will continue to monitor groundwater and respond to trends in the monitoring data. (See answers to Question 8.1.G)

4. The installation of air pollution control equipment may result in higher concentrations of metals in the fly ash. Please describe what TVA is doing to assess the impacts of these higher levels of toxic metals on the storage or disposal of coal combustion waste, and the potential reuse of such material?

TVA has recognized that more stringent control of air emissions under the Clean Air Act has the potential to result in cross-media transfer of pollutants from air to coal combustion products (CCP) as well as facility water discharges. The utility industry has several initiatives to address concerns about the fate of mercury, arsenic, and other trace metals in CCP solids. Changes in composition could negatively impact the commercial use and disposal of these materials as well as the treatment of scrubber liquors and other aqueous streams associated with air pollution control equipment including transport sluice waters and leachates. As part of the evaluation process for air pollution control improvements, TVA has initiated a number of sampling campaigns to evaluate these issues. In addition, TVA has participated in various studies of the potential for cross media contamination with the USEPA, the Electric Power Research Institute (EPRI), and other entities.

Specifically, TVA has hosted and participated in a USEPA wastewater characterization campaign related to the Effluent Guidelines plan and studies associated with the potential rulemaking covering steam electric power generation. TVA has funded and provided characterization data for the EPRI Power Plant Multimedia Toxics Characterization Program (PISCES).

TVA continues to support research and development efforts to characterize byproducts and discharges including the impacts of control technologies, improved analytical methods including speciation of arsenic and selenium in wastewaters, and piloting processes for treatment of Flue Gas Desulfurization (FGD) wastewaters.

5. Mr. Kilgore, at the Committee hearing, you said that as TVA cleans up the coal combustion waste spill that the Authority will look at the option of dry disposal and that TVA doesn't "anticipate going back with that same design" of a wet disposal impoundment for the cleaned up waste.

A. Please describe whether TVA will dispose of the coal combustion waste cleaned up from the Kingston spill in a "dry" disposal landfill.

TVA recognizes the importance of removing ash from the river expeditiously. TVA is evaluating both immediately available options and those which may

be used later in the ash recovery efforts. Existing and new landfills are being evaluated along with a mine reclamation site.

B. If TVA has not yet decided whether to dispose of it in a "dry" landfill, please provide a timeline for TVA to make such a decision.

All options currently being evaluated for Kingston are "dry" (20% or less liquid) storage options.

Question # 7

Two of the goals of TVA's mission are to be an environmental steward and a national leader in technological innovation. In the last five years alone, the federal Toxic Release Inventory shows that the Kingston plant had released an estimated 278,000 pounds of arsenic, 259,000 pounds of lead, 118,500 pounds of mercury and 40,800 pounds of selenium in its coal combustion waste.

1. Given those significant amounts of toxic material, with all the potential risks those materials pose for human health and safety and the environment, is TVA considering eliminating the "wet" disposal of coal combustion waste in impoundments -- which is associated with a greater risk of environmental or public health threats than "dry" disposal of such waste in landfills -- at the Kingston Plant and TVA's other fossil fuel plants?

Yes, TVA is seriously considering eliminating the wet disposal of fly ash in impoundments.

2. What type of design is TVA considering to replace the Kingston Plant "wet" impoundment?

TVA is considering dry storage and offsite disposal options.

3. If TVA eliminates all of its "wet" impoundments, is TVA considering using "dry" disposal at its facilities?

Yes. TVA is considering converting all of its wet fly ash impoundments to dry collection or dewatering facilities followed by offsite disposal.

4. What additional protections is TVA exploring other than "dry" disposal to safely store this coal combustion waste?

TVA is evaluating lined ponds and rigorous monitoring systems at our coal combustion byproduct storage facilities.

Question # 8

Mr. Kilgore, the challenge of responsibly managing coal combustion waste is a national one, with the Environmental Protection Agency acknowledging that at least 67 sites in 23 states have been contaminated by this waste. During the Committee hearing, a question arose as to the number of "wet" disposal impoundments and "dry" disposal landfills the

TVA operates. You answered that there were six facilities with "wet" impoundments, and perhaps two or three such holding ponds per facility, but were unclear on how many actual impoundments and landfills existed. You also testified that the TVA had an independent investigator examining those disposal facilities and holding ponds for any potential weaknesses.

Please provide the Committee with the following information:

1. The safety and operational information on each of the individual impoundments, landfills or holding ponds in TVA's operation, including their:

- A. Location,
- B. Age,
- C. Type of material disposed of,
- D. Estimated amount of material held,

Attachment 1 provides answer to 8.1 A, B, C and D.

E. Estimated breakdown of percentages of elements of concern, including arsenic, beryllium, cadmium, chromium, lead, mercury, and individual radionuclides,

TVA has performed trace element analyses on the fly ash, bottom ash, slag and gypsum at all of its plants. The elemental analyses do not indicate the actual molecular form of the elements. Additionally, these analyses are normally presented as concentrations not percentages. Per your request, we have converted these concentrations to percentage in the table below.

Fly ash, like most mineral materials, soils and rocks, contains small quantities of Ra-226 (radium 226).

- The content varied from 1-8 pCi/g with 5 being the typical result. (Note: pCi = picocuries or 10^{-12} curies)
- Ra-226 decays to Rn-222 (radon) which is a gas.

TRACE ELEMENT ANALYSES								
	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper
Slag/Bottom Ash	0.001%	0.0035%	0.0314%	0.00002%	0.00004%	0.0021%	0.00073%	0.0020%
Fly Ash	0.000093%	0.00649%	0.09778%	0.00013%	0.00025%	0.00583%	0.00206%	0.00917%
Gypsum	0.001%	0.001%	0.004%	0.0000043%	0.00005%	0.00065%	0.0005%	0.00045%

TRACE ELEMENT ANALYSES							
	Lead	Lithium	Manganese	Mercury	Molybdenum	Nickel	Selenium
Slag/Bottom Ash	0.0383%	0.0013%	0.0090%	0.00001%	0.00027%	0.0020%	0.001%
Fly Ash	0.00536%	0.00321%	0.01193%	0.000026%	0.0027%	0.00439%	0.00032%
Gypsum	0.000197%	0.00015%	0.003%	0.000011%	0.00022%	0.00040%	0.001%

	TRACE ELEMENT ANALYSES				
	Silver	Strontium	Tin	Vanadium	Zinc
Slag/Bottom Ash	0.0001%	0.0268%	0.0005%	0.0047%	0.0135%
Fly Ash	0.0001%	0.07864%	0.0005%	0.01951%	0.03819%
Gypsum	0.0001%	0.025%	0.0005%	0.00143%	0.00483%

F. The frequency of inspection of each impoundment, landfill or holding pond over the last five years, and

TVA has a comprehensive inspection process for ash containment that includes four levels of inspection and review with varying levels of detail required for each.

- Each plant does a visual inspection daily.
- For those facilities with State solid waste permits, quarterly solid waste inspections are completed by state personnel in coordination with permitting requirements.
- Plant personnel conduct seep inspections of the dikes quarterly.
- TVA conducts an annual inspection of every impoundment, pond, and landfill located at its Fossil Plants. These inspections are documented by a civil engineer in a written report which lists the inspector's findings and recommendations to preserve the integrity of these structures.

G. Any formal or informal notice or letters of violations, corrective orders, or citizen suits related to any impoundment, landfill or holding pond over the last 5 years and the resolution of each such occurrence.

TVA records indicate that as of this date other than actions resulting from the Kingston Fossil Plant ash spill on December 22, 2008, there have not been any formal or informal notices or letters of violation, or citizen suits related to any impoundment, landfill or holding pond over the past 5 years. Our records do indicate, however, the following notices were received for implementing corrective action resulting from inspections or implementing groundwater assessment studies. These notices were not considered by the state agencies as formal "notices of violation":

1) A notice was sent from TDEC to Johnsonville Fossil Plant on 7-8-05 requiring submittal of an alternative closure cap on the Dredged Ash Disposal site IDL 43-102-0082 to augment the existing soil cap in order to eliminate leachate escape to the surrounding environment. An "Evapotranspirative Tree Cap" was proposed and installed with annual performance reports required.

2) Three facilities received notices to commence Assessment Groundwater Monitoring from TDEC due to exceedances in the statistical limits set by their compliance groundwater monitoring plans.

- a) John Sevier Fossil Plant received notice 6-20-05 and are currently in assessment monitoring phase II
- b) Gallatin Fossil Plant received notice 2-23-09 - to be implemented
- c) Cumberland Fossil Plant received notice 2-23-09 - to be implemented

3) Minor corrections resulting from observations made on field inspections were generally corrected immediately by the facilities.

2. Document for each of these impoundments, landfills or holding ponds which ones rely on dikes built from coal combustion waste, and if not, the materials used in the construction of the dike walls.

TVA is in the process of evaluating all of its impoundments and dikes to verify the materials used in their construction. Core drillings of the dikes allow identification of the type of soils or coal combustion by-products in a cross-section of the structures. The investigations that have been completed to date include:

Paradise: The starter dike for the gypsum stack was constructed of mine spoil which consists of stone and soil reclaimed from the strip mines that surrounded the Plant at the time dike construction began. The remainder of the dike is composed of scrubber gypsum. As the dike is raised, soil suitable for the growth of vegetation is placed on the sides.

Widows Creek: The starter dike for the gypsum stack is composed of local soils, and the remainder of the dike consists of gypsum. Vegetation is established on the outside of the dikes as they are raised.

Johnsonville: The main ash pond dike is constructed with a base of clay topped by alternate layers of fly ash and bottom ash. The outside of the dike is vegetated over clay and topsoil.

3. Information on each TVA impoundment, landfill or holding pond:

A. A list of each impoundment, landfill or holding pond that has a Clean Water Act discharge permit,

Please see Table 1 below. This list catalogs impoundments, landfills, or holding ponds with a Clean Water Act discharge permit (either NPDES or industrial storm water permit) with an assigned discharge monitoring outfall, field number, or internal monitoring point number.

Table 1: TVA Facilities and NPDES Description

TVA Facility Name	Location (city, state)	Impoundment, landfill, etc. description	NPDES discharge description
Allen Fossil Plant	Memphis, TN	Active Ash pond	Discharge serial number (DSN) 001 or 01A
		Metal cleaning treatment pond	Internal Monitoring Point (IMP) 006
		West Ash Pond (inactive)	DSN 002
Bull Run Fossil Plant	Clinton, TN	Ash pond/gypsum stacking area	DSN 001
		Metal cleaning treatment pond	IMP 005
		Closed ash dredge cells	F16 and F17
Colbert Fossil Plant	Tuscumbia, AL	Ash pond #4	DSN 001
		Metal cleaning treatment pond	DSN 001b (actually IMP)
		Ash pond #5	DSN 010
Cumberland Fossil Plant	Cumberland City, TN	Ash pond	IMP 001
		Metal cleaning treatment pond	IMP 007
Gallatin Fossil Plant	Gallatin, TN	Ash pond	DSN 001
		Metal cleaning treatment pond	DSN 005 (changing to IMP designation)
		Abandoned ash pond	F13
John Sevier Fossil Plant	Rogersville, TN	Ash pond	DSN 001
		Iron pond and copper pond	IMP 005
		Dry fly ash stack stilling pond	F16-A
Johnsonville Fossil Plant	New Johnsonville, TN	Ash pond	DSN 001
		Metal cleaning treatment ponds	IMP 005
		Dry ash disposal sedimentation pond (future)	DSN 011
Kingston Fossil Plant	Harriman, TN	Ash pond	IMP 001
		Metal cleaning treatment ponds (decommissioned)	IMP 005
		FGD storm water pond	To be designated 01A
		Abandoned ash pond	IMP 007
Paradise Fossil Plant	Central City, KY	Fly ash pond	DSN 001
		Bottom ash pond	DSN 002
		Boiler slag/ Reed Minerals processing pond	DSN 016
Shawnee Fossil Plant	Paducah, KY	Inactive ash ponds/dry facilities & ash pond	DSN 001
		Old asbestos landfill, spent bed disposal area, AFBC fly ash disposal area	DSN 008
		Metal cleaning treatment ponds	004 (internal monitoring point)
Watts Bar Fossil (inactive plant)	Spring City, TN	Ash pond	DSN 002
		Metal cleaning treatment ponds	DSN 006
		Oil retention pond	DSN 010

B. A description of whether each such structure with a Clean Water Act permit has consistently filed daily monitoring reports or, if such monitoring reports have not been filed, the number of missed reports and the reason for each such missed filing.

The NPDES permits for these facilities issued in accordance with the Clean Water Act require us to submit monthly discharge monitoring reports (DMRs) that cover monitoring at the frequency designated in the permit. TVA has submitted timely DMRs to the states as required by our Clean Water Act permits. To our knowledge, there have not been any missed DMRs.

C. A description of each Clean Water Act discharge monitoring report that shows a violation of a water quality effluent standard.

The attached table (See Attachment 4) lists the TVA facility, the month in which an exceedance of a permit limit occurred, and a description. We are including all NPDES exceedances for Fiscal Year 2005 through Fiscal Year 2009 to date. (TVA's fiscal year is from October 1 through September 30.)

D. A description of any unregulated discharge from an impoundment, landfill or holding pond in the last five years.

All discharges from impoundments, landfills or holding ponds are regulated.

4. Information describing the following:

A. The process that TVA used to select the independent investigator who will examine TVA's disposal facilities and holding ponds for any potential weaknesses.

TVA requested information from three national engineering firms with expertise in the areas of impoundments. We did not consider AECOM because we wanted to keep them focused on the Kingston failure analysis.

- o Stantec Consulting Services Inc. (Stantec)
- o Geosyntec
- o Worley - Parsons

Stantec was selected.

- o Stantec has extensive experience and expertise in dam design and inspection. Stantec's engineers, geologists, and support staff are an integral part of current dam safety initiatives across the globe, having worked on 13 of the 20 highest risk systems for the U.S. Army Corps of Engineers (USACE).
- o Stantec's geotechnical engineers routinely perform dam inspections, subsurface explorations to assess foundation conditions and identify borrow sources for new structures, seismic evaluations to identify failure potential, as well as stability and seepage evaluations to analyze and determine the modes of failures for distressed structures.

- Stantec staff offers resolutions to intricate dam safety and is supporting the USACE in formulating policy guidelines and technical instructions for the national Dam Safety program
- Stantec has supported electric utilities including Duke, American Electric Power, Kentucky Utilities, Louisville Gas and Electric, East Kentucky Power, Ameren and other local municipal utilities at more than 25 generating stations throughout the region with planning, facility design, regulatory compliance, beneficial by-product reuse, and construction support for ash ponds, landfills, and other facility infrastructure.

B. How TVA ensured the investigator's independence from TVA,

TVA has contracted with Geosyntec Consulting to review the assessment procedures and recommendations proposed by Stantec. After reviewing Stantec's recommendations, Geosyntec proposes any changes and/or modifications. In addition to the Geosyntec review, the Office of Inspector General, OIG, also is reviewing Stantec's process to assess TVA's complexes. OIG has secured the services of a consultant to review the assessment and advise them on the process and recommendations. TDEC will also conduct an independent assessment of Stantec's work.

C. Whether the investigator has ever worked for TVA or people affiliated with TVA in the past,

No members of Stantec's Management Team for this effort are former TVA employees.

Stantec has provided consulting services to TVA in the past. Beginning in 2005 Stantec performed a by-product disposal facility siting study at the Johnsonville Fossil Plant. In 2007 Stantec designed the expansion of TVA's dry ash disposal landfill at the Shawnee Fossil Plant. Stantec has also provided various permitting and engineering services to TVA at its Paradise, Bull Run and John Sevier Fossil Plants, but not at Kingston.

During this period, 2005 thru 2008, fees from services provided to TVA totaled approximately \$650,000.

D. The anticipated timeline for the investigator to conduct a review of each impoundment, landfill or holding pond,

We expect Stantec's completion of Phase I, which includes document reviews, interviews and field reconnaissance by March 30, 2009. Phase II will then begin with engineering studies and analyses. Phase III is the beginning of implementation with design and permitting activities.

E. The quality assurance and quality control process for the information generated by this review,

The quality assurance and quality control process used by Stantec for this project is described below.

Stantec's quality control plans rely on three elements: Experienced Personnel, Internal Team Communication, and Coordinated QA/QC.

Stantec follows widely accepted QA/QC procedures. They achieved ISO certification in 2008 for following the international family of standards for quality management practices issued by the International Standards Organization (ISO). The Quality Management Plan is modeled after ISO 9001:2000.

In addition there will be several reviews of the Stantec data including Geosyntec, other engineering firms and TVA project management.

F. Any information, including initial or interim reports, of any current weaknesses, including seeps, leaks or other potential structural problems of any impoundment, landfill or holding pond,

TVA has contracted with Stantec to conduct an assessment of all of TVA's impoundments. Phase I (called "Facility Review") of their three-phase is currently underway. Phase I consists of:

- Site walk downs (Focus on seepage, erosion, drainage, sloughing, vegetative cover, spillway conditions, general operations, etc.)
- Review of historical inspection reports and other records review
- Interviews with Staff and plant personnel
- Freeboard Analysis
- Recommendations for Future Analysis and Study
- Recommendations for Short and Long Term Operations

Attachment 2 is a preliminary draft report from Stantec, which represents Phase 1a of their work. Phase 1b is expected to be completed in the near future. That information will be provided to the Committee within 30 days. We are actively addressing the primary concerns and recommendations identified in Table 2 of the attached preliminary draft report.

G. A history of any past problems at any impoundment, landfill, or holding pond, and

This information is currently being compiled and will be provided along with Item F above.

H. A record of steps considered or taken to repair a past or current problem.

This information is currently being compiled and will be provided along with Item F above.

Question # 9

The Energy Policy Act of 1992 encouraged the use of Integrated Resource Planning (IRP) as a way for power providers to consider alternative energy sources, both supply and demand, and the appropriate mix for any utility. Aside from TVA's mix of coal, hydropower and nuclear power, alternative sources are a scant portion of your energy mix. The TVA is the nation's largest utility, and part of TVA's goal is to be a national leader on environmental stewardship, technological innovation and energy issues. Yet testimony at the Committee hearing suggested that TVA has not updated its IRP since 1995.

Please describe the following:

1. When is the last time that TVA updated its IRP?

TVA completed its last formal IRP, *Energy Vision 2020* in December, 1995. *Energy Vision 2020* was a multi-year study produced in the form of an Environmental Impact Statement (EIS) as required by the National Environmental Policy Act (NEPA). It analyzed numerous different strategies for meeting the Valley's future electrical power needs through various combinations of supply side and demand side management resource options. TVA concluded that the best approach to meet the forecasted need and its long-term goals was to maintain a portfolio of resource options--both supply- and demand-side options--that could be used depending on future events.

TVA modified its 1995 IRP through two subsequent EIS processes, including updated Need for Power analyses: Browns Ferry Operating License Renewal (March 2002) and Watts Bar Nuclear Plan Unit 2 Completion and Operation (June 2007).

2. Please explain any delay in updating its IRP greater than one year.

Annually TVA updates its Power Supply Plan. The power supply planning processes consider alternative energy sources, both supply and demand, and the appropriate mix to meet energy and peak demands on the TVA system.

3. Does TVA have any current plans to update its IRP? If so, please provide a dated copy of this plan, and

Yes, TVA decided in 2008 after the Board of Directors adopted the new Environmental Policy, that the IRP should be updated. A formal project began in the fall of 2008 that will serve as TVA's environmental review of the implementation of the Environmental Policy as required by (NEPA) and the update of *Energy Vision 2020* (the current IRP).

The IRP will evaluate resource portfolios, both power and stewardship, that TVA could utilize to implement TVA's mission, the long-term goals of its Strategic Plan, and TVA's Environmental Policy. Consistent with the Environmental Policy, TVA will include in the study the stewardship resources in the Valley, such as water, natural resources, and lands.

The study will require approximately two years for completion. This study duration is consistent with the preparation of private utility IRPs that TVA has benchmarked. The public kick off of the study is planned for this spring with the publishing of a Notice of Intent (NOI) in the Federal Register in accordance with the Council on Environmental Quality's regulations (40 CFR parts 1500 to 1503) and TVA's procedures for implementing the National Environmental Policy Act (NEPA).

Project plans are to complete and issue the Draft EIS/IRP for public comment early in calendar year 2010. After review and resolution of comments received the Final EIS/IRP will be completed and issued near the end of calendar year 2010.

4. *If TVA does not have a current plan to update its IRP:*

A. *Please describe why the TVA does not have such a plan,*

As previously stated TVA has a current plan to update its IRP.

B. *Whether TVA will commit to update its IRP using an open, collaborative, and transparent process, including soliciting public input through public meetings and comments, on TVA's IRP within the next year, and*

The EIS/IRP, like *Energy Vision 2020*, will be conducted using an open, collaborative, and transparent process. There will be multiple opportunities for public input throughout the process. To ensure that the full range of issues and a comprehensive portfolio of energy resources and environmental stewardship activities are addressed, TVA will invite members of the public as well as Federal, State, and local agencies and Indian tribes to comment on the scope of the EIS. As part of the EIS process, TVA anticipates asking representatives from key stakeholder groups to participate in a public review group which will meet several times over the course of the study to learn about the issues, discuss tradeoffs associated with different resource options, and work with TVA on what a model resource portfolio will look like. It is important that Valley residents and all of those interested in the energy and stewardship future of the Tennessee Valley region have the opportunity to participate in this process.

After issuing the NOI, TVA will hold a number of public information meetings about the EIS at locations across the region. The dates and locations of the information meetings will be posted on the TVA website and published in local and regional newspapers.

After consideration of the comments received during this scoping period, TVA will develop and distribute through its external internet site a document which will summarize public and agency comments that were received and identify the issues and alternatives to be addressed in the EIS, and identify the schedule for completing the EIS/IRP process. Following analysis of the issues, TVA will prepare a draft EIS/IRP for public review and comment. Notice of availability of the draft EIS/IRP will be published by the U.S.

Environmental Protection Agency in the *Federal Register*. TVA will solicit comments on the draft EIS/IRP and hold public meetings to address it.

Like the initial scoping process, after issuing the draft EIS/IRP, TVA will hold a number of public information meetings to solicit comments about the draft EIS/IRP at locations across the region. The dates and locations of the information meetings will be posted on the EIS/IRP website and published in local and regional newspapers.

The final deliverable will identify the most effective energy and stewardship resource portfolio that will meet TVA's mission and serve the people of the Valley for the next 10 to 20 years.

C. Whether the TVA will commit to conduct an analysis in its IRP that prioritizes actions to address energy needs in the following order:

- 1) Energy efficiency steps and demand response actions that reduce energy use,*
- 2) Renewable energy and distributed generation; and*
- 3) Clean fossil fuel sources and infrastructure improvements that increase reliability and operational flexibility.*

These issues will be among a comprehensive list of supply and demand side options considered in the study. Based on preliminary internal and external stakeholder discussions, TVA anticipates that the major issues to be addressed in the EIS will be the cost and reliability of power, power generation options, the effects of power production on the environment, including climate change, the effects of climate change on the Valley, the availability and use of renewable power resources, the effectiveness and implementation of demand side management options, including energy efficiency, selecting and prioritizing techniques for the management of sensitive ecological and cultural resources, meeting the future recreational needs of the Valley, and the relationship of the economy to all of these activities.

One of the early steps in the study will be to develop metrics for the evaluation of the option portfolios that incorporate public input as well as the guiding principles of TVA's Strategic Plan and Environmental Policy.

Question # 10

The Tennessee Valley Authority is requesting proposals to supply up to 2,000 megawatts of power generation from renewable and clean energy sources to TVA by June 1, 2011. Up to 1,000 megawatts of generation would be delivered to TVA by June 1, 2009, according to the Renewable Energy and/or Clean Energy Resources request for proposals. The amount would increase to a maximum of 1,500 megawatts a year later and to 2,000 megawatts by June 1, 2011.

TVA is targeting individual companies capable of producing at least 1 megawatt of electricity from renewable or clean energy resources and is interested in proposals that would provide the power supply from 1 to 20 years.

Please provide the following information regarding this request:

1. A description of the number and types of proposals that TVA has received in response to its request.

TVA received over 60 proposals, including 11 wind, 20 biomass, 13 solar, and 1 incremental hydro that were in conformance with the RFP requirements. The remaining proposals were determined to not be responsive.

2. Copies of the proposals that TVA has received.

Consistent with federal laws restricting disclosure of procurement source selection information and contractual commitments, TVA does not disclose the commercial proposals received in response to this RFP (or any particular information which is proprietary information that is included within such proposals), except where such disclosure is required by law.

3. The total amount of renewable energy represented in the proposals that TVA has received from its request.

TVA received proposals for over 18,000 GWh of electric energy during the initial year of all proposals. This represents approximately 270,000 GWh of energy over the life of the terms of the proposals. In terms of the sizes of the various types of renewable generation technologies, TVA received proposals for approximately 3,775 MW of wind, approximately 550 MW of biomass, approximately 1,480 MW of solar and 75 MW of incremental hydro.

Question # 11

Mr. William Howard Rose Jr., Director Roane County Office of Emergency Services testified before the Committee on the following issues:

- *Unified Command -- Immediately following the event it was difficult to form a cohesive Unified Command with TVA due to the fact TVA was not using the Incident Command System as defined by the National Incident Management System.*
- *Emergency Preparedness Planning -- There does not exist for the TVA Fossil Power Division the same stringent emergency preparedness and planning program as does for TVA's nuclear and hydroelectric facilities.*
- *A comprehensive hazard analysis and risk assessment had not been performed at the TVA Kingston Fossil Plant.*

For each of these problems, Mr. Rose suggested corrective actions that are reproduced below:

- *Conduct and make available to the local community a comprehensive hazard analysis and risk assessment for all TVA owned and operated facilities.*
- *Adopt, train, exercise, and conduct emergency response operations utilizing the Incident Command System as defined by the National Incident Management System.*

- *Implement system-wide a rigorous and comprehensive emergency preparedness program that incorporates all aspects of emergency management: preparedness, response, recovery, and hazard mitigation.*

1. Does TVA commit to immediately begin to implement each of these corrective actions at each of its facilities and to quickly finish implementation of each corrective action?

In the early stages of the event, TVA followed its approved Agency Emergency Response Plan (AERP) which provides an agency-wide response to emergencies or threats that would require integrated agency action. The Senior Management Executive (SME) was responsible for directing the emergency response through the Agency Coordination Center (ACC). Once EPA arrived on-scene and declared themselves the "lead federal agency", TVA established, within 24 hours, a Unified Command Center as defined by the National Incident Management System with the assistance of the O'Brian Emergency Response Group. After EPA turned the lead federal role over to TVA, a process began to transition from the Unified Command structure to an onsite recovery response organization, utilizing TVA's Fossil Emergency Plan procedure (FPG.EP.14.000).

With respect to Mr. Rose's suggestions:

First, let us say that TVA was appreciative of the initial response by the Roane County Office of Emergency Services. TVA has a good working partnership with the state and local Emergency Management Agency at each of its fossil plants. With respect to the suggested corrective actions TVA recognizes that there is always room for improvement. Below are our responses:

1. There are several mechanisms already in place that meet many aspects of the first suggestion for making information available.

Each facility submits the state required EPA Superfund Amendments and Reauthorization Act (SARA) Tier Two Report or equivalent prior to March 1st as required. The Tier Two or state equivalent contains information about the specific hazardous chemicals stored on-site. Typical chemicals include anhydrous or aqueous ammonia, diesel fuel, sulfuric acid, etc. if they are present above the reporting threshold. The report includes potential hazards, specific chemical quantities, and storage type, condition, and locations. The Tier Two Report is sent to the State Emergency Response Commission, the Local Emergency Planning Committee, and the local fire department with jurisdiction over the facility. EPA regulations require that any site which is a large quantity generator of hazardous waste must prepare Contingency Plans which are designed to minimize hazards to public health or the environment from fires, explosions, or any unplanned sudden or nonsudden release of hazardous waste to air, soil or water. These plans are filed with the local emergency authorities (police departments, fire departments, hospitals, and state and local emergency response teams) and are updated and refiled as necessary.

In addition, TVA develops Risk Management Plans as required by OSHA for all facilities with ammonia storage.

TVA also maintains Integrated Contingency Plans or Spill Prevention Control and Countermeasure plans at each fossil site. Kingston Fossil Integrated Pollution Prevention plan (This plan includes the SPCC plan, SWPPP, and NPDES Best Management Practices) - Attachment I of the plan is a Facility Spill Contingency Plan - This contingency plan includes reporting for oil, PCBs and Hazardous substances (with RQs). Included are Notifications to the ODS, NRC, TEMA, Roan County EMA, Spill response organization, EPA, TNs Knoxville Environmental Field Office, as well as a listing of downstream users (within 5 miles planning distance).

Plant representatives regularly attend Emergency Management Agency meetings to work with local responders on emergency response at the TVA sites. Fossil Power Group has initiated actions to establish a working partnership with TEMA. This will ensure better alignment between the Fossil Plants and TEMA with regards to emergency response when needed.

2. With respect to the second and third suggested corrective action above, TVA is currently contracting with the O'Brian Emergency Response Group to perform an assessment of all emergency preparedness procedures in the generating and transmission organizations. As part of the assessment we are asking the O'Brian Group to provide recommendations for improvements in the area of emergency preparedness, response, recovery and hazard mitigation. This assessment will help ensure that all emergency procedures conform to the National Incident Management System (NIMS) requirements. Once the assessment is completed and recommendations implemented, we can then conduct emergency response exercises following the NIMS requirements. This process of assessment, improvements and training TVA Wide is expected to span six to twelve months.

2. Does TVA follow the Army Corps of Engineers recommendations for emergency action plans for dams at its impoundments and holding ponds?

Both TVA and the Corps use federal guidelines for dam safety (e.g., FEMA 93 and 64) for covered dams and impoundments. These guidelines cover classification of structures as well as emergency action planning.

3. Does TVA commit to prepare emergency action plans and inundation maps for such ponds within six months?

TVA is undertaking this action of preparing an EAP and inundation maps for all of the FPG ponds. It will take longer than six months to formulate the EAP to the standards of the FEMA 64 EAP format.

4. Please provide copies of all TVA emergency planning documents that have been used at a past release of coal combustion waste at a TVA facility and copies of any updated TVA emergency planning documents that would apply to any such future release.

TVA's Agency Emergency Response Plan (AERP) and the Fossil Emergency Response Plan apply to this incident. These plans contain emergency contact information, locations of emergency personnel and emergency response actions intended to provide the agency's response in the event of a major system interruption, plant or facility event, threat, natural disaster, national or regional emergency to protect the safety of the public and TVA employees. TVA will be consulting with the Department of Homeland Security on the appropriate release of parts or all of such plans.

Question # 12

The release of more than 1 billion gallons of coal combustion waste from the Kingston Fossil Plant affected more than 40 properties. Please describe TVA's system for assessing property damage caused by the release of the coal ash, including:

1. A description of the survey methods and standards used to assess affected properties.

Immediately following the event, TVA assembled personnel to conduct visual inspections of the impacted area. Crews were also mobilized via trucks, helicopters, and boats to assess potential impacts. Safety of the residents was first and foremost. Any resident displaced was provided temporary housing, meals and other necessities.

In response to community needs, TVA initially established Community Outreach Teams. The Community Outreach Teams, comprised of employees and retirees, served as a point of contact to answer questions and listen to the concerns of area residents. To further expand opportunities for residents to communicate their needs, TVA established an Outreach Center in the Kingston community and activated a 24/7 toll-free number for residents to call to report damages. The toll-free number was provided through Crawford & Company, who also provided claims adjustors to staff the Outreach Center and field adjustors to conduct on-site damage assessments. TVA Police supported local law enforcement to ensure that all of the assessment activities were completed while maintaining security for the homes in the affected area.

The Roane County Office of Emergency Management & Homeland Security evaluated properties in the affected area and subsequently condemned three homes, declared to be uninhabitable. Approximately 21 properties on 8 acres were directly affected by ash.

2. Whether there is any independent third-party review of purchase offers and contracts to ensure fair compensation and a preservation of rights by all parties.

TVA established performance criteria necessary for third-party independent real-estate appraisers to inspect affected properties. Fifteen State Certified Residential and State Certified General Appraisers, some of which hold SRA or MAI designations, were contracted from seven different firms. Each tract is inspected by two independent appraisers from different firms and their subsequent reports are

reviewed by a TVA senior appraiser. Each property owner is given a copy of the appraisal report for their review. If the property owner identifies discrepancies in the report, those issues are resolved and an adjustment made on the appraised value. If there is a difference in opinion between appraisals, and those differences cannot be resolved, a third appraisal is ordered and conducted by a state-certified appraiser selected by the owner.

The compensation in the purchase offers has been based on the higher of two appraisals of the property by two third-party independent appraisers who have afforded the owner or their representative the opportunity to accompany them during their inspection of the property. When an offer to purchase is made, the property owners are given a written statement of, and summary of the basis for, the amount estimated as just compensation.

The statement identifies the property and the interest therein to be acquired, including buildings and other improvements to be acquired as a part of the real property, the amount of the estimated just compensation, and the basis therefore. Moreover, property owners have been granted a Right of First Refusal, affording them the opportunity to purchase their property from TVA in the future at fair market value if TVA decides to sell the property.

3. A description of the standards used in any third-party review,

The appraisals are conducted in compliance with federal and state industry standards and Uniform Standards of Professional Appraisal Practice (USPAP). The third-party independent appraisers are either State Certified Residential Appraisers or State Certified General Appraisers, several of which hold SRA or MAI designations. Completed appraisal reports are reviewed by a Certified General Real Estate Appraiser for accuracy and compliance with accepted appraisal principles and practices.

4. A description of the number of settlements that TVA has offered so far,

As of March 13, 2009, TVA has extended offers on 78 tracts in the Kingston, Tennessee, area including primary residences, secondary residences, vacant lots, and two businesses. TVA is continuing to expeditiously evaluate properties and prepare offers to purchase.

5. Whether these offers were subject to any third-party independent assessment process,

After collecting and studying all relevant data, two independent third-party real-estate appraisers prepare reports that provide opinions of market value for the subject property. Therefore, two independent appraisal reports are submitted to TVA for each property. The reports are reviewed by senior-level Certified General Real-Estate Appraisers for accuracy and compliance with accepted appraisal principles and practices.

6. A description of the number of settlement agreements that TVA has entered into,

As of March 13, 2009, TVA has acquired 51 tracts impacted by the spill. An additional 26 personal property settlements have been executed.

7. Describe in detail and provide copies of any such settlement agreements, and

The settlement agreements are confidential to each party and TVA. All of the agreements entered into to date provide for settlement payments by TVA in addition to the value of the affected properties. Such payments are in consideration of a general liability release of TVA from any further claims arising as a result of the ash spill incident.

8. The potential number of additional settlements that TVA may offer related to this spill.

Presently, TVA is uncertain how many tracts will be acquired, as this will be influenced by the desires of the affected property owners, TVA's operational needs and by the extent of the impacts.

Question # 13

Public officials, local citizens and editorial review boards have spoken out on the lack of trust that people now have in TVA. The Committee spoke with local citizens who expressed their lack of trust in TVA. These facts are extremely troubling, especially since TVA's authorizing statute emphasizes the need for TVA to work at addressing the environmental, social, or physical well-being of the people in TVA's service area. The TVA's strategic plan states that the Authority "will communicate clearly and consistently with... stakeholders and will be responsive to their needs in order to build stronger partnerships, increase trust and develop long-term relationships."

TVA should help rebuild public trust and ensure that people affected by the spill at the Kingston Plant have a strong voice in a collaborative decision-making process to clean up and rebuild their community. To help accomplish this goal, will TVA ensure the creation of a Citizen Advisory Council -- which includes a majority of people from the area affected by the spill, including the coves or river area near the coal ash impoundment--that has the same role as a Community Advisory Group and Technical Advisory Group at a federal cleanup under the Superfund program?

On March 2, 2009, TVA submitted a Corrective Action Plan to the Tennessee Department of Conservation and EPA. In that plan, TVA committed to developing a Community Involvement Plan along with an Interagency Working Group. This plan will establish a mechanism to work with local officials, local residents, and stakeholder groups to engage in dialogue and collaboration with the affected community. It will be founded on the belief that people have a right to know what TVA is doing in their community and to have a say in it. It will give people the opportunity to become involved in TVA's activities, get community concerns understood and addressed, and help shape the decisions that are made

The Community Involvement Plan will provide a structured process enabling public review and input. It will also explain the opportunities that will be provided

to the public to involve itself in this effort. This plan will be released for agency and public comment. At a minimum, it will consist of identified opportunities for public comment and meetings on implementing plans as they are formulated, associated analyses, and environmental reviews.

Question # 14

Newspaper reports and conversations with people who live in the area impacted by the spill from the Kingston Plant indicate that people in the affected area are experiencing a range of impacts, including potential physical and mental trauma.

1. Please describe in detail the proactive steps that TVA is taking to help ensure that people are informed about medical services and that treatment is provided in a timely and comprehensive fashion, including:

A. A description of any plan that TVA has created or is implementing to direct resources to such issues, and

To address potential health issues, residents with medical issues that they believe are associated with the ash spill are currently being referred to the local office of the Tennessee Department Health at the Roane County Health Department. TVA also has contracted with Ridgeview Psychiatric Clinic to talk to individuals in the affected area who would like to talk with a mental health professional about what they have experienced.

TVA is developing a plan to respond to individual health concerns, including a process for determining whether there are health effects that may be related to the ash released from Kingston. We are in the process of contracting with Oak Ridge Associated Universities (ORAU) to provide community members and the local medical community with access to medical and toxicology experts who have experience and knowledge in the health effects related to the contaminants in the Kingston ash. ORAU has expertise in public health communication, design of medical monitoring programs, and independent verification of the clean-up of contaminated sites. ORAU is a consortium of 100 academic universities that collaborate to advance scientific research and education.

TDH and TDEC has informed members of the Kingston community that public and private water supplies are currently not impacted by the ash, that the amount of particulate matter and metals in the air meet all standards and are below levels of health concern, and that occasional exposure to the coal ash should not be a health hazard. Please see the Tennessee Department of Health's Fly Ash Release Fact sheet, updated February 13, 2009, posted on their website.

B. Whether TVA consulted with local professionals in developing any such plan or to supplement any on-going medical services?

TVA has been discussing the plan with the Tennessee Department of Health and personnel at Oak Ridge Associated Universities.

Question # 15

1. Has any TVA official, including any member of the Board stated that TVA plans not to, or intends not to, clean up the entire area impacted by the release of coal combustion waste from the Kingston Plant?

A. If so, please describe the time, location and title of this individual and any action that TVA took to address any such statement made prior to TVA completing a final cleanup plan for the Kingston spill site.

To our knowledge no such statements have been made by the Board or any TVA officials.

2. Has any TVA official, including any member of the Board stated that TVA plans not to, or intends not to, clean up the coal combustion waste that filled in coves on the Emory River and that affected land near these coves?

A. If so, please describe the time, location and title of this individual and any action that TVA took to address any such statement made prior to TVA completing a final cleanup plan for the Kingston spill site.

While TVA desires to remove ash from the sloughs or coves affected, it recognizes that the final recovery and remediation of these areas will need to go through a public input process and regulatory review. Final decisions will depend on the desires of the local community and approvals from EPA and the State.

Question # 16

A news report described a memo that TVA inadvertently sent to the news organization which shows that TVA personnel downplayed the risks used to describe the coal combustion waste spill at the Kingston Plant. The Tennessean, TVA Memo Toned Down Response to Ash Spill: Utility Denies Claims That Changes Aimed to Diminish Danger (January 24, 2009). The report found a number of changes, including one that it described in the following way: "The memo was edited to remove 'risk to public health and risk to the environment' as a reason for measuring water quality and the potential of an 'acute threat' to fish."

Please answer the following questions and provide the following material to the Committee:

1. Did TVA make the changes described in the report?

Yes.

2. Who at TVA suggested that those changes be made?

Khurshid Mehta, Greg Signer, John Myers, Anda Ray

3. Who at TVA authorized the changes in the memo?

This document was a work in progress that was inadvertently released on December 23, the day after the event, prior to final review and approval.

4. Did any TVA Board Members review any part of the document before or after the changes were made?

No.

5. Did any TVA Board Members know of any of the changes made to the document?

No.

6. Describe the process that TVA uses to write press releases and other documents in TVA's Office of Public Relations.

TVA communications staff members use a variety of resources to develop or draft communications materials - existing technical documents, interviews with subject matter experts from throughout the corporation, and their own knowledge of TVA. Staff members then prepare draft materials - news releases, news statements, talking points, fact sheets, etc. - or work from an initial draft provided by someone in the organization responsible for the program or issue. Once a draft is developed, staff members begin requesting reviews from subject matter experts. These reviews and associated revisions are needed to make sure that the non-technical communications staffers have accurately translated technical language in a way that communicates effectively to the general public. The corrections and clarifications are shown on the drafts in progress so that reviewers can see what other reviewers are recommending and discuss needed changes with each other. Once a communications product is accurate and contains relevant information that TVA believes will aid in the public's understanding of the issue or program, it is finalized, typically converted to a PDF file and distributed via an online distribution list to Valley news media.

7. Provide the Committee with all guidance documents, manuals or other material that TVA's Office of Public Relations uses to produce such material.

TVA's communications staff follows standard news writing practices and the Associated Press stylebook.

8. Does TVA have any formal or informal policy to use certain words or not use certain words when describing aspects of the Kingston Plant coal combustion waste spill?

No. TVA's objective is to be accurate in its responses.

9. If any such policy exists, please describe the policy and provide any relevant documents.

No such policy exists.

Question # 17

The TVA's Environmental Policy describes the Authority's Waste Minimization goal as: "TVA will drive increased sustainability in existing compliance programs and waste management practices by focusing on waste avoidance, minimizing waste generation, and increasing recycling to reduce environmental impacts."

1. Does TVA have a waste minimization strategic planning document that describes the Authority's annual, near-term and long-term goals and performance measures for waste minimization? If so, please provide this document to the Committee.

TVA has long supported recycling efforts to help preserve natural resources and cut operating costs. In 1993, TVA established a recycling program to meet the new requirements of "Greening the Government," a federal initiative. Current and ongoing TVA efforts include the recycling of high-grade white paper, mixed-grade paper, aluminum cans, plastic bottles, toner cartridges, office electronics and rechargeable batteries.

During this period, TVA has reduced the amount of waste it must take to landfills by as much as 80 percent in some areas. Since its inception, the Waste Free program has prevented about 3.2 million kilograms of solid waste from entering the landfills, which has saved an estimated 10 million kilowatt-hours of electricity, 42,000 trees and \$700,000 in disposal, custodial and materials costs.

The 2008 TVA Environmental Policy, corporate level waste reduction indicators are shown below. Performance of these indicators is posted on the TVA website:

- Fly ash, bottom ash, and gypsum utilized
- Hazardous waste disposed
- Low-level radioactive waste generated
- Office recyclables
- Scrap metal recycled

With respect to fly ash, bottom ash and gypsum, past waste minimization efforts within TVA have been focused on efforts at individual sites due to our decentralized procurement and warehousing efforts. In general, TVA strives to reduce the amount of all wastes generated, for both economic reasons as well as environmental reasons. Past efforts have included reduction of hazardous waste generated, reduction of hazardous materials procured through a materials standardization effort, control of hazardous materials left onsite through chemical traffic control programs, and programmatic reviews of the sites.

Currently TVA has a team comprised of the environmental compliance personnel representing each business unit that have been assessing waste minimization implementation plans. This team has been reviewing the kinds and quality of information available about all waste streams generated at TVA and will make recommendations about further improvements that can be made to the current waste reduction management practices.

2. Describe how much coal combustion waste TVA has at all of its facilities.

Please see Attachment 3.

3. Describe how much coal combustion waste TVA has produced annually for the last ten years at each of its facilities.

We have developed the attached table (See Attachment 2) of the types and amounts of coal combustion by-products produced by each site for the last ten years. Short descriptions of the types of these products are:

Fly Ash - is the coal ash that exits a combustion chamber in the flue gas and is captured by air pollution control equipment such as electrostatic precipitators, baghouses, and wet scrubbers.

Bottom Ash - consists of agglomerated ash particles formed in pulverized coal boilers that are too large to be carried in the flue gases and fall to the bottom of the boiler. Bottom ash is typically gray to black in color, is quite angular, and has a porous surface structure.

Boiler Slag - is a molten ash

AFBC Char - Atmospheric Fluidized Bed Combustion (AFBC) char is a fly ash-like by-product which is light enough to be carried out of the boiler by the flue gas.

AFBC SBM - Spent Bed Material (SBM) is the heavier, granular by-product of an AFBC process.

Gypsum - is a byproduct of flue gas desulphurization (FGD). Synthetic gypsum is chemically identical to naturally occurring gypsum, but in many cases, is of higher purity.

4. Describe the steps that TVA is currently taking to minimize the creation of coal combustion waste. Please include only steps that TVA is taking to reduce the creation of coal combustion waste, not to use the waste once TVA has created it.

The amount of coal combustion by-products produced is in direct proportion to the amount of coal burned and the minimization of the amount generated is directly related to the efficiency of the combustion process.

In order to maximize the efficiency of the conversion processes, all electric utilities measure and monitor their systems using an indicator called "heat rate". The lower the heat rate the more efficient the unit is at converting the heat from burning coal into electricity. The net effect of having a low heat rate is that you will have less coal combustion by-products from the process.

TVA continuously monitors and measures heat rates for all of its units and strives to make this as efficient as possible. TVA has instituted a 5 year Heat Rate Improvement Program that looks at all systems and implements best practices in order to reduce heat rate. The net result of implementing this program will be less coal combustion by-products produced.

However, emissions control equipment, like scrubbers and selective catalytic reduction systems provide cleaner air but also leave behind combustion by-products with higher concentrations of pollutants. The increase of these pollutants in the coal ash will decrease the amount of ash that can be utilized for beneficial uses. Further processing of the ash will be necessary to lower the concentration or remove the pollutants. Without an increase in beneficial use, more by-products would be disposed of as a solid waste.

Questions from Senator Tom Udall

1. Mr. Kilgore, you have stated that the occurrence of hazardous heavy metals in the tested soil samples are well below the limits for classification as a hazardous waste. Unfortunately this waste is now spread over approximately 275 acres and is contaminating the Emory River. Is there potential for bio-accumulation of these metals in such a situation of widespread dissemination of combustion waste? What is TVA doing to measure and mitigate bio-accumulation?

There is the potential for bio-accumulation of the metals contained in the ash in fish and aquatic life. TVA, in concert with the Tennessee Department of Environment and Conservation (TDEC), the Tennessee Wildlife Resources Agency (TWRA), the Environmental Protection Agency (EPA), and the U.S. Fish and Wildlife Service (FWS), is taking a number of actions to both measure and mitigate bio-accumulation.

The most immediate mitigation measure is TVA's implementation of the Phase 1 dredging plan to remove approximately 2 million cubic yards of ash from the main channel of the Emory River. Phase 1 dredging is currently scheduled to begin mid to late March 2009. In conjunction with the Phase 1 dredging, TVA met with TDEC, TWRA, EPA Region 4, and FWS on March 4, 2009 to discuss a sampling and analysis plan designed to monitor potential biological effects associated with the dredging. Samples of the ash in the Emory River will be collected for laboratory testing to provide indications of the current bioavailability of the metals, along with acute and chronic toxicity testing using standard methods. Additional monitoring will be performed to monitor any potential impacts associated with the re-suspension of ash that will occur as dredging operations progress. TDEC and EPA will review and concur with TVA's sampling and analysis plan for the Phase 1 dredging as a pre-condition to initiate work.

The TWRA reports that they have just completed an initial round of fish tissue sampling of several species, with laboratory analyses underway. TWRA also has plans to perform caged mussel studies in the Emory River over an extended period of time. In addition, TWRA is collaborating with the University of Tennessee and the Oak Ridge National Laboratory to conduct bio-accumulation studies on terrestrial,

amphibious, and avian species in the future. It should be noted that the State had issued a "precautionary consumption advisory" on the Watts Bar Reservoir prior to the Kingston event related to PCB contaminants.

As outlined in the TVA Corrective Action Plan (CAP) submitted to TDEC on March 2, 2009, TVA will also be working with the various state and federal agencies to develop the scope for additional data collection that can be utilized to measure the potential for bio-accumulation in order to assess overall ecological risks. TVA will integrate the independent work of the TWRA, FWS, and other entities into the overall assessment of ecological impacts. These data can be utilized in the decision making process as the final objectives for the ash spill cleanup are determined.

2. Mr. Kilgore, what is TVA doing to ensure that cleanup efforts do not have additional environmental side effects? For example, I understand that it is standard procedure to use a polymer spray to control dust from drying ash waste. What would be the environmental and public health impact of using a polymer spray on such a large area of spilled waste material?

The polymer spray that was used to control dust from the drying fly ash was carefully reviewed by experts in the fields of air, water, and solid waste.

The polymer spray was only used on approximately 40 acres of the 300 acres of ash. 26 out of the 40 acres treated were on top of the remaining portion of the dredge cell, where any water runoff is channeled through the ash pond system. The remaining 14 acres that were treated with the polymer spray were around the perimeter of the affected sloughs. The application in these areas was carefully carried out, to ensure that no areas that were free draining to the river were treated. Care was also exercised to leave a 40 to 50 foot buffer between treated areas and free bodies of water.

3. Mr. Kilgore, what is TVA doing to minimize the negative environmental impacts of seeding and fertilizing impacted areas?

To date there have been no indications of negative environmental impacts associated with the seeding and fertilizing. TVA has implemented several actions to reduce airborne dust.

Short Term Dust Suppression

TVA spread grass seed, fertilizer, and straw over the centralized areas of displaced ash via an aerial, helicopter application. More than 85 tons of winter rye grass seed and 12-24-24 fertilizer were used, as well as 650 tons of straw were spread. Winter rye requires a temperature of at least 50 degrees Fahrenheit for seven to ten days for germination to occur. A cold front moved in near the end of seeding operations, preventing the seed from properly germinating. TVA may seed and fertilize again at a later date. The straw that was spread has been successful in reducing fugitive dusting.

The remaining, undisturbed portion of the ash dredge cell was covered with a vinyl acrylic emulsion blend liquid dust suppression agent. Approximately 1,650 gallons of

agent were applied via a truck and sprayer. The agent was applied at the lower end of the recommended temperature range, reducing its effectiveness. The top layer flaked off of the ash when exposed to high winds. TVA proceeded to cover the area with straw to prevent fugitive dusting. Spraying of the liquid will continue as necessary to suppress dust.

The perimeter of the displaced ash was also treated with the liquid soil binding agent. The areas that were accessible from the road were treated via a truck and sprayer. TVA's Outreach Team worked with home owners to obtain access to these areas. In less accessible places, an amphibious vehicle towing a sled mounted sprayer was used. Approximately 2,300 gallons of agent were applied to these areas.

Long Term Dust Suppression

Ash Deposits

On the areas of ash formerly treated with seed, fertilizer, and straw or the liquid soil binding agent, TVA has applied the Flexterra erosion control mulch as areas become available. This has been applied using a truck mounted sprayer or a sled mounted sprayer towed by an amphibious vehicle. The mulch mixture requires no curing period and upon application forms a bond with the soil surface to create a continuous, erosion resistant layer. When weather conditions optimize, TVA may seed and fertilize again.

4. Mr. Kilgore, could you describe for the committee the emergency response plan that is in place at the Kingston plant prior to the spill? Was this plan followed, and was it effective?

The TVA Fossil Emergency Response procedure is divided into TVA Fossil Procedures and TVA plant site specific procedures. In 2003 TVA revised the emergency response procedure and developed a template that all Fossil Plants implemented. The template made all the procedures use the same format so the procedures were consistent for all the TVA sites.

The Kingston Fossil Plant (KIF) Emergency Response Plan was updated in June 2008. The procedure is comprised of the incident command structure and responsibilities, a notification matrix with phone numbers, evacuation instructions, accounting for employees, fire brigade member responsibilities, bomb threats, tornados, floods, civil disturbance, oil spills, environmental events, anhydrous ammonia releases to name a few.

All the appropriate notifications were made and all the appropriate organizations were activated in a timely manner and the response immediate.

Additionally, TVA followed its approved Agency Emergency Response Plan (AERP) which provides an agency-wide response to emergencies or threats that would require integrated agency action. The Senior Management Executive (SME) was responsible for directing the emergency response through the Agency Coordination Center (ACC). Once EPA arrived on-scene and declared themselves the "lead federal agency", TVA established, within 24 hours, a Unified Command Center as defined by the National Incident Management System with the assistance of the O'Brian

Emergency Response Group. After EPA turned the lead federal role over to TVA, a process began to transition from the Unified Command structure to an onsite recovery response organization, utilizing TVA's Fossil Emergency Plan procedure (FPG.EP.14.000).

(Please see the answer to Senator Boxer's Question 11 for further information on emergency response).

5. Mr. Kilgore, prior to the failure of the retaining wall, to what extent had TVA made facility hazard and risk assessments, and an emergency response plan available to the Kingston community?

The Kingston Fossil Plant (KIF) TVA facility made all known hazard and risk assessments available to the community emergency response agencies. All the local emergency response agencies have been on the Kingston Fossil Plant reservation both in the plant and all around the affected property numerous times helping identify hazards and developing site specific emergency response plans. Unfortunately, we did not anticipate a complete dike failure as one of the pre-identified risks.

In addition, the Kingston Fossil Plant holds annual emergency response drills with the plant emergency response team, TVA Police, TVA Operations Duty Specialist and all the local community agencies. These agencies include the LEMA, Harriman Fire Department, Kingston Fire Department, Rockwood Fire Department, Roane County Rescue Squad, Roane County Sheriff Department, Roane County 911, Roane County Medical Service (ambulance), and Roane Medical Services (Hospital). Some of the drills were evaluated by the Tennessee Emergency Management Agency (TEMA). Each drill included a planning session at the plant with all the agencies.

6. Mr. Kilgore, has Roane County and TVA established a long term plan for coordination of efforts to address the continued environmental and public health impacts of the spill?

TVA is working with Roane County and other local, State, and Federal agencies to establish an interagency working group that will help determine the baseline impacts to the environment, including associated monitoring. The group will be involved in assessing the requirements for long term environmental remediation and restoration and the methods used to determine if the restoration results have been effective. The plans developed by the group will be included as part of TVA's Environmental Impact Study that will be conducted on the long term solutions.

TVA is also working with EPA, the Tennessee Department of Environmental and Conservation and the Tennessee Department of Health to establish approved monitoring and sampling plans to ensure that the impact on the environment and potential public health is continuously monitored. TVA is developing a plan to respond to individual health concerns, including a process for determining whether there are health effects that may be related to the ash released from Kingston. (Please see Senator Boxer's question 14)

7. Mr. Kilgore, it is my understanding that testing of well water in private wells has been passed on to the State, and that individuals can ask the state to have their wells tested. What is TVA doing to actively encourage individuals to take advantage of this opportunity to ensure the safety of their drinking water?

TVA has notified concerned citizens that they may contact TVA directly at (865) 717-4006 or in person at the TVA Outreach Center located at 509 N. Kentucky St. in Kingston TN to request sampling. Tennessee Department of Environment and Conservation (TDEC) continues to sample private drinking water wells within a four-mile radius of the site for heavy metals. Test results from over 100 ground water drinking wells came back and all were within safe drinking water standards. TDEC's contact information is also located on TVA's website.

8. Mr. Kilgore, the nature of groundwater percolation is such that contaminants generally spread very slowly through aquifers. I applaud TVA's plan to do long-term groundwater testing. Is TVA working with the state to ensure that individual private wells also receive follow up water quality tests to ensure that mobile contaminants are not migrating into their water sources? What efforts are being taken to ensure long-term safety of private wells near the Kingston spill?

TVA will continue to work with TDEC to monitor the water quality at private wells and springs in the vicinity of the ash release to ensure their protection. As discussed in Section 4.2 of the CAP, periodic monitoring of private wells and springs located within approximately 0.25 mile of ash-impacted property bordering the Emory River and its tributaries will be performed. Some 47 land parcels having inferred well or spring water supplies are indicated within the designated monitoring region. Further discussion of the basis for the designated groundwater monitoring region is provided in CAP Section 2.1.4. Early-warning groundwater monitoring wells will be installed, as needed, at selected locations to ensure protection of water supplies deemed by TVA and TDEC to be at potential risk. Sampling frequency will vary from quarterly to semiannually during the first year depending on proximity of each well or spring to ash deposits. The frequency and ultimate duration of off-site well and spring will be re-evaluated annually by TVA and TDEC based on monitoring results and perceived risks. Water samples will be analyzed for the constituents listed in Table 4.1 of the CAP. Radionuclides are not included in the analyte list of Table 4.1 because recent radiological analyses of KIF ash samples and ash leachate samples have not exceeded health-based limits. However, radiological monitoring of groundwater samples will be performed if future radiological analysis of ash or ash leachate warrants or if TDEC requires. Protocols for evaluating and reporting monitoring results are outlined in CAP Section 4.3. Guidelines for replacing well or spring water supplies affected by the ash release are provided in CAP Section 4.4.

9. Mr. Kilgore, in your experience, have individual States and industry been capable of effectively regulating coal combustion waste? To what extent is federal regulation necessary to ensure that coal combustion waste is disposed of in a manner that is not harmful to the public or the environment?

We have observed the following trends when reviewing state and industry practices:

- there are state-of-the-art management controls at nearly all newly constructed or expanded facilities;
- the trend toward groundwater protection and monitoring at existing facilities (noted by EPA in 2000) has continued and accelerated; and
- there is a strong preference for dry handling technology when constructing new disposal capacity.

TVA is a signatory party to the Utility Industry Action Plan for the Management of Coal Combustion Products ("Action Plan"), which was developed by USWAG in consultation with EPA staff and state regulators. This Action Plan is aimed at addressing the concerns EPA identified in 2000. TVA will continue to comply with applicable regulatory requirements including any new legislation or regulation that Congress or regulators deem appropriate.

10. Mr. Kilgore, what is the TVA's maximum capacity for recycling coal ash? Is TVA recycling as much coal ash as could be recycled? What are the obstacles preventing more recycling of the ash produced by TVA?

During 2008 TVA was able to reuse more than 1.4 million tons of fly ash, about 47% of the total amount the plants produce in a year. Fly ash was beneficially reused as a cement substitute in ready mix concrete, structural fill projects, road subbase, admixture in potting soil, filler in plastics, and raw feed in cement manufacture. The majority of the fly ash that is beneficially reused is as a cement substitute in ready mix concrete or in structural fill projects. To increase the use in ready mix concrete, the fly ash has to meet Department of Transportation specifications. One main requirement is the loss on ignition (LOI) would have to be below 4%. This is the amount of residual carbon remaining on the ash after the coal is burned. To remove this carbon, the ash would have to be reburned through a thermal process. TVA is evaluating technologic to determine if this process would be feasible.

11. Mr. Kilgore, Is the Green Power Switch program the focus of TVA's efforts to incorporate renewable energy into general production?

TVA's Green Power Switch (GPS) is just one of a number of renewable energy initiatives at TVA. The following are current efforts to incorporate additional renewable energy into the generation portfolio:

Renewable Energy Resources request for proposals (RFP), December 2, 2008.
RFP Requirements:

- Requested proposals to supply up to 2,000 megawatts from renewable energy sources to TVA by June 1, 2011
- Must provide at least 1 megawatt of electricity for up to 20 years
- Results from RFP will help TVA shape the strategy for meeting any regulatory requirements.
- More than 60 proposals were received and all major technologies were represented.

Green Power Switch® – established in 2000

- o TVA initiative that offers consumers a choice to buy renewable energy (RE)
- o Consists of renewable resources - solar, wind, and methane gas
- o Successful and growing, 12,965 residential, 568 business subscribers
- o FY08 GPS Sales: 81.3 GWh
- o FY08 GPS Generation: 87.8 GWh

Generation Partners - established in 2003

- o An end-use RE program that lets consumers use net metering and an opportunity to generate RE for Green Power Switch® (GPS)
- o Expanding the Generation Partners program to increase participation, helping to achieve TVA's RE goals
- o 70 participants, 370 kW of small solar and wind

TVA Hydro Modernization Program (HMOD) began in 1992

- o An incremental hydro program designed to get more capacity out of existing renewable energy resources
- o HMOD program has already added approximately 412 MW of capacity
- o Goal is to have a total of 622 MW from HMOD

TVA Existing Hydro Program

- o TVA's hydro generation is a non-emitting, clean resource with over 7,000 GWh in 2008
- o However, TVA recognizes this resource will not likely qualify as a "renewable" under most congressional renewable energy standard (RES) bills

12. Mr. Kilgore, how many households and businesses are participating in the Green Power Switch program?

As of January 31, 2009: Customers purchased nearly 42,000 blocks of Green Power Switch includes residential & commercial

13. Mr. Kilgore, how extensive is the Green Power Switch program? (What percentage of TVA consumers have the option of participating in the program?)

Today, Green Power Switch is available to approximately 90% of Valley consumers through 113 participating power distributors.

Mr. Kilgore, what is TVA doing to promote and expand the Green Power Switch program?

Beginning in mid-April and running through September, TVA will market the Green Power Switch program through a variety of media including radio, cable TV promotions, newspapers, magazines, and the internet. April 22nd is Earth Day, and participating distributors market Green Power Switch at Earth Day events in April throughout the Tennessee Valley. Many power distributors include a spring Green Power Switch bill stuffer sign-up (available from TVA) in customer bills. Also, for the first time, TVA's Generation Partners pilot program, a program that provides incentives for Tennessee Valley homeowners and businesses that install

renewable energy generation for the Green Power Switch program, will be co-promoted.

The radio campaign will begin April 13th and run for five weeks. Then, the campaign will continue every other week, July through September. Televised cable programming "Green Tips" spots will be sponsored by Green Power Switch during the same general timeframe. Advertisements will also run in local Tennessee Valley newspapers and targeted local editions of national magazines during the months of April, May, July, and August. Targeted online internet banners will be utilized April through September.

14. Mr. Kilgore, what is TVA's long-term plan for expanding renewable energy production?

TVA recognizes that renewable energy will play an increasingly important role in its generation portfolio. TVA's long-term plan for expanding renewable energy generation includes a combination of utilizing existing TVA assets and pursuing cost effective regional market opportunities. How TVA utilizes each of those resources will be explored in the IRP planning process that TVA is undertaking. The resources that TVA will explore include the following

- Continue programs that allow consumers to buy and generate renewable energy
 - Green Power Switch - A program that allows consumers to purchase renewable energy as part of their monthly bill. Those proceeds are used by TVA to support the higher costs associated with many of the renewable technologies.
 - Generation Partners - A program that allows our customers to sell TVA generation from renewable sources such as solar or wind.
- Solicit to purchase power for renewable generation sources within the Valley and regionally through the Request for Proposals process and unsolicited proposal process. TVA recently issued an RFP requesting up to 2000 MW. See answer to Senator Boxer's Question #10.
- Evaluate options to Expand TVA internal renewable generation including;
 - Additional incremental hydro (HMOD) opportunities
 - Optimizing co-firing and other biomass or biogas opportunities at our fossil plants
- Technology innovation - continue to look for ways to reduce cost and increase the reliability of renewables for use within the Valley. Explore options to cost effectively include clean generation sources such as heat recovery.

15. Mr. Kilgore, TVA has been mandated to produce energy at the least cost possible. Does TVA factor environmental costs into the equation when determining what kind of facilities will be created and used for production?

In making such decisions, TVA factors in the costs of complying with existing and anticipated environmental laws and regulations when determining the comparative energy costs for each type of generation technology under consideration. TVA also evaluates proposed energy resource decisions under the National Environmental Policy Act and in those processes considers potential environmental impacts using pertinent metrics.

16. Mr. Kilgore, when determining the cost of Energy production, does TVA factor in the cost of remediation of spills such as the Kingston spill?

In making such decisions, TVA factors in the costs of maintaining on-site storage facilities for ash and other by-products of coal combustion and of marketing those by-products which are marketable and disposing of those which are not. We will be considering how to best take into account these risks when determining the costs of energy production for the purposes of making future decisions.

Questions from Senator James M. Inhofe

1. What is TVA doing to help and reach out to residents in the affected area?

TVA has reached out to residents with various efforts and responses beginning the first day of the spill, December 22, 2008. Efforts include:

One-Time Immediate Efforts

- Set up a hotline phone number for residents to call which was publicized through all local news outlets, including television, radio, and newspapers. More than 500 calls received to date.
- Reserved 30 hotel rooms for residents and provided transportation for two residents. Fifteen families were placed in hotels the first two nights of the spill. Family pets were also accommodated.
- Provided VISA debit and restaurant cards for purchase of meals and other sundries to those displaced from their homes, including gift cards for Christmas to one family.
- Delivered bottled water to residents during the first week.
- Purchased cell phones and delivered to residents whose phone service was temporarily disconnected.
- Claims adjustors from Crawford & Company were in contact with homeowners on December 24th and were conducting on-site assessments of the damages starting on December 25th.
- Supported local utilities with restoration of electric, gas, and water lines, and replaced local water/well line with municipal water line (short line).
- Hooked up individual water lines to approximately 30 residents.
- Installed 10,900 feet of safety fence along shoreline to protect pets and children.
- Replaced electric fence at horse farm, raised driveway to the farm above water and ash, took trucks of hay to horses.
- Cleaned roads, driveways, and mailboxes in affected areas.
- De-watered sloughs for property protection.
- Installed wheel-wash systems to keep roads clean.

- Temporary paving and repair of Swan Pond Road.
- Enhancement of Hassler Mill Road.
- Rented slips and lifts for boats.
- Sent flood survey requests/impacts letters to residents and accompanied surveyors on the river to conduct the surveys.
- Issued 900 "resident passes" to residents of Swan Pond Road and Lakeshore Drive for ease of accessibility in and out of their neighborhoods (under patrol by TVA Police).
- Moved nearly 50 mailboxes on Swan Pond Road from the plant side of the road to the resident side of the road out of concern for residents due to increased truck traffic.
- Delivered Tennessee Department of Health information about the health of the reservoirs around the affected areas to approximately 20 marinas and campgrounds.
- Provided letters to the community with updated information.

Ongoing Efforts

- Working with the State of Tennessee, set up a well water testing process for residents with wells within a 4-mile radius of the Kingston Fossil Plant.
- Interim housing program put in place; this included finding the same or better quality housing, paying moving expenses, providing furnishings and amenities, and paying security deposits and rent. At its peak, 27 families were in this program.
- Set up residential outreach teams within two days; visited 75 to 100 residents per day. This team is still in place and continues to visit, handle calls, and deliver pertinent information to residents.
- Set up business outreach teams to discuss issues of concern and questions from business owners.
- Opened a TVA Outreach Center in downtown Kingston, Tennessee, with a separate phone line, with hours of 7 a.m. - 7 p.m., seven days a week. This allowed residents to report damages, ask questions, and discuss issues of concern. The center is currently open 2 - 6 p.m., Monday - Friday. Number of visitors to date is 500.
- A toll-free number was set up to Crawford & Company Insurance for residents to continue to file claims. To date, more than 600 contacts have been received.
- Between calls and visits, TVA has touched more than 600 families during the first two months.
- Brush and tree removal from shoreline include 48,632 bags; dock debris removal is beginning.
- Debris/cenosphere collection -- 250 - 300 shoreline homes and to date, collected more than 3 million gallons of liquid cenospheres.
- Air filters delivered to residents.
- Hydro seeding for dust control along road.
- Constant dust control on roads in affected areas.
- 14 permanent air monitors set up, and more than 20,000 instantaneous "real-time" air tests done all around the affected area, including both inside and outside of homes.

- Contracted with a psychiatric clinic to talk to individuals in the affected area who would like to talk with a mental health professional about what they have experienced.
- Partnership with U.S. Coast Guard to assist in moving boats out of the affected areas.
- Providing car wash discounts to affected residents.
- Set up telephone information line (local phone number) to update residents about the latest information from the Kingston site.

Meetings

- Participated in 7 homeowner meetings and will continue these for as long as needed.
- Participated in 3 community-sponsored meetings and will continue to as requested.
- Hosted 5 meetings at the Kingston Fossil Plant for community/business leaders.
- Hosted open house at Roane State Community College on January 15, 2009; another is planned for late March or early April.
- Additional meetings will be planned as dredging gets underway.

Property Purchases

As of March 13, 2008, TVA has purchased 51 tracts of property impacted by the spill and an additional 25 personal property settlements have been executed.

2. How many tests has TVA done for water, air and soil since the accident on December 22? Have there been any abnormal results?

As of March 10, 2009, 20,162 air, water and solids samples have been collected by TVA. There have been no ash or soil results that exceeded thresholds necessary to be characterized as a hazardous waste. No drinking water standards have been exceeded at private wells or at drinking water intakes. There have been isolated excursions beyond the Water Quality Criteria for metals such as Aluminum and Arsenic in some surface water analyses close to the site.

3. How many other agencies are testing? Can you give the committee results from their sampling?

EPA, TDEC, DOE, Oak Ridge National Laboratory, Tennessee Wildlife Resource Agency, and the Army Corps of Engineers have all collected samples of one type or another. The vast majority of samples have been collected by TVA.

Other agencies are validating their own data and publishing the information to their web sites. They do share information with TVA and TVA does post links to other agencies (and their data) directly from the TVA web site.

4. Is the Toxicity Characteristic Leaching Procedure (TCLP) the industry standard test to use when there is a release of coal combustion waste into the environment?

TVA elected to perform TCLP analyses to confirm that our historical results were still representative and to compare to EPA standards which use that method.

Releases to the environment, of any material, are unique incidents and the required testing is different at each release. The EPA TCLP extraction (Method 1311) is not an industry standard test for use when there is a release of coal combustion by-product into the environment, except for the specific purpose of characterizing the released coal combustion by-product for disposal into a regulated landfill. The TCLP characterization is performed to define the material as either hazardous or non-hazardous for the purpose of regulated landfill disposal. TCLP extraction has been performed on ash samples collected at the Kingston site both by TVA and by EPA. For the 116 TCLP extraction metals analyses performed to date by the third-party TN State accredited laboratories under contract to TVA, not a single sample result has been defined as hazardous with regard to the EPA TCLP metals criteria for hazardous wastes.

Is this the test that the Environmental Protection Agency proscribes?

The EPA TCLP extraction (Method 1311) is prescribed when materials need to be characterized as either hazardous or non-hazardous for regulated landfill disposal purposes. TCLP extraction is not specifically prescribed for the purpose of characterization or remediation when coal combustion waste is released into the environment.

TVA has analyzed for total metals as well as the TCLP metals and these results are being utilized to develop our cleanup plan that is being reviewed by TDEC and EPA. During the review of the cleanup plan all analytical results will be assessed to determine the appropriate course and level of cleanup.

5. Is the TCLP test performed by third parties? Is this standard operating procedure?

For all parties who are interested in disposing of materials in a regulated landfill, those materials need to be first characterized as either hazardous or non-hazardous using the EPA TCLP extraction (Method 1311). The TCLP extractions and analysis for samples collected since the release have been performed by third-party TN State accredited commercial laboratories, on behalf of TVA.

How often is this test performed?

TCLP extractions are performed prior to disposal of by-products in regulated landfills to determine if the material is hazardous or non-hazardous. For the Kingston ash recovery, TCLP extraction and analysis has been performed on 130 samples to date. None of the results exceed the EPA metals criteria essentially defining the sampled ash material as non-hazardous for the EPA purposes of disposal in regulated landfill.

6. Is the TCLP test the most accepted by third parties?

For the purposes of disposing of materials in a regulated landfill, the EPA TCLP extraction (Method 1311) is required and is acceptable to any party (regulator or

regulated landfill owner) if that is the purpose of performing the TCLP extraction and analysis. Apart from this regulatory purpose, the TCLP test provides one benchmark for determining potential risks.

7. Due to the size of the spill, is the TCLP test the right test to use at the Kingston spill site?

For the purpose of characterizing materials as either hazardous or non-hazardous for disposal in a regulated landfill, the EPA TCLP extraction (Method 1311) is the required procedure, regardless of the size of the spill. It provides a useful benchmark for determining potential risks but it is not and will not be the only benchmark used to do this at the Kingston site. Other methods such as the Synthetic Leaching Precipitation Procedure (SPLP) will be evaluated.

What type information will the TCLP test results deliver?

The TCLP metals test results includes the results for 8 heavy metals in a leachate solution that the laboratory prepares from the samples submitted to the laboratory for characterization. The concentrations of each of those heavy metals are compared to the EPA method-defined limits to determine if the material is hazardous or non-hazardous for the purpose of landfill disposal.

8. I understand you sell 50% of your fly ash for uses such as Portland cement. Are there ways to increase the amount that is used for other purposes?

During 2008 TVA was able to reuse more than 1.4 million tons of fly ash, about 47% of the total amount the plants produce in a year. Fly ash was beneficially reused as a cement substitute in ready mix concrete, structural fill projects, road subbase, admixture in potting soil, filler in plastics, and raw feed in cement manufacture. The majority of the fly ash that is beneficially reused is as a cement substitute in ready mix concrete or in structural fill projects. To increase the use in ready mix concrete, the fly ash has to meet Department of Transportation specifications. One main requirement is the loss on ignition (LOI) would have to be below 4%. This is the amount of residual carbon remaining on the ash after the coal is burned. To remove this carbon, the ash would have to be reburned through a thermal process. TVA is evaluating technologies to determine if this process would be feasible.

9. Certain environmental organizations have called for the accelerated phase-out of the use of wet storage facilities, like the ones at Kingston. What would be the cost ramifications of such a phase out?

TVA is currently evaluating the costs for closing the ponds and preparing the new dry stacking areas at these plants as well as the procurement of additional land required. Estimates are not available at this time.

10. Has the incident created any concern for the release of radiation from the cesium-137 on the bottom of the Clinch River? What steps has TVA taken to address this?

No, this incident did not disturb any Clinch River sediments. The incident took place on the Emory River approximately 2 miles above it's confluence with the Clinch

River. While the bulk of the ash remains near the site, a thin layer of ash has been deposited downstream on the Emory and Clinch Rivers. Due to the legacy Department of Energy (DOE) contaminated sediments in the Clinch River and Watts Bar Reservoir; the Watts Bar Interagency Working Group (WBIAWG) must approve any potential dredging occurring in these waters. The WBIAWG has had the opportunity to review sediment contamination data relative to reservoir-bottom sediments and near-shore sediments. Based on this review, the WBIAWG has determined that the sediments in the area above Emory River Mile 1.0 would not pose a risk due to exposure of cesium contaminated river sediments. This evaluation only pertains to the area located above Emory River mile 1.0. The Working Group determined that more data was required below Emory River mile 1.0 and on the Clinch River below the confluence of the Emory and Clinch Rivers before a determination could be made regarding the risk associated with dredging sediments from that area. DOE has collected more samples in this area but a final determination has not yet been made concerning any potential dredging downstream of Emory River mile 1.0.

11. Coal supplies approximately 60 percent of TVA's total power production, which is similar to the nation as a whole. Some might exploit this tragedy to further their objective of forcing the nation away from coal generation. What role do you see coal, obviously including clean coal technology, playing in providing TVA's base load in the future to provide a reliable, low-cost base load?

TVA evaluates numerous supply resources, including potential clean coal technologies, as well as demand side resources to achieve an optimal portfolio that results in a diverse mix of resources. TVA will continue to examine the resource plan going forward taking into account potential changes due to anticipated or new regulations.

12. Certain environmental organizations, including the Southern Alliance for Clean Energy who is testifying before us today, have called for coal combustion waste to be listed as hazardous waste under the Resource Conservation Recovery Act. What would be the ramifications of such a listing on your operations? How much would it increase costs of dealing with coal combustion waste?

The opportunities for beneficial uses of fly ash would be significantly diminished if it was classified as a hazardous waste. Operationally, employees would have to be trained to handle a hazardous waste

Specific operational and cost implications of coal combustion by-products being listed as a hazardous waste under the Resource Conservation Recovery Act are unknown at the time. It can reasonably be assumed that the price to dispose of the material would increase. If not stored onsite, the cost to transport the material as well as the disposal fee at the landfill would be higher than a non-hazardous waste. Another unknown would be how to handle the material that is currently stored onsite.

13. A number of environmental groups are encouraging lawsuits over this tragedy. If they are successful, where would the money from any awards come from since TVA is a self funded entity?

It is anticipated that any monetary awards paid by TVA would be funded from TVA's own sources or from possible recoveries from insurance policies. TVA sources might include additional operating revenues or funds from issuing debt.

14. There was a lot of discussion on restoring the coves along the river. Could you please clarify why you were unable to give us a definite answer to whether TVA would be restoring the coves? I am under the impression that the seeding you are doing in the area is a short term solution to minimize erosion and dust. Does TVA see the seeding a permanent solution at this point?

While TVA desires to remove ash from the sloughs or coves affected, it recognizes that the final recovery and remediation of these areas will need to go through a public input process and regulatory review. Final decisions will depend on the desires of the local community and approvals from EPA and the State.

Currently, seeding is a dust suppression approach, along with several other methods being used. It is not intended to be a long-term action.

Attachment 1
 Customs #81 A, B, C, D (San, Brown)
 Customs #112 (San, Brown)

Facility	Dry Ash				Bottom Ash				Gypsum				Boiler Slag			
	Original Handling Method	Estimated Storage (tons)	Current Handling Method	Remaining Storage Capacity (years)	Original Handling Method	Estimated Storage (tons)	Current Handling Method	Remaining Storage Capacity (years)	Original Handling Method	Estimated Storage (tons)	Current Handling Method	Remaining Storage Capacity (years)	Original Handling Method	Estimated Storage (tons)	Current Handling Method	Remaining Storage Capacity (years)
gph, TN	Pond	2,778,000	Being evaluated	7 years	Pond	460,000	Dry Stack	31 years	Net Stack	40,000	Being evaluated	6 years	Pond	529,000	Being evaluated	7 years
gms, TN	Pond	4,370,000	Dry Stack	4,145,000	Pond	728,000	Dry Stack	38 years	Net Stack	2,202,000	Being evaluated	17 years				
gms, AL	Pond	9,680,000	Dry Stack	7,000,000	Pond	2,678,000	No change in handling method	13 years	Net Stack							
gms, TN	Pond	11,668,000	Dry Stack	3,402,000	Pond	2,202,000	No change in handling method	13 years	Net Stack							
gms, TN	Pond	8,915,000	Being evaluated	12 years	Pond	922,000	1 year									
gms, TN	Pond	11,280,000	Being evaluated	1 year	Pond/Stack	943,000	No change in handling method	12 years								
gms, TN	Pond	6,030,000	Dry Stack	2,443,000	Pond	5,323,000	Being evaluated									
gms, TN	Pond	21,458,000	Being evaluated		Pond/Stack											
gms, NY	Pond	9,450,000	Being evaluated	13 years					Net Stack	11,050,000	Being evaluated	27 years	Pond	50,000	Being evaluated	25 years
gms, NY	Pond	22,800,000	Dry Stack	11,800,000	Pond	760,000	16 years									
gms, TN	Pond	464,000	Inactive		Pond	1,478,000										
gms, AL	Pond	14,280,000	No change in handling method	2 years	Pond	5,050,000	No change in handling method	2 years	Pond	11,652,000	Net Stack	10,050,000				

Attachment 2

**Draft
Phase 1A Summary Report
TVA By-Product
Disposal Facility Assessment
Kentucky, Tennessee and Alabama**

Introduction

The Tennessee Valley Authority (TVA) requested that Stantec Consulting Services Inc. (Stantec) perform coal combustion by-product disposal facility assessments at 11 active fossil plants and one closed fossil plant near the Watts Bar Nuclear Power plant. These facilities are located in the states of Kentucky, Tennessee and Alabama. Enclosure 1 depicts the proximity of the plants to the nearest cities of Louisville, Nashville and Knoxville. The purpose of the assessments was to observe the by-product disposal facilities at each site and report visible signs of distress that needed immediate attention or an engineering evaluation. Stantec's scope of work was developed at the direction of TVA and within the framework of current dam safety regulations.

The types of disposal facilities that were assessed varied considerably depending on the by-product generated. In general, they consisted of ash ponds, dredge cells, stacks and ponds of varied purpose. A number of the facilities were abandoned having completed their design life, while the majority of them were actively receiving by-products. Table 1 includes a summary of the sites that were visited along with the facilities observed.

Table 1. Summary of Sites and Facilities Observed

Facility – Abbr.	City, State	Walkover Date (January 2009)	Observed Facilities
Allen – ALF	Memphis, TN	15 th -16 th	East and West Ash Pond Chemical Treatment Pond Coal Yard Drainage Basin
Bull Run – BRF	Clinton, TN	14 th -15 th	Bottom Ash Stack and Pond Coal Yard Drainage Basin Chemical Ponds Dry Fly Ash Disposal Area East and West Dredge Cells Fly Ash Pond and Stilling Basin Gypsum Stilling Pond Sediment Pond
Colbert – COF	Tuscumbia, AL	14 th -15 th	Fly Ash Dry Stack Disposal Area 5 Drainage Basin Coal Yard Drainage Basin Chemical Treatment Pond Bottom Ash Dredge Stack
Cumberland – CUF	Cumberland City, TN	13 th -14 th	Coal Yard Drainage Basin Chemical Treatment Pond Ash Pond Dry Ash Stack Gypsum Storage Area

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Table 1. Summary of Sites and Facilities Observed

Facility – Abbr.	City, State	Walkover Date (January 2009)	Observed Facilities
Gallatin – GAF	Gallatin, TN	15 th -16 th	Closed Disposal Area Fly Ash Pond Bottom Ash Pond Chemical Treatment Pond Stilling Ponds
John Sevier – JSF	Rogersville, TN	15 th -16 th	Bottom Ash Pond, Stack and Stilling Area Iron and Copper Chemical Ponds Coal Yard Drainage Basin Dry Ash Disposal Area Miscellaneous Ponds
Johnsonville – JOF	New Johnsonville, TN	12 th -13 th	Ash Pond
Kingston - KIF	Kingston, TN	15 th -16 th	Gypsum Pond Main Ash Pond Stilling Pond Dredge Cell Sluice Channels Coal Yard Drainage Basin Chemical Treatment Ponds
Paradise – PAF	Drakesboro, KY	14 th -15 th	Gypsum Stack Bottom and Fly Ash Ponds Miscellaneous Ponds Dry Stacks Dredge Cell
Shawnee – SHF	Paducah, KY	15 th -16 th	Consolidated Waste Dry Stack Active and Inactive Ash Ponds Coal Yard Drainage Basin Chemical Treatment Pond Intake Channel Dredge Pond
Watts Bar – WBF (Closed Facility)	Spring City, TN	16 th	Stilling and Red Water Ponds Abandoned Ash Disposal Area Abandoned Coal Yard Drainage Basin
Widows Creek – WCF	Stevenson, AL	12 th -13 th	Ash Pond Gypsum Stack Dredge Cell Stilling and Drainage Ponds Coal Yard Drainage Basin Abandoned Ash Disposal Area

It is important to note that Stantec did not observe all disposal facilities in TVA's inventory. Facilities such as small polishing ponds, settling ponds, closed or inactive disposal sites, and other features considered unlikely to pose a significant consequence of failure were not observed.

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Scope of Work and Limitations

Stantec's scope of work for facility assessments is divided into four phases described briefly as follows:

- Phase 1A – Review most Recent TVA Inspection Reports, Observe Critical Disposal Features at Sites Listed in Table 1 Accompanied by TVA Personnel, Develop a List of Primary Concerns and Recommend Immediate Action or Engineering Evaluation as Considered Necessary.
- Phase 1B – Review Available Historical Documentation for Sites Listed in Table 1 and other Facilities, Visit Sites for More Detailed Observations and Measurements, Complete Dam Safety Checklists Adapted from Standard Dam Safety Protocols, Recommend Immediate Action as Judged Necessary and Recommend Sites/Features that Should Undergo Further Investigation.
- Phase 2 – Compare TVA Facilities to Current Dam Safety Criteria in the Appropriate State where the Plant is Located, Conduct Geotechnical Investigations and Engineering Analyses at Sites Recommended in Phase 1B as well as Complete Conceptual Repair Designs and Budget Level Costs Estimates.
- Phase 3 – Design of Repairs of Sites Recommended in Phase 2, Plans and Specifications for Construction as well as Permit/Planning Documents.
- Phase 4 – Dam Safety Training for TVA Staff.

The work described herein represents only Phase 1A. Phase 1B has been initiated with historical document collection on-going at TVA's Headquarters in Chattanooga, Tennessee.

It is important to understand that both Phase 1A and 1B are judgment based, non-invasive and are limited to features and concerns that are visible by the engineer in the field. Phases 1A and 1B do not constitute a complete engineering assessment of the conditions at the facilities observed during these efforts. Unknown conditions are likely to exist at each facility, and Stantec cannot provide an opinion relative to the stability or integrity of existing facilities until the completion of Phase 2 of the scope of work. Undocumented features at these sites may still remain a concern even after completion of Phase 2 and these items will remain a residual risk for TVA.

Summary of Phase 1A Observations

Stantec's observations are categorized into 1) TVA's disposal and operation practices and 2) primary concerns. Comments relative to TVA's disposal and operation practices are broad in nature and reflect Stantec's philosophy and opinions on by-product management.

Disposal and Operation Practices

While conducting the walkovers of TVA facilities, Stantec observed a number of disposal practices which, in our opinion, should be changed to provide for safer and more efficient operations. These items included:

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some facilities. Such unidentified, undocumented pipes will continue to be a residual risk for TVA that cannot be qualified. Finally, Stantec noted that emergency pool drawdown pipes are generally absent at TVA facilities. These pipes can be used in an emergency to lower the pool level to avoid dam failure or reduce damages. We recommend that TVA consider the installation of such pipes at structures that maintain a significant pool consistent with current dam safety regulations.

- **Conduit and Weir Abandonment Procedures** – As various disposal facilities have been raised in the past to increase by-product storage capacity, process water conduits and weirs have been abandoned in place. Apparently, the abandonment procedures have varied over the years and from site to site. We understand that at times, these procedures have been inadequate and have led to uncontrolled releases. We recommend that as a part of the conduit inventory work, abandonment procedures be reviewed and assessed including records for conduit and weir locations. This review should result in action plans to properly remediate these features. In general, abandoned conduits should be grouted full or removed.

Note that the specific concerns listed below include facilities where these practices have been employed. TVA should make an independent assessment with plant managers and other appropriate staff to provide a check of current operational procedures because at certain facilities, these items were difficult to discern based on the limited observations conducted.

Priority Concerns and Recommendations

Stantec field teams compiled observations of both primary and secondary concerns during their site visits. Primary concerns are defined as observed signs of distress which, in the opinion of Stantec, should receive immediate attention or evaluation. Secondary concerns are those items that are considered maintenance or monitoring in nature, or where a deficiency already has a mitigation plan in place. Table 2 includes a summary of primary concerns noted at each of the facilities and corresponding recommendations. It should be noted that no primary concerns were observed at Allen, Cumberland, Gallatin, Shawnee or Watts Bar. Complete team summary reports, including both primary and secondary concerns, will be provided as a separate deliverable. Plan views and photographs are included in Enclosures 2 through 13. Note that red text indicates primary concerns and blue text indicates secondary concerns.

In addition to the items in Table 2, Stantec understands that Mr. Stuart Harris of TVA has an inventory of spillways that would be instrumental in understanding where concrete "push-together" pipes have been employed in riser structures and discharge pipes. Based on summary information provided by Mr. Harris, there may be well over 30 of these type structures with some currently leaning and as tall as 35 feet. We believe these types of structures pose significant risk in terms of uncontrolled releases and/or dike failure. In addition, searching this inventory for closed conduits that are plugged at the downstream end is a top priority. This practice allows water at full reservoir pressures to be present the entire pipe length. We recommend an engineering evaluation of all active and abandoned spillway systems at these facilities. Finally, sites that have had historical karst activity should undergo an engineering evaluation. These sites include Colbert, Gallatin and Kingston.

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Table 2. Primary Concerns and Recommendations

Structure	Active?	Concern ID	Description	Commentary and Recommendations
John Sevier – JSF				
Dry Ash Disposal Area	Y	JOF-DAS-1-1,2,3	Stack Failure, Slumps on Dike Crest and Raised Areas in Slope.	Rainfall in January 2009 caused failure of a temporary clay berm around the active stacking area in four locations. A slump and corresponding raised area was noted in the second lift of the north dike. Reportedly, this area has had historical stability problems. This facility requires an engineering evaluation of the concern areas.
Johnsonville – JOF				
Ash Pond	Y	JOF-AP-1-1,2,3,4,5 & 6	Seepage, steep slopes, unknown dike and foundation materials, freeboard stacked concrete pipe riser and abandoned weir structures.	Seepage is evident on the benches below the southeast and east dikes. Apparently this seepage has existed for many years and the seepage area on the southeast dike was noted in the most recent TVA inspection report to have possibly enlarged since the previous inspection. The perimeter dike slopes are approximately 1:7H to 1V are appear very steep. Several slopes are hummocky and uneven indicative of creep movements. The dike and foundation materials are largely unknown. The pond appears to operate with insufficient freeboard (2 feet or less). Stacked concrete riser sections are currently in use as well as concrete sewer pipe for the spillway discharge pipe. Air surging was noted in the spillway system which can lead to internal erosion of the embankment at the pipe joints. Four abandoned weir structures exist within Ponds B and C, and the closure methods are unknown. Reportedly, one of the structures may have experienced joint separation of the horizontal outlet beneath the dike. This facility requires an engineering evaluation of the noted features, installation of a seepage collection and monitoring system in the southeast dike seepage area, and a reduction in pool level to increase in freeboard.

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Table 2. Primary Concerns and Recommendations

Structure	Active?	Concern ID	Description	Commentary and Recommendations
Kingston - KIF				
Dike D	Y	KIF-AP-1-1	Dike D was adjacent to the failed dredge cell.	Dike D was impacted when the adjacent dredge cell failed in December, 2008. This dike exhibits cracks, steep slopes and sloughing. A temporary stability buttress is currently being constructed.
Peninsula Gypsum Pond	Not on-line yet	KIF-GP-1-2	Circular depressions indicative of karst activity.	This facility is currently being constructed and is not on-line. Circular depressions are present in the foundation and embankment. These may have been caused by karst activity. The geologic formation beneath the facility is prone to dissolution and the formation of sinks and cavities in the bedrock. This facility needs a complete engineering evaluation prior to operation.
Paradise - PAF				
Gypsum Stack (Scrubber Sludge Complex)	Y	PAF-GS-1-1,2,3	Co-mingling of Fly-Ash, Stack Construction, Erosion, Abandoned Conduits, Outlet Structure.	Fly-Ash is being co-mingled with gypsum. Engineering properties such as strength, compressibility and permeability of the combined materials is unknown and would require an engineering evaluation. Construction of the embankment with these materials is not recommended. The slopes of the stack appear saturated in areas and they pond water. Numerous erosion features exist in the slopes, benches and crest. A number of abandoned conduits were noted. This facility requires an engineering evaluation of the concern areas.

Table 2. Primary Concerns and Recommendations

Structure	Active?	Concern ID	Description	Commentary and Recommendations
Widows Creek - WCF				
Gypsum Stack and Stilling Pond	Y	WCF-GS-1-1.2.3	Conduits, Sleep Interior Slopes and Freeboard.	A number of existing and abandoned conduits and weirs were noted on plans for the stack. Abandonment procedures for the conduit that failed were inadequate and it is considered possible that other conduits were abandoned in the same fashion. It does not appear that construction of the stack is proceeding in accordance with the design drawings and construction quality controls need to be more stringent. It is recommended that all drawings be reviewed for conduit penetrations and closure procedures, and a revised construction quality control program developed. Furthermore, there is known joint separation and leakage in the riser structures that should be evaluated and addressed. The design freeboard at this facility appears to be five feet as shown on the drawings, yet it is being operated with a freeboard of about a 3 to 4 feet. Evidence of overtopping is wide spread across the top of the stack. We recommend that the design freeboard be maintained. During Stanlec's support of the recovery efforts at this site, we were informed by TVA personnel that two other issues exist at this facility that should undergo an engineering evaluation. The Gypsum Stack stilling pond decant weir structure is reportedly leaning and appears unstable. Also the conduit between the upper and lower stilling ponds surges. If concrete push-together pipes are employed, internal embankment erosion could occur and potentially jeopardize the integrity of the divider dike.

Legend:
 Concern ID Format: Facility-Structure and Number- Concern/Photo Number. AP - Ash Pond, BAP - Bottom Ash Pond, FAP - Fly Ash Pond, ADC - Ash Dredge Cell, GS - Gypsum Stack, P - Ponds, RWP - Red Water Pond, GSP - Gypsum Stilling Pond, USP - Upper Stilling Pond, LSP - Lower Stilling Pond, CYRP - Coal Yard Runoff Pond, LRP - Limestone Runoff Pond, AADA - Abandoned Ash Disposal Area, DAS - Dry Ash Stack.

1. Engineering Investigation Report

Dam Safety Program Management

The following discussion does not represent a legal review or opinion regarding applicable law, but rather our thoughts on overall planning for dam safety program management. Current dam safety regulations in the state of Tennessee provide an exception such that TVA is not required to implement dam safety regulations in the design and operation of their facilities. The same exception is also provided for other federal entities such as the Corps of Engineers. At present, the state of Alabama does not have a clearly defined dam safety program. There is pending dam safety legislation in Alabama that would provide an exemption for federally owned facilities. However, this pending legislation requires that federally owned facilities meet the states minimum safety criteria. From a review of Kentucky dam safety guidelines, it is not clear if an exemption is provided for TVA. Specific exemptions exist in Kentucky for the Corps of Engineers and waters impounded by the Kentucky Department of Highways.

Stantec does not know at present how TVA's facilities will compare to current dam safety regulations in Tennessee, Alabama and Kentucky. At the point in time we complete Phase 2 of our scope of work we will be in a position to offer an opinion on compliance. Phase 2 will include the proper instrumentation and engineering analyses necessary to consider compliance. It is important to note that dam safety regulations are often updated to reflect changes in the standard of care. Accordingly, compliance with these regulations requires re-evaluations of facilities at regular intervals and in turn, rehabilitation efforts as necessary to meet minimum standards. At this point in time, Stantec recommends that TVA either voluntarily comply with dam safety regulations, or consider alternative disposal methods such as landfilling or dry handling. If the latter option is selected, then obviously the disposition of existing facilities will require careful consideration and planning. We recommend a parallel study to better understand the costs of options related to dry handling to support TVA's decision making process.

Closure

Stantec has completed Phase 1A of our scope of work. This work included reviewing the most recent TVA facility inspection reports, performing a walkover of 12 sites, developing a list of primary concerns and providing recommendations for immediate action or engineering evaluation. Phase 1A does not constitute a complete engineering assessment of the conditions at the facilities observed during these efforts. Stantec cannot offer an opinion relative to the integrity of the existing facilities until the completion of Phase 2 of the scope of work. Undocumented features and subsurface conditions at these sites may still remain a concern even after the completion of Phase 2 and these items will remain a residual risk for TVA.

Attachment 3
TVA Coal-fired Plants: Coal Combustion Waste 1995-2008

Plant	By-Product	Tons Produced									
		CY2005	CY2006	CY2005	CY2006	CY2005	CY2006	CY2005	CY2006	CY2005	CY2006
Allen	Slag	117,739	117,431	117,828	124,735	115,215	116,221	113,529	105,291	118,518	90,700
	Fly Ash	39,246	39,144	39,276	38,405	41,576	38,740	37,843	35,097	48,534	38,900
	Sub-Total	156,984	156,575	157,104	163,140	156,791	154,961	151,372	140,388	167,052	129,600
Bull Run	Fly Ash	148,203	238,850	177,734	244,536	175,930	232,768	231,188	195,159	155,474	133,029
	Bottom Ash	16,467	26,940	19,748	27,171	19,337	25,963	25,988	21,964	16,176	22,032
	Gypsum	3,126	NA								
Sub-Total	164,770	265,460	197,482	271,707	195,267	258,731	256,876	217,123	171,650	155,061	
Colbert	Fly Ash	325,750	371,108	295,908	265,253	236,657	245,216	234,124	270,403	287,328	251,127
	Bottom Ash	36,194	41,234	32,990	29,584	26,295	27,246	26,014	30,044	30,132	58,277
	Sub-Total	361,944	412,342	328,898	294,837	262,952	272,462	260,138	300,447	317,460	309,404
Cumberland	Fly Ash	454,850	493,154	548,995	478,256	507,634	334,294	485,000	547,244	599,992	462,100
	Bottom Ash	113,712	123,288	137,240	119,564	128,908	83,573	121,500	136,811	65,882	114,745
	Gypsum	1,028,810	1,087,476	1,198,729	1,047,669	1,059,260	782,411	999,980	835,352	1,111,801	989,050
Sub-Total	1,595,372	1,703,918	1,884,964	1,645,489	1,695,802	1,200,278	1,607,491	1,519,477	1,777,673	1,545,895	
Gallatin	Fly Ash	193,543	189,990	190,070	180,848	176,593	196,147	188,483	163,911	204,066	215,400
	Bottom Ash	48,386	47,397	47,518	45,211	44,146	49,037	47,123	45,978	48,620	53,900
	Sub-Total	241,929	237,387	237,588	226,059	220,739	245,184	235,676	209,889	252,686	269,300
John Sevier	Fly Ash	201,597	207,161	223,939	227,968	223,415	220,183	188,130	227,888	227,883	169,975
	Bottom Ash	15,174	15,593	16,836	17,159	16,816	16,573	14,180	17,153	16,361	40,820
	Sub-Total	216,771	222,754	240,775	245,127	240,231	236,756	202,310	245,041	244,244	210,795
Johnsonville	Fly Ash	425,680	241,810	242,972	222,138	214,878	225,655	222,301	236,942	256,026	206,900
	Bottom Ash	105,420	60,452	60,743	55,535	53,720	56,414	55,575	59,235	59,724	51,700
	Sub-Total	532,100	302,262	303,715	277,673	268,598	282,069	277,876	296,177	315,750	258,600
Kingston	Fly Ash	350,316	352,539	362,903	326,371	367,372	377,387	367,448	370,199	353,922	330,300
	Bottom Ash	87,579	88,135	90,726	81,593	91,843	94,347	91,862	92,550	85,176	82,600
	Sub-Total	437,894	440,674	453,629	407,964	459,215	471,734	459,310	462,749	439,098	412,900
Paradise	Fly Ash	146,623	135,853	143,037	125,672	119,107	62,953	134,205	174,092	102,789	83,900
	Slag	439,870	407,558	428,111	377,016	357,319	47,430	402,616	522,278	411,155	335,900
	Gypsum	851,867	791,152	571,675	508,926	488,766	331,151	503,363	583,852	526,551	338,400
Sub-Total	1,438,360	1,334,563	1,143,823	1,011,614	965,192	441,534	1,040,284	1,260,223	1,040,495	758,200	
Shawnee	Fly Ash	294,428	285,885	281,770	244,593	247,743	245,861	237,151	248,414	217,100	243,910
	Bottom Ash	73,607	71,471	70,443	61,28	61,536	61,465	59,289	62,104	24,556	58,960
	AFBC Char	123,967	102,198	101,742	98,358	82,715	86,974	74,968	108,534	236,444	96,946
Sub-Total	492,002	459,554	453,955	393,239	391,994	394,860	371,404	451,956	509,094	399,816	
Widows Creek	Fly Ash, Units 1-6	163,848	174,149	176,981	158,807	138,021	166,072	145,301	137,250	161,837	161,837
	Fly Ash, Units 7-8	221,909	224,150	210,031	249,417	230,849	221,764	233,816	228,406	209,744	294,600
	Bottom Ash, Units 1-8	96,414	99,575	102,056	92,217	96,964	94,779	90,914	87,356	87,356	92,700
Sub-Total	482,171	497,874	489,068	498,033	465,634	462,556	466,091	467,410	456,947	559,143	
System Total	Fly Ash	6,618,051	6,988,526	8,351,328	5,935,519	5,784,922	4,923,453	5,795,541	6,064,813	6,139,116	5,363,207

Attachment 4
Question #8.3.C (Sen. Boxer)

Facility	Date	Description	Ash related? Y/N
Paradise Fossil Plant	10/26/2004	oil sheen from dredge	N
Paradise Fossil Plant	11/01/2004	Oil sheen	N
Allen Fossil Plant	11/15/2004	narrative criteria - discoloration	N
Johnsonville Fossil Plant	12/05/2004	Oil sheen	N
Widows Creek Fossil Plant	12/10/2004	release of cenospheres	Y
Colbert Fossil Plant	01/10/2005	Oil sheen	N
Shawnee Fossil Plant	01/11/2005	Iron exceedance	N
Paradise Fossil Plant	02/07/2005	Oil sheen	N
Paradise Fossil Plant	03/17/2005	Bypass of the sewage treatment system to internal pond.	N
Widows Creek Fossil Plant	03/25/2005	Unpermitted discharge to the Tennessee River.	N
Johnsonville Fossil Plant	03/31/2005	Failure to collect samples	N
Widows Creek Fossil Plant	05/22/2005	Oil sheen	N
John Sevier Fossil Plant	05/26/2005	Oil and grease exceedance	N
Johnsonville Fossil Plant	06/17/2005	Oil sheen	N
Johnsonville Fossil Plant	06/29/2005	Unpermitted discharge of sluice water	Y
Paradise Fossil Plant	07/06/2005	Thermal discharge limit exceedance*	N
Johnsonville Fossil Plant	08/08/2005	Exceedance of ash pond pH limit	Y
Shawnee Fossil Plant	11/15/2005	Exceedance of the TSS limit at outfall 008.	N
Paradise Fossil Plant	12/23/2005	Unpermitted discharge of wastewater	N
Widows Creek Fossil Plant	12/25/2005	Unpermitted discharge of ash sluice water.	Y
John Sevier Fossil Plant	01/21/2006	Oil sheen	N
Kingston Fossil Plant	02/07/2006	Unpermitted bypass.	N
Shawnee Fossil Plant	03/07/2006	Exceeded TSS and Ammonia permit limits*	N
Widows Creek Fossil Plant	04/16/2006	Unpermitted discharge	N
Widows Creek Fossil Plant	04/28/2006	Unpermitted discharge ash sluice	Y
Paradise Fossil Plant	06/01/2006	Unpermitted bypass of the sewage treatment plant into internal pond	N
Johnsonville Fossil Plant	06/14/2006	Diesel oil spill	N
John Sevier Fossil Plant	08/01/2006	Unpermitted discharge X-ray trailer wastewater	N
Kingston Fossil Plant	10/05/2006	Oil sheen	N
Watts Bar Fossil Plant (inactive)	10/16/2006	Unpermitted release of caustic soda.	Y
Cumberland Fossil Plant	12/18/2006	Oil sheen	N
Gallatin Fossil Plant	02/02/2007	Oil sheen from tug boat	N
John Sevier Fossil Plant	03/07/2007	Turbid discharge	Y
Widows Creek Fossil Plant	03/12/2007	Unpermitted discharge to another treatment unit	Y
Kingston Fossil Plant	03/26/2007	Failed to collect samples.	N
Kingston Fossil Plant	04/11/2007	Iron limitation exceeded on internal monitoring point.	N
John Sevier Fossil Plant	05/07/2007	Unpermitted discharge	N
Paradise Fossil Plant	06/22/2007	Thermal Discharge Limits Exceeded	N
Widows Creek Fossil Plant	07/02/2007	pH limit exceedance	N
Gallatin Fossil Plant	09/07/2007	Film of unknown origin was observed from an oil source or a heavy algae growth.	N
John Sevier Fossil Plant	09/14/2007	Copper and iron limits exceedance on internal monitoring point.	N
Watts Bar Fossil Plant (inactive)	11/28/2007	Unpermitted discharge	N
Watts Bar Fossil Plant (inactive)	11/26/2007	Unpermitted discharge	N
Cumberland Fossil Plant	12/04/2007	Oil sheen	N
Shawnee Fossil Plant	12/06/2007	TSS exceedance	Y

Attachment 4
Question #8.3.C (Sen. Boxer)

Colbert Fossil Plant	12/26/2007	Oil and grease exceedance	Y
Cumberland Fossil Plant	01/05/2008	Oil sheen	N
Widows Creek Fossil Plant	01/30/2008	Discharge of cenospheres	Y
Cumberland Fossil Plant	02/12/2008	Oil spill - 50 gallons	N
Shawnee Fossil Plant	03/24/2008	Ammonia limit exceedance	N
Paradise Fossil Plant	04/04/2008	Unpermitted discharge	N
Johnsonville Fossil Plant	04/08/2008	Iron exceedance at internal monitoring point.	N
Gallatin Fossil Plant	04/17/2008	Unpermitted discharge of fly-ash	Y
Widows Creek Fossil Plant	05/22/2008	FGD slurry bypass	N
Shawnee Fossil Plant	07/01/2008	Failure to analyze samples	Y
Allen Fossil Plant	08/27/2008	pH exceedance	Y
Allen Fossil Plant	08/27/2008	pH exceedance	Y
Paradise Fossil Plant	09/10/2008	Unpermitted release of Depositrol	N
Paradise Fossil Plant	09/10/2008	Unpermitted release of Depositrol	N
Kingston Fossil Plant	12/22/2008	Dike failure releasing coal ash*	Y
Widows Creek Fossil Plant	01/09/2009	Gypsum pond surge spilling an unknown amount into Widows Creek.	Y
Shawnee Fossil Plant	01/26/2009	Ammonia nitrogen exceedance.	N
Kingston Fossil Plant	02/03/2009	Iron exceedance (internal monitoring point).	N
Shawnee Fossil Plant	02/24/2009	TSS exceedance	N
Paradise Fossil Plant	02/24/2009	Unpermitted discharge of gypsum.	Y
Colbert Fossil Plant	02/24/2009	pH exceedance	N

* denotes enforcement action taken

Senator BOXER. Thank you very much.

Mr. Kilgore, January 2008, dike stability report for the Kingston plant states that impoundment walls failed in 2003 and 2006 due to “excessive seepage.” Walls on this same impoundment failed in December and caused this disaster. A January 4th Tennessean article found that TVA chose a cheap fix to those earlier problems that I cited and states that TVA has known about “some seeps along the toe of the dike since the early 1980s.”

Knowing what you know now—do we have that article? We are going to put that article into the record from the Tennessean.

[The referenced material follows:]

3/25/2015

TVA rejected costly fixes | The Tennessean | tennessean.com

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TVA rejected costly fixes

Earlier landfill blowouts sounded alarm; seepage continued as coal ash pile grew

Jun. 25, 2009

A A

Written by
Anne Palms
The Tennessean

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After a blowout five years ago on the wall of a massive, above-ground coal ash landfill at TVA's Kingston power plant, engineers were under pressure to find a fix that was not only viable, but also economical.

The blowout wasn't large but indicated that something was not quite right inside the 98-acre mound of sludge.

Water was tunneling in the layers of ash and creating pressure points on the dike holding the structure in place.

How the Tennessee Valley Authority decided to stabilize Kingston's ash landfill would have implications for its many other elevated waste dumps, an important tool in the agency's strategy to maximize its storage on-site and avoid more costly options.

A Tennessean review of state records and some TVA documents shows that top officials rejected solutions that were deemed "global fixes" because they were simply too costly. The most expensive option was listed at \$25 million.

In the end, TVA chose to install a series of trenches and other drainage mechanisms to try to relieve the water pressure and give the walls more stability.

On Dec. 22, the walls gave way.

A dark avalanche of coal ash sludge rolled over more than 300 acres around 1 a.m., knocking one home off its foundation and damaging others, toppling trees, filling two inlets of the Emory River and raising health and environmental concerns in nearby neighborhoods and for miles downstream.

Remarkably, no lives were lost.

But the cleanup could cost far more than the most expensive options TVA once considered.

State to boost scrutiny

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TVA officials say they are investigating why the mountain of ash collapsed. So far, they have said heavy rains and freezes probably triggered the disaster.

Before the break, plant officials had been monitoring the dike and recent repairs.

"They had not seen any indications that there was some type of imminent problem with the dike," said TVA spokesman Mike Harris. "They were evaluating the situation as it went along."

One engineer who reviewed TVA's Feb. 15, 2008, Annual Ash Pond Dike Stability Inspection report questioned TVA's evaluation.

The stability report was perplexing, he said, because it contained information about seeps, erosion and other issues, but no information to back up the claim that the dike was indeed stable.

"Obviously, it failed because of slope instability. ... I don't see that really being addressed," said Bruce Tschantz, a dam safety consultant who was the first U.S. chief of federal dam safety for the Federal Emergency Management Agency. There was no information about the pressure inside the landfill in relation to the seepages and cohesiveness of the material, for example.

The ash disposal site is regulated by the state of Tennessee's Department of Environment and Conservation and was classified as a Class II industrial landfill.

TVA had to get approval from the state when it made changes to the landfill. For example, the state approved the installation of the drainage trenches in 2005, and did periodic visual inspections.

Gov. Phil Bredesen suggested last week, however, that too much deference has been paid to federal agencies, including the TVA, over the years, and that TVA should expect closer scrutiny in the future.

He called for inspections of all of TVA's ash facilities and a review of state environmental regulations, which could result in the state's taking back some of the responsibilities it may have ceded to federal authorities.

Troubles were apparent early

The Kingston power plant, one of TVA's largest, began producing electricity in the 1950s at the base of a peninsula formed by the Clinch and Emory river embayment of Watts Bar Lake — part of the Tennessee River system.

Each year, about 360,000 tons of powdery fly ash is produced as a byproduct of burning coal. It contains trace amounts of arsenic, lead, mercury, beryllium and other potentially toxic substances. Environmentalists have tried unsuccessfully to have it regulated as hazardous waste.

The Kingston ash pile has slowly grown and, in 2000, TVA requested and the state issued a landfill permit.

Ash has accumulated at all the power producer's 11 coal-fired power plants, helped by Tennessee consistently being among the top — some years it's No. 1 — electricity users in the nation.

Some of TVA's coal-burning plants add water to the fine ash to collect and store it, and others keep it dry.

The Kingston ash facility, a wet version, is unusual for having been built so high.

Before the cataclysmic break on Dec. 22, the stashed ash towered about 60 to 65 feet above Swan Pond Road, which skirted it.

The walls were made of the heavy chunks of ash that fall to the bottom of the plant's burners. The wet fly ash was deposited inside the walls after being dredged out of settling ponds. TVA refers to the landfill as dredge cells.

State records show troubles were apparent not long after the state issued the landfill permit.

In mid-November 2003, a blowout caused the shutdown of the landfill, and an emergency dredge cell was set up next to it while an investigation took place.

Blame was placed on "piping" and excessive seepage — both water issues.

Water from the ash and also from rain can accumulate. If the liquid gathers and finds weak points, it can channel through the ash, leaving a pipeway for more water to move through, undermining the structure.

A Dec. 22, 2003, report listed several repair alternatives, including converting to a dry ash collection system, a liner over the entire landfill, a vibrating beam cutoff wall and a new dredge cell.

Safer method cost most

A dry collection system — a method that is more labor intensive — is considered more environmentally safe for waterways and groundwater than the wet method. It also was the most expensive fix at \$25 million, according to the TVA report. The liner installation was estimated at \$5 million, but TVA noted that it would set "a precedence for all other dredge cells" and "take a long time to construct."

The cheapest option, a new dredge cell, would cost \$480,000 and was a possibility for the short term, according to TVA in 2003, but could be viewed as a lateral expansion that would require the onus of a major permit modification, the update said.

TVA decided to hire an outside firm, Parsons E&C, now WorleyParsons, to develop the plan to repair the landfill.

In April 2005, TVA submitted a proposal for repair, backed with analysis by Parsons, and reviewed by a peer engineering firm, GeoSyntec. The solution would include a series of trench drains at different levels on the dike, another drain at the base of the mound and a riprap channel.

Trench drains were not mentioned in the earlier 2003 options.

"Effectiveness, constructability, economics and practical experience led TVA to focus its efforts on trench drains as the preferred fix," the April 2005 TVA report said. TVA urged quick approval of its plans so it could make repairs and resume dredging.

The state signed off, without any apparent dissension.

"Nothing showed anyone had any concerns," said Glen Pugh, division manager with the state's environmental agency's solid waste management in Nashville. "We don't reproduce the studies, but we look at the results."

The fix was viewed as a minor modification to TVA's landfill permit, and work was completed in October 2005.

Wall ruptured in 2006

Failure followed in 2006, with another rupture loosing water and ash from a nearby section of wall.

Though TVA officials have referred to it as "a small blowout" today, concerns were high enough afterward to install special wells to pull out water from behind the dike and to add 30 shallow piezometers, slim wells sunk into the landfill that measure water levels and help gauge pressure.

"The monitors in place did not show any indications of any immediate problems," TVA's Harris said.

Gil Francis, another TVA spokesman, dismissed any comparison to the previous break.

"It was a 5-by-5-foot section with seepage that released some ash," he said of the 2006 event, adding that it was properly repaired. "That was not the section that failed with this incident."

Meanwhile, another matter hovered over the landfill. By about 2015, at the current rate of disposal, it would be full.

The maximum elevation could be about 815 feet above sea level — with the last level intended to be a mound of dry ash covered with a layer of earth and grass.

3/25/2015

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"They were at 790 feet" in 2006, Pugh said. "They weren't far from reaching the maximum."

The Kingston plant planned to add new air filtering equipment in 2009. The new scrubbers would remove additional waste from air emissions, which would mean a more than doubling of the waste stream with at least 372,000 tons of a new byproduct, gypsum. The gypsum waste could be sold — it's used in Sheetrock — but TVA would store the rest on-site as needed with the fly ash.

It proposed to expand the dredge cells laterally, into the adjacent ash settling pond, to handle the additional waste, according to a March 2006 report.

Dredging resumes

In mid-November 2007, engineers recommended a halt to the dredging as a preventive measure "to avoid another blowout" going into the winter months.

Within a few months, the ash pile began drying out without the addition of new wet ash, and dust had become an issue.

This potentially toxic dust carries sharp-edged bits of silica — like the building-materials dust in the air that sickened workers in New York after the 9/11 attacks.

Dredging restarted for one day and then a decision was made to spray the cells with a coating to try to seal the material, the report said.

A February dike stability inspection said the slopes "appeared to be in sound condition" and dredging resumed in March. Erosion and gullies were noted in the February report, but some seeps along the toe of the dike — known since the early 1980s — were not visible during the inspection.

The February report included many recommendations, including taking action that would "allow an additional release of water from the dikes."

Plant operators were commended for mowing the landfill slopes. Trees too large to be mowed should be cut, the stumps removed, the area backfilled with soil and seeded, the report said.

"They mentioned small trees being removed," said Tschantz, the dam safety consultant. "I'm wondering if trees had a role to play. You don't just pull those things out. The root channels have to be filled and compacted."

Water can run along roots, or the channels if roots are removed, weakening a dike.

'Substantial' cleanup costs

The Tennessean's request for interviews this week with TVA

<http://archive.tennessean.com/article/20090104/GREEN02/90625044/TVA-rejected-costly-fixes>

57

3/25/2015

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engineers was not granted.

But there are clearly many wild cards in the quest to determine what went wrong. Rains had dropped almost 5 inches of water in December, compared with the usual 2.8 inches, officials said.

A small earthquake, which did no damage, was reported by the U.S. Geological Service just northeast of Knoxville a few days before the coal ash disaster.

Aside from figuring out what happened, officials also have to total up possible costs.

Slow leaks from ash ponds in Maryland and Montana have resulted in \$45 million and \$25 million settlements.

PPL Corp. has estimated its cleanup costs from leaking ashy water from a coal-burning plant in Pennsylvania at \$37 million.

In TVA's case, the equivalent of more than a billion gallons of ash sludge blew out all at once.

"I do not know what the costs will be," Neil Carriker, TVA's environmental unit chief, said at a news conference last week. "I can guarantee you it will be substantial."

Contact Anne Paine at 615-259-8071 or apaine@tennessean.com.

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Senator BOXER. Knowing what you know now, would you have taken some different steps than you took?

Mr. KILGORE. Madam Chairwoman, I don't know that until we finish the failure investigation. Obviously those things concern me, some of them I have reviewed very hastily while we are trying to reach out to the community. We had outside experts look at that. What I am interested in finding out is whether or not the mechanism was the same, whether the location. Those locations were on the west side of the dike. It appears to me, just from a layman's standpoint, that the dike went north. So the location appears to be different.

We had outside experts help us with those fixes. The most expensive solution wasn't chosen. Obviously that looks bad for us. I would like to get the failure investigation complete and know exactly what the cause was.

Senator BOXER. OK, well, let me just simply respond to your answer. If I was sitting there and somebody said do you wish you would have done more to stop this, I would say yes. Let me go on.

Mr. Kilgore, TVA's Kingston power plant has been one of the top 100 polluting facilities in the Nation in 4 of the last 5 years, according to the Federal Toxic Release Inventory data. From 2002 to 2006, Kingston released over 37 million pounds of toxic pollution and the size of this spill, am I right in saying it is more than a billion gallons? Is that correct?

Mr. KILGORE. You could measure it that way. We measure it in cubic yards, because this is mostly solid material.

Senator BOXER. Well, what if I did it in gallons?

Mr. KILGORE. Measured in gallons, that would be approximately correct.

Senator BOXER. OK. Because when you look back in the 1970s, when there was a terrible breach of a dam in West Virginia, that was a very small number of gallons. It was nowhere near this. A lot of people got killed in that one, and we are so, as you say, fortunate in this particular case in terms of timeframe.

But the point is, given the facility's high volume of waste, do you agree it makes sense to invest in strong waste management practices, including protections like those administered by EPA at ordinary landfills, which I might say do not have this level of toxic waste in it?

Mr. KILGORE. Yes, ma'am. We are in the process of investing hundreds of millions of dollars to put scrubbers on this plant, in reference to your comments about cleaning it up.

Senator BOXER. Scrubbers—

Mr. KILGORE. That is to put scrubbers on the plant.

Senator BOXER. Well, that is air pollution.

Mr. KILGORE. That is air pollution.

Senator BOXER. I am talking about the—I mean, that is wonderful and we all applaud that and we want you to do that. But that even gets us more waste, more ash. So I am asking you about the safe disposal of the ash. And I am saying to you, would you think it would make sense to do the type of protection that you have in an ordinary landfill that doesn't even have as much toxins.

Mr. KILGORE. As we go forward to clean this up, I am sure we will look at that option, every option. We have looked at several op-

tions to clean this up. We don't anticipate going back with that same design.

Senator BOXER. Well, let me make a suggestion. And I think that Tom Carper really picked up on it and I want to thank him. I am so proud that he is going to head the subcommittee, because we are going to work with you in the future.

It seems to me that TVA ought to be a leader here. It may be that eventually we all decide on a bipartisan way or maybe it splits across regions, we don't know, that we should control this waste the way we do other waste, that it should have a liner or it should be safer to protect the constituents of our people who have the coal plants.

And I would like to say to Senator Inhofe, I don't know one Senator who said that we are not interested in moving toward cleaner coal. Everyone I know, including myself, we want to see clean coal and safe coal, just like we want to see safe nuclear energy, all the rest. We need it all. It has to be safe.

So I think that is what we are really after. So what we would like to see, at least some of us here, maybe all of us here, is for TVA to step out, be a little bold, say, you know what, we are a quasi-governmental authority here. We want to be the leader. So before we pass some more, maybe we won't, but we might say from now on, we want those rules in place that are the same rules at a hazardous waste site. Wouldn't it be great if TVA were to take these steps, if you felt it was warranted. So I just ask you that.

Then my last question on this round, I want to ask about problems at other storage facilities that you have. First of all, how many storage ponds do you have in the whole system?

Mr. KILGORE. We have 11 coal plants, five have dry ash collection and six have wet. So outside of Kingston, we would have five dry and five wet.

Senator BOXER. And how many wet ponds do you have?

Mr. KILGORE. We would have six.

Senator BOXER. Because I know in this plant you have several holding ponds. It is not just one pond.

Mr. KILGORE. Yes, ma'am, that is correct.

Senator BOXER. So you have six others, including everything?

Mr. KILGORE. Six locations.

Senator BOXER. No, I am not asking you that.

Mr. KILGORE. I know.

Senator BOXER. How many ponds, holding ponds?

Mr. KILGORE. I don't have that information.

Senator BOXER. Give me a sense of it. Is it 100? Is it 40? Is it 1,000?

Mr. KILGORE. It would be two or three per site. So 6, I would guess about 20, probably.

Senator BOXER. OK, about 20. Do you, has TVA had potential problems or wall failures at impoundments in other facilities?

Mr. KILGORE. We have not, to my knowledge. We are looking at those. We have an independent investigator looking at those. We have had since this occurred.

We have one or two other places that concern us, because we have a wet spot on the dike. And those are getting our attention right now.

Senator BOXER. Good. Would you please provide a list to Senator Carper's subcommittee and to the full Committee of all potential or known weaknesses at other impoundment or landfills and the steps you have taken or will take to address these potential problems?

Mr. KILGORE. I will be glad to.

Senator BOXER. Thank you, Mr. Kilgore.

Mr. KILGORE. And could I say that we will be glad to work with you in becoming a leader in the disposal of this ash.

Senator BOXER. That is music to our ears, and we are so appreciative. Thank you.

Senator Inhofe.

Senator INHOFE. Thank you, Madam Chairman.

The witness in the next panel, the Southern Alliance for Clean Energy, has in their written statement asserted that you had prior knowledge of needed repairs to the ash containment pond at the facility, yet did nothing about that. Now, it is my understanding that you do this investigation once a year, but the State does it on a quarterly basis.

Mr. KILGORE. That is correct.

Senator INHOFE. So the question I would ask you is, either in the State's quarterly reports or in the last, I don't know when the last annual inspection was by you, what those results were?

Mr. KILGORE. Those results were not abnormal. In either case, I have looked at both the State reports and our reports. We have looked further back at engineering studies. We had outside engineering studies done on these repairs that were referenced earlier in 2003. So we did not rely on just internal expertise in that, we went outside and hired experts to give us advice on how to repair those leaks at the time.

Senator INHOFE. OK. A lot of environmental organizations, perhaps including the Southern Alliance, who will be on the next panel, have called for coal combustion waste to be listed as hazardous waste under the Resource Conservation and Recovery Act, RCRA. What would be your feeling about the results of that, and is that good advice or how do you see that?

Mr. KILGORE. Well, I am sure with these events that this will get a lot of attention. We look forward, frankly, to following the lead of Congress and the EPA at doing whatever is necessary to make sure something like this does not happen again.

Senator INHOFE. In opening remarks, several members said, and I think I did, too, that when something like this happens, all the focus is here, we are having a hearing today, the media is here, the victims are here, that once all that goes away, that you kind of forget about, there is a propensity to just forget about that and get onto other things. How are you going to assure us that that won't happen in your case?

Mr. KILGORE. Well, for one thing, we are a member of the community. We have 300 employees, we have some that live in the immediate area. And we have been there since 1955, actually before then when we started construction. It is only in our best interest, as it is in the county's and everybody else, to do this right and stay until the job is done, until the county says to TVA, OK, you have cleaned this up as we have requested.

Senator INHOFE. That stands to reason. It is just that I want to be sure to get that in the record here, so that we will be facing that perhaps in the future.

There is one thing, and I would ask you, Madam Chairman, if it is all right to do this, since I won't be here to ask questions of the next panel, I would like to ask one of the witnesses to perhaps include this in his statement, and that is the witness for the, I guess Mr. Smith, the Southern Alliance for Clean Energy, I understand they are considering a lawsuit. What I would like to have, to get a commitment, if we can get a commitment from them that if they have an award from a lawsuit or if they have a settlement that the proceeds would go toward mediating and addressing this problem, and not for some other cause. In other words, to the victims of the spill, habitat restoration and those things that would be directly related to this. I would like to ask them if they would address this in their opening remarks. I see a nod back there.

Senator BOXER. I will give the witness an extra minute or two to respond to that.

Senator INHOFE. That is fine. Thank you, Madam Chairman.

Senator BOXER. Thank you very much.

Senator Udall.

Senator UDALL. Now, my understanding, when we talk about whether we list it under RCRA, is that we are dealing with hazardous substances here. In 1 year, would this be correct, in the Toxic Release Inventory, TVA showed in 1 year at this plant that the dredge shelves contained 45,000 pounds of arsenic, 49,000 pounds of lead, 1.4 million pounds of barium, 91,000 pounds of chromium and 140,000 pounds of manganese? And these are metals that can cause cancer, liver damage, neurological complications, among other health problems. They have been accumulating for decades in these ponds and pools and sites, is that correct?

Mr. KILGORE. That is correct.

Senator UDALL. And has your position been that these should be included as toxic hazardous substances? Have you taken a position on this in the past?

Mr. KILGORE. No, Senator. We have tried to keep these contained, as we are supposed to, and follow our permits. We thought this containment was a viable containment. We had no reason to believe that it wouldn't hold this.

These metals and arsenic that you refer to are concentrated in the burning of coal. They are out there in a lot of substances. They are elements and we concentrate them as we burn, and they are in this fly ash.

Senator UDALL. So what eventually is going to happen with these substances? What is your plan you have right now to deal with these thousands and thousands of pounds of toxic substances and hazardous substances? Your plan is just to keep accumulating them and then just to hope that it goes away? I don't understand where you are headed here. If we are trying to look at a sustainable operation, where are you headed with this? Are you going to accumulate it and accumulate it and then what happens to it?

Mr. KILGORE. Much of this fly ash is actually sold, and I don't want, what happens there, when we burn the coal, it consolidates these materials. But when you use it in concrete or in soil, stabi-

lizers and things like that, you actually spread this back out to where it is about natural background again. So we sell about 50 percent of our fly ash for use in things like concrete, road stabilization and things like that. That is a beneficial use, it spreads all of those elements back out, similar to what they are in the natural soils.

For these wet cells, we eventually would dry them out, cap them and plant grass and have just a containment.

Senator UDALL. And your regulator now is the EPA, or is it the State?

Mr. KILGORE. It is the State, as delegated by EPA.

Senator UDALL. Does the State have specific regulations dealing with each one of these substances?

Mr. KILGORE. They have regulations dealing with our containments, yes.

Senator UDALL. For arsenic, for manganese, for cadmium, all of it?

Mr. KILGORE. Water quality, yes.

Senator UDALL. And isn't it true that around these sites that we are seeing the pollution of wells?

Mr. KILGORE. I haven't seen that. All the wells that I have heard tested so far have all come back good.

Senator UDALL. Well, the EPA, in statements to the press, has said that frequently we are seeing more pollution, maybe not in these particular sites, but in these kinds of sites where you accumulate this much in terms of materials that eventually it does get into the groundwater. But you are monitoring all of these sites and you believe there is no evidence of pollution of groundwater at this point?

Mr. KILGORE. For this site, I have no evidence that the wells are being contaminated. That is one of the concerns, is whether this material leaches out the bottom.

Senator UDALL. Thank you very much.

Thanks, Madam Chair.

Senator BOXER. I am going to put in the record a couple of charts, Senator, to back up what you said. Not at TVA sites, but we will have these printed up for you.

[The referenced material follows:]

Coal Ash Contaminates Groundwater Across The Country

State	Site Name	Description
WI	E.J. Stoneman Generating Station Ash Disposal Pond	<ul style="list-style-type: none"> Ash disposal in unlined holding pond Cadmium & chromium in groundwater over drinking water standards Residential wells had elevated levels of contaminants State moved town drinking supply wells and required new landfill with double liner and leak collection
MA	Vitale Brothers Fly Ash Pit	<ul style="list-style-type: none"> Ash disposal in abandoned gravel and sand mine Arsenic & selenium in groundwater over drinking water standards Contamination in tributary to a surface drinking water supply State issued citations and cleanup orders
SC	Canadys Plant	<ul style="list-style-type: none"> Ash disposal in storage pond Drought caused containment failure Arsenic in groundwater over drinking water standards Recent violations have occurred outside of site boundaries
VA	Chisman Creek Disposal Site	<ul style="list-style-type: none"> Ash disposal in abandoned sand and gravel pit Selenium over drinking water standards in residential wells Well water turned green Superfund site cleanup

Source: EPA, Coal Combustion Waste Damage Case Assessments, Proven Cases (2007)

Coal Ash Contaminates Groundwater Across The Country

State	Site Name	Description
IN	Yard 520 Landfill	<ul style="list-style-type: none"> Disposal of estimate 1 million tons of ash in landfill Arsenic, manganese & lead contaminate residential wells Superfund ordered cleanup
MI	North Lansing Landfill	<ul style="list-style-type: none"> Ash disposal in former gravel quarry Selenium & lithium in groundwater above health-based levels State closed site and initiated a cleanup
ND	W.J. Neal Station Surface Impoundment	<ul style="list-style-type: none"> Ash disposal in surface impoundment Arsenic, cadmium, & lead over drinking water standards in groundwater Arsenic, antimony, chromium, manganese, & selenium above background levels in wetlands State required facility to close
NY	Don Frame Trucking Fly Ash Landfill	<ul style="list-style-type: none"> Ash disposal in old waste management facility Lead over drinking water standard in drinking water well State law required that facility cease receiving waste Site covered and closed under state law

Source: EPA, Coal Combustion Waste Damage Case Assessments, Proven Cases (2007)

Senator BOXER. But coal ash contaminates groundwater across the Country. And we have listed here, from Indiana, Michigan, North Dakota, New York, Wisconsin, Massachusetts, South Carolina, Virginia, where you are right, this is where it is at. So this is an issue that we need to look at. Because again, I would quote from Thomas Friedman, sometimes we have a real problem that is masquerading as an insoluble problem. This isn't insoluble. We can fix this if we have better controls over it.

But I think your points have really illustrated you are not making it up, this is where it is happening.

Senator UDALL. Thank you, Madam Chair.

Senator BOXER. Thank you very much.

Senator Isakson.

Senator ISAKSON. Thank you, Madam Chair.

On that question about groundwater, who issues the standards for the construction of these ponds? Is it the Tennessee EPA or the—

Mr. KILGORE. Tennessee Department—

Senator ISAKSON. But Federal regulations?

Mr. KILGORE. Yes.

Senator ISAKSON. They do the inspections. Do you have leachate collectors under these ponds, or are they more of a dammed lake?

Mr. KILGORE. They are the normal ash sediment, they are not lined, if that is what you are asking.

Senator ISAKSON. That is what I was asking. I understand 14 years ago, there was a similar spill, although smaller, in Pennsylvania. Is there, were there investigations of environmental damage there, and if there were, was there any finding of extensive damage or life-threatening damage from that spill?

Mr. KILGORE. I have read that briefly and I have had staff in touch with those folks. It is my understanding that that was successfully cleaned up. It took some period of time, but that it was successfully cleaned up.

The failure mechanism was not the same as what we saw here. It was a failure of a stop-log, I think, that held the dike at one point.

Senator ISAKSON. The Chairman was talking about over-seeding and strawing the immediate area temporarily. But I think I heard you say that you are going to remove, you are going to have all the heavy equipment, the yellow equipment which I guess means Caterpillar, you are going to eventually take all this out, right?

Mr. KILGORE. Our first objective is to get the river. That will be dredge the river and get that out. Then we will move successfully back onto our site. Our first objective is to get it all back on our property. Out of that 275 acres, about 50 acres of it is private property. We need to get it back on our property and then we can successively work it back. And either take it offsite, store it on, there are some fabrics that are made that actually filter this, so that it dewater naturally and turns into a more solid material. There are other ways to dewater this. But we are looking at all those options.

Senator ISAKSON. When you sell the fly ash to primarily to concrete producers, I understand, in what form do you sell it, wet or dry?

Mr. KILGORE. It is usually, I would call it damp. It is not wet like this. It is dry fly ash, we keep it slightly damp so that it doesn't dust. Though we call it dry.

Senator ISAKSON. Is that delivered by rail?

Mr. KILGORE. Usually by truck. Could be by rail, but usually sold by truck.

Senator ISAKSON. Is there any other use for fly ash, or market for fly ash beyond concrete?

Mr. KILGORE. Yes, it is a good soil filler. It is used in various things. The cenospheres that we are collecting off the river, and I think we have collected several tons of those, are actually used in the manufacture of such things as bowling balls and things like that. They are a filler material.

Senator ISAKSON. The elements that were on the chart, beryllium, chromium, arsenic, those are all naturally occurring elements that become hazardous in larger concentrations than naturally occurring, is that correct?

Mr. KILGORE. That is correct. We obviously don't invent these elements, they are elements in nature. We do concentrate them as we burn the coal.

Senator ISAKSON. And if I heard you right, by selling it and using it in concrete, it deconcentrates the elements back to a level of naturally occurring, is that correct?

Mr. KILGORE. You spread it back out. When you sell it, it goes back to normal background levels as you spread it out.

Senator ISAKSON. OK, my last question. You have five dry facilities and six wet, is that correct?

Mr. KILGORE. Yes, that is correct.

Senator ISAKSON. In your experience, what made the difference in one site you did it wet and one site you did it dry?

Mr. KILGORE. I don't know the TVA history there. My experience is that the wet facilities were the older facilities, because as you collected this from the electrostatic precipitators that were put on in the 1960s and 1970s, the way you got the ash away from the plant was to basically sluice it out to a pond. That kept it wet, kept the dusting down, which is what we were all worried about. And so the older facilities are generally wet, and probably the newer ones are dry.

Senator ISAKSON. But either one can be approved by EPA, is that correct?

Mr. KILGORE. That is correct.

Senator ISAKSON. Currently?

Mr. KILGORE. Yes.

Senator ISAKSON. And last, I would just reiterate what I said in my remarks—

Senator BOXER. Senator, did you mean EPA Federal or State?

Senator ISAKSON. Well, the States enforce Federal standards.

Senator BOXER. We don't have any standards.

Senator ISAKSON. We don't have any? OK.

Senator BOXER. We do not. That is why I wanted to—please go on. I will give you another minute. I just wanted to make sure you knew.

Senator ISAKSON. And I appreciate that.

Senator BOXER. We have no Federal standard for the disposal of this.

Senator ISAKSON. Last, I want to repeat what I said earlier. You served us in Georgia and I appreciate the service you gave us in the utility industry. Since we have 10 facilities in our State, I am very interested in seeing to it that we learn from this experience so that the standards in place prevent this from happening again. I appreciate your stewardship and your being here today. Thank you.

Senator BOXER. Senator, thank you.

Senator Merkley.

Senator MERKLEY. Thank you, Madam Chair.

Mr. Kilgore, I wanted to ask you a couple things related to this. One is that a TVA spokesman had said that the piles of ash in the pond were 60 feet above the water. Is that an unusual practice, or does it exceed any expected standard, or does it add to the loading that would create greater pressure against the dike? Is that a factor in any way in this disaster?

Mr. KILGORE. It could be. I will say this is the only facility we have that is like that, where it has a ring dike above ground. Most of the rest of them are below ground ponds, so to speak. The ash dike was about 60 feet above the road, and it had about probably a foot of water on top of it, in terms of the ash, and then water on top to keep the dust down.

Senator MERKLEY. My understanding of this statement was that the ash was 60 feet above the water.

Mr. KILGORE. That would be above the river level, yes.

Senator MERKLEY. I see. Thank you.

Second, in terms of the contamination of groundwater, I believe I understood you to say that that has not been an issue in the TVA sites in general?

Mr. KILGORE. It has not.

Senator MERKLEY. OK. I just want to draw your attention to an EPA report from 2007, which identified 63 sites in 26 States where water was contaminated by heavy metals from dumps, including 3 Tennessee Valley Authority dumps. I don't have the details of that report in front of me, but I think it would be worth checking that.

Mr. KILGORE. I will go back and look at that. Thank you.

Senator MERKLEY. Third is, you noted in your testimony that you wouldn't go back to the same model. I imagine there are a range of options under consideration, whether or not to go to dry storage, whether to increase the strength of the dikes, et cetera. Could you just kind of outline for us the five or six strategies that might be the ones you are looking at?

Mr. KILGORE. Yes, I will do that.

First of all, we build one weir downstream to keep the ash from migrating downstream. There is actually a narrow spot in the river just below where all this spill occurred. It is about 615 feet wide. We built a weir, which means we built gravel riprap out about a third of the way in the river, then left a notch for the river to flow on by so it doesn't back up and flood the residents. That should collect most of the ash that comes downstream, if it moves.

Second, we have gone upstream on our property at the edge of it and asked for permission to build a second weir up there to con-

tain about 50 percent more behind that, so it can't get out to the river. So there is about three options here. One, we can dredge the river, put it behind that second weir and then proceed to dry it. Two, we could use this fabric we talk about, dredge the river and put it in this fabric and stack those fabrics. They come in long tubes, about 20 yards long, I am told. I don't have the specifics on that. You can actually stack them, and we could put them in another place onsite. That is a good, stout containment. We have tried that. It seems to work well in terms of letting the water out and keeping all the solids in. That is a second option.

A third option would be to use, when we dredge this, is actually to put it on a barge and barge it to another site that is permitted and properly dispose of that ash at another site. And of course, we have rail onsite, in addition to using a barge we could try to use the rail. I think the barge and the fabric drying and the normal dewatering of putting it back in a drier place and then letting it dry is the three options that seem to be most promising right now.

Senator MERKLEY. Thank you. Thank you, Madam Chair.

Senator BOXER. Thank you, Senator.

Senator Alexander.

Senator ALEXANDER. Thank you, Madam Chairman.

Mr. Kilgore, thank you for being here.

In an earlier meeting we had with the TVA congressional caucus, I asked you these questions, but I would like to do it again in public. In my meeting with the residents who are here, they wanted to make sure, one, that TVA would have a long-term interest in cleaning up this problem. Two, that TVA might consider giving them options to move from the land that is affected and to move back if after they see what you have done they like what you have done. And three, that there be some sort of independent verification of what you have done from a health and environmental standard.

Are those three areas that you are willing to make happen?

Mr. KILGORE. Yes, sir. And if I could elaborate, we do want to, we need to purchase property that has been damaged. If people do want to reserve the option to come back, we are very willing to do that. If people don't think they want to come back, we would like to purchase that property and so that we can move on with the cleanup. We are very willing to do that and give them the option.

And we are also not only willing but interested in independent verification. We need the EPA and the Tennessee Department of Environment and Conservation. They are the ones that have credibility right now, more than we do. We need them to stay there with the water samples and the sampling that needs to be done in the environment.

Senator ALEXANDER. In the spirit of turning this from an environmental disaster into a long-term technology opportunity, I want to ask you, unless it is proprietary information, relatively what the cost is of producing electricity in the Tennessee Valley, and any way you want to define it. Kilowatt hour, what does it cost to produce coal?

Mr. KILGORE. A kilowatt hour of coal, if you just talk about the electricity out of the coal, not the transmission and other things, it will be about four and a half to five cents.

Senator ALEXANDER. Does that include the cost of building the coal plant?

Mr. KILGORE. Yes.

Senator ALEXANDER. Is that what you call an all-in cost?

Mr. KILGORE. That is an all-in cost. That is for older equipment. So if we built new plants, obviously that would be higher.

Senator ALEXANDER. And for nuclear?

Mr. KILGORE. And for nuclear, the nuclear plant we are building right now is about 4.2 cents, as I recall, Senator.

Senator ALEXANDER. And for natural gas?

Mr. KILGORE. Natural gas would be, the fuel alone for natural gas would cost about six cents. So about eight cents to ten cents.

Senator ALEXANDER. And hydro?

Mr. KILGORE. Hydro is a few dollars, in terms of the, that would be less than a cent.

Senator ALEXANDER. And solar you don't have?

Mr. KILGORE. Solar, we have very little of. We buy that from other folks.

Senator ALEXANDER. And wind?

Mr. KILGORE. Wind is about 70 cents.

Senator ALEXANDER. Seventy cents.

Now, looking ahead, and I say this to Madam Chairman, I am very excited about President-elect Obama's emphasis on electric cars and trucks. And one reason I am is because, according to Brookings and others who have looked at it, we don't have to build any power plants to use them. If we plug them in at night, into our existing power plants, and you have testified this yourself, you are working with Nissan in Tennessee as an example of your looking ahead, the plants that you have, whether they are coal or hydro or nuclear, at night will have cheaper power that will be available to electric cars and trucks. The estimates are that we might be able to electrify as much as half our fleet over the next 20 years, and thereby reduce our dependence on foreign oil.

Now, in order to do that, since nationally, 50 percent of our electricity is made by coal, we are going to have to clean up the coal. And those who argue for the electric cars point out that even if we don't clean it up, that the carbon footprint of an electric car is less than an internal combustion car. But I feel like what we need to do is help you and other utilities take the coal plants that are going to continue to exist in this Country and clean them up. Go ahead and put scrubbers on all of them, make the mercury limit 90 percent. Deal with this coal ash problem that we are talking about today and have some sort of mini-Manhattan project to find some way to recapture the carbon that comes from there, which commercially isn't available today.

Would you have any advice for us? Is there any one or two things that we could do to make it easier for you to operate clean coal plants in the next 10 to 20 years?

Mr. KILGORE. Well, that is a heavy question in terms of everything else I have been thinking about, Senator, is focused on this recovery.

Senator ALEXANDER. But the recovery brings to question the true cost of using coal to make electricity.

Mr. KILGORE. There are several technologies that the Electric Power Research Institute is looking at in terms of being able to use coal in the future, everything from coal gasification first, which cleans up the stream before it is used, to, well, several other technologies. One doesn't come to mind now, but there are about three technologies that are used there.

And we do need to find a way, there is coal to liquids, coal to gas, then there is cleaning up, scrubbing the existing facilities that could all be used as we go forward.

Senator ALEXANDER. Thank you, Madam Chairman.

Senator BOXER. I want to pick up on this attitude of the TVA, because you are a very nice man and you have been very agreeable. And I so associate myself with the remarks of Senator Alexander.

But isn't it true that you fought very hard against the EPA? They said you have 50 violations of the New Source Review. And weren't you even involved in the case in saying you didn't want to be told that you had to clean up the air, that you needed these new scrubbers? Didn't you fight against that legally?

Mr. KILGORE. I don't know, Madam Chairwoman.

Senator BOXER. You don't know?

Mr. KILGORE. I have been there a short period of time.

Senator BOXER. OK. Well, my staff says that—

Mr. KILGORE. Could I reply to you in writing, please?

Senator BOXER. Please. But I think what you will find is that your legal department entered that case—am I correct on that?—and fought against your having to clean up your act. Now, I just think, I like your answer to Senator Alexander, but I hope you will go back and show me this.

Mr. KILGORE. I will.

Senator BOXER. Because in the past, very recent past, in this New Source Review, finally has gotten resolved. And as I understand it, the State of North Carolina has sued TVA for polluting. So you have got problems. And you are a nice man. And I have a sense that maybe you didn't know all of this.

Mr. KILGORE. I will give you—

Senator BOXER. But you have got big problems. And I get back to what Senator Carper said, we want to work with you. But you have got to clean up your act there, literally.

Now, Mr. Kilgore, the Kingston plant has released, and I think we have a chart on this, 518,000 pounds of arsenic. Here it shows 278,000, so we will go with this, 278,000 pounds of arsenic, 259,000 pounds of lead, 118,500 pounds of mercury and 40,800 pounds of selenium, for a total of 580,213 pounds of heavy toxic metals released.

Now, selenium causes wildlife deformities. I know that from my State. We had a horror show going on with too much selenium in our environment. And ash waste is now spread throughout the valley. Can you hold that up again, the one that shows sort of like a mud slide? That graphically shows what is going on. And Senator Carper, if you turn around, you could see this. The mud, which is this right here, spread there. And this isn't harmless, this has all this in it.

Now, you said, in answer to one of the questions, you are going to clean this up, you are going to get this stuff and you are going

to put it back on your property, then you are going to figure out, sell it, you are going to do this. What about the coves? What I understand from the homeowners, and I don't know if we have the picture of the coves, we have a small picture, that they showed me, why they bought their property, these little coves all around. They say you have no plans that they know of to restore the water there. They say you are just going to cover it up and plant it up so people who had water outside their house now have this gunk there that has seeds put in it, grass growing up.

Is that what your plan is? Is that what you consider a cleanup for those homeowners?

Mr. KILGORE. There are two coves and—well, I will just answer you bluntly, no, that is not a cleanup. There are two coves, one of them had deeper water than the other one. The other is more to the northwest, if you will. And I was asked specifically at a town meeting, are you going to make that back into an embayment, in other words, have water back there. And I said, until we can study that and make sure we are working with the State to permit that correctly, I can't answer that directly at this time. It could be that a creek through that area would stir up less and we could cap that and shake that.

We want to recover all that we can recover. The likelihood is that we will take this and store it some way and dewater it. I didn't want to make a promise on that particular one until I know what the best options are for the environment and for the neighbors.

Senator BOXER. But at this time, you have no plans on the books to restore those coves the way they were before is my point.

Mr. KILGORE. But I also don't have plans not to, Madam Chairman.

Senator BOXER. Well, that's not an answer.

Mr. KILGORE. OK.

Senator BOXER. You need to have a plan to clean this up. And if you don't have a plan now, that is my point, that is not cleanup, just leaving the stuff there, in my opinion. It is not cleanup. Because people will never feel safe there. They know what is in this. They are very smart. And they know what is in it, and it is sitting out there, and they are going to send their grandkids out or their kids out to play? I don't think so. I don't think you'd send your grandkid out to play in an area like that.

Now, I want to make the point that you said that you looked at the studies prior to the failure and they all looked good. Well, one engineer who reviewed TVA's February 2008 annual ash pond dike stability inspection report questioned your evaluation. His name is Bruce Tschantz, a dam safety consultant who was the first U.S. Chief of Federal Dam Safety for the Federal Emergency Management Agency. He said he was perplexed that you felt it was safe. He said it contained information about seeps, erosion and other issues, but no information to back up the claim that the dike was indeed stable.

So I think there is just a lot of questions surrounding your decisionmaking prior to the failure. And I have to say from everything I read, I believe the decision was made to go with the cheapest fix. That is a very bad thing. It is a bad thing to do. It is just like if you have a problem with the roof in your house and you take the

cheapest solution, which is put a little patch over there, but you ignore the fact that there were some cracks that seemed to be in the roof that were spreading, and then one day you have a massive flood.

This isn't your house, I don't mean you personally, sir, you are a nice man. But this isn't TVA's house. This isn't. Just like this isn't our Government, the Senators here. We govern for the people. You have people who trust in you, in your management. Again, I say you, I mean your organization. They live, they are neighbors, I know that the entire area, because we spent a lot of time talking about it, TVA is this area. TVA is the community.

So you can't treat people and their investments, their homes and their families as if they are just neighbors to you by proximity. It goes back to Senator Carper's quote, when you are a neighbor, you have to be concerned about this.

Now, you were told you had a problem, you chose the cheapest fix. That turned out to be wrong. You didn't pick the right fix, and now you have the most expensive problem on your hands and this horrific thing, a billion gallons of toxic waste. There is a lot of blame to go around, sir. I myself share it because of my lack of focus on this. But when the EPA confirmation comes about, I want to just say to my colleagues, I intend to ask Lisa Jackson what she intends to do. Because the EPA doesn't even need any legislation from us, colleagues. They have the ability to regulate this. And I see it coming, and I hope it is coming.

And the technology is already there, Senator Alexander, they really are, we can do, for safer disposal. The dry ash is way safer than the wet. All you have to do is look and see, way safer than the wet.

So that right away is available. But we could go to the lined alternative, line these fills and so on and so forth.

So I have other questions I will submit for the record, because we want to get to our next panel. I won't ask you any more questions, I am sure you will be delighted to know that. But I am going to call on other colleagues to take their round now.

Senator Carper.

Senator CARPER. Thank you, Madam Chair.

I see out in the audience we recognized your neighbors, our neighbors from Roane County. And looking at the folks who are sitting in the front row, I look all the way down to my right, to your left, and there is, Senator Alexander, I see there is a member of the audience who looks familiar to me, and perhaps to you. I think maybe at one time she was Secretary of the Senate? Is that Emily Reynolds that I see sitting out there?

And Jeff Merkley, our new Senator from Oregon, and Tom Udall, our new Senator from New Mexico, were participants in the orientation for new Senators and spouses last month. And that is an initiative that Senator Alexander and Senator Voinovich and I and others worked on with great support from Emily Reynolds. I just wanted you to know that that experiment that we kicked off 4 or 5 years ago is alive and well and I think bearing good fruit, bringing along a new generation of Senators. I think they will be well served, and our Country and their States will be well served because of it, so welcome.

I would just observe, Mr. Kilgore, I have served with Barbara Boxer, we were elected to the House together in 1982. I have been in a number of committee hearings with her then, and I have never heard her say to one witness three times that you are a nice person.

[Laughter.]

Senator CARPER. I know you are carrying some heavy burdens in your responsibility, but you can feel better about that. That is pretty unusual.

But when I was a younger man, I used to study a little bit of economics, not nearly enough. But I studied some economics, and I always say, in my work here I look for market solutions to help us incentivize good public policy. And I want to ask one question that relates to the fly ash and then look to some broader environmental issues I want to talk to you about.

When you think of best practices, let's just think about best practices in the industry for dealing with fly ash. We create a lot of coal, I was born in West Virginia, my dad was a coal miner for a short time in his life. So we have sort of a family history with coal. And I know we are going to be using coal for a long time. But we have to find ways to, as you know, reduce the emissions from the coal.

But just talk to us a little bit about best practices within the industry for dealing with fly ash that comes from using coal. What are some things that you are doing that you think are cutting edge, and what are some things that others are doing, other utilities are doing, that are cutting edge that we could all learn from?

Mr. KILGORE. Well, I think the two obvious ones are to use the dry ash method of collecting it. That way it is more marketable, if it is. And it also keeps the water out. So those are the two things. If you can market the fly ash, obviously that puts it back in a more natural state, out in a cementacious mixture of some sort, either a road bed, or lightweight concrete or something like that. So the best thing you can do with this fly ash is find ways to re-use it, much as we are trying to do with a lot of other things in our environment, that is to recycle as opposed to just holding onto it. That is, I think, where we need to concentrate.

Senator CARPER. Is there anything that the State or Federal Government should be doing to incentivize that best practice, or is nothing needed?

Mr. KILGORE. Not that I can readily think of. I am sure I can if I take a little time, but at the moment, I don't think of anything.

Senator CARPER. Fair enough. Let me just pivot if I could and move toward, I guess what I will call a cleaner TVA, some questions related to a cleaner TVA. There are a couple of areas I would like to explore with you. One of those is, can you share with us some of the investments that you are making at TVA with respect to reducing mercury emissions and to carbon capture technologies?

Mr. KILGORE. On the mercury emissions, we have seven scrubbers in operation. We are installing a fourth and fifth one now on this Kingston plant, I mean, eighth and ninth, and then we also have one at Bull Run. So we will have nine, ten scrubbers in operation in the next couple of years. That is the most of our co-genera-

tion, that captures, as you know, the mercury is a co-benefit of that scrubbing. You capture the mercury out of that.

Senator CARPER. Roughly how much do you think you are capturing or reducing mercury emissions through that approach?

Mr. KILGORE. I am sorry?

Senator CARPER. Roughly what percentage of your mercury emissions do you think you are capturing with that approach, as a co-benefit?

Mr. KILGORE. The co-benefits, I think, and I will need to go back and check on this, I think are about 90 percent. And it gets the mercury below detectable limits as it goes out. Obviously there might still be some there, but it is below those detectable limits.

Senator CARPER. That is pretty encouraging.

Talk to us about what you are doing with respect to carbon capture.

Mr. KILGORE. Carbon capture, we are——

Senator CARPER. Or other issues. Other initiatives relating to not just sequestration, but other things that you are doing, or thinking about doing with carbon.

Mr. KILGORE. Yes, let me take that question, because that is the one that I can answer best. The carbon capture is obviously going to be a very expensive proposition, and then you have, what are you going to do with the carbon after you have captured it. Sequestration could be problematic, who owns the space under the ground, how do you do that?

So we are following the Electric Power Research Institute, participating in that, on that score. Meanwhile, we still need to minimize our carbon. So our strategy there is two-fold. We have a very good strategic plan that our new board guided us through. It is anchored on two things, one, increase our nuclear generation, because it is carbon-free, and it is also sulfur-free and nitrogen-free. So it captures all three of those and it doesn't have those. And then also, just the efficiency. We think there is a lot of room to be gained in our energy efficiency and conservation program. Senator Alexander mentioned the cars. To be able to fuel cars at night on electricity and then run them during the day utilizes the system better, it spreads the fixed costs of our system better. But even other things, just like how we heat and cool our houses and all that. So we are engaged in a program, we have about \$100 million budgeted this year, and that increases every year for the next 5 years to just look at our energy efficiency.

Senator CARPER. Give us some examples of how that \$100 million is going to be spent. We had yesterday a guy sitting in your seat, John Doerr, from California talk to us about how they have incentivized utilities in California to be able to make money but to make money by selling actually less electricity. How are you going to use some of that \$100 million?

Mr. KILGORE. Let me give you the most practical example. We worked with Oak Ridge National Labs to build five Habitat for Humanity houses that are all about 1,200 square feet. And the last one of those houses we built is an all-electric house, 1,200 square feet, and the electricity cost for that house is less than \$1 a day. It is that way because all of the facilities, the heating and cooling, are all engineered, you don't put the heat ducts or the cooling ducts

in the attic where it is the hottest or the coldest, so you lose all the heat. You put them down in heated space. We have a micro-computer that tells the air conditioner when it is running, put the heat from the air conditioner back in the hot water. Don't put it out to the air where as you or I might go out beside our air conditioner and hold our hand over it, you feel all that hot air. Put that heat back in the hot water. That basically gives you hot water free all summer.

And so yes, we sell less electricity that way. But on the balance of that, that is really good because it evens out our system and doesn't expose us to these high peaks. What costs us a lot of money to serve our customers are having to bill for high peaks and then having no sales at off-peak times. If we can levelize that, then we can give the economic benefit to our customers. So that is why conservation and energy efficiency is good for all of us.

Senator CARPER. Thank you very much.

Senator BOXER. Senator Carper, thank you. I don't want to get off of this spill today, but this is important, because these are the kinds of other issues we are going to get into.

I would like to move on, if it is OK with colleagues, to our next panel. And again, in parting, I would say, Mr. Kilgore, remember your mission. Being a national leader in technological innovation, low-cost power and environmental stewardship. It doesn't say one or the other. All of these things. And I would just say, from what I know about you, TVA, you are lagging in some of these areas.

So we are going to need to work very closely with you. And I am glad that you reached your hand out. But all of us feel these people have to be made whole, they need a remedy that is a real remedy, not some cover up the problem remedy. And we need to see you, speaking for myself, not fighting cleaner technologies, not utilizing a budget that you get from ratepayers to fight against ways to clean up their air. But to be on the right side of those issues. We hope to see this agency transformed into a leader. I think we do have the interests and the right frame of mind to make that happen. So we will see you again and hopefully in better circumstances than this one.

And we would ask Stephen Smith, Executive Director, Southern Alliance for Clean Energy, to come up. William "Howie" Rose, Director of Emergency Management, Roane County, Tennessee, to come up. Mr. Smith, are you going to open it up?

Mr. SMITH. I would be happy to, Madam Chairman.

Senator BOXER. OK. We will give you 8 minutes, sir. If you need to go over that, we will give you a little extra. But we did run a long time, and there was good reason for that. So please proceed.

STATEMENT OF STEPHEN A. SMITH, DVM, EXECUTIVE DIRECTOR, SOUTHERN ALLIANCE FOR CLEAN ENERGY

Mr. SMITH. Madam Chair, Senator Alexander, members of the Committee, I want to thank you for holding these important hearings today. I also want to recognize the community members who have traveled up here with me today.

The devastation unleashed on this small community on the night of December 22d is difficult to describe. Words and pictures do not do justice to the magnitude of this disaster. To see hundreds of

acres of nasty, coal combustion sludge, many places 20 feet deep, destroying beautiful lakefront property is truly sad.

I have witnessed a host of emotions from families in this community: fear, frustration, anger and depression. But most of all is betrayal. The Tennessee Valley Authority has unleashed devastation on the very watershed and communities that it was created to protect. Yet as devastating as this was, the fact that this occurred on a cold December night instead of warm July afternoon where people would have been enjoying the vast recreational opportunities of this once beautiful river has spared potentially hundreds of lives.

News reports and my organization's preliminary investigate indicate that this could and should have been avoided. Shortcuts have been taken, rules have been waived or broken and accountability has been absent. This was not a natural disaster, this was a man-made disaster.

It is clear that in its early response, TVA prioritized public relations over public health and has largely been overwhelmed by the size of the spill, which appears to be the largest industrial spill in our Nation's history. The force of this accident not only ripped homes off their foundation, it ripped the lid off a national problem and the failure of EPA to develop minimal standards for this waste. It is outrageous that landfills that hold our household garbage are more regulated than pits holding this toxic coal sludge.

It also washed away millions of dollars of clean coal advertising, reminding us of the reality that burning coal is dirty business. From mountaintop removal mining, which destroys the southern Appalachian mountains, to air pollution which chokes our cities, our Nation's national parks and leads to climate destabilization. To this toxic coal sludge, into which is in the Tennessee River, burning coal is a dirty business. We can and we must do better. We have cleaner technologies.

But this is not just a story of TVA's failure, but also EPA's. In 2000, EPA shirked its responsibilities by not regulating coal ash as a hazardous waste. And it promised to promulgate minimum standards. I am sad to report that over 8 years later and 28 years since Congress first asked EPA to study this issue, we still do not have the most basic standards for this waste.

This too is a national problem. Today, EPA cannot fully account for the hundreds of millions of tons of coal ash that are generated every year. And this problem is only going to get worse. As we tighten our air regulations, removing more pollutants from the hundreds of smokestacks, we will end up with this ash in greater volumes and greater concentrations.

Today I call on your Committee at a minimum to require the orderly phase-out of all wet storage of this toxic ash. Require EPA to immediately inspect and monitor all toxic coal ash storage and disposal units. And third, to develop a long-promised Federal regulation of all toxic coal ash storage and disposal by year's end.

TVA was born out of crippling economic times. And as we find ourselves again in similar difficult times, it is an opportunity to remake TVA as a leader going into the 21st century.

The great challenge of how we produce and consume energy in this Country cries out for leadership from the power industry. We need an agency like TVA to be a living laboratory to lead us into

the future, heavily invested in advanced clean energy efficiency, smart grid technology and clean, safe, renewable energy. This is the fuel for an economic recovery. This Committee has the power to confirm up to four new TVA board members by May 2009. We must ensure that these new members have relevant experience, a strong commitment to clean energy and have a bold vision for this agency's future.

Madam Chair and members of this Committee, the operative words here today are accountability and oversight. The citizens demand and deserve no less. And we must have cleanup, no cover-up.

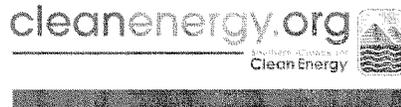
That is the end of my prepared remarks. I did want to briefly respond to Senator Inhofe. We have under two Federal laws filed the intent to sue. We have notified TVA of this under the Clean Water Act and under the Resource Conservation and Recovery Act. We have not made a commitment yet to sue. We were so overwhelmed and disappointed about this, we felt that we wanted to sink a legal hook, potentially, into the agency to make sure they do the right thing.

If they do the right thing, we may never sue. We are not intending to get rich on the suit. We are intending to hold them accountable. If you all supersede us in doing this, maybe there is no legal activity.

Now, I cannot represent other lawyers' activities that are going to take place. And I cannot represent the litany of legal activities that are going on. But my organization is not looking to enrich ourselves. We just want this cleaned up.

Thank you.

[The prepared statement of Mr. Smith follows:]



**Testimony of Stephen A. Smith, DVM
Executive Director
Southern Alliance for Clean Energy**

**Submitted to the U.S. Senate Committee on Environment and Public Works
January 8, 2009**

Chairman Boxer, Ranking Member and Members of the Committee:

My name is Stephen Smith. I am the Executive Director of the Southern Alliance for Clean Energy (SACE). Since 1985, SACE has worked on behalf of citizens in the Southeast to promote responsible energy choices that create global warming solutions and ensure clean, safe and healthy communities throughout the Southeast.

Thank you for holding this hearing to consider oversight of the Tennessee Valley Authority (TVA) and the federal government's role in regulating coal combustion waste (CCW). As you are certainly aware, on December 22, 2008 a surface impoundment at TVA's Kingston Fossil Plant (KFP) ruptured, releasing over a *billion* gallons of CCW-laden sludge into the Emory River and surrounding neighborhoods in Harriman, TN. While there are still a number of unknowns, it is clear that heavy metal contamination has occurred. Government agencies have identified higher than normal levels of arsenic, lead and thallium. In addition, independent samples have shown additional levels of these metals as well as cadmium, chromium, barium and nickel. These independent sampling results are attached as Appendix 1.

The surface impoundment breach in Harriman, TN is an environmental catastrophe that reveals not only the dangers of burning coal and mismanaging coal combustion waste, but also the need for federal regulation of this toxic substance. In addition, this incident highlights the outstanding need for greater oversight of the Tennessee Valley Authority to ensure that TVA lives up to its responsibilities and its promise of being a leader in how we produce and consume energy in this country. I hope that these hearings and subsequent federal action will initiate a process that results in proper management of coal combustion waste and repositions TVA as a national leader in making clean, safe and responsible energy choices.

In this testimony, I would like to address several points. First, I will review the circumstances surrounding the surface impoundment breach and describe TVA's response to this disaster, which we perceive to be wholly inadequate and somewhat irresponsible. Second, I will make the case for comprehensive federal regulation of coal combustion waste to protect human health and the environment. Finally, I would like to discuss several of TVA's shortcomings that must be addressed if TVA is to once again become a leader among our nation's utilities.

Review of TVA's Response to the Coal Ash Spill at the Kingston Fossil Plant on December 22, 2008 reveals severe deficiencies in its ability to protect the health and environment of the communities within TVA's service territory.

Shortly before 1:00 a.m. on Monday, December 22, 2008, an earthen wall holding a 40-acre surface impoundment failed at the Tennessee Valley Authority's (TVA) Kingston Fossil Plant (KFP) in Harriman, Tennessee. Public officials made an early estimate that 1.8 million cubic yards (more than 360 million gallons) of toxic fly ash spilled into nearby land and waterways, but the total amount was later determined to be 5.4 million cubic yards (more than 1 billion gallons). TVA reported that the spill covered approximately 300 acres, 3,000 feet of Swan Pond Road and 1,500 feet of Swan Pond Circle.¹ Roane County officials confirmed that 42 individual pieces of property experienced some form of damage, including 13 instances of damage to a residence.² Three of these residences were completely destroyed, and one was swept off of its foundation. TVA maintains that 80% of the spill was contained on its property.³

On the day of the incident, TVA President and CEO Tom Kilgore issued a statement describing TVA's primary concern as protecting human health and the environment. "Our intense effort to respond effectively will continue 24/7 for the foreseeable future with the safety of the public our top priority," the statement read.⁴ The Red Cross established a shelter at the Roane State Community College gymnasium, where six individuals were housed before being relocated by TVA to the Holiday Inn Select.⁵ TVA began providing a variety of services for the residents, including: connecting homeowners with insurance representatives and realty companies; providing storage units; and issuing Wal-Mart gift cards and gift cards for food.⁶

On December 23, 2008, the day following the incident, TVA held a press conference where Mr. Kilgore elaborated on the initial progress made in the recovery. Mr. Kilgore indicated that he was at the scene on the morning of December 22nd while TVA staff canvassed the affected neighborhood and attempted to reach unavailable residents. Although nearby residents lost power and some lost water, these services were restored the day after the spill. Officials notified the Environmental Protection Agency (EPA) shortly after the spill occurred and promptly began coordinating efforts to sample water downstream of the incident.

TVA initiated a variety of activities within the first few days designed to contain the spill and certify the safety of local water resources. This included mobilizing 30 pieces of heavy machinery and 90 workers to begin the recovery.⁷ TVA also commenced aerial surveys of the affected area.⁸

TVA set up management stations for the recovery in the plant's conference center and at an emergency response center in Chattanooga, Tn. According to Mr. Kilgore, one of three senior officials was on site at all times.⁹ Nearly a week after the incident, TVA, Roane County, EPA and Tennessee Department of Environment and Conservation (TDEC) established a "Unified Command" and designated TVA Vice President Tim Hope as the Incident Commander.¹⁰ On December 28, 2008, the public received notice that these organizations had activated the Roane County Joint Information Center (JIC).¹¹

Although it appears that TVA officials took several needed and appropriate steps in the wake of the incident at the KFP, several components of their response have been inadequate and irresponsible. TVA officials had prior knowledge of needed repairs to the ash containment pond at the facility, yet they failed to ensure the containment pond's stability. Immediately following the incident and for several days afterward, TVA downplayed the potential toxicity of the ash and the extent of damage to nearby property. Finally, TVA has consistently provided incomplete and unreliable information about water quality results, jeopardizing the safety of their constituents and nearby residents.

History of Noncompliance and Lack of Regulatory Oversight

Recent events, which have culminated in the coal waste disaster at the Kingston Fossil Plant, demonstrate that the Tennessee Valley Authority enjoys privileged treatment and deference from other government agencies, including those with the duty to exercise oversight.

No Tennessee state agency has the mandate to oversee the stability of coal ash impoundments. The Tennessee Safe Dams Act, Tenn. Code Ann. Sections 69-11-101, *et seq.*, exempts federal agencies, such as TVA. The definition of "person" regulated under the law "does not include the United States government nor any agency owned by the United States or any agency thereof, nor those who own a dam or reservoir leased to or operated by the United States or an agency thereof, nor those dams licensed by the federal power commission." Tennessee, unlike some states, regulates coal ash fills as solid waste disposal facilities, but TVA's KFP was not required to comply with requirements for liners and leachate collection systems for the ash fill that failed. Nor are there any requirements for dike stability evaluations.

A preliminary review of TVA's interactions with state regulatory agencies' shows that TVA regularly fails to comply with designated regulations, often with impunity. Furthermore, TVA, perhaps due to its status as a federal corporation, often receives shelter from even basic regulation, oversight and penalty.

For example, evaluating TDEC permits issued to TVA reveals that the utility is privy to uniquely lenient requirements for its major operations. The permit that TDEC issued to TVA on December 20, 2007 for the construction and operation of a Class II disposal facility was dulled with six variances and waivers. TDEC allowed TVA to construct the facility without a leachate migration control system, a gas migration control system, a random inspection program, daily or intermediate cover for the ash fill area or a geologic buffer. These requirements are basic and standard; they are rarely, if ever, waived.

Nevertheless, TVA's waste disposal processes were hardly subject to any inspection or oversight, granting TVA the regulatory version of a blank check. Even where standard regulations do exist, TVA freely neglects to comply without fear of cost or liability to its operations. In order for TVA to comply with its NPDES¹² permit, it must submit quarterly discharge monitoring reports. When SACE representatives recently attempted to obtain copies of TVA's discharge reports, a TDEC records clerk divulged that they had not received the report in 18 months. Surprised to learn that TVA had not filed the reports, the clerk revealed that the reports were not known to be missing.

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 3

Tennessee's Governor Bredesen commented on this apparent lack of regulatory oversight, indicating that he suspected TVA received too lenient treatment. Governor Bredesen said, "I strongly suspect that over the years there may have been exaggerated deference given to them as a federal agency. We need to take a fresh look at that. We will be looking at all aspects of that. We need to tighten those up."¹³

My organization's preliminary investigation revealed that this is not an isolated or localized incident. Rather it is a symptom of the lack of oversight and regulation being exercised with regard to TVA. Another example of this lax regulatory oversight occurred in March 2008, when the TVA Office of the Inspector General (IG) reported that two significant flue gas ductwork (FGD) leaks occurred at the Widows Creek Fossil Plant (WCF) in Alabama without being reported externally to the appropriate regulatory agencies for years.

The IG's report revealed that TVA officials knew about the leak for years without reporting it to the relevant authorities and sought to wait years before making repairs. The investigation also revealed that TVA officials were not concerned that the leak might result in a permit violation or that they had an ethical obligation to notify the public of the leak.

The Alabama Department of Environmental Management (ADEM) and EPA ultimately issued TVA a Notice of Violation (NOV). TVA initially disputed the agencies' claims but acquiesced to an ADEM consent order obligating the power company to a \$100,000 civil penalty. However, as of April 2008, the EPA's NOV had not been resolved.

According to ADEM, **"TVA did not exhibit a standard of care commensurate with applicable regulatory requirements, specifically operating and maintaining control equipment in a manner so as to minimize emissions."** TVA management emphasized efforts to contain the leaks while keeping the plant operating until the next scheduled shutdown. Under TVA's Winning Performance scorecard program, the WCF management team "had a financial incentive to keep the plant operating," clearly subordinating public health and environmental quality to profits.

The TVA Office of the Inspector General recommended, "TVA has a responsibility from an ethics and compliance standpoint to report issues that may be of concern. We believe TVA...should err on the side of reporting such issues in order to avoid the appearance of ignoring or hiding any such matters."¹⁴ Still TVA is not required to make any changes. Without an obligation to reform, TVA simply continues to operate without consideration for its regulatory and ethical obligations.

Also in 2008 the KFP conducted an Annual Ash Pond Dike Stability Inspection. This report showed chronic maintenance issues affecting the Kingston Fossil Plant's fly ash impoundment. Specifically, the inspection notes that TVA officials had been aware of seepage at the impoundment since 1980.¹⁵ Subsequent reports also illustrate TVA's failure to address ongoing problems at this facility.

Local residents report that the surface impoundment chronically experienced “baby blowouts” in addition to “gushing this gray ooze” and spilling materials similar to those visible after the recent breach.¹⁶ Indeed, in 2003 “a leak in the toe of the dike slope for Cells 2 and 3” required that the workers cease dredging in the cells while repairs were made. Repairs to the slope were not finalized until late 2005, nearly two years after the dike failure.¹⁷

However, a subsequent failure occurred near the 2003 failure in November 2006. Nearly nine months after the first major breach, the dike inspection determined that the second failure was “caused by excessive seepage resulting from a combination of issues: inadequate internal drainage (addressed in 2005) and infiltration of surface waters on the existing dike benches.” A number of repairs were made in 2006, including the installation of dewatering wells; construction of a riprap buttress; and installation of spring boxes for drainage. KFP personnel later located an area of seepage on the northeastern dike of Cell 2.¹⁸

Despite the appearance of erosion and seepage, TVA’s dike inspectors stated that the dike slopes appeared to be in “sound condition” in the report dated February 15, 2008.¹⁹ Experienced engineers questioned the veracity of that claim, based on the information provided in the dike inspection report. Mr. Bruce Tschantz, dam safety consultant and first U.S. chief of federal dam safety for the Federal Emergency Management Agency, reviewed the report after the breach on December 22, 2008 and said, “Obviously, it failed because of slope instability... I don’t really see that being addressed.” Mr. Tschantz also described the report as “perplexing... because it contained information about seeps, erosion and other issues, but no information to back up the claim that the dike was indeed stable.”²⁰

TVA reviewed options for addressing the previous dike failures, but senior officials rejected higher-quality options that they deemed to be too costly. For example, the KFP could have switched to a dry ash collection system, which would have cost \$25 million. Alternatively, installing a liner would have cost \$5 million, but that option was also denied. Instead, TVA opted for the cheapest option: installing another dredge cell for \$480,000. In addition to balking at high costs, TVA officials also rejected some options, like installing a liner, because they would set precedence for other dredge cells. Rather than demonstrating leadership, TVA shirked away from an opportunity to ensure long-lasting solutions. Dismissing an option that would set precedence undermines TVA’s claims that they “set high standards and goals” as well as “innovate and seek new ideas.”²¹

That TVA rejected better options for a cheaper solution suggests that the KFP dike breach could have been prevented. The catastrophe that occurred on December 22, 2008 is an example of how cutting corners for immediate savings can prove costly in the long run. Indeed, the Alabama example and the prior failures at the KFP impoundment show that TVA prioritizes short-term profits over long-term viability.

Downplaying the Damage

From the beginning of the recovery process, TVA officials failed to live up to their responsibility to divulge information about potential hazards and permit violations and to observe an ethical

obligation to report issues that might cause concern. Instead, TVA deemphasized the potential toxicity of the ash, the potential affect to water quality and the extent of the damage caused.

For example, on the day after the incident, Mr. Kilgore characterized the situation and the pollutants as “safe” before samples had been taken and test results were available. Mr. Kilgore said, “chemicals in the ash are of concern, but the situation is probably safe.” He also said, “we don’t think there’s anything immediate of danger...” However, at the time those statements were made, “the amount of poisons in TVA’s ashy wastes...could not be determined....Workers sampled river water...but didn’t sample the dune-like drifts of muddy ash.”²²

TVA spokesman Gilbert Francis, Jr. subsequently stated that the material “does have some heavy metals within it, but it’s not toxic or anything,” leading the *New York Times* to report that TVA “played down the risks.”²³ Only days after the incident, TVA officials categorically denied the possibility that the ash was toxic, but they did not complete analysis of the ash itself until after January 1, 2009.²⁴

Displaying an egregious disregard for the safety of nearby residents, TVA Senior Vice President for Environmental Policy Anda Ray spoke euphemistically about the incident. Mrs. Ray “refused to call the spill an environmental disaster,” maintaining that the coal waste is “inert.” Rather, Mrs. Ray chose to characterize the incident as “a challenging event to restore the community back to normalcy.”²⁵ In personal correspondence with me, Mrs. Ray disputed my own observations that the waste was mobilized and spreading downstream, describing the floating pollutants as “inert floating sand,” and supporting her claim only by saying, “I am reassured of the public health by the preliminary [water quality] results I’ve seen.”

Instead of prudently employing the precautionary principle, TVA assumed the contamination was benign before they had the results to prove it. Compounding the danger created when TVA characterized the contaminants as safe and nontoxic, the power company declined to issue warnings about the contents of the toxic CCW-laden sludge to nearby residents. TVA officials released only a basic fact sheet about the ash in the days immediately following the incident.²⁶ Five days after the incident, TVA released generic safety information about the material.

The JIC finally released comprehensive safety information on December 29, 2008, the day after EPA released a letter indicating that their water quality tests showed elevated heavy metal concentrations, particularly of arsenic. However, on December 26, 2008, TVA reported finding elevated levels of lead and thallium near the incident site. TVA spokesman Terry Johnson stated that those metals were not considered to be a threat to public health because of the likelihood that they would settle to the riverbed before moving downstream.²⁷ Still, TVA issued no warnings about water quality or the ash until a week after the incident, other than telling residents to wash their hands and avoid the contaminated area.²⁸

TVA later revealed that the company’s annual waste production includes 45,000 pounds of arsenic; 49,000 pounds of lead; 1.4 million pounds of barium; 91,000 pounds of chromium; and 140,000 pounds of manganese. The *New York Times* reports that the ruptured impoundment held “many decades’ worth of these deposits.”²⁹

Although they made early efforts to assist affected residents and commence the recovery, TVA exhibited little urgency in describing the contents of the spill to their constituents and affected residents. TVA did have individual conversations with affected residents, but they did not host a public meeting, other than press briefings, until December 30, 2008.³⁰ Two days prior, the Kingston City Council convened a public meeting that attracted more than 300 community members.³¹

Since millions of pounds of waste were deposited into the impoundment, it is reasonable to conclude that toxicity is at least a possibility, if not nearly certain. TVA should have taken basic steps to inform the public and residents of the potential for toxicity and what steps people should take if they come into contact with the effluent. Instead, TVA denied even a possibility that the discharge was toxic and neglected to issue warnings about the material.

Lack of Reliability

In addition to trivializing the danger associated with the ash spill, TVA also provided unreliable and misleading information regarding the safety of water quality and the extent of the damage.

On numerous occasions, TVA officials promised to restore the river and the residents' lives to their original condition. Saying, "We are going to clean it up right... We're going to make it whole."³² Although TVA initially estimated that the recovery would take "weeks," it no longer will speculate as to the duration of the recovery. Describing the damage done to nearby property, TVA representative Mr. Francis stated, "We're going to make it right... We're going to restore these folks to where they were prior to this incident."³³ At the public hearing convened by the Kingston City Council, Mr. Kilgore said, "TVA plans to work until the water is as pure as it was before the spill."³⁴

Scientists and public officials have disputed the possibility of returning the river and the surrounding ecosystem to its condition before the spill. TDEC Deputy Commissioner Paul Sloan said, "the long term cleanup is going to take years, and in some instances the impact of it can't be cleaned up."³⁵ Furthermore, Dr. Carol Babyak, Chemistry professor at Appalachian State University, emphasized that some of the heavy metal compounds will likely never leave the river: "Once a metal enters the environment, it's always going to be there. It doesn't decompose or change into anything else."³⁶ Mr. Kilgore has since qualified his statements, acknowledging that the scenery where the Emory and Clinch Rivers merge will never be the same.³⁷

Nevertheless, TVA officials have a responsibility to put forth their best effort to take care of affected residents and Tennessee's natural heritage.

Furthermore, early reports from TVA drastically underestimated the extent of damage that the ash spill caused. TVA initially estimated that that the rupture spilled 1.8 million cubic yards of waste, but radar analysis showed the amount to be 5.4 million cubic yards.³⁸ It is not evident that TVA intentionally understated the amount of waste spilled into the local area, but the gross miscalculation suggests that TVA had little information regarding the amount of ash stored at the facility.

Plant manager Ronald Hall defended the hasty error: "In the urgency of the event we had, we had to reach out and make sure the community was safe...Folks wanted to know. We sent somebody to make an estimate. There was no science behind it."³⁹

Downplaying the spill's impact, TVA prematurely declared the river water and drinking water to be safe.⁴⁰ However, the original claim pertained only to water treated at up to four water treatment plants and not private wells in the affected area. TVA failed to stipulate that their claims of safe drinking water did not include water from private wells. In fact, TVA did not announce that they would begin testing well water until after making these claims.⁴¹

As TVA began to collect water samples from private residences and private wells, some local residents reported that TVA took several days to come to their property. According to Sandy Gupton, a local registered nurse, TVA waited five days to respond to her request for water quality testing at her property.⁴² Additionally, some residents reported that TVA employees sought to take water samples only from clearer water and not the water that was visibly soiled.⁴³ TDEC ultimately sampled water from 40 wells in a four-mile radius from the incident site, but they did not finish sampling until January 2, 2008.⁴⁴ On January 5, 2009, the EPA released results from three wells containing safe drinking water.⁴⁵

On December 28, 2008, EPA provided information questioning the safety of the area's water quality. EPA reported their water samples showed "several heavy metals are present in water slightly above drinking water standards," but below levels considered harmful to humans. "The one exception maybe arsenic," according to the EPA. Their test results so far had yielded an arsenic sample with concentrations characterized as "very high."⁴⁶ The EPA later released water quality samples showing arsenic 149 times the normal limit.⁴⁷

The EPA's arsenic results contrast with what TVA called "barely detectable" levels of arsenic.⁴⁸ Water quality samples analyzed by Appalachian State University professors Dr. Shea Tuberty and Dr. Carol Babyak on behalf of Appalachian Voices also showed drastically abnormal levels of several heavy metals. Their analysis, which was conducted according to EPA specifications, demonstrated arsenic levels between 25 to 300 times the allowable limit; cadmium levels two and a half times the allowable limit for drinking water and four to seven times higher than the maximum level for aquatic wildlife; lead level two to 21 times the allowable limit and nearly 60 times the maximum level appropriate for aquatic biota.⁴⁹

Drastic differences in the water quality results reported by TVA and other independent observers further undermine the veracity of the power company's claims. As of January 02, 2009, TVA had not released the full results of their water quality samples. When questioned about this information, TVA spokesman Jim Allen could not explain why the results had not been made available.⁵⁰

So far my organization and our allies have observed an inadequate and irresponsible reaction to this preventable disaster. Repudiating reasonable assertions that the waste and contaminated water contained elevated toxic materials, TVA mischaracterized the state of affairs in its announcements to the public. TVA's actions are rooted in a demonstrated history of neglecting its responsibility as a steward of the Tennessee Valley.

TVA must clean up this mess. TVA has a responsibility as a steward of the Tennessee Valley. When the national spotlight wanes from this disaster, citizens in the Tennessee Valley will hold TVA accountable. We fully expect TVA to adhere to its commitments to return this area to a healthy state and as close as possible to its pre-disaster condition.

Recommendations:

- 1. TVA should be held accountable for its response to this disaster.**
- 2. Independent researchers should fully analyze and characterize both human health conditions and environmental impacts.**
- 3. Citizens should be fairly compensated for all reasonable claims of property loss and personal injury.**
- 4. TVA should complete a full review of its emergency response procedures and processes for providing information that may impact public health and make recommendations for their improvement.**

Federal regulation of coal combustion waste (CCW) is necessary to ensure responsible storage and disposal that protects surrounding communities and the environment from the suite of toxic heavy metals that CCW contains.

Burning coal is a dirty business. From cradle to grave, coal creates devastating impacts at every step. Destructive mining practices such as mountain-top removal, devastate mining communities. As it's burned, coal emits myriad pollutants, including NO_x, SO₂, hazardous air pollutants and mercury. As recent events have certainly demonstrated, even after it has been burned, coal waste can devastate a community. Using coal as a primary fuel source for electric power generation leads to significant impacts, endangering human health and environmental quality. A growing body of evidence shows that the carbon dioxide emissions from coal combustion are a significant cause of global warming and a threat to the stability of our global climactic systems.

This spill highlights the little-known risks of dealing with post-combustion solid waste. SACE advocates that no new coal-fired power plants be permitted unless they can address all of these issues, including the full capture and storage of carbon dioxide emissions. We also believe there needs to be a thoughtful discussion on how to replace or retire existing coal-fired generation in a way that prevents further build up of global warming pollution in Earth's atmosphere.

It is unfortunate that the tragedy that occurred in Harriman, TN returns this issue to national attention. Simply stated, it has been apparent for nearly a decade that CCW is a hazardous substance that requires responsible federal regulations to ensure proper storage and disposal of these waste materials. While the Harriman catastrophe highlights, in no uncertain terms, the potential dangers of storing CCW in surface impoundments, this is not a localized issue. Across the United States, voluntary and/or state regulations have not done an adequate job of preventing severe contamination of land and water in the areas surrounding CCW disposal sites, whether in surface impoundments, landfills or mines.

The Environmental Protection Agency (EPA) has dropped the ball on this issue. In a March 5, 2000 report entitled *Regulatory Determination on Wastes from the Combustion of Fossil Fuels*, the EPA concluded that regulation as a contingent hazardous waste under Subtitle C of RCRA is warranted for CCW. While this determination is no longer available through the EPA database, a copy is provided as Appendix 2 to this testimony. This determination states, "EPA has determined that regulation under Subtitle C of the Resource Conservation and Recovery Act (RCRA) is warranted for the following wastes when they are land disposed (e.g. managed in landfills or surface impoundments) or when used to fill surface or underground mines. . . Large-volume coal combustion wastes generated at electric utility and independent power producing facilities. . ." ⁵¹ This determination resulted in the decision to develop national management standards that include a contingent hazardous waste listing under Subtitle C of RCRA. ⁵² Under this approach, EPA would establish standards to ensure management of these wastes to protect human health and environment and the wastes would remain non-hazardous provided that they are managed properly. ⁵³ The contingent hazardous waste listing would have allowed EPA to develop a program tailored to the risks posed by coal combustion wastes while minimizing compliance costs.

The March 5, 2000 determination explained the rationale for the contingent hazardous waste

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 10

listing of CCW. The EPA determined such listing was necessary:

because: (a) the composition of these wastes has the potential to present danger to human health and environment and ‘potential’ damages cases identified by EPA and commenters, while not definitively demonstrating damage from coal combustion wastes, lend support to our concern that these wastes have the potential to pose such dangers; (b) we have identified eleven documented cases of proven damages to human health and the environment by improper management of these wastes in landfills and surface impoundments; (c) present disposal practices are such that these wastes are currently being managed in a significant number of landfills and surface impoundments without proper controls in place, particularly in the area of groundwater monitoring; and (d) while there have been substantive improvements in state regulatory programs, we have also identified significant gaps either in states’ regulatory authority or in their exercising existing authorities. Also, we believe the costs of complying with regulations that specifically address these problems, while large in absolute terms, are a small percentage of industry revenues.⁵⁴

Unfortunately, this determination was reversed, with no new findings or data, just weeks later in a May 22, 2000 *Regulatory Determination on Wastes from the Combustion of Fossil Fuels*.⁵⁵ Even in that determination, however, EPA still concluded that federal standards for the disposal of coal combustion waste under RCRA and/or the Surface Mining Control and Reclamation Act (SMCRA) are required to protect health and the environment. This determination extended to coal ash disposed in landfills, surface impoundments and mines. Yet eight years later, comprehensive federal regulation of this hazardous substance remains absent.

The failure to fulfill this commitment is wholly unjustified, particularly in light of the substantial research that has already been completed by both EPA and the National Academies of Science (NAS). Preceding EPA’s 2000 determination, EPA complied with a congressional mandate under RCRA to study the risks posed by coal combustion waste, solicit public comment, hold a public hearing, and publish a Report to Congress.⁵⁶ As a result, there is a robust record documenting the risks posed by coal ash and the damage that has occurred throughout the country as a result of its mismanagement.

Multiple publications since the 2000 EPA determination have confirmed the potential risks of irresponsible disposal of CCW. In 2004, the National Academy of Sciences published a report, *Managing Coal Combustion Residues in Mines*, that recommended federal standards be established under RCRA, SMCRA, or a combination of both statutes to protect ecological and human health from the potential effects of CCW disposal. Further supplementing the record, EPA published a Notice of Data Availability in August 2007 that included additional documentation of the risks posed by coal combustion waste including a draft *Human Health and Ecological Risk Assessment* and a *Coal Combustion Waste Damage Case Assessment*. Lastly, EPA’s Office of Research and Development has published a series of documents detailing the

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before 11 the Senate Committee on Environmental and Public Works.

increasing toxicity of coal combustion waste, including *Characterization of Mercury-Enriched Coal Combustion Residues from Electric Utilities Using Enhanced Sorbents for Mercury Control* and *Characterization of Coal Combustion Residues from Electric Utilities Using Wet Scrubbers for Multi-Pollutant Control*.

It is now two years since the publication of the NAS report, 8-plus years after EPA's final regulatory determination, 28 years since Congress first asked EPA to study the question, and 16 days since the catastrophe in Harriman, TN. While the federal agencies have failed to act, the need to resolve this question has become increasingly urgent. As evidenced by the Harriman catastrophe and the numerous incidents of pollution resulting from CCW disposal practices across the country, inadequate state laws offer scant protection. What is required is comprehensive federal regulation that protects human health and environment nationwide from the risks posed by mismanagement of coal combustion waste.

Coal combustion waste represents a significant threat to human health and environment from improper storage and disposal.

Several factors make federal regulation of CCW necessary to protect human health and environment. These factors were previously identified by Lisa Evans, Project Attorney for Earthjustice in her June 10, 2008 testimony before the U.S. House of Representative's Subcommittee on Energy and Mineral Resources, Committee on Natural Resources.

1. *CCW Causes Documented Damage to Human Health and the Environment*

The absence of national disposal standards has resulted in environmental damage at disposal sites throughout the country. In fact, scientists have documented such damage for decades. Impacts include the leaching of toxic substances into soil, drinking water, lakes and streams; damage to plant and animal communities; and accumulation of toxins in the food chain.^{57, 58} In 2007, EPA published a draft *Human Health and Ecological Risk Assessment* that found extremely high risks to human health from the disposal of coal ash in waste ponds and landfills. According to EPA, the excess cancer risk for children drinking groundwater contaminated with arsenic from CCW disposal in unlined ash ponds is estimated to be as high as nine in a thousand - 900 times higher than EPA's own goal of reducing cancer risks to less than one-in-one hundred thousand individuals. Figure 3 compares EPA's findings on the cancer risk from arsenic in coal ash disposed in waste ponds to several other cancer risks, along with the highest level of cancer risk that EPA finds acceptable under current regulatory goals.

Further, EPA's *Damage Case Assessment for Coal Combustion Waste*, also published in 2007, identifies 24 proven damage cases and 42 potential damage cases as a result of CCW-caused contamination in 23. Further, this is likely a low estimate because the report also concludes that most CCW disposal sites are not adequately monitored.

Documented damage from CCW includes:

- Public and private drinking water contaminated by CCW in at least 8 states, including Wisconsin, Illinois, Indiana, New Mexico, Pennsylvania, North Dakota, Georgia and Maryland.⁵⁹

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 12

- Hundreds of cattle and sheep killed and many families sickened in northern New Mexico by ingesting water poisoned by CCW.⁶⁰
- Entire fish populations destroyed and fish consumption advisories issued in Texas and North Carolina for water bodies contaminated with selenium from CCW disposal sites.⁶¹,⁶²
- Documented developmental, physiological, metabolic, and behavioral abnormalities and infertility in nearly 25 species of amphibians and reptiles inhabiting wetlands contaminated by CCW in South Carolina.⁶³

In addition, new CCW-contaminated sites are being uncovered with disturbing frequency. One need only pick up the *Washington Post*, *Baltimore Sun* or *Virginian-Pilot* over the last year to grasp the national crisis. Evidence of poisoned water has recently surfaced in Baltimore, Charles County, Virginia Beach, and across the country in Illinois, Indiana and Montana.

The following sites are illustrative:

- **Gambrills Fly Ash Site, Anne Arundel County, Maryland** where 3.8 million tons of ash were dumped in unlined gravel pits contaminating drinking water wells with arsenic, lead, cadmium, nickel, radium and thallium as high as 4 times the drinking water standard.
- **Faulkner Landfill, Charles County, Maryland** where leaching coal ash is contaminating a wetland with selenium and cadmium at levels high enough to kill any animal life. The Smithsonian Institution has called the affected wetlands, Zekiah Swamp, one of the most ecologically important areas on the East Coast.
- **Battlefield Golf Course, Chesapeake, Virginia** where developers used 1.5 million tons of fly ash to build a golf course over a shallow aquifer. Although the course was just completed last winter, wells in close vicinity to the unlined, uncapped site are already starting to show elevated lead, arsenic, chromium, and boron.
- **PPL Montana Power Plant, Colstrip, Montana**, the second largest coal-fired power plant west of the Mississippi, where leaking unlined coal ash ponds contaminated residential wells with high levels of metals, boron and sulfate. Five companies agreed in May 2008 to pay \$25 million to settle a groundwater contamination lawsuit brought by residents.
- **Gibson Generating Station, Gibson County, Indiana** where enormous ash ponds are exposing threatened species to dangerous levels of selenium and where the power company supplies residents with bottled water because their wells are contaminated with boron.

2. States Fail to Provide Adequate Regulation of CCW Disposal

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 13

With no minimum federal standards, state regulation of CCW disposal has been inconsistent and inadequate. The lack of federal regulation is glaring in comparison to its decision to regulate less toxic substances. For example, if one compares how EPA regulates the disposal of ordinary household trash with its hands-off approach to CCW, the results defy logic. While newspapers, soda cans and banana peels under no circumstances qualify as RCRA hazardous waste, EPA has established detailed federal disposal standards for the landfills that contain them.⁶⁴ EPA has regulations governing all aspects of the disposal of household trash in landfills including performance standards, siting restrictions, monitoring, closure requirements, bonding, and post-closure care.⁶⁵ These regulations, promulgated under subtitle D of RCRA, are enforceable by states and citizens against any owner or operator of a landfill in violation of the standards. Furthermore, RCRA requires that state solid waste programs promulgate equivalent (or more stringent) regulations in order to maintain authorization.⁶⁶ So, while EPA has found it necessary to regulate the disposal of non-hazardous municipal waste, EPA has no such regulations for the disposal of toxic CCW whose leachate exceeds *hazardous waste* levels for toxic metals.

The utility industry, as well as some states, erroneously claims that the states are doing a good job of regulating coal ash despite the absence of federal standards. The fact that EPA admits at least 67 sites in 23 states have been contaminated by CCW indicates that this is not true. A survey of state laws governing CCW disposal in landfills and surface impoundments shows that state regulations fall short of requiring measures that would adequately protect human health and the environment. Earthjustice, along with several other environmental organizations, submitted analyses of the laws and regulations of 20 states in response to EPA's Notice of Data Availability in February 2008. This analysis shows definitively that state solid waste programs do not provide consistent and adequate safeguards sufficient to protect human health and the environment from CCW. In fact, most states failed to require even the basic safeguards essential for waste management, including liners, leachate collection systems, groundwater monitoring, bonding, corrective action (cleanup), closure and post-closure care.

According to this study, among the top 15 CCW generating states, which represent 74% of U.S. CCW generation, *only one state* requires all CCW surface impoundments to be lined and *only one state* requires all CCW lagoons to monitor groundwater for migrating pollutants. *Only three states* out of those 15 require CCW landfills to be lined. It is not surprising, therefore, that EPA reported in 2000 that only 57 percent of CCW landfills and only 26% of CCW surface impoundments were lined and that only 65% of landfills and 38% of surface impoundments conducted groundwater monitoring.⁶⁷

In addition, in 2005, a report prepared for EPA's Office of Solid Waste, entitled *Estimation of Costs for Regulating Fossil Fuel Combustion Ash Management at Large Electric Utilities Under Part 258*, included a survey on state disposal regulations that verified that states fail to prohibit the most dangerous CCW disposal practices. The report examined the top 25 coal-consuming states to determine how much CCW is prohibited from disposal below the natural water table. Since isolation of ash from water is critical to preventing toxic leachate, it is axiomatic that disposal of ash must occur *above* the water table. Yet the report found that only 16% of the total waste volume being regulated by these 25 states is prohibited from disposal in water when waste is disposed in surface impoundments. For landfills, the total waste volume that is prohibited from disposal in water is only 25%. Thus, in these states, 84% of the total volume of CCW

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 14

disposed in surface impoundments and 75% of the total volume disposed in landfills is allowed to be disposed into the water table.⁶⁸

A 2005 report published jointly by EPA and the U.S. Department of Energy (DOE), entitled *Coal Combustion Waste Management at Landfills and Surface Impoundments, 1994-2004*, attempted to show that certain industry practices have improved since EPA's regulatory determination. This report is deeply flawed, beginning with the fact that the report was based primarily on data voluntarily submitted by the utility industry. The report surveyed 56 permitted landfills and surface impoundments built between 1994 and 2004. The report cited the presence of "liners" at all newly permitted surface impoundments and landfills and concluded "[t]he use of liners has become essentially ubiquitous." This conclusion, however, is grossly misleading because while more liners appear to be installed on disposal units built in the last 14 years, the type of liners is insufficient to protect health and the environment. In fact, the same DOE/EPA Report reveals that only 39% of the units, at best, installed composite liners. According to EPA's 2007 draft *Human and Ecological Risk Assessment*, landfills and surface impoundments with clay liners do not provide adequate protection of health and the environment.⁶⁹

The *Risk Assessment* further states that *composite liners* effectively reduce risks from all constituents to below the risk criteria for both landfills and surface impoundments. A composite liner is defined as a high-density polyethylene (HDPE) membrane combined with either geosynthetic or natural clays. Yet the DOE/EPA Report reveals that clay liners were used at 25% of the permitted units. Single liners, also deemed inadequate, were used at 18% of the surveyed units. Unless the liner is of a sufficient quality to prevent the migration of contaminants, its use is largely irrelevant. The DOE/EPA Report's updated survey of state-permitted disposal units does not show that adequate protections are in place. Conversely, it reveals that the absence of a federal rule requiring composite liners has produced a whole new generation of waste units in at least a dozen states that pose serious threats to human health and the environment.

Furthermore, the 2005 DOE/EPA Report documents that nearly a third of the net disposable CCW generated in the U.S. are potentially *totally exempt* from solid waste permitting requirements.⁷⁰ The DOE/EPA Report explains this fact in great detail:

[t]he six States that have solid waste permitting exemptions for certain on-site CCW landfills generated a total of approximately 17 million tons of net disposable CCWs in 2004, which is 20% of the total net disposable CCWs generated for all States. The one State that excludes CCW from all solid waste regulations, Alabama, generated a total of approximately 2.7 million tons of net disposable CCWs in 2004, which is about 3.3% of the total net disposable CCWs generated in all States. Ohio, which excludes "nontoxic" fly ash, bottom ash, and boiler slag from solid waste regulations, generated a total of 5.9 million tons of these wastes and 1.1 million tons of FGD wastes (about 7 million tons total) in 2004. Of these amounts, about 1.3 million tons of "nontoxic" fly ash, bottom ash, and boiler slag are beneficially used and about 1 million tons of FGD sludge are beneficially used. Hence, the net disposable CCWs that were potentially exempt from solid waste permitting requirements in Ohio in 2004 amount to about 4.6 million tons. Thus the amount of net disposable CCWs in Ohio that is

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before 15 the Senate Committee on Environmental and Public Works.

potentially exempt from solid waste permitting requirements represents about 5.4% of the total net disposable CCWs generated for all States. **Overall, the portion of the net disposable CCWs that is potentially exempt from solid waste permitting requirements is approximately 24 million tons, which corresponds to 29% of the total net disposable CCWs generated in the United States during 2004.**⁷¹

(Emphasis added).

The report also explains that this exempted CCW represents almost a third of the US coal-fired generating capacity:

In terms of electric generating capacity, the six States that have solid waste permitting exemptions for certain on-site CCW landfills generated a total of approximately 66,000 MW, which is approximately 20% of the total coal-fired electric generating capacity in the United States in 2004. The one State the excluded CCWs from all solid waste regulations, Alabama, generated a total of approximately 12,000 MW in 2004, which is about 3.7% of the total. Ohio which excludes “nontoxic” fly ash, bottom ash and boiler slag from solid waste regulations, generated a total of about 24,000 MW in 2004. This represents about 7.2% of the total coal-fired electric generating capacity in the United States. **Overall, the portion of the coal-fired electric generating capacity in the States that potentially exempt CCW landfills from solid waste permitting requirements and that exclude certain CCWs from all solid waste regulation is approximately 102,000 MW, which corresponds to about 30% of the total coal-fired electric generating capacity in the United States in 2004.**⁷²

(Emphasis added.) Thus the DOE/EPA Report demonstrates that a significant portion of the CCW generated in the U.S. is potentially not subject to *any* solid waste permitting. This is another wholly unacceptable gap in regulation of CCW that is likely to have significant negative impact on health and the environment.

Finally, some 23 states have “no more stringent” provisions in their statutes that prohibit the states from enacting stricter standards than are found in federal law. Thus for those states, without federal regulation, *there can be no regulation of CCW beyond what few safeguards there are now.*⁷³ Among states with “no more stringent provisions” are Colorado, Kentucky, Montana, New Mexico, Tennessee and Texas.

Under these circumstances, it is ridiculous to continue relying on state regulations for proper oversight of the storage and disposal of CCW.

3. *The Volume of Chemical Waste Resulting from Coal Combustion is Immense*

Burning coal produces over 129 million tons *each year* of coal combustion waste in the U.S. This is the equivalent of a train of boxcars stretching from Washington, D.C. to Melbourne, Australia.⁷⁴ CCW is largely made up of ash and other unburned materials that remain after coal

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 16

is burned in a power plant to generate electricity. These industrial wastes include the particles captured by pollution control devices installed to prevent air emissions of particulate matter (soot) and other gaseous pollutants from the smokestack. Further adding to the toxicity of CCW is that in addition to burning coal, some power plants mix coal with other fuels and wastes, including a wide range of toxic or otherwise hazardous chemicals, such as the residue from shredded cars (a potential source of PCBs), oil combustion waste (often high in vanadium), railroad ties, plastics, tire-derived fuel and other materials.⁷⁵

What results from these processes is a waste product that is significantly more toxic than coal itself. As coal is burned, its volume is reduced by two thirds to four fifths, concentrating metals and other minerals that remain in the ash. Elements such as chlorine, zinc, copper, arsenic, selenium, mercury, and numerous other dangerously toxic contaminants are found in much higher concentrations on a per volume basis in the ash compared to the coal. In fact, the thousands of tons of chemicals disposed of in CCW by placement in unlined surface impoundments, landfills, or mines each year dwarf other industrial waste streams. (See Figure 2 at the end of this section) Table 1 below indicates some of the contaminants commonly found in CCW and their human health effects.

Table 1: Human Health Effects of Coal Combustion Waste Pollutants

Aluminum	Lung disease, developmental problems
Antimony	Eye irritation, heart damage, lung problems
Arsenic	Multiple types of cancer, darkening of skin, hand warts
Barium	Gastrointestinal problems, muscle weakness, heart problems
Beryllium	Lung cancer, pneumonia, respiratory problems
Boron	Reproductive problems, gastrointestinal illness
Cadmium	Lung disease, kidney disease, cancer
Chromium	Cancer, ulcers and other stomach problems
Chlorine	Respiratory distress
Cobalt	Lung/heart/liver/kidney problems, dermatitis
Lead	Decreases in IQ, nervous system, developmental and behavioral problems
Manganese	Nervous system, muscle problems, mental problems
Mercury	Cognitive deficits, developmental delays, behavioral problems
Molybdenum	Mineral imbalance, anemia, developmental problems
Nickel	Cancer, lung problems, allergic reactions
Selenium	Birth defects, impaired bone growth in children
Thallium	Birth defects, nervous system/reproductive problems
Vanadium	Birth defects, lung/throat/eye problems
Zinc	Gastrointestinal effects, reproductive problems

Source: ATSDR ToxFAQs, available at www.atsdr.cdc.gov/toxfaq.html

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 17

4. Better Air Pollution Controls Will Make CCW More Toxic

As air pollution control regulations are implemented under the Clean Air Act, more particulates and metals are captured in the ash instead of being emitted from the smokestack. In a 2006 report on CCW, EPA found that when activated carbon injection was added to a coal-fired boiler to capture mercury, the resulting waste leached selenium and arsenic at levels sufficient to classify the waste as “hazardous” under RCRA.⁷⁶ Specifically, EPA found that arsenic leached (dissolved) from the CCW at levels as high as 100 times its maximum contaminant level (MCL) for drinking water, and selenium leached at levels up to 200 times its MCL.⁷⁷

In a follow-up study that is currently underway by EPA’s Office of Research and Development, EPA tested the leaching characteristics of CCW from a power plant employing both mercury controls and a wet scrubber for sulfur dioxide control. EPA found that CCW from a plant with a wet scrubber leached numerous additional toxic metals at levels significantly higher than their MCLs.⁷⁸ EPA found that the CCW leached arsenic, thallium, boron, and barium above RCRA’s hazardous waste threshold (100 times the MCL). The CCW also leached levels of antimony, cadmium, chromium, lead, mercury, molybdenum and selenium in quantities sufficient to contaminate drinking water and harm aquatic life.

This is the hidden catch that clean-coal advocates would prefer to keep secret. While clean coal technologies will reduce air emissions, the widespread adoption of these technologies will also lead to massive increases in the production of CCW that contains higher levels of contamination. Unfortunately current technology is not capable of simply making these pollutants disappear, and when the burning of coal does not result in the emission of pollutants from smokestacks, it is the responsibility of the regulatory authority to ask where, if not in the air, are they going. In the case of “clean coal,” the answer to that question is onto our land and into our ground and surface waters.

As new technologies are mandated to filter air pollutants from power plants, cleaning the air we breathe of smog, soot and other harmful pollution, the quantity of pollutants and dangerous chemicals in the ash increases. Without adequate safeguards, the chemicals that have harmed human health for years as air pollutants- mercury, arsenic, lead and thallium- will now reach us through drinking water supplies and other sources of environmental contamination. Given the documented tendency of CCW to leach metals at highly toxic levels, there is clearly the need for federal regulations to ensure proper storage and disposal of CCW to protect human health and environment.

5. Voluntary Industry Agreements are not a Solution

It is not viable to allow the utility industry to police itself. The proliferation of contaminated sites demonstrates that industry is not voluntarily ensuring safe disposal. A voluntary agreement recently signed by some utilities and presented to EPA as a substitute for enforceable regulations is unacceptable.⁷⁹ Its shortcomings are too numerous to describe here in detail, but suffice it to say that the utilities are proposing substantially less protection for their toxic ash than is required by law for the garbage from their cafeterias.

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 18

The voluntary industry agreement is designed to allow the electric utility industry to continue avoiding the cost of safe disposal of its voluminous waste. The plan intentionally fails to require monitoring that would detect pollution escaping CCW surface impoundments and landfills or to require any specific response should pollution be detected. The plan fails to require the most basic of safeguards, composite liners, and it fails to prohibit the placement of CCW directly into groundwater and nothing in the plan applies to disposal of CCW in mines. In view of continuing damage from coal ash, the hundreds of disposal units operated by industry today without safeguards, and the comprehensive body of evidence showing CCW's toxic characteristics, it is untenable for any federal agency to entertain an unenforceable, voluntary proposal.

6. *Federal regulations are necessary to protect human health and environment from the damages of contamination from CCW.*

The goal of RCRA is to ensure the safe disposal of solid and hazardous waste and to encourage the safe reuse of waste in order to protect human health and the environment and conserve the nation's natural resources.⁸⁰ By failing to make good on its promise to promulgate minimum federal standards, EPA has failed in both respects. The disposal of CCW without safeguards has resulted in the creation of "open dumps," as they are defined in 40 C.F.R. Part 257, which is specifically prohibited by the statute.⁸¹ Furthermore, because disposal of CCW in unlined, unmonitored pits so frequently presents the threat of an imminent and substantial endangerment to health or the environment, these disposal units violate RCRA's core statutory mandate that disposal of solid waste avoid the potential for substantial damage, as set forth in section 7003 of RCRA. Finally, Section 1008 of RCRA requires EPA to "develop and publish suggested guidelines" for solid waste management under subtitle D, as necessary to ensure protection of public health and the environment. Thus EPA has failed with regard to CCW, not only to abide by its own regulatory determination, but also to comply with the mandates of RCRA.

The solution is straightforward. EPA, or in the case of CCW disposal in mines, OSM, *in conjunction with EPA*, must phase out the use of surface impoundments for CCW disposal and provide minimum federal enforceable safeguards for the disposal of CCW in mines and landfills. In the case of mines, this includes site characterization, isolation from groundwater, effective monitoring, site-specific management plans, adequate bonding, public participation in permitting, and site-specific cleanup standards. For landfills, it is a simple matter to require the basics that are currently required for municipal solid waste disposal: placement above the water table, composite liners, groundwater monitoring, daily cover of the waste, cleanup standards if contamination is discovered, construction of a cap upon closure, financial assurance, and post-closure care. These are not new concepts; they are well-established practices for protecting human health and environment from the effects of toxic exposure.

Further, by failing to impose disposal standards, EPA fails to encourage CCW reuse. When cheap dumping is no longer available, power plants will have far greater incentive to recycle their ash. Reuse of ash as a component of asphalt, concrete, and gypsum board are legitimate and safe reuses that should be encouraged. In addition, recycling ash in concrete can result in a large reduction of greenhouse gases. Approximately one ton of CO₂ is released for every ton of Portland cement produced, but certain classifications of CCW can replace up to 50% by mass of Portland cement.⁸² Further, since cement kilns are one of the largest emitters of mercury in the nation, the reduction of Portland cement production will reduce mercury emissions.

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 19

In Wisconsin, for example, adequate regulation of CCW has raised recycling rates significantly. Wisconsin CCW regulations are probably the most comprehensive in the nation. As a result, the recycling rate in Wisconsin for CCW is 85%, more than double the average recycling rate for all other CCW-producing states (36%).⁸³ It stands to reason that if the true cost of disposal were borne by electric utilities, there would be far greater incentive to find beneficial uses for the ash.

However, the EPA should proceed cautiously in analyzing industry claims of the beneficial uses of CCW. While the scientific research indicates that certain grades of CCW can replace Portland Cement in the manufacturing of concrete by acting as a binder to the concrete and thereby binding many of the heavy metals for several years, this should not be confused with another common practice: re-burning CCW in the cement manufacturing process. The re-burning of coal combustion waste to fire cement kilns further concentrates the pollutants present in the waste and mercury emission levels from these facilities have been found to be significantly higher than those emitted during the first burning of the coal.

In all, a comprehensive regulatory approach to the storage and disposal of coal combustion waste is not only necessary to protect human health and environment, but would enhance the incentive to find beneficial uses for CCW. The time to mandate federal regulation of CCW has long passed. However, with the current catastrophe in Harriman, TN failure of the EPA to quickly enact responsible regulation to ensure that human health and environment are protected, as is mandated by RCRA, would be an egregious failure of duty and would doubtlessly lead to further health effects and environmental damage from CCW waste.

Recommendations:

The catastrophe in Harriman, TN has left families homeless, hundreds of acres of land contaminated, and resulted in yet-to-be-determined levels of contamination to surface and groundwater resources. It will take years, if not decades for the area to return to its natural condition. However, the breach represents merely a symptom to a much larger problem: the complete inadequacy of regulations that protect human health and the environment from the devastating effects of irresponsible CCW storage and disposal. Research and analysis conducted by EPA, the Science Advisory Board, and the National Academies of Science clearly indicates a high and unacceptable risk from CCW when the waste is disposed without safeguards. The threat is not theoretical. According to EPA's own data an increasing number of injuries to health and the environment has resulted from unsafe disposal of CCW.

In light of this well-documented and severe deficiency in federal regulation, please allow this testimony to serve as a request that Chairman Boxer and the Committee to direct EPA to begin the promulgation of regulations that will provide minimum requirements for the storage and disposal of coal combustion waste by the end of this calendar year. Specifically, we request the following actions:

1. *A specific timetable for establishing federal regulations.*

EPA must immediately begin to formulate adequate minimum waste management requirements

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before 20 the Senate Committee on Environmental and Public Works.

that will be required at all surface impoundments, landfills and, in cooperation with OSM, at all mines and must promulgate these requirements by 2010. In view of EPA's longstanding failure to abide by its 2000 commitment to promulgate regulations and the harm that is currently occurring because of EPA's failure to act, it is necessary to ensure that the agency is indeed moving forward to establish federal standards. Further action by this Committee to conduct additional hearings and support legislation to set a deadline for federal action would help ensure that the destruction caused by CCW does not continue any longer than absolutely necessary.

2. *EPA should conduct a timely review to determine the extent of the risk posed by dangerous CCW storage and disposal, including inspection of all CCW impoundments to ensure that they are not constructed of coal ash.*

A lack of federal regulation has resulted in an absence of even the most basic data regarding the storage and disposal of this hazardous substance. EPA's own risk assessment was based on voluntary responses to a survey distributed to industry members and estimates on the number of facilities and the widespread adoption of proper handling practices can vary significantly. A look at the EPA website reveals that in the past year, several reports have been published on the beneficial uses of CCW, while no further research has been accomplished on the potential risks associated with improper storage and disposal. In other words, the EPA is expending far more resources studying the potential of CCW to generate income for industry than it is expending to understand the risks CCW poses to the general public.

A nationwide, mandatory reporting of CCW storage and disposal facilities, both operating and closed, including their size, the estimated amount of CCW, and a detailed explanation of any protective or remedial measures implemented would allow for the creation of a proper regulatory framework for addressing the risks to human health and environment. Without at least a basic understanding of the scope of the problem, EPA will be at a significant disadvantage in their efforts to protect the public from the potential harms of CCW. The electric utility has been generating CCW for over half a century. The public has a right to know where and how this toxic waste has been disposed, and EPA has an obligation under RCRA and CERCLA to find out.

Critical to this review, all surface impoundments must be inspected to ensure that their berms and dams are not constructed of fly ash or bottom ash. If impoundments are found that are constructed of ash, they must be rebuilt or emptied to guard against another catastrophic failure. The TVA berm that failed was a berm constructed of compacted fly ash or bottom ash. The berms are described by TVA as being constructed of "earthen materials." But "earthen materials" is an inaccurate and misleading characterization of coal ash.

True earthen materials (clay, silt, sand, etc.) can be compacted to densities and strengths than can be measured and relied upon for physical containment, using standard engineering practices and procedures. These materials are virtually non-reactive in the surface environment, because they are in equilibrium with it. It will last indefinitely, so long as the load behind it doesn't exceed its strength.

Coal ash is not, however, in equilibrium with the environment. It is known, and should be expected, to react (weather) in the environment. With the weathering, ash mass, density, and strength typically decline, ash chemistry changes, and ash permeability typically increases.

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before 21 the Senate Committee on Environmental and Public Works.

Observations consistent with each of these changes are described in the TVA inspection reports. Coal ash progressively loses strength over time. Instead, the berm would have a functional life, and would last only until the load behind it exceeds its declining strength. At Kingston, that apparently occurred December 22, 2008.

3. *Surface impoundments must be phased out at existing coal-fired plants and the construction of surface impoundments at new plants must be prohibited.*

EPA should prohibit construction of surface impoundments at all new coal-fired plants and require a phasing-out of surface impoundments at existing plants. Wet storage or disposal, as was practiced in the failed surface impoundment at TVA's Kingston plant in Harriman, TN, is the most damaging option for the storage and disposal of CCW. Even in the absence of the risk of catastrophic failure, the presence of water facilitates the dissolution and migration of pollutants, particularly when the ash pond is unlined or lined with only soil or clay. The dozens of cases of contamination from the leaching of arsenic and other pollutants from surface impoundments across the U.S. is testament to the danger of wet disposal. As described in this testimony, EPA's 2007 draft *Human and Ecological Risk Assessment of Coal Combustion Wastes* identifies exceedingly high risks of groundwater contamination from CCW surface impoundments and finds that the risk from surface impoundments is considerably higher than the risk from CCW landfills. In the absence of comprehensive federal regulation of coal combustion waste, industry has consistently ignored basic common sense safeguard of isolating toxic waste from surface and ground water sources, risking catastrophic failure as happened in Harriman, TN and severe contamination of drinking water and surface waters due to infiltration and leaching.

TVA's own claim that the failure of the Kingston surface impoundment was unpredictable supports the conclusion that these facilities must be phased out. Certainly the federal government would step in and ban the storage of explosives that had the potential to spontaneously detonate, leaving hundreds of acres destroyed, families displaced and water resources contaminated. Why then would that same government continue to allow the use of surface impoundments for toxic waste when the next catastrophic failure is neither predictable nor preventable? In such circumstances, it is the role of the federal government to promulgate regulations that prevent such happenings.

Electric utilities have a choice of producing dry or wet waste, and given risk of severe pollution events and the evidence of gradual damage to human health and the environment from disposal of slurried (wet) ash in waste ponds, an essential and important step to improve waste management over the long term is to require utilities to move toward dry disposal of CCW. Isolation of CCW from water is unquestionably the safest way to dispose of ash. A prohibition on new surface impoundments would greatly reduce the risk of new cases of poisoning and would ensure that waste management practices at new coal plants coming on line reflect our scientific knowledge. Communities living near coal-fired power plants deserve protection from this wholly avoidable threat to their health and environment.

For existing plants with currently operating or retired surface impoundments, EPA should establish stringent regulations for the installation of composite liners, leachate collection systems, and groundwater monitoring. Further, bonding, corrective action (cleanup), closure and

post-closure care should be required for all active and retired CCW surface impoundments. These stringent requirements are necessary because of the historical lack of precautions that have been taken by operators of these facilities to ensure the safety of surrounding communities and the environment.

Currently, the majority of the estimated 300 or more surface impoundments used for the storage of coal combustion waste in the U.S. are not lined to prevent leakage to ground and surface waters, are not properly monitored to detect potential problems, and are not adequately backed by financial assurances in the event of environmental damage. These basic requirements are either not required by state laws, or are not enforced in the states that do have such requirements on their books. Often times, the NPDES permit issued for a surface impoundment does not even cover monitoring, let alone set limits on, many of the heavy-metal pollutants that are so toxic to our environment, and that now threaten the Tennessee River system. Further, once closed, the coal combustion waste in these so-called "storage" facilities is rarely, if ever, removed to a proper disposal facility. Therefore, they continue to threaten ground and surface waters and risk catastrophic failure as happened in Harriman, TN. These inadequacies can only be remedied quickly by comprehensive federal regulation that requires the installation of basic safeguards and the monitoring of facilities to allow for quick detection and remediation of environmental degradation.

4. *EPA must require the use of engineered landfills for CCW disposal.*

CCW must be either recycled in a way that avoids the release of the hazardous substances contained in CCW, or must be disposed or stored in a properly designed and monitored dry-storage landfill. Disposal in sand and gravel pits, or in mines without adequate study and pollution controls is irresponsible and unnecessarily increases the risk to human health and environment due to CCW contamination.

A great number of communities in the U.S. are concerned about this issue. OSM's *Advanced Notice of Proposed Rulemaking on the Placement of Coal Combustion Byproducts in Active and Abandoned Coal Mines* drew over 4,000 comments from citizens last June, and over 10,000 individuals responded to EPA's *Notice of Data Availability on Coal Combustion Wastes* in February 2008. Communities threatened by the disposal of coal ash are requesting that minimum standards be put in place as soon as possible. It is the duty of the federal government and the EPA to heed these calls for regulation because it is now clearly evident that CCW poses a significant risk to human health and environment due to its toxic nature.

Minimum standards for the disposal of CCW require a dry landfill equipped with a double liner, including an impermeable composite liner. In addition, the landfill must be sufficiently isolated from water sources and have a leachate collection system. Location restrictions must prohibit the siting of landfills in wetlands, earthquake zones, and floodplains. Adequate groundwater monitoring and bonding must be required for the life of the landfill and 30 years after the closure of the facility. Finally, regulations should ensure the implementation of timely corrective action if contamination is detected. Only by requiring these basic safeguards, the same safeguards that regulate non-hazardous municipal solid waste, can the EPA say with any confidence that they are obeying the charges of RCRA to protect the human health and environment from the hazardous

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before 23 the Senate Committee on Environmental and Public Works.

contamination associated with coal combustion waste. Maintenance of the status quo ensures that further damage will occur.

Claims by industry that these requirements will be too costly to implement should be regarded with the same skepticism as their claims that CCW is an inert substance. In its final both its March 5th and May 22nd 2000 *Regulatory Determination on Wastes from the Combustion of Fossil Fuels*, EPA determined that the cost to industry of compliance with tailored hazardous waste regulations would be “only a small percentage of industry revenues.”⁸⁴ EPA estimated this cost to be “less than 0.4 percent of industry sales.”⁸⁵ Regulating CCW under solid waste authority, as opposed to subtitle C requirements of RCRA would be even less expensive. Therefore, the cost of safe disposal is *not* burdensome to industry, although it has proved, at site after site, to be catastrophic to the public and the environment.

Figure 1:

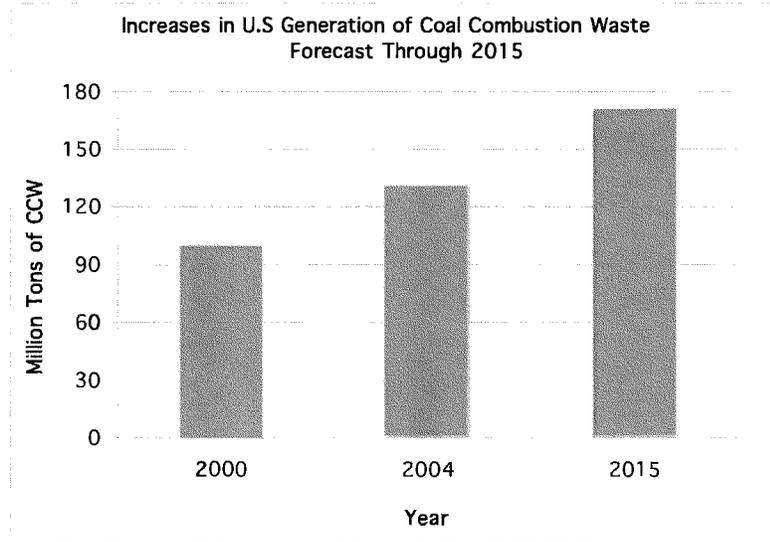
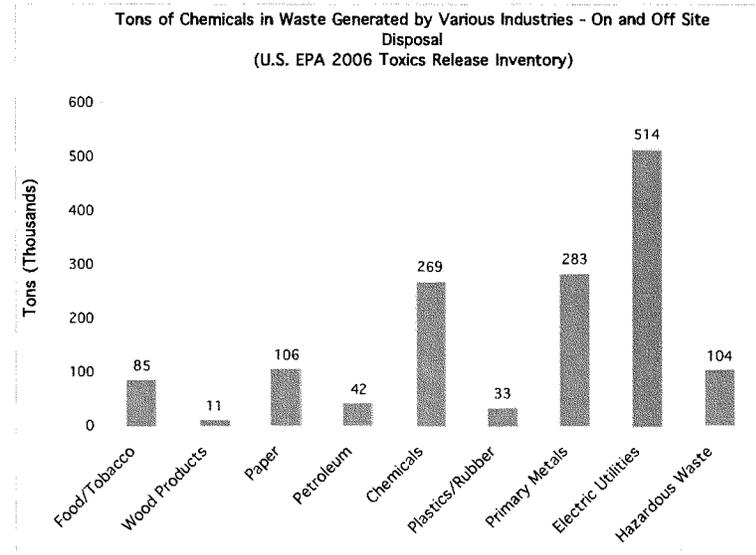
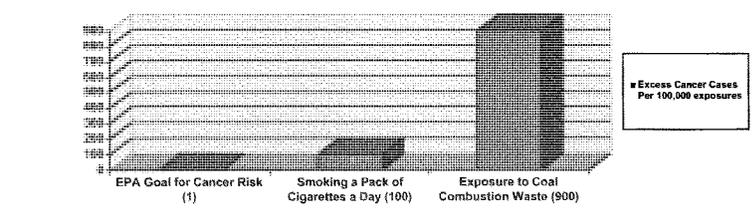


Figure 2: Electric utilities generation significantly more tons of chemicals than other industries.



Source: U.S. EPA 2006 Toxics Release Inventory

Figure 3: The cancer risk associated with exposure to CCW is 900 times greater than the EPA goal for cancer risk.



Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 26

The TVA needs increased congressional oversight, skilled leadership and sound planning to once again make it a leader in energy innovation and responsibility.

Given TVA's role in providing electricity to almost nine million people in seven southern states, it is imperative that TVA has diligent oversight, sound leadership and comprehensive planning procedures. I have tremendous respect and admiration for the original vision that established TVA and I believe if properly configured and directed, TVA has an important role in the 21st century that could surpass its accomplishment of the past 75 years. Unfortunately, I believe that there are still fundamental flaws in the governance and oversight of the agency that have the potential to undermine the agency's success in the future.

As a federally owned corporation and the largest public electricity provider in the nation, TVA is in a unique position to provide leadership in adapting our nation's electricity generation and distribution systems to modern innovations and environmental standards. While TVA has aggressively and successfully pursued its initial goals of providing electricity and fostering economic development in the Southeastern U.S., more recently, TVA has been ineffective on energy efficiency and renewable energy development, making TVA one of the leading contributors to global warming pollution in the nation and placing the Southeastern United States at a competitive disadvantage in the growing clean-energy markets.

Southeastern states within the TVA service area now consistently rank at the bottom of the barrel in terms of both energy efficiency and renewable energy development. At the same time, TVA's coal-fired power plants rank among the dirtiest in the nation, emitting more than 107 million tons of carbon dioxide annually.⁸⁶ In response to these shortcomings, TVA's primary solution is to once again focus solely on nuclear power development by attempting to finish construction on several unfinished nuclear reactors and planning to build two new nuclear reactors of unproven design, all at an unknown cost to consumers. The Table below shows that TVA already receives 30% of its generating capacity from nuclear generation. If these projects are completed as planned, TVA's generation mix will likely exceed 50% from nuclear generation. This one-dimensional approach increased economic, environmental, and reliability risks to the TVA system.

At the same time, TVA is ignoring the Southeast's renewable energy potential and making, at best, half-hearted attempts at conservation and efficiency. The table below shows TVA's generation mix from 2005 to 2007. While the ratio of electricity generated from coal and nuclear has risen steadily, the amount of power generated by renewable energy resources other than hydropower has steadily declined, reaching a paltry 0.017% in 2007. The table below is a sad statement of the fact that the nation's largest public power utility has non-hydro renewable generation at a fraction of one percent.

Power Supply from TVA-Owned Generation Facilities

Year	2007		2006		2005	
	Generation (in million kWh)	% of mix	Generation (in million kWh)	% of mix	Generation (in million kWh)	% of mix
Coal-fired	100,169	64%	99,598	64%	98,381	62%
Nuclear	46,441	30%	45,313	29%	45,156	28%
Hydroelectric	9,047	6%	9,961	6%	15,723	10%
Renewables	27	0.017%	36	0.023%	47	0.029%
Total	156,389	100%	155,521	100%	159,882	100%

Source: TVA's 2007 Form 10-K report, filed with the SEC on 12/12/07 for the period ending 09/30/07.

Recommendations:

1. *President-elect Obama should appoint, and this Committee should approve, TVA Board members who are proactive about establishing TVA as a national leader in the nation's energy future.*

TVA's governance went largely unchanged for over 70 years until, as part of the Consolidated Appropriations Act of 2005, Congress enacted amendments to the TVA Act that mandated fundamental changes in TVA's governance structure. In March 2006, TVA made the transition from a 3-member, full time board, to a 9-member part-time board of directors. Also under the authority of the 2005 amendments to the TVA Act, the new Board appointed the federal corporation's first chief executive officer in its 73-year history. Under TVA's management structure, the Board is responsible for providing strategic guidance and policy direction, while the CEO is responsible for the day-to-day management of TVA's operations.

These changes have largely been welcomed for providing expanded representation of TVA's service territory and I am not here to attack the current board members. However, I do wish to showcase an emerging opportunity for this Committee to have a significant and positive impact on TVA operations almost immediately. There are currently two vacant seats on the TVA Board and two more seats will become available for appointment in May 2009. Therefore, four Board appointments can be made within the next 6 months.

Because of TVA's prominent role in the nation's energy community it is critically important that Board appointments be individuals who committed to safeguarding the natural resources of the Southeastern U.S. and are willing and able to take advantage of TVA's potential to be a leader in energy efficiency and renewable energy development. The long history of ambivalence towards environmental safety documented in the press and reviewed in previous sections of this testimony highlights the need for strong leadership within TVA.

TVA is administered by a board of nine part-time members appointed by the President of the United States with the advice and consent of the Senate.⁸⁷ A Board member serves for

renewable, 5-year terms. The TVA Board currently consists of seven members and two outstanding seats. The table below lists the current members, their ages, home states, and terms of office. A biography of each Board member, as well as current President and CEO Tom Kilgore, is provided in Figure 4.

Board member	Home state	Year appointed	Term expires
William Sansom (Chairman)	Tn	2006	2009
William Graves	Tn	2007	2012
Dennis Bottorff	Tn	2006	2011
Donald DePriest	Ms	2006	2009
Mike Duncan	Ky	2006	2011
Tom Gilliland	Ga	2008	2011
Howard Thrailkill	Al	2006	2010
Vacant seat	?	?	2013
Vacant seat	?	?	2013

The TVA Act provides that at least 7 of the 9 Board members must be legal residents of TVA's service area.⁸⁸ To be appointed a member of the Board, an individual:

- (1) shall be a citizen of the U.S.;
- (2) shall have management expertise relative to a large for-profit or nonprofit corporate, government, or academic structure;
- (3) shall not be an employee of the Corporation;
- (4) shall make full disclosure to Congress of any investment or other financial interest that the individual holds in the energy industry; and
- (5) shall affirm support for the objectives and missions, of the Corporation, including being a national leader in technological innovation, low-cost power, and environmental stewardship.⁸⁹

The TVA Act instructs the President, in appointing Board members, to "consider recommendations from such public officials as: (A) the Governors of the States in the service area; (B) individual citizens; (C) business, industrial, labor, electric power distribution, environmental, civic, and service organizations; and (D) the congressional delegations of the States in the service area."⁹⁰ The Act also directs the President to "seek qualified members from among persons who reflect the diversity, including the geographic diversity, and needs of the service area of the Corporation."⁹¹

Once appointed, the removal of board members is extremely rare. Only once, in 1938, has a Board member been removed from his position. However, it led to the 1940 Federal Appeals Court holding in *Morgan v. TVA*, where the court held that a Board member, having duties predominantly executive, could be removed by the President without cause.⁹² Board members may also be removed by joint resolution of both houses of the U.S. Congress.⁹³

Once Board members are selected, the agency is free to act with little oversight in choosing the course of the Southeastern States' energy future. While we are now calling for increased congressional oversight of TVA operations, some will warn against "micro-managing" the agency. I believe that the current situation is far from any sort of "micro-management" and has led to the situation that we have witnessed in the past weeks. In this situation, it is critical that the Board of Directors be staffed with members who have the skill and vision to reposition TVA as leader in this nation's energy future.

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 30

2. *TVA should be required to undertake integrated resource planning at regular intervals so that all energy options, including energy efficiency and renewable energy resources are considered on a level playing field.*

In spite of mounting research showing the benefits of integrated resource planning to both utilities and customers, TVA has repeatedly denied requests to undertake a comprehensive planning process that includes all resource options to meet future electricity demand. This process, called integrated resource planning, is in use throughout the nation and is mandated by many states that recognize the benefits associated with proper planning and assessment of all resource options to meet future demand.

In detail, integrated resource planning (IRP) is a planning process for electric utilities that evaluates many different options for meeting future electricity demands and selects the optimal mix of resources that minimizes the cost of electricity supply while meeting reliability needs, environmental requirements, and other objectives. With traditional utility planning, supply side options, (those that supply more power), are typically considered the only way to meet future demand. IRP, however, also includes the consideration of demand-side options – those options that reduce electricity demand, thereby avoiding the costs of new generation facilities. IRP strives to:

1. Evaluate all options, from both the supply and demand sides, in a consistent manner.
2. Minimize costs to all stakeholders (and not just costs to the utility).
3. Create a flexible plan that allows for uncertainty and permits adjustment in response to changed circumstances.
4. Allow for open decision-making processes that and involvement of all stakeholders.

The result of this process is the achievement of lower overall costs than might result from considering only supply-side options. Furthermore, the inclusion of demand-side options and non-traditional supply-side options such as cogeneration and renewable energy sources, presents more possibilities for saving fuel and reducing negative environmental impacts than might be possible if only supply-side options were considered.

Integrated resource planning usually consists of a number of steps that make intuitive sense when planning for the provision of electricity to nearly 9 million people in the current situation where a complex regulatory system is in place and fuel and construction costs are highly variable. These steps generally include:

1. Identifying the objectives of the plan (e.g. reliable service, meeting peak demand at least cost, etc.) and the appropriate time horizon.
2. Collecting data needed for the planning process.
3. Developing one or more demand forecasts.
4. Identifying resource options including demand-side and supply-side resources.
5. Consistently evaluating all resources including calculating avoided costs, conducting benefit-cost analyses, and considering environmental externalities.

6. Selecting the most promising options to create an integrated, effective, and responsive plan.
7. Conducting uncertainty or scenario analyses for different economic, environmental, and social circumstances.
8. Based on these uncertainty or scenario analyses, developing a plan that best addresses the most likely contingencies while providing flexibility in case one of the less likely scenarios comes to pass.
9. Developing an action plan.
10. Implementing the action plan.
11. Monitoring and evaluating implementation of the plan and revising the plan as necessary.
12. An open planning process and Stakeholder input and review of plans and proposed amendments.

The benefits of IRP are generally recognized and supported by a growing body of scientific research. Several states nationally have now mandated IRP to their electric utilities, including several southern states that neighbor TVA. In North Carolina, integrated resource planning is required along with yearly reviews to reevaluate utilities' strategic plans and amend them to changing circumstances. Additionally, Kentucky and Georgia require IRP with review and amendment every three years. Florida also has integrated resource planning requirements that require a 10-year plan be submitted every year for review and approval by the utilities commission.

In contrast to the integrated resource planning and regular review and amendment that is occurring throughout the nation, TVA's 1995 Integrated Resource Plan, (also referred to as Energy Vision 2020) continues to guide decision-making regarding the TVA system. I participated in the 1995 TVA IRP review process. I can promise you that the technology and the utility environment have changed considerably since then. The simple fact is that relying on a 14-year old resource plan in today's constantly changing electricity markets is irresponsible. As recently as 2007, TVA has wed itself to this outdated plan for meeting future energy needs. TVA's 2007 Strategic Mission, approved by the TVA Board of Directors on May 31, 2007, states that the "goals in the Strategic Plan are consistent with those in the 1995 IRP . . . At this time, no change to the IRP is necessary as a result of the content or direction provided by the strategic plan."⁹⁴

Congressional requirement of integrated resource planning has precedent in that it is required of the Northwest Power and Conservation Council, created by Congress in 1980 through enactment of the Northwest Power Act. Sections 839b(d) through (g) of the Northwest Power Act requires the Council to prepare, adopt and review not less than once every five years a regional conservation and electric power plan.⁹⁵ The Act also requires public input into the plan creation and amendment process and mandates the priorities for the Council, prioritizing conservation, renewable resources and waste heat recovery or high fuel conversion efficiency over all other resources. Further requirements of the Act ensure that the Council's plan is adequately detailed and that it goes through a lengthy stakeholder review process. Such an integrated resource plan mandated by Congress would provide the framework necessary for proper decision-making within the TVA.

Testimony of Stephen A. Smith, DVM, Executive Director, Southern Alliance for Clean Energy, before the Senate Committee on Environmental and Public Works. 32

The IRP process and subsequent review and amendment is critical to TVA's ability to develop strategies that fits into a carbon constrained world, advanced energy efficiency and develop cost-effective renewable energy resources. Since TVA is unwilling to undertake a transparent integrated resource planning process, Congress must mandate it upon TVA to ensure that TVA remains competitive in the 21st century utility community. This process must be transparent and have independent stakeholder review.

3. *TVA should begin the process of updating its generation facilities and distribution grid to position itself to become a leader in energy innovations in the 21st century.*

The disaster that occurred at the Kingston Plant can be directly attributed to the use of outdated and dangerous facilities that do not adhere to current scientific knowledge. In fact, however, many of TVA's shortcoming, to some degree, are derived from the fact that TVA's generation, transmission and distribution system is severely outdated and in need of significant improvements. A concerted effort to begin what will be the long process of updating TVA's generation, transmission and distribution system must be mandated in order to position TVA to take a leadership role in this nation's energy future. Examples of TVA's aging assets include:

- Fifty-nine coal-fired generation units with an average age of about 50 years.
- Forty eight combustion turbines with an average age of about 35 years.
- Twenty-nine power producing dams with an average age of about 65 years.
- A transmission system that in 1998 had 24% of its substation transformers over 50 years old, 39% of its plant transformers over 50 years old, 39% of its circuit breakers over 40 years old, and 21% of its protective relays over 40 years old.⁹⁶

Exacerbating this problem is the fact that, similar to many of the nation's largest utilities, TVA is faced with maintaining and, in some cases, modernizing or rehabilitating its aging infrastructure in an environment which includes:

- Increasing demands on the transmission system from new merchant plants, open access requirements, and transmission wheeling;
- Increasing power demand, especially during peak seasons
- The need to maintain system reliability
- Changing environmental requirements and legislation
- The pressure to keep power rates low.

Modernizing TVA's generation, transmission and distribution system is a large and daunting task, spreading over seven states and 80,000 square miles. However, it is necessary not only to maintain reliable electricity service to the 8.8 million people that TVA serves, but also to position TVA to move successfully into the 21st century energy environment. Further, at a time when economic crisis grips the nation, such a large-scale project could significantly improve the economic situation of millions of people in the TVA region, allow for the rapid development of renewable energy sources, and greatly increase the energy efficiency of a significant portion of the United States.

However, it is unlikely that the modernization of TVA's generation and distribution system will occur without a Congressional commitment of some sorts. As we're sure you are aware, TVA is self-funded through the sale of its electricity and has received no federal funding since 1998. Also, TVA is charged with maintaining the lowest rates possible, thereby severely restricting its ability to take proactive measures in this regard. Given the challenges of global warming and the need for greater innovation in the electric utilities sector, I believe it may be appropriate to reconsider direct federal funding to TVA for limited research and development and deployment of energy efficiency, smart grid, and renewable energy technologies.

4. *TVA should aggressively develop all cost-effective energy efficiency programs and renewable energy resources within their region.*

TVA needs to set strong goals on renewable energy development, and create a plan to reach those goals. Energy efficiency and renewable energy development will ensure that the electricity supply for TVA is less dependent on large power plants that use imported fossil and nuclear fuels, will result in significantly lower emissions of global warming pollution and will support grid strength. Further, renewable energy development is associated with more local jobs than power generation that relies on imported fuels.

These green jobs are a major economic development activity. For example, Tennessee, Alabama and Georgia are among the top 20 states in the country with potential to add wind generation related manufacturing jobs.⁹⁷ Tennessee and Alabama alone could add over 21,000 manufacturing jobs if the U.S. pursued an aggressive national renewable energy program.⁹⁸ Tennessee also has a burgeoning solar manufacturing industry that would benefit from programs that encouraged the widespread adoption of these technologies, thereby creating further job opportunities.

Claims that the TVA region is not rich in renewable energy resources are false. According to recent estimates, today's biomass, wind, and solar technologies has the potential to achieve 20% of TVA's demand.⁹⁹ However, TVA has consistently challenged these study results by denigrating valid resource potential studies, overestimating the potential cost of developing renewable energy resources and ignoring the price trends of these technologies. The fact is that while the costs of constructing new nuclear and coal-powered generation continue to rise sharply, the costs of developing solar, wind, and other renewable resources have generally declined. These price trends raise the question of why TVA would commit to spending a now estimated \$17 billion on constructing new nuclear power generation when by the time these facilities come on line (most likely in 7 to 10 years) the cost of developing solar and wind resources could be far less expensive per unit of electricity generated.

TVA's efforts to implement effective energy efficiency programs has also been lackluster. If the TVA adopted energy efficiency programs with a goal of being a national leader (as stated in TVA's recent strategic plan), it could use energy efficiency to meet a significant percentage of its projected annual growth. In contrast to this potential, in 2005-06, the Tennessee Valley Authority and its distributors achieved energy savings of 0.04% of annual sales. Compared to peer utilities, the TVA is at the "back of the pack." Leading utilities are achieving energy savings of 0.4% to well in excess of 1% of annual sales. Figure 5 shows how TVA compares with other utilities in

energy efficiency savings.

Among the leaders are utilities from different regions of the United States, public and investor-owned utilities, utilities with high load growth and negative load growth, utilities with high rates and utilities with low rates. There is ample proof that motivated utilities can achieve high levels of energy savings using energy efficiency programs on a reliable and consistent basis.

The TVA's recent commitment to invest \$99 million in energy efficiency is a good step forward in developing effective energy efficiency programs. However, the development of programs that actually reduce electricity consumption requires more than just committing monetary resources. It requires the development of programs that are specifically tailored to reduce energy consumption on both a per capita basis and overall. Also, TVA has been highly secretive of the programs they are developing and I am relatively certain that a large proportion of this money will be spent on reducing demand during peak periods, thereby not reducing overall electricity consumption, but simply shifting consumption patterns to times when demand is historically lower.

In all, TVA has not been a leader in any sense of the word with regards to either the development of renewable energy resources or effective energy efficiency programs. While enormous potential exists to reduce electricity demand through energy efficiency and to develop clean, renewable energy resources, TVA has continued with the business-as-usual approach: building more and more potentially harmful generation facilities while ignoring the opportunities that efficiency and renewable energy provide. This lack of vision and desire has the potential to severely hamper the nation's efforts to increase productivity in a carbon-constrained world.

To once again put TVA on a course towards being a leader in energy innovation, Congress must either provide specific legislative goals for the development of renewable energy and energy efficiency in the TVA service territory or include TVA in any future renewable energy or energy efficiency legislation. It is entirely possible for TVA to achieve a 1% reduction in energy demand through energy efficiency measures each year and to receive 20% of its generation capacity from new renewable resources by 2025. This Committee should ensure that TVA, at a minimum, meets these goals.

Finally, a simple change to the TVA Act will send a proper signal to TVA to include energy efficiency and renewable energy in their electricity portfolio mix. Currently, the TVA Act charges TVA with ensuring that consumer *rates* remain as low as possible. However, the proper goal should be to ensure that consumer *costs* remain as low as possible. This simple change would have a significant impact on the operations of TVA. For example, if electricity costs 10 cents/kWh and a resident uses 1000 kWh per month, then that resident's electricity charges are \$100 per month. However, if TVA enacts energy efficiency programs that raise the price of electricity to 12 cents/kWh, but the consumer only uses 800 kWh/month, then while the rates have risen, the consumer's monthly costs have decreased to \$96 per month while simultaneously reducing stress to the system and greenhouse gas emissions. While this is a simplified example, it serves to illustrate the point that TVA should not be pursuing the lowest rates possible. Instead, TVA should be pursuing energy efficiency programs that reduce the overall costs to consumers.

In all, energy efficiency and renewable energy must be significant components of any utility's future energy portfolio. States are rapidly adopting legislation to require not only integrated resource planning but also minimum investments in energy efficiency and renewable energy. Further, the push for federal legislation has increased in momentum in recent years. In light of these societal changes, coupled with the growing renewable energy and energy efficiency markets, TVA must either aggressively pursue these resources, or continue to lag behind the rest of the nation.

5. *Congress should address the conflicts of interest in the TVA Act that result in TVA acting as both regulator of, and party to contract with distributors of TVA-generated electricity.*

TVA's simultaneous position as regulator and a party to contracts with wholesale distributors of TVA-generated electricity creates a conflict of interest that prohibits the proper regulation of distributors. Typically, an independent public utility commission that approves rate charges regulates a utility or electricity distributor. However, in the case of the TVA, the regulatory authority is coupled with contractual arrangements between TVA and its distributors for the sale and distribution of TVA-generated electricity. This places the organization in an inherent conflict of interest by attempting to maintain good relations with its customers while at the same time being tasked with regulating them to keep rates low and ensure proper service.

In 2006, the Office of Inspector General completed *Review of TVA's Role as a Rate Regulator*.¹⁰⁰ That report concluded: "We believe there is an increasing inherent conflict in TVA serving as a regulator while working to ensure good customer relations."¹⁰¹ The report further notes that there are no formalized guidelines or specific criteria related to when rate adjustments should be disallowed.

Further, in a September 2008 report by the TVA Office of Inspector General, the issue was once again raised of the conflict of interest between TVA's customer service relations and its role as a regulator.¹⁰²

The TVA act places the organization in a situation of inherent conflict attempting to maintain good relations with its customers while at the same time being tasked with regulating them to keep rates as low as feasible. . . . The fact that it took TVA over two years to respond to our [2006] report suggest that magnitude of the problem. The TVA act gives the Board authority to include terms and conditions in power contracts as needed to carry out the purposes of the Act, which include keeping rates as low as feasible. Pursuant to this authority, most power contracts include, in addition to a required nondiscriminatory provision, terms and conditions related to resale rates, use of revenues, and financial and accounting requirements. It remains to be seen as to whether or not TVA can manage this increasing conflict. When Congress enacted the TVA Act creating TVA, it could not have foreseen the current circumstances that compromise TVA's integrity as a regulator. It is likely that the increasing demands of distributors upon TVA will increase the conflict for TVA.¹⁰³

The report further notes the likelihood of the problem growing worse in the future.

In recent years, distributors have begun to see options to purchase power from companies other than TVA. The restrictions on TVA selling power outside the Valley, however, remain unchanged. Because TVA cannot obtain new customers outside the valley, TVA has a strong incentive to take steps to ensure it retains its current customers. As competition becomes more and more a reality, this incentive grows. This compounds the difficulty for TVA being an objective regulator of these customers.¹⁰⁴

Congress must address this conflict of interest to allow for proper regulations of distributors and effective contractual agreements between distributors and TVA. Otherwise, as competition between TVA and outside generators of electricity grows, TVA will grow more and more at the mercy of the distributors for which it is charged with regulating.

Conclusions:

I would like to thank Chairman Boxer and Members of the Committee for holding these hearings. It is a critical first step towards greater environmental protections for us and future generation of Americans, as well as the beginning of a process that I sincerely hope will result in the Tennessee Valley Authority becoming this nation's living laboratory, leading the way towards a clean and sustainable energy future. I am deeply committed to working towards the success of both of these goals and am happy to answer any questions that you may have now or in the future.

Thank you.

Stephen A. Smith, DVM
Executive Director
Southern Alliance for Clean Energy

Figure 4: TVA Board Members and CEO:

Source: TVA website at: <http://www.tva.com/abouttva/board/members.htm>

Chairman William B. Sansom of Knoxville, Tenn., is chairman and chief executive officer of The H.T. Hackney Co. and has held that position since 1983. Hackney is a diversified company involved in wholesale grocery, gas and oil, and furniture manufacturing. His term expires May 18, 2009.

Dennis Bottorff of Nashville, Tenn., serves as chairman and partner of Council Ventures, a venture capital firm. He was chairman of AmSouth Bancorporation in Nashville until his retirement in 2001 and previously was chief executive officer of First American Bank. His term expires May 18, 2011.

Don DePriest of Columbus, Miss., is chairman of a venture capital firm headquartered in Alexandria, Va. The firm has founded or invested in such companies as American Telecasting, now merged with Sprint; his Charisma Communications Corp. was a pioneer in the cellular phone business. He previously chaired the Columbus, Mississippi, Utilities Commission. His term expires May 18, 2009.

Mike Duncan of Inez, Ky., is chairman, chief executive officer, and director of Community Holding Co.; chairman, CEO, and director of Inez Deposit Bank; and Chairman of the Republican National Committee. He is a director of the regional Center for Rural Development. His term expires May 18, 2011.

Tom Gilliland, of Blairsville, Ga., recently retired as executive vice president, general counsel and secretary of United Community Banks Inc. He is a former chief of staff to Georgia Lt. Gov. Pierre Howard and served as chairman of the Stone Mountain Authority under Georgia Govs. Roy Barnes and Sonny Perdue. His term expires May 18, 2011.

William Graves of Memphis is presiding Bishop of the Christian Methodist Episcopal Church. He was previously pastor of the Phillips Temple CME Church of Los Angeles, Calif. He is the immediate Past President of the Board of the National Congress of Black Churches and a former member of the board of Memphis Light, Gas & Water. His term expires on May 18, 2012.

Howard Thrailkill of Huntsville, Ala., recently retired as president and chief operating officer of Adtran, Inc., in Huntsville, which supplies equipment for telecommunications service providers and corporate end-users. Previously, he was president and chief executive officer of the firm Floating Point Systems. His term expires May 18, 2010.

President and CEO Tom Kilgore previously served as President and CEO of Progress Energy Ventures, a subsidiary of Progress Energy Company, and as Senior Vice President of Power Operations for Carolina Power & Light (which became Progress Energy).

Figure 5: TVA ranks near the bottom in terms of energy efficiency savings compared with utilities from across the nation.

Utility	Savings	Sales	Growth
(1) Massachusetts Electric	1.60%	12,990,328 (27)	-15%
(2) PG&E	1.32%	76,817,131 (8)	7%
(3) Edison International	1.31%	78,863,143 (7)	6%
(4) Connecticut Light & Power	1.09%	22,109,070 (19)	-7%
(5) Puget Energy	0.81%	21,091,533 (20)	4%
(6) Sacramento Municipal Utility	0.75%	10,799,230 (30)	4%
(7) Alliant Energy	0.72%	26,605,902 (15)	0%
(8) MidAmerican Energy	0.60%	23,389,319 (18)	5%
(9) Sierra Pacific Resources	0.51%	29,827,109 (13)	3%
(10) Long Island Power Authority	0.46%	18,353,670 (22)	-4%
(11) IDACORP	0.41%	13,939,314 (25)	5%
(12) Xcel Energy	0.41%	86,584,655 (5)	2%
(13) PacifiCorp	0.34%	51,797,336 (9)	5%
(14) Hawaiian Electric Industries	0.30%	10,115,832 (31)	1%
(15) PSE&G	0.21%	34,354,438 (10)	-2%
(16) FP&L	0.19%	103,652,914 (4)	2%
(17) FirstEnergy	0.15%	31,711,206 (11)	-1%
(18) TECO Energy	0.14%	19,025,064 (21)	1%
(19) Salt River Project	0.12%	26,249,636 (16)	7%
(20) Wisconsin Energy	0.12%	28,855,158 (14)	-2%
(21) Consolidated Edison	0.09%	26,100,714 (17)	-11%
(22) New York Power Authority	0.07%	14,887,670 (23)	-1%
(23) E.ON	0.05%	30,661,216 (12)	-2%
(24) Progress Energy	0.04%	82,723,457 (6)	-1%
(25) Tennessee Valley Authority	0.04%	163,587,097 (1)	1%
(26) UniSource Energy Corp	0.02%	10,812,839 (29)	4%
(27) AES	0.02%	14,715,841 (24)	-3%
(28) Santee Cooper	0.01%	11,616,626 (28)	1%
(29) Southern Company	0.01%	161,333,527 (2)	4%
(30) Pennsylvania Electric	0.01%	13,577,726 (26)	2%
(31) Duke Energy	0.01%	125,416,094 (3)	0%

Source: Data collected from the Energy Information Administration Form 861, 2005-2006.

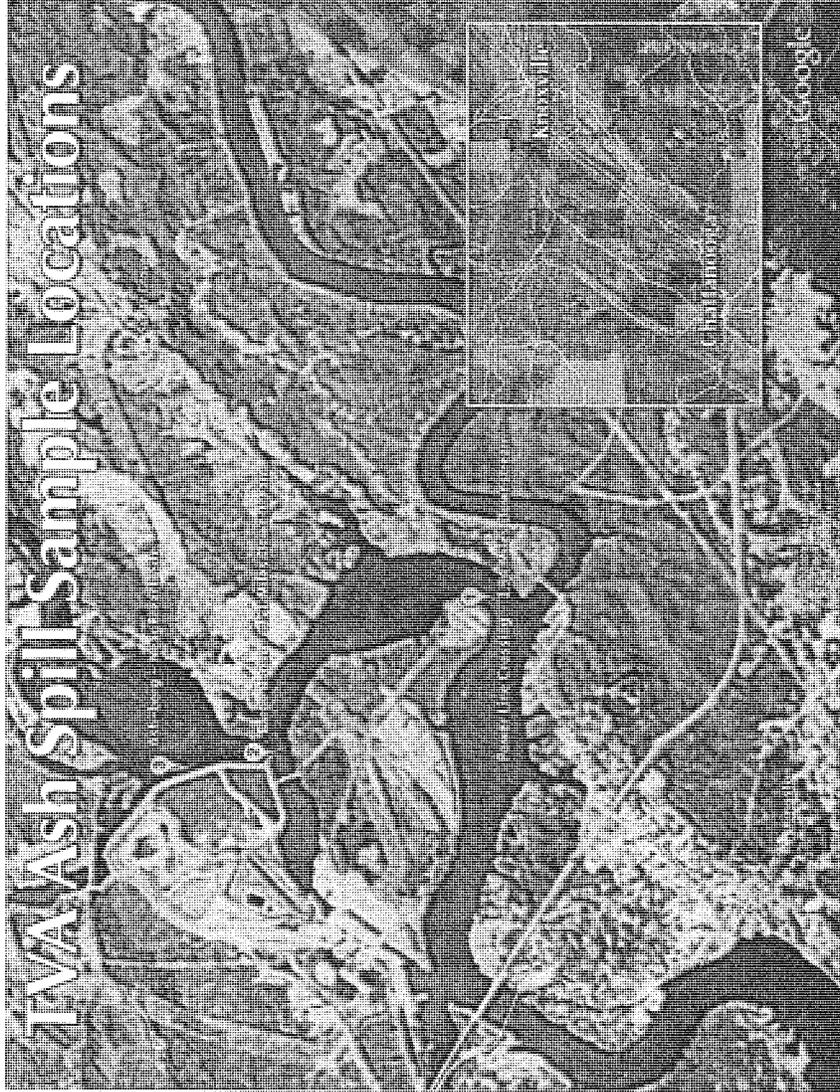
APPENDIX 1:

**Independent Sampling Results for Heavy Metal Concentrations at Sites in Proximity to
the December 22, 2008 TVA Coal Ash Spill**

Results of ICP-OES analyses of the TVA ash spill samples collected 12-27-08 from the Emory River
 Samples collected by Donna Lisenby (Appalachian Voices/Wasaga Riverkeeper) and analyzed by Shea Tuberty, PhD and Carol Babayak, PhD (Appalachian State University)

Element	Water Samples				Sediment		TN Water Quality Standards		Notes
	N=3 mean std dev	Power Line Crossing 1.94 miles downstream 0.356 0.083	Barge Boom 0.51 miles 3.062 0.572	Ash-berg Near breach site 1.083 0.082	Ash-berg Near breach site 135.205 0.463	Domestic Water Supply 0.010	Fish & Aquatic Maximum (CMC)		
Arsenic	mean std dev	0.818 0.214	5.265 0.424	7.904 0.928	583.603 11.576	n/a	0.340	35 to 500 times higher than drinking water criteria 3 to 10 times the max TN aquatic life criteria	
Barium	mean std dev	0.001 0.000	0.014 0.001	0.008 0.000	0.985 0.000	0.005	0.002	2 to 4 times higher than drinking water criteria	
Cadmium	mean std dev	0.049 0.004	0.376 0.033	0.345 0.072	49.857 1.780	0.100	*	0.25 to 3 times higher than drinking water criteria 0.2 times the max TN aquatic life criteria	
Chromium	mean std dev	0.031 0.009	0.195 0.042	0.141 0.059	11.143 1.152	n/a	n/a	3.5 times higher than max drinking water criteria	
Cobalt	mean std dev	0.095 0.013	0.622 0.093	1.035 0.111	86.624 2.417	n/a	0.013	7 to 10 times the max TN aquatic life criteria	
Copper	mean std dev	28.004 30.497	151.917 22.594	122.988 19.473	18849.788 1009.305	n/a	n/a		
Iron	mean std dev	0.029 0.006	0.137 0.038	0.313 0.044	75.931 0.982	0.005	0.065	6 to 60 times higher than max drinking water limit 0.2 to 0.5 times the max TN aquatic life criteria	
Lead	mean std dev	1.172 0.683	10.893 0.249	1.705 0.097	92.870 2.984	n/a	n/a		
Manganese	mean std dev	0.010 0.013	not detected 0.017	0.017 0.022	0.173 0.008	0.002	0.001	5 to 8 times higher than max drinking water limit 7 to 12 times the max TN aquatic life criteria	
Mercury	mean std dev	0.027 0.012	0.182 0.075	0.061 0.004	4.034 0.099	n/a	n/a		
Molybdenum	mean std dev	0.046 0.012	0.339 0.026	0.363 0.033	40.016 1.440	0.100	0.470	3 times higher than max drinking water limit	
Nickel	mean std dev	0.005 0.001	0.006 0.007	0.002 0.013	2.598 0.559	0.050	0.020	0.25 to 0.7 times the max TN aquatic life criteria	
Selenium	mean std dev	not detected not detected	not detected not detected	not detected not detected	0.021 0.008	n/a	n/a		
Silver	mean std dev	not detected not detected	0.006 0.000	0.008 0.003	0.008 0.046	0.002	n/a	3 to 4 times higher than max drinking water limit	
Thallium	mean std dev	0.196 0.050	1.280 0.178	1.388 0.305	124.074 3.257	n/a	n/a		
Vanadium	mean std dev	0.164 0.045	0.977 0.055	0.619 0.077	71.149 3.284	n/a	0.120	1.5 to 8 times the max TN aquatic life criteria	
Zinc	mean std dev								

not detected = no levels were found at the limits of our analytical instrumentation
 n/a = there are no regulated levels of these elements in drinking water
 *Fish and Aquatic criteria are speculated into Co III and Co IV but samples are not speculated
 Sample exceeds one or more TN water quality criteria
 Description of domestic drinking water criteria exceedance
 Description of fish and aquatic criteria exceedance



Results of ICP-OES analyses of the TVA ash spill samples collected 12-27-08 from the Emory River

Samples collected by Donna Lisenby (Appalachian Voices/Watauga Riverkeeper)
 Samples analyzed by Professor Shea Tuberty, PhD and Professor Carol Babyak, PhD - Appalachian State University
 Each field sample was used to prepare 3 replicate samples for analyses, means and standard deviations were calculated from these three replicates

Element	Water Samples from Emory River Sites			Ash Pile Sample	
	Power Line Crossing	Barge Boom	Ash-berg	Ash-berg	Ash-berg
	Water values are expressed in mg/L (or parts per million)				
Arsenic	0.380	3.711	0.989		135.691
	0.285	2.635	1.116		139.304
mean	0.403	2.839	1.142		130.619
std dev	0.356	3.062	1.083		135.205
	0.063	0.572	0.082		4.363
Barium	0.916	5.750	8.649		570.244
	0.572	4.965	8.188		589.901
mean	0.965	5.079	6.876		590.665
std dev	0.818	5.265	7.904		583.603
	0.214	0.424	0.920		11.576
Cadmium	0.001	0.015	0.009		0.987
	0.001	0.013	0.009		0.985
mean	0.001	0.013	0.008		0.983
std dev	0.001	0.014	0.008		0.985
	0.000	0.001	0.000		0.002
Chromium	0.055	0.414	0.329		48.901
	0.033	0.358	0.371		48.815
mean	0.058	0.356	0.336		51.854
std dev	0.049	0.376	0.345		49.857
	0.014	0.033	0.023		1.730
Cobalt	0.035	0.169	0.207		9.891
	0.021	0.243	0.121		12.158
mean	0.037	0.172	0.094		11.381
	0.031	0.195	0.141		11.143

	std dev	0.009	0.042	0.059	1.152
Copper		0.105	0.689	1.120	83.573
		0.073	0.581	1.066	89.985
	mean	0.108	0.596	0.890	86.314
Iron	std dev	0.095	0.622	1.025	86.624
		0.019	0.058	0.121	3.217
		32.638	177.875	117.263	18575.140
Lead		15.988	137.125	138.375	18005.377
		35.388	140.750	113.325	19967.345
	mean	28.004	151.917	122.988	18849.288
Manganese	std dev	10.497	22.554	13.471	1009.305
		0.031	0.157	0.347	25.070
		0.023	0.126	0.329	26.752
Mercury		0.035	0.128	0.264	25.970
	mean	0.029	0.137	0.313	25.931
	std dev	0.006	0.018	0.044	0.842
Molybdenum		1.179	11.075	1.756	89.838
		1.144	10.609	1.729	93.430
	mean	1.193	10.984	1.630	95.342
Zinc	std dev	1.172	10.893	1.705	92.870
		0.025	0.249	0.067	2.794
		0.020	not detected	0.042	0.273
Cadmium		0.001	not detected	0.006	0.141
	mean	not detected	not detected	0.004	0.105
	std dev	0.010	not detected	0.017	0.173
Cobalt		0.013	0.022	0.088	0.088
		0.032	0.267	0.060	4.082
	mean	0.012	0.127	0.057	4.100
Nickel		0.035	0.153	0.065	3.920
	mean	0.027	0.182	0.061	4.034
	std dev	0.012	0.075	0.004	0.099

Appendix 2:

**EPA's March 5, 2000 Regulatory Determination on Wastes from
Combustion of Fossil Fuels**

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 261

3/5/00

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EPA

Regulatory Determination on Wastes from the Combustion of Fossil Fuels

AGENCY: Environmental Protection Agency

ACTION: Regulatory Determination

SUMMARY: This notice explains EPA's determination of whether regulation of fossil fuel combustion wastes is warranted under Subtitle C of the Resource Conservation and Recovery Act (RCRA). Today's action applies to all utility, industrial, commercial and institutional burners of fossil fuels, including coal, oil, and natural gas fuels. It also applies to entities that use or reuse fossil fuel combustion wastes for beneficial uses or other purposes.

The Agency has concluded, based on our review of the criteria which RCRA directs EPA to consider in making today's regulatory determination:

- The following fossil fuel combustion wastes do not warrant regulation under Subtitle C of

RCRA:

- Wastes from the combustion of oil;
- Wastes from the combustion of natural gas; and

- Certain coal combustion wastes used for beneficial purposes, other than to fill surface or underground mines, such as waste stabilization, beneficial construction applications (e.g., cement, concrete, and concrete products, road bed, wall board), and in agricultural applications (e.g., as a substitute for lime).
- EPA has determined that regulation under Subtitle C of RCRA is warranted for the following wastes when they are land disposed (e.g., managed in landfills or surface impoundments) or when used to fill surface or underground mines. The Agency intends to develop regulations establishing national management standards following the approach taken in the recently proposed regulations applicable to cement kiln dust which includes a contingent hazardous waste listing (64 FR 45632; August 20, 1999). If EPA adopts such an approach, when the following wastes are properly managed in accordance with the standards, they will not be classified as hazardous wastes. When they are not properly managed, these wastes would become listed hazardous wastes subject to tailored Subtitle C standards pursuant to Section 3004(x) of RCRA.
 - Large-volume coal combustion wastes generated at electric utility and independent power producing facilities that are co-managed together with certain other coal combustion wastes;
 - Coal combustion wastes generated by non-utilities;
 - Coal combustion wastes generated at facilities with fluidized bed combustion technology;
 - Petroleum coke combustion wastes; and
 - Wastes from the combustion of mixtures of coal and other fuels (i.e., co-burning).

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Floor, Arlington, VA 22202. Comments may also be submitted electronically through the Internet to: rcra-docket@epa.gov. Comments in electronic format should also be identified by the docket number F-2000-FF2F-FFFFF and must be submitted as an ASCII file avoiding the use of special characters and any form of encryption.

Commenters should not submit electronically any confidential business information (CBI). An original and two copies of CBI must be submitted under separate cover to: RCRA CBI Document Control Officer, Office of Solid Waste (5305W), U.S. EPA, Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460-0002.

Public comments and supporting materials are available for viewing in the RCRA Information Center (RIC), located at Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, VA. The RIC is open from 9 a.m. to 4 p.m., Monday through Friday, excluding federal holidays. To review docket materials, we recommend that the public make an appointment by calling 703 603-9230. The public may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost \$0.15/page. The index and some supporting materials are available electronically. See the "Supplementary Information" section for information on accessing them.

FOR FURTHER INFORMATION CONTACT: For general information, contact the RCRA Hotline at 800 424-9346 or TDD 800 553-7672 (hearing impaired). In the Washington, DC, metropolitan area, call 703 412- 9810 or TDD 703 412-3323.

For more detailed information on specific aspects of this regulatory determination, contact Dennis Ruddy, Office of Solid Waste (5306W), U.S. Environmental Protection Agency,

Ariel Rios Building, 1200 Pennsylvania Avenue, NW, Washington, DC 20460-0002, telephone (703) 308-8430, e-mail address ruddy.dennis@epa.gov.

SUPPLEMENTARY INFORMATION: The index and several of the primary supporting materials are available on the Internet. You can find these materials at <http://www.epa.gov/epaoswer/other/fossil/index.htm>.

The official record for this action will be kept in paper form. Accordingly, EPA will transfer all comments received electronically into paper form and place them in the official record, which will also include all comments submitted directly in writing. The official record is the paper record maintained at the address in "ADDRESSES" at the beginning of this notice.

EPA will not immediately reply to commenters electronically other than to seek clarification of electronic comments that may be garbled in transmission or during conversion to paper form, as discussed above.

The contents of today's notice are listed in the following outline:

- I. GENERAL INFORMATION
 - A. What action is EPA taking today?
 - B. What is the statutory authority for this action?
 - C. What was the process EPA used in making today's decision?
 - D. What is the significance of "uniquely associated wastes" and what wastes does EPA consider to be uniquely associated wastes?
 - E. Who is affected by today's action and how are they affected?
 - F. What additional actions will EPA take after this regulatory determination regarding coal, oil and natural gas combustion wastes?

2. WHAT IS THE BASIS FOR EPA'S REGULATORY DETERMINATION FOR COAL COMBUSTION WASTES?
 - A. What is the Agency's decision regarding the regulatory status of coal combustion wastes and why did EPA make that decision?
 - B. What were EPA's tentative decisions as presented in the Report to Congress?
 - C. How did commenters react to EPA's tentative decisions and what was EPA's analysis of their comments?
 - D. What is the basis for today's decisions?
 - E. What other information would EPA like to receive to assist the Agency in implementing today's regulatory determination?
3. WHAT IS THE BASIS FOR EPA'S REGULATORY DETERMINATION FOR OIL COMBUSTION WASTES?
 - A. What is the Agency's decision regarding the regulatory status of oil combustion wastes and why did EPA make that decision?
 - B. What were EPA's tentative decisions as presented in the Report to Congress?
 - C. How did commenters react to EPA's tentative decisions and what was EPA's analysis of their comments?
 - D. What is the basis for today's decisions?
4. WHAT IS THE BASIS FOR EPA'S REGULATORY DETERMINATION FOR NATURAL GAS COMBUSTION WASTES?

- A. What is the Agency's decision regarding the regulatory status of natural gas combustion wastes and why did EPA make that decision?
 - B. What were EPA's tentative decisions as presented in the Report to Congress?
 - C. How did commenters react to EPA's tentative decisions and what was EPA's analysis of their comments?
 - D. What is the basis for today's decisions?
5. WHAT IS THE HISTORY OF EPA'S REGULATORY DETERMINATIONS FOR THE FOSSIL FUEL COMBUSTION INDUSTRY?
- A. On what basis is EPA required to make regulatory decisions regarding the regulatory status of fossil fuel combustion wastes?
 - B. What was EPA's general approach in making these regulatory determinations?
 - C. What happened when EPA failed to issue its determination of the regulatory status of the large volume utility combustion wastes in a timely manner?
 - D. When was the Part 1 regulatory decision made and what were its findings?
6. EXECUTIVE ORDERS AND LAWS ADDRESSED IN TODAY'S ACTION
- A. Executive Order 12866 - Determination of Significance
 - B. Regulatory Flexibility Act, as amended
 - C. Paperwork Reduction Act (Information Collection Requests)
 - D. Unfunded Mandates Reform Act

- E. Executive Order 13132: Federalism
 - F. Executive Order 13084: Consultation and Coordination with Indian Tribal Governments
 - G. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks
 - H. National Technology Transfer and Advancement Act of 1995
 - I. Executive Order 12898: Environmental Justice
7. HOW TO OBTAIN MORE INFORMATION

1. GENERAL INFORMATION

A. What action is EPA taking today?

In today's action, we are announcing two sets of decisions. Our first decision is to continue to exempt the following fossil fuel combustion (FFC) wastes from regulation as hazardous wastes under Subtitle C of the Resource Conservation and Recovery Act (RCRA):

1. Wastes from the combustion of oil;
2. Wastes from the combustion of natural gas; and
3. To the extent they are beneficially used, coal combustion wastes generated at non-utilities, coal combustion wastes generated at facilities with fluidized bed combustion technology, petroleum coke combustion wastes, wastes from the combustion of coal and other fuels (i.e., co-burning), and large-volume coal combustion wastes generated at electric utility and independent power producing facilities that are co-managed together

with other low volume and uniquely associated coal combustion wastes are covered by this continued exemption. Beneficial purposes include waste stabilization, beneficial construction applications (e.g., cement, concrete, and concrete products, road bed, wall board), and agricultural applications (e.g., as a substitute for lime). We acknowledge that when relevant factors are properly addressed, the use of coal combustion wastes to fill surface or underground mines can also provide significant benefits. However, when not done properly, minefilling has the potential to contaminate ground water to levels that could damage human health and the environment. For that reason, we have not classified minefilling as an exempted beneficial use.

Our second decision is that regulation of the following wastes under Subtitle C of RCRA is warranted when they are land disposed (e.g., managed in landfills or surface impoundments) or when used to fill surface or underground mines. We are considering developing national management standards following the approach taken in the recently proposed regulations applicable to cement kiln dust (see 64 FR 45632; August 20, 1999) which includes a contingent hazardous waste listing under Subtitle C of RCRA. Under this approach, when the following wastes are properly managed in accordance with the standards, they would not be classified as hazardous wastes. When they are not properly managed, they would become listed hazardous wastes subject to tailored Subtitle C standards pursuant to Section 3004(x) of RCRA.

- Large-volume coal combustion wastes generated at electric utility and independent power producing facilities that are co-managed together with certain other coal combustion wastes;
- Coal combustion wastes generated at non-utilities;

- Coal combustion wastes generated at facilities with fluidized bed combustion technology;
- Petroleum coke combustion wastes; and
- Wastes from the combustion of mixtures of coal and other fuels (i.e., co-burning of coal with other fuels where coal is at least 50% of the total fuel). [NOTE: In 1981, EPA issued a letter that provided its interpretation of the statutory exemption for coal burners to include wastes from burning mixtures of coal and non-fossil fuels provided that coal is at least 50% of the fuel mixture. Otherwise, the combustion wastes are not covered by the exemption. A copy of the EPA letter, dated January 13, 1981, is available in the docket supporting today's action.]

Under this approach, we would establish standards to ensure management of these wastes to protect human health and the environment. The wastes would remain non-hazardous provided that they are managed properly. We would also establish a contingent hazardous waste listing for wastes that are not managed in accordance with these prescribed standards and tailored Subtitle C management standards applicable to the wastes. In developing the hazardous waste regulations, which would be federally enforceable, we would use our broad authority provided by RCRA Sections 2002(a), 3001(b)(3)(C), and 3004(x) to develop a program tailored to the risks posed by coal combustion wastes while minimizing compliance costs.

EPA recognizes that our determination to develop regulations under Subtitle C of RCRA for the above-listed coal combustion wastes is a departure from the leanings expressed in our March 31, 1999 Report to Congress. This change reflects our consideration of public comments received on the Report to Congress and other analyses that we conducted. Today's decision was, in the Agency's view, a difficult one given the many competing considerations discussed

throughout today's notice. As described in the Report to Congress, this industry has made significant improvements in its waste management practices over recent decades, and most state regulatory programs are similarly improving. Public comments and other analyses, however, have convinced EPA that these wastes can, and do, pose significant risks to human health and the environment when not properly managed, and there is sufficient evidence that adequate controls may not be in place for a significant number of facilities. This, in our view, justifies the development of tailored regulations under Subtitle C of RCRA.

New information received by EPA in public comments includes additional documented damage cases, as well as cases indicating at least a potential for damage to human health and the environment. While the absolute number of documented damage cases is not large, EPA believes that the evidence of proven and potential damage is significant when considered in light of the large numbers of facilities, particularly surface impoundments, that today lack basic environmental controls such as liners and groundwater monitoring. EPA acknowledges, moreover, that its inquiry into the existence of damage cases was focused primarily on a subset of states. Given the huge volume of coal combustion wastes generated nationwide and the numbers of facilities that currently lack some basic environmental controls, especially groundwater monitoring, there is at least a substantial likelihood that other cases of proven and potential damage exist. Since the Report to Congress, EPA has also conducted additional analyses of the potential for the constituents of coal combustion wastes to leach in dangerous levels into groundwater. Based on a comparison of drinking water and other appropriate standards to leach test data from coal combustion waste samples, we identified a potential for significant risks from arsenic that we cannot dismiss at this time.

EPA acknowledges that, even without federal regulatory action, many facilities in the industry have either voluntarily instituted adequate environmental controls or have done so at the direction of states that regulate these facilities. However, in light of the evidence of actual and potential damage to human health or the environment from these wastes, the sheer volume of wastes generated from coal combustion, the significant numbers of facilities that do not currently have basic controls in place, and the composition of these wastes, EPA believes that, on balance, the best means of ensuring that adequate controls are imposed where needed is to develop tailored regulations under Subtitle C of RCRA.

While the Agency is making a final decision pursuant to 42 U.S.C. § 3001(b)(3)(C) regarding these wastes, EPA acknowledges our decision is a departure from the approach described in the Report to Congress, and we are providing the public an opportunity to comment on today's determination. We will consider these comments in either developing regulations under Subtitle C or revisiting and, if appropriate, revising today's determination.

Additionally, in a 1993 regulatory determination, EPA previously addressed coal combustion wastes not covered by today's regulatory determination. The 1993 regulatory determination addressed large volume coal combustion wastes generated at electric utility and independent power producing facilities that manage the wastes separately from certain other low volume and uniquely associated coal combustion wastes (see 58 FR 42466; August 9, 1993). Our 1993 regulatory determination maintained the exemption of these large volume coal combustion wastes from being regulated as hazardous wastes when managed separately from other wastes (e.g., in monofills). In developing national standards for the wastes subject to today's regulatory determination, including tailored standards under Subtitle C of RCRA, we also

intend to address the wastes covered in the 1993 regulatory determination so that all coal combustion wastes are consistently regulated across all waste disposal scenarios and when used to fill surface and underground mines. Thus, EPA intends to revise its 1993 regulatory determination and subject these wastes to the same regulatory regime being considered for the coal combustion wastes covered by today's regulatory determination. We are soliciting public comment regarding our intent to revisit our 1993 regulatory determination and subject these wastes to the same national management standards and management-based hazardous waste listing as for those wastes listed above that are covered by today's action.

Also, based on comments received on the RTC, we are reviewing the groundwater model used to estimate risks for fossil fuel combustion wastes. We also continue to refine the risk assessment methodology for evaluating health impacts of wastes used in agricultural settings. We will also evaluate the effect of future air pollution control requirements for coal burning utilities on levels of mercury and other hazardous constituents in coal combustion wastes. These efforts may result in a re-evaluation of the risks posed by managing fossil fuel combustion wastes.

Finally, though oil combustion wastes will not be subject to hazardous waste regulations, we will work with relevant stakeholders so that any necessary measures are taken to ensure that oil combustion wastes currently managed in the two known remaining unlined surface impoundments are managed in a manner that protects human health and the environment.

B. What is the statutory authority for this action?

We are issuing today's notice under the authority of RCRA Section 3001 (b) (3) (C), as amended. This section exempts certain wastes, including fossil fuel combustion wastes, from hazardous waste regulation until the Agency completes a Report to Congress mandated by RCRA Section 8002 (n) and the EPA Administrator makes a determination whether Subtitle C (hazardous waste) regulation of fossil fuel combustion (FFC) wastes is warranted. RCRA Section 3004 (x) provides the Agency with flexibility in developing Subtitle C standards, if appropriate, for these formerly exempted wastes, in areas such as treatment standards, liner design requirements and corrective action.

C. What was the process EPA used in making today's decision?

1. What approach did EPA take to studying fossil fuel combustion wastes?

We conducted our study of wastes generated by the combustion of fossil fuels in two phases. The first phase, called the Part 1 determination, covered high volume coal combustion wastes (e.g., bottom ash and fly ash) generated at electric utility and independent power producing facilities (non-utility electric power producers that are not engaged in any other industrial activity) and managed separately from other fossil fuel combustion wastes. In 1993, EPA issued a regulatory determination that exempted Part 1 wastes from regulation as hazardous wastes (see 58 FR 42466; August 9, 1993). Today's regulatory determination is the second phase of our effort, or the Part 2 determination. It covers all other fossil fuel combustion wastes not covered in Part 1. This includes high volume, utility-generated coal combustion wastes when co-managed with certain low volume wastes that are also generated by utility coal burners; coal combustion wastes generated by industrial, non-utility, facilities; and wastes from the

combustion of oil and gas. Under court order, we are required to complete the Part 2 regulatory determination by March 10, 2000.¹

2. *What statutory requirements does EPA have to meet in making today's regulatory determinations?*

RCRA Section 8002(n) specifies eight study factors that we must take into account in our decision-making. These are:

1. The source and volumes of such materials generated per year.
2. Present disposal practices.
3. Potential danger, if any, to human health and the environment from the disposal of such materials.
4. Documented cases in which danger to human health or the environment has been proved.
5. Alternatives to current disposal methods.
6. The costs of such alternatives.
7. The impact of those alternatives on the use of natural resources.
8. The current and potential utilization of such materials.

Additionally, in developing the Report to Congress, we are directed to consider studies and other actions of other federal and State agencies with a view toward avoiding duplication of effort (RCRA Section 8002(n)). In addition to considering the information contained in the

¹ The consent decree entered into by EPA (Frank Gearhart, et al. v. Browner, et al., No. 91-2435 (D.D.C.) for completing the studies and regulatory determination for fossil fuel combustion wastes used the term "remaining wastes" to differentiate the wastes to be covered in today's decision from the large-volume utility coal combustion wastes that were covered in the August 1993 regulatory determination (see 58 FR 42466).

Report, EPA is required to base its regulatory determination on information received in public hearings and comments submitted on the Report to Congress (RCRA Section 3001(b)(3)(C)).

3. *What were the Agency's sources of information and data that serve as the basis for this decision?*

We gathered publicly available information from a broad range of sources, including federal and state agencies, industry trade groups, environmental organizations, and open literature searches. We requested information from all stakeholder groups on each of the study factors Congress requires us to evaluate. For many of the study factors, very limited information existed prior to this study. We worked closely with the Edison Electric Institute (EEI), Utility Solid Waste Activities Group (USWAG), the Electric Power Research Institute (EPRI), and the Council of Industrial Boiler Owners (CIBO) as those organizations developed new information. Because other ongoing EPA projects currently focus on portions of the FFC waste generator universe, we also leveraged data collection efforts conducted for air, industrial waste, and hazardous waste programs. In addition, we obtained information from environmental organizations regarding beneficial uses of some FFC wastes and methods for characterizing the risks associated with FFC wastes.

Specifically, we gathered and analyzed the following information from industry, states and environmental groups:

- Published and unpublished materials obtained from state and federal agencies, utilities and trade industry groups, and other knowledgeable parties on the volumes and characteristics of coal, oil, and natural gas combustion wastes and the corresponding low-

volume and uniquely associated wastes (see the following section for a description of “uniquely associated wastes”).

- Published and unpublished materials on waste management practices (including co-disposal and re-use) associated with FFC wastes and the corresponding low-volume and uniquely associated wastes.
- Published and unpublished materials on the potential environmental impacts associated with FFC wastes.
- Published and unpublished materials on trends in utility plant operations that may affect waste volumes and characteristics. We gathered specific information on innovations in scrubber use and the potential impacts of the 1990 Clean Air Act Amendments on waste volumes and characteristics.
- Energy Information Agency (EIA), Department of Energy, data on utility operations and waste generation obtained from EIA’s Form 767 database. These data are submitted to EIA annually by electric utilities.
- Site visit reports and accompanying facility submittals for utility and non-utility plants we visited during the study.
- Materials obtained from public files maintained by State regulatory agencies. These materials focus on waste characterization, waste management, and environmental monitoring data, along with supporting background information.

We visited five states to gather specific information about state regulatory programs, FFC waste generators, waste management practices and candidate damage cases related to fossil fuel combustion. The five states we examined in great detail were: Indiana, Pennsylvania, North

Carolina, Wisconsin, and Virginia. These five states account for almost 20 percent of coal-fired utility electrical generation capacity.

We also performed a variety of analyses, including human health and ecological risk assessments, analyses of existing federal and state regulatory programs, and economic impact analyses. We discussed and shared these results with all of our stakeholders. We also conducted an external peer review of our risk analysis.

4. *What process did EPA follow to obtain comments on the Report to Congress?*

RCRA requires that we publish a Report to Congress (RTC) evaluating the above criteria. Further, within six months of submitting the report, we must, after public hearings and opportunity for comment, decide whether to retain the exemption from hazardous waste requirements or whether regulation as hazardous waste is warranted. On March 31, 1999, we issued the required RTC on those fossil fuel combustion wastes (coal, oil and gas) not covered in the Part 1 regulatory determination, which are also known as the “remaining wastes” (see footnote 1).

We asked the public to comment on the Report and the appropriateness of regulating fossil fuel wastes under Subtitle C of RCRA. To ensure that all interested parties had an opportunity to present their views, we held a public meeting with stakeholders on May 21, 1999. The April 28, 1999 Federal Register notice provided a 45-day public comment period, until June 14, 1999. We received over 150 requests to extend the public comment period by up to six months. However, we were obligated by a court-ordered deadline to issue our official Regulatory Determination by October 1, 1999. (See 64 FR 31170; June 10, 1999.) In response to requests for an extension, we entered into discussions with the parties to consider an extension of the

comment period to ensure that all interested members of the public had sufficient time to complete their review and submit comments. Subsequently, the plaintiffs in *Gearhart v. Reilly* moved to modify the consent decree to reopen the comment period and to allow EPA until March 10, 2000 to complete the Regulatory Determination. We supported the motion, and on September 2, 1999, the Court granted the motion. In compliance with the court order, on September 20, 1999, we announced that public comments would be accepted through September 24, 1999 (64 FR 50788; Sept. 20, 1999).

We received about 220 comments on the RTC from the public hearing and our *Federal Register* requests for comments. The docket for this action (Docket No. F-99-FF2P-FFFFF) contains all individual comments presented in the public meetings and hearing, and a transcript from the public hearing, and all written comments. The docket is available for public inspection. Today's decision is based on the RTC, its underlying data and analyses, public comments, and EPA analyses of these comments.

The comments covered a wide variety of topics discussed in the Report to Congress, such as fossil fuel combustion waste generation and characteristics; current and alternative practices for managing FFC waste; documented damage cases and potential danger to human health and the environment; existing regulatory controls on FFC waste management; cost and economic impacts of alternatives to current management practices; FFC beneficial use practices; and our review of applicable state and federal regulations.

- D. What is the significance of “uniquely associated wastes” and what wastes does EPA consider to be “uniquely associated wastes?”**

Facilities that burn fossil fuels generate combustion wastes and also generate other wastes from processes that are related to the main fuel combustion processes. Often, as a general practice, facilities co-dispose these wastes with the large volume wastes that are subject to the RCRA Section 3001 (b) (3) (C) exemption. Examples of these related wastes are:

- precipitation runoff from the coal storage piles at the facility.
- waste coal or coal mill rejects that are not of sufficient quality to burn as fuel.
- wastes from cleaning the boilers used to generate steam.

There are numerous wastes like these, collectively known as “low-volume” wastes. Further, when one of these low-volume wastes, during the course of its generation or normal handling at the facility, comes into contact with either fossil fuel (e.g., coal, oil) or fuel combustion waste (e.g., coal ash or oil ash) and it takes on at least some of the characteristics of the fuels or combustion wastes, we call it a “uniquely associated” waste. When uniquely associated wastes are co-managed with fossil fuel combustion wastes, they fall within the coverage of today’s regulatory determination. When managed separately, uniquely associated wastes are subject to regulation as hazardous waste if they are listed wastes or exhibit the characteristic of a hazardous waste (see 40 CFR 261.20 and 261.30, which specify when a solid waste is considered to be a hazardous waste).

The Agency recognizes that determining whether a particular waste is uniquely associated with fossil fuel combustion involves an evaluation of the specific facts of each case. In the Agency’s view, the following qualitative criteria should be used to make such determinations on a case-by-case basis:

- (1) Wastes from ancillary operations are not “uniquely associated” because they are not properly viewed as being “from” fossil fuel combustion.
- (2) In evaluating a waste from non-ancillary operations, one must consider the extent to which the waste originates or derives from the fossil fuels, the combustion process, or combustion residuals, and the extent to which these operations impart chemical characteristics to the waste.

The low-volume wastes that are not uniquely associated with fossil fuel combustion are not subject to today’s regulatory determination. That is, they are not accorded an exemption from RCRA Subtitle C, whether or not they are co-managed with any of the exempted fossil fuel combustion wastes. Instead, they are subject to the RCRA characteristic standards and hazardous waste listings. The exemption applies to mixtures of an exempt waste with a non-hazardous waste, but when an exempt waste is mixed with a hazardous waste, the mixture is not exempt.

Based on our identification and review of low volume wastes associated with the combustion of fossil fuels, we offer the following guidance concerning our views on which low volume wastes are uniquely associated with and which are not uniquely associated with fossil fuel combustion. Unless there are some unusual site-specific circumstances, we would generally consider that the following lists of low volume wastes are uniquely and non-uniquely associated wastes:

Uniquely Associated

- Coal Pile Runoff
- Coal Mill Rejects and Waste Coal
- Air Heater and Precipitator Washes

- Floor and Yard Drains and Sumps
- Wastewater Treatment Sludge
- Boiler Fireside Chemical Cleaning Wastes

Not Uniquely Associated

- Boiler Blowdown
- Cooling Tower Blowdown and Sludges
- Intake or Makeup Water Treatment and Regeneration Wastes
- Boiler Waterside Cleaning Wastes
- Laboratory Wastes
- General Construction and Demolition Debris
- General Maintenance Wastes

Moreover, we do not generally consider spillage or leakage of materials used in the processes that generate these non-uniquely associated wastes, such as boiler water treatment chemicals, to be uniquely associated wastes, even if they occur in close proximity to the fossil fuel wastes covered by this regulatory determination.

EPA solicits comment on this discussion of uniquely associated wastes in the context of fossil fuel combustion.

E. Who is affected by today's action and how are they affected?

As explained above, fossil fuel combustion wastes generated from the combustion of oil and natural gas, and coal combustion wastes when used for beneficial purposes (other than when used to fill surface or underground mines) will continue to remain exempt from being regulated

as hazardous wastes under RCRA. No party is affected by today's determination to develop regulations applicable to coal combustion wastes when they are land disposed or used to fill surface or underground mines because today's action does not impose requirements. However, if such regulations are promulgated, they would affect electric utility and independent power producing facilities where large-volume coal combustion wastes are co-managed together with certain other (low volume and uniquely associated) coal combustion wastes, coal combustion wastes generated at non-utilities, and wastes from the co-burning of coal (i.e., where coal is burned with other fuels and coal is at least 50% of the total fuel) when they are land disposed (e.g., in surface impoundments or landfills) or when used to fill surface or underground mines.

As a result of the Part 1 regulatory determination, large-volume coal combustion wastes generated at electric utility and independent power producing facilities that manage these wastes separately from low volume and uniquely associated coal combustion wastes are exempt from being regulated as hazardous wastes. For the following reasons, we believe, in light of today's regulatory determination, that revisiting the exemption of these Part 1 wastes from being regulated as hazardous wastes would be appropriate when land disposed separately (e.g., in landfills or surface impoundments) or when used separately to fill surface and underground mines:

- (1) These large-volume wastes, on a dry basis, account for over 95% of coal combustion wastes.
- (2) The co-managed coal combustion wastes that we studied extensively in making today's regulatory determination derive their characteristics largely from these large-volume wastes.

- (3) We believe that the risks posed by the co-managed coal combustion wastes result principally from the large-volume wastes.

In developing national standards for the wastes subject to today's regulatory determination, including tailored standards under Subtitle C of RCRA, we also intend to address the wastes covered in the Part 1 regulatory determination so that all coal combustion wastes are consistently regulated across all waste disposal scenarios and when used to fill surface and underground mines. Thus, we intend to revise our Part 1 regulatory determination and subject these wastes to the same regulatory regime being considered for the coal combustion wastes covered by today's regulatory determination. We are soliciting public comment regarding our intent to revisit our Part 1 regulatory determination and subject these wastes to the same national management standards and management-based hazardous waste listing as for those coal combustion wastes that are covered by today's action.

At this time, we do not intend to revisit the Part 1 regulatory determination for these large-volume wastes when managed separately and used for beneficial purposes (other than when used to fill surface or underground mines) because we do not believe they pose a significant risk to human health and the environment when used in these ways.

In addition, while we have determined that Subtitle C regulation of oil combustion wastes is not warranted, we intend to work with relevant stakeholders so that any necessary measures are taken to ensure that oil combustion wastes currently managed in the two known remaining unlined surface impoundments are managed in a manner that protects human health and the environment.

F. What additional actions will EPA take after this regulatory determination regarding coal, oil and natural gas combustion wastes?

To ensure that entities who generate and/or manage fossil fuel combustion wastes provide long-term protection of human health and the environment, we plan several actions:

- At this time, we intend to revise our Part 1 decision so that large-volume coal combustion wastes generated at electric utility and independent power producing facilities and land disposed separately (e.g., in landfills or surface impoundments) or when used separately to fill surface or underground mines will become subject to conditional Subtitle C regulation if they are not managed in accordance with prescribed conditions. We will consider any public comments submitted on today's notice prior to revisiting the Part 1 regulatory determination.
- We will work with the State of Massachusetts and the owners and operators of the remaining two oil combustion facilities that currently manage their wastes in unlined surface impoundments to ensure that any necessary measures are taken so that these wastes are managed in a manner that protects human health and the environment (described in Section 3.D. of this Notice).
- We are evaluating the ground water model and modeling methods that were used in the RTC to estimate risks for these wastes. This review may result in a re-evaluation of the potential ground water risks posed by the management of fossil fuel combustion wastes and action to revise today's determination if appropriate (see Section 2.C. of this Notice).

- There are a number of ongoing and evolving efforts underway at EPA to improve our understanding of the human health impacts of wastes used in agricultural settings. We expect to receive substantial comments and new scientific information based on a risk assessment of the use of cement kiln dust as a substitute for agricultural lime (see 64 FR 45632; August 20, 1999) and other Agency efforts. As a result, we may refine our methodology for assessing risks related to the use of wastes in agricultural settings. If these efforts lead us to a different understanding of the risks posed by fossil fuel combustion wastes when used as a substitute for agricultural lime, we will take appropriate action to reevaluate today's regulatory determination (see Section 2.C. of this Notice).
- We will evaluate the levels of mercury and other hazardous constituents in coal combustion wastes that may result from future air pollution control requirements for coal burning utilities. We will ensure that the regulations we develop as a result of today's regulatory determination address any additional risks posed by these wastes if hazardous constituent levels should increase significantly (see Section 2.C. of this Notice).
- We will continue EPA's partnership with the states to finalize voluntary industrial solid waste management guidance that identifies baseline protective practices for industrial waste management units, including fossil fuel combustion waste management units. We will use relevant information and knowledge that we obtain as a result of this effort to assist us in developing national regulations applicable to coal combustion wastes.

2. WHAT IS THE BASIS FOR EPA'S REGULATORY DETERMINATION FOR COAL COMBUSTION WASTES?

A. What is the Agency's decision regarding the regulatory status of coal combustion wastes and why did EPA make that decision?

We have determined that it is appropriate to establish national regulations applicable to coal combustion wastes when they are land disposed (e.g., managed in landfills and surface impoundments) because: (a) the composition of these wastes has the potential to present danger to human health and the environment and "potential" damage cases identified by EPA and commenters, while not definitively demonstrating damage from coal combustion wastes, lend support to our conclusion that these wastes have the potential to pose such danger; (b) we have identified eleven documented cases of proven damages to human health and the environment by improper management of these wastes in landfills and surface impoundments; (c) present disposal practices are such that these wastes are currently being managed in a significant number of landfills and surface impoundments without proper controls in place, particularly in the area of groundwater monitoring; and (d) while there have been substantive improvements in state regulatory programs, we have also identified significant gaps either in states' regulatory authorities or in their exercising existing authorities. Also, we believe that the costs of complying with regulations that specifically address these problems, while large in absolute terms, are a small percentage of industry revenues.

We have also determined that it is appropriate to establish national regulations applicable to the placement of coal combustion wastes in surface or underground mines. We have reached this decision because (a) we find that these wastes when minefilled have the potential to present a danger to human health and the environment, and (b) there are few states that currently operate comprehensive programs that specifically address the unique circumstances of minefilling, making it more likely that damage to human health or the environment will occur. Additionally, we believe that the cost of complying with regulations that address these potential dangers will not have a substantial impact on this practice because minefilling continues to grow in those few states that already have comprehensive programs.

With the exception of minefilling as described above, we have determined that it is not appropriate to establish national regulations applicable to any of the other beneficial uses of coal combustion wastes. We have reached this decision because: (a) we have not identified any other beneficial uses that are likely to present significant risks to human health or the environment; and (b) no documented cases of damage to human health or the environment have been identified. Additionally, we do not want to place any unnecessary barriers on the beneficial uses of coal combustion wastes so they can be used in applications that conserve natural resources and reduce disposal costs.

B. What were EPA's Tentative Decisions as Presented in the Report to Congress?

On March 31, 1999, EPA indicated a preliminary decision that disposal of coal combustion wastes should remain exempt from regulation under RCRA Subtitle C. We also presented our tentative view that most beneficial uses of these wastes should remain exempt from

regulation under RCRA Subtitle C. However, in the RTC we identified three situations where we had particular concerns with the disposition or uses of these wastes.

First, we indicated some concern with the co-management of mill rejects (“pyrites”) with coal combustion wastes which, under certain circumstances, could cause or contribute to ground water contamination or other localized environmental damage. We indicated that the utility industry responded to our concern by implementing a voluntary education program for the proper management of these wastes. We expressed satisfaction with the industry program and tentatively concluded that additional regulation in this area was not necessary. We explained that we were committed to overseeing industry’s progress on properly managing pyritic wastes, and would revisit our regulatory determination relative to co-management of pyrites with large volume coal combustion wastes at a later date, if industry progress was insufficient in this area.

Second, we identified potential human health risks from arsenic when these wastes are used for agricultural purposes (e.g., as a lime substitute). To address this risk, we indicated our preliminary view that Subtitle C regulations may be appropriate for this management practice. We explained that an example of such controls could include regulation of the content of these materials such that, when used for agricultural purposes, the arsenic level could be no higher than that found in agricultural lime. As an alternative to Subtitle C regulation, we indicated that EPA could engage the industry to implement a voluntary program to address the risk, for example, by limiting the level of arsenic in coal combustion wastes when using them for agricultural purposes. Moreover, we indicated that a decision to establish hazardous waste regulations applicable to agricultural uses of co-managed coal combustion wastes would likely affect the regulatory status of the Part 1 wastes (i.e., electric utility high volume coal combustion wastes

managed separately from other coal combustion wastes) when used for agricultural purposes. This is because the source of the identified risk was the arsenic content of the high volume coal combustion wastes and not other materials that may be co-managed with them.

Third, we expressed concern with potential impacts from the expanding practice of minefilling coal combustion wastes (i.e., backfilling the wastes into mined areas) and described the difficulties we had with assessing the impacts and potential risks of this practice. We explained that these difficulties include:

- determining if elevated contaminants in ground water are due to minefill practices or pre-existing conditions resulting from mining operations,
- trying to model situations that may be more complex than our ground water models can accommodate,
- the lack of long-term experience with the recent practice of minefilling, which limits the amount of environmental data for analysis, and
- the site-specific nature of these operations.

Accordingly, we did not present a tentative decision in the RTC for this practice. We indicated that Subtitle C regulation would remain an option for minefilling, but that we needed additional information prior to making a final decision. Rather, we solicited additional information from commenters on these and other aspects of minefilling practices and indicated we would carefully consider that information in the formulation of today's decision.

- C. **How did commenters' react to EPA's tentative decisions and what was EPA's analysis of their comments?**

Commenter's provided substantial input and information on several aspects of our overall tentative decision to retain the exemption for these wastes from RCRA Subtitle C regulation. These aspects are: modeling and risk assessment for the ground water pathway, documented damage cases, the potential for coal combustion waste characteristics to change as a result of possible future Clean Air Act regulations, proper management of mill rejects (pyrites), agricultural use of coal combustion wastes, the practice of minefilling coal combustion wastes, and our assessment of existing State programs.

1. How did commenters react to the ground water modeling and risk assessment analyses conducted by EPA to support its findings in the Report to Congress?

Comments. Industry and public interest group commenters submitted detailed critiques of the ground water model, EPACMTP, that we used for our risk analysis. Industry commenters believe that the model will overestimate the levels of contaminants that may migrate down-gradient from disposed wastes. Environmental groups expressed the opposite belief; that is, that the model underestimates down-gradient chemical concentrations and, therefore, underestimates the potential risk posed by coal combustion wastes.

The breadth and potential implications of the numerous technical comments on the EPACMTP model are significant. Examples of the comments include issues relating to:

- the thermodynamic data that are the basis for certain model calculations,
- the model's ability to account for the effects of oxidation-reduction potential,
- the model's ability to account for competition between multiple contaminants for adsorption sites,
- the model's algorithm for selecting adsorption isotherms,

- the impact of leachate chemistry on adsorption and aquifer chemistry, and
- the model's inherent assumptions about the chemistry of the underlying aquifer.

EPA's analysis of the comments. We have been carefully reviewing all of the comments on the model. We determined that the process of thoroughly investigating all of the comments will take substantially more time to complete than is available within the court deadline for issuing this regulatory determination. At this time, we are uncertain of the overall outcome of our analysis of the issues raised in the comments. Accordingly, we have decided not to use the results of our ground water pathway risk analysis in support of today's regulatory determination on fossil fuel combustion wastes. As explained below, in making today's regulatory determination, we have relied on other information related to the potential danger that may result from the management of fossil fuel combustion wastes.

Meanwhile, we will continue with our analysis of comments on the groundwater model and risk analysis. This may involve changing or re-structuring various aspects of the model, if appropriate. It may also include additional analyses to determine whether any changes to the model or modeling methodology would materially affect the groundwater risk analysis results that were reported in the RTC. If our investigations reveal that a re-analysis of groundwater risks is appropriate, we will conduct the analysis and re-evaluate today's decisions as warranted by the reanalysis.

In addition to our ongoing review of comments on the groundwater model, one element of the model – the metals partitioning component called "MINTEQ" – has been proposed for additional peer review. When additional peer review is completed, we will take the findings and

recommendations into account in any overall decision to re-evaluate today's regulatory determination.

While not relying on the EPACMTP groundwater model, we have conducted a general comparison of the metals levels in leachate from coal combustion wastes to their corresponding hazardous waste toxicity characteristic levels. Fossil fuel wastes infrequently exceed the hazardous waste characteristic. For co-managed wastes, 2% (1 of 51 samples) exceeded the characteristic level. For individual wastes streams, 0% of the coal bottom ash, 2% of the coal fly ash, 3% of the coal flue gas desulfurization, and 7% of the coal boiler slag exceeded the characteristic level.

We also compared leach concentrations from fossil fuel wastes to the drinking water MCLs. In the case of arsenic, we examined a range of values because EPA expects to promulgate a new arsenic drinking water regulation by January 1, 2001. This range includes the existing arsenic MCL (50 ug/l), a lower health based number presented in the FFC Report to Congress (RTC) (0.29 ug/l), and two assumed values in between (10 and 5 ug/l). We examined this range of values because of our desire to bracket the likely range of values that EPA will be considering in its effort to revise the current MCL for arsenic. The current MCL of 50 ug/L was selected for the high end of the range because EPA is now considering lowering the current MCL and does not anticipate that the current MCL would be revised to any higher value. We selected the health-based number presented in the Report to Congress for the low end of the range, based on the National Research Council's 1999 report on Arsenic in Drinking Water which indicated that the current MCL is not sufficiently protective and should be revised downward as soon as possible. Because at this time we cannot project a particular value as the eventual MCL, we also

examined values in between these low-end and high-end values, a value of 5 ug/L and a value of 10 ug/L, for our analyses supporting today's regulatory determination.

Those circumstances where the leach concentrations from the wastes exceed the drinking water criteria have the greatest potential to cause significant risks. This "potential" risk, however, may not occur at actual facilities. Pollutants in the leachate of the wastes undergo dilution and attenuation as they migrate through the ground. The primary purpose of models such as EPACMTP is to account for the degree of dilution and attenuation that is likely to occur, and to obtain a realistic estimate of the concentration of contaminants at a groundwater receptor. To provide a view of potential groundwater risk, we tabulated the number of occurrences where the waste leachate hazardous metals concentrations were: (a) less than the criteria, (b) between 1 and 10 times the criteria, (c) between 10 and 100 times the criteria, and (d) greater than 100 times the criteria. Groundwater models that we currently use, when applied to large volume monofill sources of metals, frequently predict that dilution and attenuation will reduce leachate levels on the order of a factor of 10 under reasonable high end conditions. This multiple is commonly called a dilution and attenuation factor (DAF). For this reason and because lower dilution and attenuation factors (e.g., 10) are often associated with larger disposal units such as those typical at facilities where coal is burned, we assessed the frequency of occurrence of leach concentrations for various hazardous metals which were greater than 10 times the drinking water criteria. Based on current MCLs, there was only one exceedence (for cadmium). However, when we considered the arsenic health based criterion from the RTC, we found that a significant percentage (86%) of available waste samples had leach concentrations for arsenic that were greater than ten times the health-based criterion. Even considering intermediate values closer to

the current MCL, a significant percentage of available waste samples had leach concentrations for arsenic that were greater than ten times the criteria (30% when the criterion was assumed to be 5 ug/l, and 14% when the criterion was assumed to be 10 ug/l). Similar concerns also occurred when comparing actual groundwater samples associated with FFC waste units and this range of criteria for arsenic. We believe this is an indication of potential risks from arsenic that we cannot dismiss at this time.

2. *How did commenters react to EPA's assessment of documented damage cases presented in the Report to Congress?*

Prior to issuing the RTC, we sought and reviewed potential damage cases related to these particular wastes. The activities included:

- a re-analysis of the potential damage cases identified during the Part 1 determination,
- a search of the CERCLA Information System for instances of these wastes being cited as causes or contributors to damages,
- contacts and visits to regulatory agencies in five states with high rates of coal consumption to review file materials and discuss with state officials the existence of damage cases,
- a review of information provided by the Utility Solid Waste Act Group and the Electric Power Research Institute on 14 co-management sites, and
- a review of information provided by the Council of Industrial Boiler Owners on eight fluidized bed combustion facilities.

These activities yielded three damage case sites in addition to the four cases initially identified in the Part 1 determination¹. Five of the damage cases involved surface impoundments and the two other cases involved landfills. The waste management units in these cases were all older, unlined units. The releases in these cases were confined to the vicinity of the facilities and did not affect human receptors. None of the damages impacted human health. We did not identify any damage cases that were associated with beneficial use practices.

Comments. Public interest group commenters criticized our approach to identifying damage cases associated with the management of fossil fuel combustion (FFC) wastes, stating that EPA did not use the same procedure used to identify damage cases for the cement kiln dust (CKD) Report to Congress. These commenters believed that we were too conservative in our interpretation and determination of FFC damage cases and dismissed cases that commenters believe are relevant instances of damage. For example, these commenters indicated that EPA, in the RTC, did not consider cases where the only exceedences of ground water standards were for secondary MCLs (Maximum Contaminant Levels as established by EPA for drinking water standards). They further indicated that the states often require ground water monitoring only for secondary MCL constituents and that elevated levels of the secondary MCL constituents are an indication of future potential for more serious, health-based standards to be exceeded for other constituents in the wastes, such as toxic metals. Additionally, these commenters stated that the Agency's analysis for damage cases was incomplete and they provided information on 59 possible damage cases involving these wastes, mostly at utilities. Additionally, commenters

¹ The Part 1 determination identified six cases of documented damages. Upon further review, we determined that two of these cases involve utility coal ash monofills which are covered by the Part 1 determination. However, the other four cases involved remaining wastes that are covered by today's regulatory determination.

submitted seven cases of ecological damage that allege damage to mammals, amphibians, fish, benthic layer organisms and plants from co-management of coal combustion wastes in surface impoundments.

Industry commenters cited EPA's finding of so few damage cases as important support for our tentative conclusion to exempt these wastes from hazardous waste regulation. Further, some of the industry commenters indicated that the few damage cases that EPA identified do not represent current utility industry management practices, but rather reflect less environmentally protective management practices at older facilities that pre-date the numerous state and federal requirements that are now in effect for managing these wastes.

EPA's analysis of the comments. Regarding ecological damage, while we did not identify any ecological damage cases in the RTC associated with management of coal combustion wastes, we reviewed the information on ecological damage submitted by commenters and agree that four of the seven submitted are documented damage cases that involve FFC wastes. All of these involve some form of discharge from waste management units to nearby lakes or creeks. These confirm our risk modeling conclusions as presented in the RTC that there could be adverse impacts on amphibians, birds, or mammals if they were subject to the elevated concentrations of selected chemicals that had been measured in some impoundments. However, no information was submitted in comments that would lead us to alter our conclusion that these threats are not substantial enough to cause large scale, system level ecological disruptions. These damage cases, attributable to runoff or overflow that is already subject to Clean Water Act discharge or stormwater regulations, are more appropriately addressed under the existing Clean Water Act requirements.

Regarding our assessment of damage to ground water, we believe our approach to FFC damage cases in the RTC was consistent with the approach we used for identifying CKD damage cases. For CKD, we established two categories of damage cases – “proven” damage cases and “potential” damage cases. Proven damage cases were those with documented MCL exceedences that were measured off-site, that is, in ground water at a sufficient distance from the waste management unit to indicate that hazardous constituents had migrated to the extent that they could cause human health concerns. Potential damage cases were those with documented MCL exceedences that were measured on-site, that is, in ground water beneath or close to the waste source. In these cases, the documented exceedences had not been demonstrated at a sufficient distance from the waste management unit to indicate that waste constituents had migrated to the extent that they could cause human health concerns. We do not believe that it would be appropriate to consider an exceedence directly beneath a waste management unit or very close to the waste boundary to be a documented, proven damage case. State regulations typically use a compliance procedure that relies on measurement at an off-site receptor site or in ground water at a point beyond the waste boundary (e.g., 150 meters). While our CKD analysis did not distinguish between primary and secondary MCL exceedences, most CKD damage cases involved a primary MCL constituent. Our principal basis for determining that CKD when managed in land-based units would no longer remain exempt from being regulated as a hazardous waste was our concern about generally poor management practices characteristic of that industry. Our conclusion was further supported by the extremely high percentage of proven damage cases occurring at active CKD sites for which groundwater monitoring data were available.

For FFC, we used the same test of proof to identify possible damage cases, noting where contamination was measured off-site. Our FFC analysis drew a distinction between primary and secondary MCL exceedences because we believe this factor is appropriate in weighing the seriousness of FFC damage in terms of indicating risk to human health and the environment. For FFC, in the RTC, we reported only the “proven” damage (i.e., exceedence of a health-based standard such as a primary MCL and measurement in off-site ground water or surface water). As was done in the CKD analysis, we also identified a number of potential FFC damage cases (eleven) which were included in the background documents that support the RTC.

Unlike the primary MCLs, secondary MCLs are not based on human health considerations. (Examples are dissolved solids, sulfate, iron, and chloride for which ground water standards have been established because of their effect on taste, odor, and color.) While some commenters believe that elevated levels of some secondary MCL parameters such as soluble salts are likely precursors or indicators of future hazardous constituent exceedences that could occur at coal combustion facilities, we are not yet able and will not be able to test their hypothesis until we complete our analysis of all comments received on our ground water model and risk analysis, which will not be concluded until next year.

Of the 59 damage cases reported by commenters, 11 cases appear to involve exceedences of primary MCLs or other health-based standards as measured either in off-site ground water or in nearby surface waters, the criteria we used in the RTC to identify proven damage cases. Of these eleven cases, two are coal ash monofills which were included in the set of damage cases described by EPA in its record supporting the Part 1 regulatory determination. The remaining nine cases involve the co-management of large volume coal combustion wastes with other low

volume and uniquely associated coal combustion wastes. We had already identified five of these nine cases in the RTC. Thus, only four of these eleven damage cases are newly identified to us.

Briefly, the four new cases involve:

- Exceedence of a state standard for lead in downgradient ground water at a coal fly ash landfill in New York. There were also secondary MCL exceedences for sulfate, dissolved solids, and iron.
- Primary MCL exceedences for arsenic and selenium in downgradient monitoring wells for a coal ash impoundment at a power plant in North Dakota. There were also secondary MCL exceedences for sulfate and chloride.
- Primary MCL exceedences for fluoride and exceedence of a state standard for boron in downgradient monitoring wells at a utility coal combustion waste impoundment in Wisconsin. There was also a secondary MCL exceedence for sulfate.
- Exceedence of a state standard for boron and the secondary MCL for sulfate and manganese in downgradient monitoring wells at a utility coal combustion landfill in Wisconsin.

Nineteen of the damage cases submitted by commenters involve either on-site or off-site exceedences of secondary MCLs, but not primary MCLs or other health-based standards.

Consistent with our CKD analysis, we consider these cases to be indicative of a potential for damage to occur at these sites because they demonstrate that there has been a release to ground water from the waste management unit.

Regarding the remaining 29 cases submitted by commenters:

- Six involve primary MCL exceedences, but measurements were in ground water either directly beneath the waste or very close to the waste boundary, i.e., no off-site ground water or receptor measurements indicated that ground water standards had been exceeded. Consistent with our analysis of damage cases for cement kiln dust, we consider these six cases to be indicative of a potential for damage to occur at these sites because they demonstrate that there has been a release to ground water from the waste management unit.
- Eighteen case summary submissions contained insufficient documentation and data for us to verify and draw a conclusion about whether we should consider these to be potential or proven damage cases. Of these 18 cases, commenters claimed that 11 cases involve primary MCL exceedences, and another two involve secondary MCLs, but not primary MCLs. The other five cases lacked sufficient information and documentation to determine whether primary or secondary MCLs are involved. Examples of information critical to assessing and verifying candidate damage cases that was not available for these particular cases include: identification of the pollutants causing the contamination; identification of where or how the damage case information was obtained (e.g., facility monitoring data, state monitoring or investigation, third party study or analysis); monitoring data used to identify levels of contaminants; and/or sufficient information to

determine whether the damages were actually attributable to fossil fuel combustion wastes; and/or location of the identified contamination (i.e., directly beneath the unit or very close to the waste boundary or off-site or on-site at a point somewhat distant (e.g., 150 meters) from the unit boundary).

- Three case submissions are cases we identified in the the Part 1 determination and involve monofilled utility coal ash wastes. However, as explained in the Report to Congress for the Part 1 determination, EPA determined that there was insufficient evidence to consider them to be documented damage cases.
- One case did not involve fossil fuel combustion wastes.
- One case involved coal combustion wastes and other unrelated wastes in an illegal, unpermitted dump site. This site was handled by the state as a hazardous waste cleanup site.

Our detailed analysis of the damage cases submitted by commenters is available in the public docket for this regulatory determination.

In summary, based on damage case information presented in the RTC and our review of comments, we conclude that there are 11 proven damage cases associated with wastes covered by today's regulatory determination. We identified seven of these damage cases in the RTC, so there are four new proven damage cases that were identified by commenters. Additionally, we determined that another 25 of the commenter submitted cases are potential damage cases for the reasons described above. Thus, added to the 11 potential damage cases that we identified in the

background documents that support the RTC, we are aware of 36 potential damage cases. While we do not believe the latter 36 cases satisfy the statutory criteria of a documented, proven damage case because damage to human health or the environment has not been proven (see RCRA Section 8002(n)(4)), we believe that these potential damage cases are relevant to EPA's consideration of the "potential danger" of these wastes under RCRA Section 8002(n)(3) and are indicative that these wastes pose a potential danger to human health and the environment.

In conclusion, while the absolute number of documented, proven damage cases is not large, we believe that the evidence of proven and potential damage is significant when considered in light of the large numbers of facilities, particularly surface impoundments, that today lack basic environmental controls such as liners and groundwater monitoring. We acknowledge, moreover, that our inquiry into the existence of damage cases was focused primarily on a subset of states. Given the huge volume of coal combustion wastes generated nationwide and the large number of facilities that currently lack groundwater monitoring, there is at least a substantial likelihood that other cases of actual and potential damage exist.

3. *What concerns did commenters express about the impact of potential future regulation of hazardous air pollutants under the Clean Air Act on today's regulatory determination?*

Comments. In both public hearing testimony and written comments, public interest groups expressed concern about potential changes in the characteristics of these wastes when new air pollution controls are established under the Clean Air Act. The commenters referred to the possible future requirement for hazardous air pollutant controls at coal burning electric utility power plants, which could result in an increased level of metals and possibly other hazardous constituents in coal combustion wastes. The commenters indicated that these increased levels, in

turn, could have serious implications for cross-media environmental impacts such as leaching to groundwater and volatilization to the air. The commenters argued that the Agency should include these factors in its current decision making on the regulatory status of coal combustion under the Resource Conservation and Recovery Act.

EPA's analysis of the comments. We have carefully considered the issue of cross-media impacts and the commenters' specific concerns that future air regulations could have an adverse impact on the characteristics of coal combustion wastes. We have concluded that it is premature to consider the possible future impact of such new air pollution controls on the wastes that are subject to today's regulatory determination. The Agency plans to issue a regulatory determination in the latter part of 2000 regarding hazardous air pollutant (HAP) controls at coal-burning, power generating facilities. If EPA decides to initiate a rulemaking process, final rulemaking under the Clean Air Act is projected to occur in 2004. Thus no final decision has been made on what, if any, constituents will be regulated by future air pollution control requirements. Additionally, the regulatory levels of the those specific pollutants that might be controlled and the control technologies needed to attain any regulatory requirements have not yet been identified. Therefore, we believe there is insufficient information at this time for evaluating the characteristics and potential environmental impacts of solid wastes that would be generated as a result of new Clean Air Act requirements.

When any rulemaking under the Clean Air Act proceeds to a point where we can complete an assessment of the likely changes to the character of coal combustion wastes, we will evaluate the implications of these changes relative to today's regulatory determination and take appropriate action.

4. *How did commenters react to the findings presented in the Report to Congress related to proper management of mill rejects (pyrites)?*

The RTC explained that we identified situations where pyrite-bearing materials such as mill rejects (a low volume and uniquely associated waste) that are co-managed with coal combustion wastes may cause or contribute to risks or environmental damage if not managed properly. These materials when managed improperly with exposure to air and water can generate acid. The acid, in turn, can mobilize metals contained in the co-managed combustion wastes. The RTC also explained that the Agency engaged the utility industry in a voluntary program to ensure appropriate management of these wastes. The industry responded by developing technical guidance and a voluntary industry education program on proper management of these wastes.

Comments. Utility industry commenters supported our tentative decision to continue the exemption for coal combustion wastes co-managed with mill rejects from regulation as a hazardous waste. Their position is based primarily on the industry's voluntary implementation of an education program and technical guidance on the proper management of these wastes, as described in the RTC.

Public interest groups and other commenters disagreed with our tentative decision, explaining their belief that such voluntary controls or programs are inadequate. They indicated that coal combustion wastes should be subject to hazardous waste regulations.

EPA's analysis of the comments. We remain encouraged by the utility industry program to educate and inform its members by implementing guidance on the proper management of coal mill rejects. However, as pointed out by commenters, there is no assurance that facilities where coal combustion wastes co-managed with pyritic wastes will follow the guidance developed by

industry. In light of the number of demonstrated and potential damage cases identified to date, we are concerned that simply relying on voluntary institution of necessary controls would not adequately ensure the protection of human health and the environment. At this time, to ensure that we are aware of all stakeholders views on the adequacy of the control approaches described in the guidance to protect human health and the environment, we are soliciting public comment on the final version of the industry coal mill rejects guidance. This guidance is available in the docket supporting today's decisions.

5. *How did commenters react to the findings presented in the Report to Congress related to agricultural use of coal combustion wastes?*

In the RTC, we presented findings on the human health risks associated with agricultural use of coal wastes as an agricultural lime substitute. The pathway examined embodies risks from ingestion of soil and inhalation, and from ingestion of contaminated dairy, beef, fruit and vegetable products. The resultant "high end" cancer risk reported in RTC was 1×10^{-5} (one in one hundred thousand exposed population), for the child of a farmer. The variables held at high end for this calculation were contaminant concentration and children's soil ingestion. With all variables set to central tendency values, the risk was calculated to be 1×10^{-7} (one in ten million exposed population). We did not identify the presence of any non-cancer hazard of concern. Based on the high end risk, the Agency raised the possibility in the RTC of developing Subtitle C controls or seeking commitments from industry to a voluntary program.

Comments. A number of industry, academic, and federal agency commenters disagreed with our tentative conclusion that some level of regulation may be appropriate for coal combustion wastes when used as an agricultural soil supplement. They indicated that EPA used unrealistically conservative levels for four key inputs used in our risk analysis and that use of a realistic level for any one of these inputs would result in a risk level less than 1×10^{-6} . The four inputs identified by the commenters are: application rate of the wastes to the land, the rate of soil ingestion by children, the bioavailability of arsenic and the phytoavailability of arsenic.

These commenters further recommended that EPA not regulate or encourage voluntary restrictions because:

- agricultural use of coal combustion wastes creates no adverse environmental impacts and EPA identified no damage cases associated with this practice;
- agricultural use of these wastes has significant technical and economic benefits;
- federal controls would be unnecessarily costly and would create a barrier for research and development on the practice;
- existing regulatory programs are sufficient to control any risks from this practice; and
- the limits suggested in the RTC for arsenic levels in coal combustion wastes are inconsistent with limits applied to other materials used in agriculture.

Public interest groups stated their belief that a voluntary approach would not be sufficiently protective of human health and the environment. They believe the Agency should apply restrictions on the use of these wastes in agriculture because the Agency's analyses of the risks and benefits of this practice were inadequate. They further recommended that EPA should prohibit the land application of coal combustion wastes generated by conventional boilers, and make the arsenic limitation of EPA's sewage sludge land application regulations applicable to the land application of coal combustion wastes generated by fluidized bed combustors, which add lime as part of the process.

EPA's analysis of comments. After reviewing these comments and supporting information provided by the commenters, we concluded that a revised input into the model for children's soil ingestion rate is appropriate. We decided, based on further review of the Agency's Exposure Factors Handbook (EFH) and published literature in this area to model a children's soil ingestion rate of 1 gram per day instead of 1.2 to 1.4 grams per day. A soil ingestion rate of 1 gram per day gives special consideration to the possibility of pica-induced ingestion and is still a clear "high end" for this input variable. The EFH permits selection of any value between 0.4 and 1 gram per day depending on circumstances unique to a particular exposure scenario. Thus, EPA views the 1.0 gram per day value to be an appropriate high end, or plausible "worst case" value. This change alone reduced the calculated risk to 5×10^{-6} and suggests that agricultural use of FFC wastes does not cause a risk of concern.

The other considerations raised in comments would act to further reduce this risk. Some studies indicate that phytoavailability will decrease with time. This would of course

reduce bioavailability. The combined effect of plausible reductions in ingestion rate and plausible further changes in phyto- and bioavailability would cause our estimate of the risk from this pathway to go below 10-6. Our technical analysis that resulted in these changes is explained in a document titled *Reevaluation of Non-groundwater Pathway Risks from Agricultural Use of Coal Combustion Wastes*, which is available in the docket for this action.

Two ongoing studies of wastes of potential use as agricultural soil supplements relate to the use of FFC wastes for this purpose. Although these did not play a direct role in EPA's decision regarding FFC wastes, they are summarized below and may play a role in any future review of today's decision.

(1) On August 20, 1999, the agency proposed risk-based standards for cement kiln dust when used as a liming agent (see 64 FR 45632; August 20, 1999). This analysis was completed in 1998 just prior to our completion of the analysis of FFC wastes when used as agricultural supplements. The CKD analysis underwent a special peer review by a standing committee that is used by the Department of Agriculture. We were not able to respond to the peer review comments in either the CKD proposal or in our assessment for fossil fuel combustion wastes, prior to publication of the Report to Congress. The comment period for the CKD proposal closed on February 17, 2000, and we will soon begin our review and analyses of the public and peer review comments that we received.

(2) In December 1999, EPA proposed new risk based standards for the use of municipal sewage sludge under Section 503 of the Clean Water Act (the “503 standards”). It is important to note that municipal sludge has unique properties, application rates, and uses. This makes it inappropriate to transfer the 503 standards directly. Even though the standards cannot be used directly, there may be interest in the risk assessment methodologies used to support the development of these standards. We disagree that it is appropriate to establish an arsenic limitation for coal combustion ash when used for agricultural purposes equivalent to that contained in the EPA sewage sludge land application regulations. The organic nature of sewage sludge makes it behave very differently from inorganic wastes such as coal combustion wastes.

We conclude at this time that arsenic levels in coal combustion wastes do not pose a significant risk to human health when used for agricultural purposes. We expect to continue to review and refine the related risk assessments noted above, and will consider comments on the Agency’s CKD and municipal sludge proposals, as well as new scientific developments related to this issue such as additional peer review of the EPA MINTEQ model that was used as a component of our risk analysis. If these efforts lead us to a different understanding of the risks posed by coal combustion wastes when used as a substitute for agricultural lime, we will take appropriate action to reevaluate today’s regulatory determination.

6. *How did commenters react to the findings presented in the Report to Congress related to minefilling of coal combustion wastes?*

In the RTC, we explained that we had insufficient information to adequately assess the risks associated with the use of coal combustion wastes to fill surface and underground mines, whether the mines are active or abandoned. Accordingly, we did not present a tentative conclusion in the RTC with respect to the use of coal combustion wastes for disposal in active mines or for reclamation of mines. However, we did indicate that regulation of minefilling under hazardous waste rulemaking authority would remain an option for minefilling, but that we needed additional information prior to making a final decision. Thus, we solicited additional information on specific minefilling techniques, problems that may be inherent in this management practice, risks posed by this practice, existing state regulatory requirements, and environmental monitoring data. We indicated that we would consider any comments and new information on minefilling received in comments and would address this management practice in today's regulatory determination. Comments. A number of commenters responded to our request by providing reports on individual case studies, including minefilling in underground as well as in surface mines, descriptions of current state regulatory requirements that address this practice, monitoring data, and information about risk analysis techniques.

Industry commenters and one federal agency supported our decision to study the issue further and not attempt to estimate the risks posed by this practice using existing methods. Further, numerous industry, academic, state agency, and federal agency

commenters encouraged EPA not to adopt national regulations or voluntary restrictions on minefilling because: (a) nationwide standards would not be conducive to the site-specific evaluations needed to appropriately control these operations; (b) minefilling creates no adverse environmental impacts and EPA identified no damage cases associated with this practice; (c) existing state and federal regulatory programs and industry practices are sufficient to control any risks from this practice, and (d) federal standards would be an unreasonable interference with states' authorities.

Additionally, several industry representatives, legislators, and state mining and environmental agencies mentioned that this practice, when used to remediate abandoned mine lands, will produce considerably greater environmental benefits than risks. Further, they maintained that minefilling is a relatively inexpensive means to stop or even reverse the environmental damage caused by old mining practices. They indicated that through remediation by minefilling, these lands frequently can be returned to productive use. These commenters recommended no additional regulation of this practice.

Public interest groups and others believe we should regulate minefilling under RCRA Subtitle C or prohibit it for several reasons including weaknesses in existing state and federal regulatory programs, the poor practices and performance at existing minefilling operations, and potential impacts on potable water sources. Commenters stated that state programs effectively allow open dumps without any design or construction standards. For minefilling, one commenter urged EPA to defer to state regulations only when the Agency has specifically found regulations to be adequate.

EPA's analysis of comments. We agree with commenters that it is inappropriate to estimate the risks posed by minefilling using the existing methods that we employed, for example, to conduct risk analyses for disposal of coal combustion wastes in landfills and impoundments. We found that the groundwater models available to us are unsuitable for estimating risks from minefills because, for example, they are not able to account for conditions such as fractured flow that are typical of the hydrogeology associated with mining operations. In addition, as explained above, EPA's primary ground water model, EPACMTP, is now undergoing careful review on the basis of comments received on the Report to Congress.

We are aware that the use of coal combustion wastes to conduct remediation of mine lands can improve conditions caused by mining activities. We also recognize that this often is the lowest cost option for conducting these remediation activities. We generally encourage the practice of remediating mine lands with coal combustion wastes when minefilling is conducted properly and when there is adequate oversight of the remediation activities. We are also aware that relatively few states currently operate regulatory or other programs that specifically address minefilling, and that many states where this practice is occurring do not have programs in place. Based on our review of information on existing state minefill programs, we find serious gaps such as a lack of adequate controls and restrictions on unsound practices, e.g., no requirement for groundwater monitoring and no control or prohibitions on waste placement in the aquifer.

We continue to be concerned about certain aspects of minefilling and about a general lack of information that would enable us to assess the current state of this practice with certainty. At this time, we cannot reach definitive conclusions about the adequacy of minefilling practices employed currently in the United States and the ability of government oversight agencies to ensure that human health and the environment are being adequately protected. For example, it is often impossible to determine if existing groundwater quality has been impacted by previous mining operations or as a result of releases of hazardous constituents from the coal combustion wastes used in the minefilling applications. Additionally, data and information submitted during the public comment period indicates that if the chemistry of the mine relative to the chemistry of the coal combustion wastes is not properly taken into account, the addition of coal combustion wastes can lead to an increase in hazardous metals released into the environment.

Finally, we concluded in our recent study of disposal of cement kiln dust that placement of cement kiln dust directly in contact with ground water led to a substantially greater release of hazardous metal constituents than we predicted would occur when such placement in ground water did not occur. We are aware of situations where coal combustion wastes are being placed in direct contact with ground water in both underground and surface mines. We find that it is possible that this could lead to increased releases of hazardous metal constituents as a result of minefilling. Thus, if the complexities related to site-specific geology, hydrology, and waste chemistry are not properly taken into account when minefilling coal combustion wastes, we believe that minefilling has the potential to

contaminate, rather than improve, existing groundwater quality and can pose a potential danger to human health and the environment..

7. *How did commenters react to EPA's tentative reliance on state programs and voluntary industry implementation of improved management practices to mitigate potential risks from coal combustion waste management?*

In the RTC, EPA considered retaining the exemption for coal combustion wastes disposed in surface impoundments and landfills and for mill rejects (pyrites) that are managed with those wastes. The Agency cited a reliance on state programs that have improved substantially over the past 10 - 15 years and continue to improve, combined with voluntary industry implementation of guidance for improved management practices to mitigate risk. In addition, we stated that we would continue to work with industries and states to promote and monitor improvements.

To assess the adequacy of state programs and the potential for voluntary implementation of improved practices, we looked at the current number of facilities with liners and ground-water monitoring (which may reflect voluntary industry upgrading as well as state requirements), and the number of state programs that currently have authority to require a broad range of environmental controls. For currently operating units, we found that among utilities, slightly more than half of the disposal units are surface impoundments. Of these impoundments, 38 percent have ground-water monitoring and 26 percent have liners. Eighty-five percent of the utility landfills have ground-water monitoring and 57 percent have liners. For non-utility landfills, 94 percent have ground-water monitoring, and somewhere

between 16 and 52 percent have liners. Over the last 15 years, 75 percent of new landfills and 60 percent of new surface impoundments have been lined.

In looking at state programs, we found that for landfills, more than 40 states have the authority to require permits, siting restrictions, liners, leachate collection, ground-water monitoring, closure controls, and cover/dust controls. Forty-three states can require liners and 46 can require ground-water monitoring compared to 11 and 28 states, respectively, in the 1980's. For surface impoundments, more than 40 states have authority to require permits, siting restrictions, liners, ground-water monitoring, and closure control; 33 can require leachate collection (there is no earlier comparison data for surface impoundments). Forty-five states can require liners and 44 can require ground-water monitoring for impoundments.

Comments. Industry and state agency commenters generally stated that the Agency presented an accurate and comprehensive analysis of state programs and that existing state regulations are adequate. Public interest commenters raised many concerns about the adequacy of state programs: either they do not have provisions to cover all elements of a protective program; they do not consistently impose the requirements for which they have authority; and/or enforcement is lax. Evidence commenters cited for the inadequacy of state programs included grandfathering for older management units and an apparent lack of controls for surface impoundments. For these reasons, some found EPA's review of state programs inaccurate or incomplete.

Public interest commenters were also skeptical of programs or efforts that rely on voluntary industry implementation because adherence to guidance is not guaranteed. Several commenters, primarily from industry, urged the Agency not to regulate pyrite co-management because of the voluntary, industry-developed guidance.

EPA's analysis of comments. We believe that state programs have, in fact, substantially improved over the last 15 years or so, as evidenced by the large number of states that have authority to impose protective management standards on surface impoundments and landfills, especially for groundwater monitoring, liners, and leachate collection, which mitigate potential risks posed by these units. In addition, we believe that the trend to line and install groundwater monitoring for new surface impoundments and landfills is positive. However, as some commenters noted, we acknowledge that our state program review looked at the authorities available to states and their overall regulatory requirements, not the specific requirements applied to any given facility, which could be more or less stringent. In addition, we recognize that many individual state programs have some gaps in coverage, as indicated below, so that some controls may not now be required at coal combustion waste impoundments and landfills.

One consistent trend that raises concern for the Agency is that surface impoundment controls occur at a significantly lower rate than at landfills. Hydraulic pressure in a surface impoundment increases the likelihood of releases; and groundwater monitoring, at a minimum, in existing as well as new impoundments, is a reasonable approach to monitor performance of the unit and a critical first step to addressing groundwater damage that may

be caused by the unit. Only 38 percent of currently operating utility surface impoundments have groundwater monitoring and only 26 percent have liners.

While liners and groundwater monitoring are applied more frequently at landfills, there are still many utility and non-utility landfills that do not have liners. In addition, 15 percent of utility landfills do not have groundwater monitoring and some small proportion of non-utility landfills do not have groundwater monitoring.

The utility industry through its trade associations has demonstrated a willingness to work with EPA to develop protective management practices, and individual companies have committed to upgrading their own practices. However, the Agency recognizes the validity of the comment that adherence to voluntary programs is not assured. Also, individual facilities and companies may not implement protective management practices and controls, for a variety of reasons, in spite of their endorsement by industry-wide groups.

We see a trend toward significantly improving state programs and voluntary industry investment in liners and ground-water monitoring that we believe can mitigate potential risks over time. However, we identified significant gaps in controls already in place and, in particular, requirements that may be lacking in some states, either in authority to impose the requirements or potentially in exercising that authority. In response to comments, we further analyzed risks posed by coal combustion wastes taking into account waste characteristics and potential and actual damage cases. Based on these analyses, we concluded that coal combustion wastes have the potential to present danger to human health and the environment and that a number of proven damages have been documented and that more are likely if we

had been able to conduct a more thorough search of available state records and if groundwater monitoring data were available for all units. We recognize that there will probably continue to be some gaps in practices and controls and are concerned at the possibility that these will go unaddressed. We also believe that the timeframe for improvement of current practices is likely to be longer in the absence of federal regulations.

D. What is the basis for today's decisions?

Based on our collection and analysis of information reflecting the criteria in Section 8002(n) of RCRA that EPA must consider in making today's regulatory determination, materials developed in preparing the RTC and supportive background materials, existing state and federal regulations and programs that affect the management of coal combustion wastes, and comments received from the public on the findings we presented in the RTC, we have concluded the following:

1. Beneficial Uses

To the extent that they are used for beneficial purposes, we believe that coal combustion wastes should continue to remain exempt from being regulated as hazardous wastes under RCRA. Beneficial purposes include waste stabilization, beneficial construction applications (e.g., cement, concrete, and concrete products, road bed, wall board), and agricultural applications (e.g., as a substitute for lime). [For the reasons presented below, we have not classified the use of coal combustion wastes to fill surface or underground mines as an exempted beneficial use.] We have reached this decision because,

other than for minefilling: (a) we have not identified that any beneficial uses are likely to present significant risks to human health or the environment; and (b) no documented cases of damage to human health or the environment have been identified. Additionally, we do not want to place any unnecessary barriers on the beneficial use of coal combustion wastes so that they can be used in applications that conserve natural resources and reduce disposal costs.

Disposal can be burdensome and fails to take advantage of beneficial characteristics of fossil fuel combustion wastes. About one-quarter of the coal combustion wastes now generated are diverted to beneficial uses. Currently, the major beneficial uses of coal combustion wastes include: construction (including building products, road base & sub-base, blasting grit and roofing materials) accounting for 21%; sludge and waste stabilization and acid neutralization accounting for 3%; and agricultural use accounting for 0.1%. Based on our conclusion that these beneficial uses of coal combustion wastes are not likely to pose significant risks to human health and the environment, we support increases in these beneficial uses of coal combustion wastes.

Off-site uses in construction, including wallboard, present low risk due to the coal combustion wastes being bound or encapsulated in the construction materials or because there is low potential for exposure. Use in waste and sludge stabilization and in acid neutralization are either regulated (under RCRA for hazardous waste stabilization or when placed in municipal solid waste landfills, or under the Clean Water Act in the case of municipal sewage sludge or wastewater neutralization), or appear to present low risk due to

low exposure potential. While in the RTC, we expressed concern over risks presented by agricultural use, we now believe our previous analysis assumed unrealistically high-end conditions, and that the risk, which we now believe to be below 1×10^{-6} , does not warrant regulation of coal combustion wastes that are used in agricultural applications.

In the RTC, we were not able to identify damage cases associated with these type of beneficial uses, nor do we now believe that these uses of coal combustion wastes present a significant risk to human health or the environment. While some commenters disagreed with our findings, no data or other support for the commenters' position was provided, nor was any information provided to show risk or damage associated with agricultural use. Therefore, we conclude that none of the beneficial uses of coal combustion wastes listed above pose risks of concern.

2. Land Disposal

We believe that establishment of national regulations under Subtitle C of RCRA is warranted for coal combustion wastes when they are land disposed (e.g., managed in landfills and surface impoundments) because: (a) the composition of these wastes has the potential to present danger to human health and the environment and “potential” damage cases identified by EPA and commenters, while not definitively demonstrating damage from coal combustion wastes, lend support to our conclusion that these wastes have the potential to pose such danger; (b) we have identified eleven cases of proven damage to human health and the environment by improper management of these wastes when land disposed; (c) present disposal practices are such that these wastes are currently being managed in a

significant number of landfills and surface impoundments without proper controls in place, particularly in the area of groundwater monitoring; and (d) while there have been substantive improvements in state regulatory programs, we have also identified significant gaps either in states' regulatory authorities or in their exercise of existing authorities. Also, we believe that the costs of complying with regulations that specifically address these problems, while large in absolute terms, are only a small percentage of industry revenues.

We identified that the constituents of concern in these wastes are metals, particularly hazardous metals. We further identified that leachate from various of these wastes generated at coal combustion facilities has exceeded the hazardous waste toxicity characteristic for one or more of the following metals: arsenic, cadmium, chromium, lead, and mercury. Additionally, when we compared waste leachate concentrations for hazardous metals to their corresponding MCLs, we found that there was a potential for significant risk as a result of arsenic leaching from these wastes. The criteria we examined included the existing arsenic MCL, a lower health based number presented in the RTC, and two assumed values in between. We examined this range of values because, as explained earlier in this notice, EPA is in the process of revising the current MCL for arsenic to a lower value as a result of a detailed study of arsenic in drinking water and we wanted to assess the likely range of values that would be under consideration by EPA.

We also identified situations where the improper management of mill rejects, a low volume and uniquely associated waste, with high volume coal combustion wastes has the potential to cause releases of higher quantities of hazardous metals. When these wastes are

improperly managed, the mill rejects can create an acidic environment which enhances leachability and can lead to the release of hazardous metals in high concentrations from the co-managed wastes to ground water or surface waters. Thus, our analysis of the characteristics of coal combustion wastes leads us to conclude that these wastes have the potential to pose a significant danger to human health and the environment.

Additionally, we identified 11 proven damage cases that documented disposal of coal combustion wastes in unlined landfills or surface impoundments that involved exceedences of primary MCLs or other health-based standards in ground water or drinking water wells. Three of the proven damage cases were on the EPA Superfund National Priorities List. These damage cases point to the fact that coal combustion wastes have been shown to present a danger to human health and the environment.

As detailed in the RTC and explained earlier in this notice, we identified that the states and affected industry have made considerable progress in recent years toward more effective management of coal combustion wastes. We also identified that the ability for most states to impose specific regulatory controls for coal combustion wastes has significantly increased over the past 15 years. In addition to regulatory permits, the majority of states now have authority to require siting controls, liners, leachate collection, groundwater monitoring, closure controls, and other controls and requirements for surface impoundments and landfills. Nonetheless, we have concluded that there are still gaps in the actual application of these controls and requirements, particularly for surface impoundments. While most states now have the appropriate authorities and regulations to require liners and

groundwater monitoring that would reduce or minimize the risks that we have identified, we have also identified numerous situations where these controls are not being applied. For example, only 26 percent of utility surface impoundments and 57 percent of utility landfills have liner systems in place. We have insufficient information to determine whether the use of these controls is significantly different for non-utility disposal units. While many of these unlined units may be subject to grandfathering provisions that allow them to continue to operate without being lined, we are especially concerned that a substantial number of units do not employ ground water monitoring to ensure that if significant releases occur from these unlined units, they will be detected and controlled. Ground water is monitored at only 36 percent of utility surface impoundments. While monitoring is more frequent at landfills, because of the large number of units employed, there are still a large number of units at which significant releases of hazardous metals could go undetected. We are concerned that undetected releases could cause significant contamination that may threaten public health or groundwater and surface water resources. Thus, we conclude that national regulations would lead to substantial improvements in the management of coal combustion wastes.

For these reasons, we believe it is prudent to establish national regulations applicable to coal combustion wastes when managed in surface impoundment and landfills. We will rely on all of the flexibility afforded by RCRA, especially that allowed under Section 3004(x), to ensure that the regulations have minimal affect on those states that are effectively overseeing management of coal combustion surface impoundments and landfills to assure protection of human health and the environment.

3. *Minefilling*

We believe that establishment of national regulations under Subtitle C of RCRA is warranted for coal combustion wastes when they are placed in surface or underground mines because: (a) we find that these wastes when minefilled have the potential to present a danger to human health and the environment, and (b) there are few states that currently operate comprehensive programs that specifically address the unique circumstances of minefilling, making it more likely that damage to human health or the environment will occur. Additionally, we believe that the cost of complying with regulations that address these potential dangers will not have a substantial impact on this practice because minefilling continues to grow in those few states that already have comprehensive programs.

When the complexities related to site-specific geology, hydrology, waste chemistry and interactions with the surrounding matrix, and other relevant factors are properly taken into account, coal combustion wastes used as minefill can provide significant benefits. However, when not done properly, minefilling has the potential to contaminate ground water to levels that could damage human health and the environment for the following reasons. Based on materials submitted during the public comment period, coal combustion wastes used as minefill can lead to increases in the quantity of hazardous metals released into ground water if the acidity within the mine overwhelms the capacity of the coal combustion wastes to neutralize the acidic conditions. This is due to the increased leaching of hazardous metals from the wastes. The potential for this to occur is further supported by data showing that management of coal combustion wastes in the presence of acid-generating pyritic wastes

has caused metals to leach from the combustion wastes at much higher levels than are predicted by leach test data for coal combustion wastes when strongly acidic conditions are not present. Such strongly acidic conditions often exist at mining sites.

We are also aware of situations where coal combustion wastes are being placed in direct contact with ground water in both surface and underground mines. We concluded in our recent study of cement kiln dust management practices that placement of cement kiln dust in direct contact with ground water led to a substantially greater release of hazardous metals than we predicted would occur when the waste was placed above the water table. For this reason, we find that there is a potential for increased releases of hazardous metals as a result of placing coal combustion wastes in direct contact with groundwater.

We are also concerned that government oversight is necessary to ensure that minefilling is done appropriately to protect human health and the environment. Because minefilling is a recent, but rapidly expanding use of coal combustion wastes, government oversight has not yet "caught up" with the practice consistently, across the country. There are a few states that have minefilling programs. Some are relatively comprehensive, but commenters pointed out significant gaps in others, for example, no requirement for groundwater monitoring and no control or prohibition on waste placement in the aquifer. In addition, such programs are not widespread and do not exist in many states where minefilling is now being practiced.

For these reasons, we believe that it is prudent to establish national regulations applicable to the use of coal combustion wastes to fill surface and underground mines. We

will rely on all the flexibility afforded by RCRA, especially that allowed under Section 3004 (x), to ensure that the regulations have minimal effect on those states that are effectively overseeing minefilling operations to ensure protection of human health and the environment. The regulations can also be tailored to the differing circumstances of surface and underground mines. We will draw on the expertise of other federal agencies with responsibility in the mining area, states, and industry and public interest stakeholders to ensure that our regulations are protective, flexible and complementary to existing state and federal programs.

E. What other information would EPA like to receive to assist the Agency in its efforts to implement today's regulatory determination?

As described above, at this time, we intend to develop management standards for coal combustion wastes that, when met, would result in these wastes remaining non-hazardous wastes. While those standards would not be federally enforceable (except under Section 7003 of RCRA if there is a finding of substantial endangerment), failure to comply with the management standards would result in the application of hazardous waste requirements, which would be enforceable by the federal government. This is the approach that EPA took in our recently-proposed regulations applicable to cement kiln dust (64 FR 45632; August 20, 1999). Based on the information available today, this is the Agency's preferred approach for addressing the hazards presented by coal combustion wastes that are land disposed (e.g., managed in landfills and surface impoundments) or used to fill surface

or underground mines. However, as noted previously, this decision has been a difficult one given the competing considerations described throughout this notice. Thus, we are soliciting comment on this regulatory determination and will, if appropriate based on comments and any other information obtained by the Agency, revise this determination if warranted. As discussed further below, options under consideration by the Agency include deciding that regulation under Subtitle C of RCRA is not warranted for coal combustion wastes.

When proposing regulations applicable to cement kiln dust, EPA presented information on several possible approaches, including EPA's preferred approach, for addressing the risks posed by cement kiln dust. We also solicited comments on these various regulatory and non-regulatory approaches. We did so to enable us to evaluate our preferred regulatory approach not only on its own merits, but also in comparison to alternative approaches. (See 64 FR 45640 - 45643.) The period for commenting on the proposed cement kiln dust regulations, including the information on alternative approaches provided in the preamble to the proposed rule, ended on February 17, 2000. Prior to proposing a comparable approach for coal combustion wastes, we are today inviting comment so that all interested parties can offer comments on alternative approaches to EPA's preferred approach that would also ensure that coal combustion wastes are managed safely.

Alternative approaches that have been shared previously in the context of cement kiln dust that appear to be relevant to coal combustion wastes include state improvement of existing programs such that federal regulations are no longer necessary; a "state-based

approach,” based somewhat on the approach specified in RCRA under which EPA approves state municipal solid waste landfill permitting programs; reliance on a Memorandum of Understanding (MOU) between industry and EPA; regulation exclusively under RCRA non-hazardous waste authority (Subtitle D); and development of tailored standards under hazardous waste regulatory authority. Under all of these approaches, EPA could take enforcement action under Section 7003 of RCRA if there is a finding of substantial endangerment. If the Agency were to decide at a later time to rely on any of these alternative approaches, with the exception of developing tailored hazardous waste management standards, we would revisit today’s regulatory determination, and determine that regulation under Subtitle C of RCRA is not warranted.

Additionally, we would more favorably consider revisiting our regulatory determination in favor of a lesser federal role if: 1) there were more evidence that coal combustion facilities have made additional improvements to their waste management practices, especially in the area of groundwater monitoring; 2) there was greater agreement among all stakeholders regarding appropriate waste management, including placement of coal combustion wastes in surface and deep mines; 3) there was a strong level of support from industry, states, and other stakeholders for movement toward an MOU or state-based approach; and 4) the alternative adequately considered the interests of other parties with a stake in the Agency’s coal combustion rulemaking effort. Prior to issuing a proposed rule, EPA will carefully consider new information that is provided, along with the alternative

approaches discussed below. This process is similar to how the Agency is dealing with cement kiln dust.

1. *States Adopt Appropriate Programs*

Alternatively, states may come forth with appropriate programs for managing coal combustion wastes when land disposed or used to fill surface or underground mines. The Agency believes there may be no need to finalize a federal program if states adopt and implement appropriate programs to ensure the safe management of coal combustion wastes. We solicit comments on this approach to ensuring that coal combustion wastes are managed in a manner that protects human health and the environment.

2. *State-Based Approach*

The American Portland Cement Alliance (APCA) has submitted a proposal to EPA for a state-based approach to cement kiln dust (CKD) management. The main components of APCA's proposed approach are listed below, in chronological order:

(a) *EPA Would Complete Work on Management Standards.* EPA would complete draft management standards for issuance as guidance as described below.

(b) *EPA Would Publish Proposed Guidance and "Backstop" Regulatory Regime For Public Comment.* EPA would publish a Notice of Data Availability in the *Federal Register* which would have two separate components. The first component would describe and summarize the key components of the management standards, and announce the public availability of a complete copy of the management standards. In the notice, the Agency would announce its willingness to withdraw its earlier regulatory determination if all of the

states in which coal combustion waste is managed in landfills and surface impoundments or used to fill surface or underground mines developed an adequate management program within two years. The second component would be a “backstop” proposed rule based on a “conditional exclusion” or “contingent management” approach in which RCRA Subtitle C authority would not be triggered unless the conditions of the exclusion were violated. EPA would finalize the proposal only if one or more states in which coal combustion waste is land disposed do not have an adequate management program within two years. EPA would solicit public comment on all aspects of the notice.

(c) *EPA Would Publish Final Guidance In Response To Public Comment.* One year after publishing the initial guidance and backstop proposal, EPA would publish its “final” guidance in a subsequent *Federal Register* notice in response to public comments. In this notice, EPA would also include an explicit time line for the remaining steps in the State-based approach.

(d) *EPA Would Take Final Action Regarding Inadequate State Programs.* Two years after publishing the initial proposed guidance and backstop proposal, EPA would publish another *Federal Register* notice announcing its assessment of the adequacy of state coal combustion waste management programs. If EPA finds that such state programs are adequate, the Agency would announce withdrawal of its regulatory determination. Conversely, if the Agency finds one or more states with inadequate programs, EPA would issue a final rule that will be effective in those states. These regulations would be based on a conditional exemption approach in which RCRA Subtitle C authorities would not be

invoked unless terms of the exemption were violated. For those states with adequate programs, EPA would revise its regulatory determination and determine that Subtitle C regulation was not warranted in those states.

3. *Memorandum of Understanding*

Another option, in lieu of a detailed regulatory scheme, would have EPA enter into a memorandum of understanding (MOU) with the coal combustion industry. The MOU would include specific standards for the management of coal combustion wastes. This approach is not unprecedented. In January 1994, EPA and the American Forest and Paper Association (AF&PA) negotiated a MOU regarding the implementation of land application agreements among AF&PA member pulp and paper mills and the EPA. The purpose of the MOU (which is available in the docket that supports today's action) was to develop a stewardship program for the practice of land application of pulp and paper mill sludges. Each paper mill participating in the program signed a "Land Application Agreement" which established standards and land management practices for the mill's land application of sludge. The MOU also provided for annual materials monitoring reports to be submitted to EPA, AF&PA member outreach programs, and annual AF&PA member surveys. The individual "Land Application Agreements" specify, among other things, dioxin/furan concentration limits for land applied sludge and receiving soils, application rates, waste testing requirements, and recordkeeping and reporting requirements. The MOU and "Land Application Agreements" do not contain specific enforcement provisions, including citizen

suit provisions. Moreover, EPA, to date, has not formally assessed the success of the Agreements.

The Agency could consider a similar approach to tailored management standards and for monitoring the management of coal combustion wastes. The Agency solicits comments on the advantages and disadvantages of a program utilizing a memorandum of understanding to encourage environmentally-sound waste management practices.

4. *Develop Regulations Under Authority of Subtitle D*

Another option would be to issue standards as RCRA Subtitle D requirements, relying on the authority in RCRA sections 1008(a)(3) and 4004(a). EPA would issue such standards after consulting with states. Under this approach, EPA would establish standards for the disposal and minefilling of coal combustion wastes, and failure to abide by those standards would be considered “open dumping” under RCRA Subtitle D. Such “open dumping” is a prohibited act under RCRA section 4005(a). States are required under RCRA section 4005(a) to see that their state solid waste management plans ensure that all disposal facilities comply with the “open dumping” standards which EPA issues to eliminate health hazards and minimize potential health hazards.

These “open dumping” standards issued by EPA under RCRA Sections 1008(a)(3) and 4004(a) standards would be enforceable by the public through citizen suits. However, such standards would not be directly enforceable by EPA under the enforcement authorities of Sections 3007 and 3008. In contrast, as described above, the Agency’s preferred approach would, as implemented in the proposed cement kiln dust regulations, provide the

opportunity for federal enforcement against major violations of the proposed standards, where warranted. The Agency solicits comment on issuing management standards solely as RCRA Subtitle D requirements and views on the need for federal enforcement of violations of the management standards.

5. *Tailored Standards Under Subtitle C*

Another option available to the Agency is to establish regulations under authority of Subtitle C, using a tailored approach to standards development as allowed in Section 3004(x) of RCRA. Under this approach, affected coal combustion wastes would be listed as hazardous wastes and would be regulated under management standards tailored to the risks posed by the regulated wastes. The management standards would be federally enforceable.

The Agency solicits comment on the option of regulating coal combustion wastes under authority of RCRA Subtitle C and whether certain provisions could be eliminated or whether additional provisions are needed.

3. WHAT IS THE BASIS FOR EPA'S REGULATORY DETERMINATION FOR OIL COMBUSTION WASTES?

A. What is the decision regarding the regulatory status of oil combustion wastes and why did EPA make this decision?

We have determined that it is not appropriate to issue regulations under Subtitle C of RCRA applicable to oil combustion wastes because: (a) we have not identified any

beneficial uses that are likely to present significant risks to human health or the environment; and (b) except for a limited number of unlined surface impoundments, we have not identified any significant risks to human health and the environment associated with any waste management practices.

We intend to work with the State of Massachusetts and the owners and operators of the remaining two oil combustion facilities that currently manage their wastes in unlined surface impoundments to ensure that any necessary measures are taken to ensure that their wastes are managed in a manner that protects human health and the environment.

B. What were EPA's tentative decisions as presented in the Report to Congress?

In the Report to Congress, we stated that the only management scenario for which we found risks posed by management of oil combustion wastes was when oil combustion wastes are managed in unlined surface impoundments. The Report to Congress further explained that we were considering two approaches to address these identified risks. One approach was to regulate using RCRA Subtitle C authority. The other approach was to encourage voluntary changes so that no oil combustion wastes are managed in unlined surface impoundments. This voluntary approach is based on recent industry and state regulatory trends to line oil combustion waste disposal units and implement ground-water monitoring.

We also tentatively decided that the existing beneficial uses of OCW should remain exempt from RCRA Subtitle C. There are few existing beneficial uses of these wastes, which include use in concrete products, structural fill, roadbed fill, and vanadium recovery.

We determined that no significant risks to human health exist for the beneficial uses of these wastes. For the case of facilities that accept these wastes to recover vanadium from them, we explained that if the wastes resulting from the metal recovery processes are hazardous, they will be subject to existing hazardous waste requirements.

We found in most cases that oil combustion wastes (OCW), whether managed alone or co-managed, are rarely characteristically hazardous. Additionally, we identified no significant ecological risks posed by OCWs that are land disposed. We identified only one documented damage case involving OCW in combination with coal combustion wastes, and it did not affect human receptors.

Although most of the disposed oil combustion wastes are managed in lined surface impoundments, we did identify six utility sites where wastes are managed in unlined units. We expressed particular concern with management of these wastes in unlined settling basins and impoundments that are designed and operated to discharge the aqueous portion of the wastes to ground water. Our risk analysis indicated that, in these situations, three metals – arsenic, nickel, and vanadium – may pose potential risk by the ground-water pathway.

C. How did commenters react to EPA's tentative decisions and what was EPA's analysis of their comments?

Comments. The primary focus of the comments regarding oil combustion wastes was on the six unlined surface impoundments that we identified. Industry commenters supported the approach to encourage voluntary changes in industry practices on a site-specific basis,

and explained why they believed hazardous waste regulations are unnecessary. The environmental community supported the development of hazardous waste regulations.

EPA's analysis of comments. In the RTC, we identified that our only concern about oil combustion wastes was based on the potential for migration of arsenic, nickel, and vanadium from unlined surface impoundments. We requested information on this issue and did not receive any additional data and/or information to refute our tentative finding stated in the RTC that these unlined surface impoundments could pose a significant risk.

As stated in the RTC, there are only six sites involving two companies that have unlined surface impoundments. Four of the sites are in Florida and are operated by one company. The company operating the four unlined impoundments in Florida is undertaking projects to mitigate potential risks posed by their unlined management units. At a May 21, 1999 public hearing, the company announced its plans to remove all the oil ash and basin material from its unlined impoundments and to line or close the units. The company informed us in January 2000 that it had completed the lining of all the units. Based on this information, we do not believe that these units pose a significant risk to human health and the environment.

The other two sites with unlined impoundments are operated by one utility in Massachusetts. Both sites are permitted under Massachusetts' ground water discharge permit program and have monitoring wells around the unlined basins. Arsenic is monitored for compliance with state regulations. Although the company expressed no plans to line their impoundments, they are preparing to implement monitoring for nickel and vanadium in

ground water around the waste management units. We have been working with the State and the company to obtain additional information to evaluate these two management units. We will continue this effort and will work with the company and the State to ensure that any necessary measures are taken so that these wastes are managed in a manner that protects human health and the environment.

D. What is the basis for today's decisions?

We have determined that it is not appropriate to establish national regulations applicable to oil combustion wastes because: (a) we have not identified any beneficial uses that are likely to present significant risks to human health or the environment; and (b) except for a limited number of unlined surface impoundments, we have not identified any significant risks to human health and the environment associated with any waste management practices. As explained in the previous section, we intend to work with the State of Massachusetts and the owners and operators of the remaining two oil combustion facilities that currently manage their wastes in unlined surface impoundments to ensure that any necessary measures are taken so that their wastes are managed in a manner that protects human health and the environment. Given the limited number of sites at issue and our ability to adequately address risks from these waste management units through site-specific response measures, we see no need for issuing regulations under Subtitle C of RCRA.

4. WHAT IS THE BASIS FOR EPA'S REGULATORY DETERMINATION FOR NATURAL GAS COMBUSTION WASTES?

A. What is the decision regarding the regulatory status of natural gas combustion wastes?

For the reasons described in the Report to Congress (pages 7-1 to 7-3), EPA has decided that regulation of natural gas combustion wastes as hazardous wastes under RCRA Subtitle C is not warranted. The burning of natural gas generates virtually no solid waste.

B. What was EPA's tentative decision as presented in the Report to Congress?

The Agency's tentative decision was to retain the Subtitle C exemption for natural gas combustion because virtually no solid waste is generated.

C. How did commenters react to EPA's tentative decision?

No commenters on the RTC disagreed with EPA's findings or its tentative decision to continue the exemption for natural gas combustion wastes.

Specific comments on this issue supported our tentative decision to retain the exemption for natural gas combustion waste. One industry association encouraged us to foster the use of natural gas as a substitute for other fossil fuels. While some public interest group commenters disagreed broadly with our tentative conclusions to retain the exemption

for fossil fuel combustion wastes, they did not specifically address natural gas combustion wastes.

D. What is the basis for today's decision?

The burning of natural gas generates virtually no solid waste. We, therefore, believe that there is no basis for EPA developing hazardous waste regulations applicable to natural gas combustion facilities.

5. What is the History of EPA's Regulatory Determinations for Fossil Fuel Combustion Wastes

A. On what basis is EPA required to make regulatory determinations regarding the regulatory status of fossil fuel combustion wastes?

Section 3001(b)(3)(C) of the Resource Conservation and Recovery Act (RCRA) as amended requires that, after completing a Report to Congress mandated by section 8002(n) of RCRA, the EPA Administrator must determine whether Subtitle C (hazardous waste) regulation of fossil fuel combustion wastes is warranted.

B. What was EPA's general approach in making these regulatory determinations?

We began our effort to make our determination of the regulatory status of fossil fuel combustion wastes by studying high volume coal combustion wastes managed separately

from other fossil fuel combustion wastes that are generated by electric utilities. In February 1988, EPA published the *Report to Congress on Wastes from the Combustion of Coal by Electric Utility Power Plants*. The report addressed four large-volume coal combustion wastes generated by utilities and independent power producers when managed alone. The four wastes are fly ash, bottom ash, boiler slag, and flue gas desulfurization (FGD) wastes. The report did not address co-managed utility coal combustion wastes (UCCWs), other fossil fuel wastes generated by utilities, or wastes from non-utility boilers burning any type of fossil fuel. Because of other priorities at the time, we did not immediately complete a determination of the regulatory status of these large-volume coal combustion wastes.

C. What happened when EPA failed to issue its determination of the regulatory status of the large volume utility combustion wastes in a timely manner?

In 1991, a suit was filed against EPA for not completing a regulatory determination on fossil fuel combustion wastes (*Gearhart v. Reilly* Civil No. 91-2345 (D.D.C.)). On June 30, 1992, the Agency entered into a Consent Decree that established a schedule for us to complete the regulatory determination for all fossil fuel combustion wastes in two phases:

- The first phase covers fly ash, bottom ash, boiler slag, and flue gas emission control wastes from the combustion of coal by electric utilities and independent commercial power producers. These are the four large volume wastes that were the subject of the 1988 Report to Congress described above. We refer to this as the Part 1 regulatory determination.

- The second phase covers all of the “remaining” fossil fuel combustion wastes not covered in the Part 1 regulatory determination. We refer to this as the Part 2 regulatory determination, which is the subject of today’s action. Under the current court-order, EPA was directed to issue the Part 2 regulatory determination by March 10, 2000.

D. When was the Part 1 regulatory decision made and what were EPA’s findings?

In 1993, EPA issued the Part 1 regulatory determination, in which we retained the exemption for Part 1 wastes (see 58 FR 42466; August 9, 1993). The four Part 1 large-volume utility coal combustion wastes (UCCWs) are also addressed in the Part 2 regulatory determination when they are co-managed with low-volume fossil fuel combustion wastes not covered in the Part 1 determination.

6. EXECUTIVE ORDERS AND LAWS ADDRESSED IN TODAY’S ACTION

A. Executive Order 12866 - Determination of Significance

Under Executive Order 12866, (58 FR 51735, Oct. 4, 1993) we must determine whether the regulatory action is “significant” and therefore subject to review by the Office of Management and Budget (OMB) and the requirements of the Executive Order. The Order defines “significant regulatory action” as one that is likely to result in a rule that may:

- have an annual effect on the economy of \$100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;
- create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles in the Executive Order."

Under Executive Order 12866, this a "significant regulatory action." Thus, we have submitted this action to OMB for review. Changes made in response to OMB suggestions or recommendations are documented in the public record.

B. Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 USC 601 et. seq.

Today's action is not subject to the RFA, which generally requires an agency to prepare a regulatory flexibility analysis for any rule that will have a significant economic impact on a substantial number of small entities. The RFA applies only to rules subject to notice-and-comment rulemaking requirements under the Administrative Procedure Act (APA) or any other statute. This action is not subject to notice and comment requirements

under the APA or any other statute. Today's action is being taken pursuant to Section 3001(b)(3)(C) of the Resource Conservation and Recovery Act. This provision requires EPA to make a determination whether to regulate fossil fuel combustion wastes after submission of its Report to Congress and public hearings and an opportunity for comment. This provision does not require the publication of a notice of proposed rulemaking and today's action is not a regulation. See American Portland Cement Alliance v. E.P.A., 101 F.3d 772 (D.C.Cir. 1996).

C. Paperwork Reduction Act (Information Collection Requests)

Today's final action contains no information collection requirements.

D. Unfunded Mandates Reform Act

Today's rule is not subject to the requirements of sections 202 and 205 of the UMRA. Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), P.L. 104-4, establishes requirements for federal agencies to assess the effects of their regulatory actions on state, local, and tribal governments and the private sector. Under section 202 of the UMRA, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "federal mandates" that may result in expenditures to state, local, and tribal governments, in the aggregate, or to the private sector, of \$100 million or more in any one year.

Before we issue a rule for which a written statement is needed, section 205 of the UMRA generally requires us to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective, or least burdensome alternative that achieves the rule's objectives. Section 205 doesn't apply when it is inconsistent with applicable law. Moreover, section 205 allows us to adopt an alternative other than the least costly, most cost-effective, or least burdensome alternative if the final rule explains why that alternative was not adopted. Before we establish any regulatory requirements that may significantly affect small governments, including tribal governments, we must have developed under section 203 of the UMRA a small-government-agency plan. The plan must provide for notifying potentially affected small governments, enabling them to have meaningful and timely input in the developing EPA regulatory proposal. with significant federal intergovernmental mandates, and informing, educating, and advising small governments on compliance with the regulatory requirements.

Today's final action contains no federal mandates (under the regulatory provisions of Title II of the UMRA) for state, local, or tribal governments or the private sector. Today's final action imposes no enforceable duty on any state, local or tribal governments or the private sector.

In addition, we have determined that this rule contains no federal mandate that may result in expenditures of \$100 million or more for state, local, and tribal governments, in the aggregate, or the private sector in any one year.

E. Executive Order 13132: Federalism

Executive Order 13132, entitled Federalism (64 FR 43255, August 10, 1999) requires us to develop an accountable process to ensure meaningful and timely input by state and local officials in the development of regulatory policies that have federalism implications. The executive order defines policies that have federalism implications to include regulations that have substantial direct effects on the states, on the relationship between the national government and the states, or on the distribution of power and responsibilities among the various levels of government.

Under section 6 of Executive Order 13132, we may issue a regulation that has federalism implications, that imposes substantial direct compliance costs, and that isn't required by statute, only if the federal government provides funds the direct compliance costs incurred by state and local governments, or if EPA consults with state and local officials early in the development of the proposed regulation. Also, EPA may issue a regulation that has federalism implications and that preempts state law, only if we consult with state and local officials early in the development of the proposed regulation.

If EPA complies by consulting, Executive Order 13132 requires us to provide OMB, in a separately identified section of the rule's preamble, a federalism summary impact statement (FSIS). The FSIS must describe the extent of our prior consultation with state and local officials, summarizing the nature of their concerns and our position supporting the need for the regulation, and state the extent to which the concerns of state and local officials have been met. Also, when we transmit a draft final rule with federalism implications to

OMB for review under Executive Order 12866, our federalism official must include a certification that EPA has met the requirements of Executive Order 13132 in a meaningful and timely manner.

Today's final action does not have federalism implications. It will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. This is because no requirements are imposed by today's action, and EPA is not otherwise mandating any state or local government actions. Moreover, today's action does not affect the relationship between the national government and the states and does not affect distribution of power and responsibilities among the various levels of government. Thus, the requirements of section 6 of the Executive Order do not apply to this final action.

F. Executive Order 13084: Consultation and Coordination with Indian Tribal Governments

Under Executive Order 13084, EPA may take an action that isn't required by statute, that significantly or uniquely affects the communities of Indian tribal governments, and that imposes substantial direct compliance costs on those communities, only if the federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments or EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires us to describe in a separately identified section of the

preamble to the rule the extent of our prior consultation with representatives of affected tribal governments, summarizing of the nature of their concerns, and state the need for the regulation. Also, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments "to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities."

Today's final action does not significantly or uniquely affect the communities of Indian tribal governments. This is because today's action by EPA involves no regulations or other requirements that significantly or uniquely affect Indian tribal governments. So, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

G. Executive Order 13045: Protection of Children from Environmental Health Risks and Safety Risks

"Protection of Children from Environmental Health Risks and Safety Risks" (62 F.R. 19885, April 23, 1997) applies to any rule that: (1) is "economically significant" as defined under E.O. 12866, and (2) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets both criteria, we must evaluate the environmental health or safety effects of the planned rule on children and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

Today's final action isn't subject to the Executive Order because it is not economically significant as defined in E.O. 12866, and because we have no reason to believe the environmental health or safety risks addressed by this action present a disproportionate risk to children. Risks were thoroughly evaluated during the course of developing today's decision and were determined not to disproportionately affect children.

H. National Technology Transfer and Advancement Act of 1995

As noted in the proposed rule, Section 12(d) of the National Technology Transfer and Advancement Act of 1995 ("NTTAA"), Pub L. No. 104-113, § 12(d) (15 U.S.C. 272 note) directs EPA to use voluntary-consensus standards in its regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary-consensus standards are technical standards (such as materials specifications, test methods, sampling procedures, and business practices) that are developed or adopted by voluntary-consensus standards bodies. The NTTAA directs us to explain to Congress, through OMB, when we decide not to use available and applicable voluntary-consensus standards.

Today's final action involves no technical standards. So, EPA didn't consider using any voluntary-consensus standards.

I. Executive Order 12898: Environmental Justice

EPA is committed to addressing environmental justice concerns and is assuming a leadership role in environmental justice initiatives to enhance environmental quality for all

populations in the United States. The Agency's goals are to ensure that no segment of the population, regardless of race, color, national origin, or income bears disproportionately high and adverse human health or environmental impacts as a result of EPA's policies, programs, and activities, and that all people live in safe and healthful environments. In response to Executive Order 12898 and to concerns voiced by many groups outside the Agency, EPA's Office of Solid Waste and Emergency Response formed an Environmental Justice Task Force to analyze the array of environmental justice issues specific to waste programs and to develop an overall strategy to identify and address these issues (OSWER Directive No. 9200.317).

7. HOW TO OBTAIN MORE INFORMATION

Documents related to this regulatory determination, including EPA's response to the public comments, are available for inspection in the docket. The relevant docket numbers are: F-99-FF2D-FFFFF for the regulatory determination, and F-99-FF2P-FFFFF for the RTC. the RCRA Docket Information Center (RIC), is located at Crystal Gateway I, First Floor, 1235 Jefferson Davis Highway, Arlington, VA. The RIC is open from 9 a.m. to 4 p.m., Monday through Friday, excluding Federal holidays. To review docket materials, it is recommended that the public make an appointment by calling 703 603-9230. The public may copy a maximum of 100 pages from any regulatory docket at no charge. Additional copies cost \$0.15/page. The index and some supporting materials are available

electronically. See the "Supplementary Information" section for information on accessing them.

In addition to the data and information that was included in the docket to support the RTC on FFC waste and the Technical Background Documents, the docket also includes the following document: *Responses to Public Comments on the Report To Congress, Wastes from the Combustion of Fossil Fuels*.

List of Subjects

Fossil fuel combustion waste, Coal combustion, Oil combustion, Gas combustion, Special wastes, Bevill exemption

Dated: _____

Carol M. Browner,
Administrator

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**Environment and Public Works Committee Hearing
January 8, 2009
Response to Follow-Up Questions for Written Submission**

Responses by: Stephen A. Smith, DVM
Executive Director
Southern Alliance for Clean Energy

Questions from Senator Barbara Boxer

Questions # 1: Mr. Smith, Environmental Protection Agency's (EPA) past regulatory statements on the lack of federal requirements for coal combustion waste disposal sites are based on information that the agency had at the time. This potentially excludes more current information that could better assist EPA in making new and more protective regulatory determinations for coal combustion waste disposal requirements.

In your experience, does new information exist that could help the agency to assess the adequacy of its past determinations and the protectiveness of any future federal disposal requirements?

Response to Question # 1: Senator Boxer, while it is clear that EPA's own analyses of coal Combustion waste (CCW) makes it apparent that stringent federal regulation is necessary to protect human health and the environment, there are several documents that have been released since EPA's August 2007 *Notice of Data Availability on the Disposal of Coal Combustion Waste in Landfills and Surface Impoundments* ("NODA").

In comments submitted on February 11, 2008 by Earthjustice and the Clean Air Task Force *et al* regarding EPA's July 2007 *Coal Combustion Waste Damage Case Assessment*, sixteen additional potential damage cases attributable to CCW were identified in ten states. These comments also identify shortcomings of EPA's damage case assessment and conclude that EPA's assessment significantly underestimates the nation-wide damage caused by the faulty storage and disposal of CCW. The full comments are available at: <http://www.publicintegrity.org/assets/pdf/CoalAsh-Doc3.pdf>.

Further, in comments also submitted February 11, 2008 by Earthjustice, Clean Air Task Force, Environmental Integrity Project, Southern Environmental Law Center, the Appalachian Center for the Economy and the Environment, Kentucky Resource Council and Plains Justice, as well as 65 undersigned groups concerning the EPA's August 2007 NODA, these organization concluded that: "the data made available by EPA in the NODA illustrate the necessity for EPA to promulgate expeditiously minimum federal standards for safe disposal of CCW. The documents

demonstrate clearly that the threat to health and the environment from CCW is very high, that state regulations are grossly insufficient to control the waste, that damage to health and the environment has occurred in the past and continues to occur throughout the U.S. and that the utility industry is not willing to voluntarily employ the minimum safeguards necessary to protect health and the environment.” The full comments are available at: http://www.earthjustice.org/library/references/final-noda_cover_letter_021108.pdf

I would also direct you to the Environmental Integrity Project’s January 7, 2009 report entitled *Disaster in Waiting: Toxic Coal Ash Disposal in Surface Impoundments* and associated indexes. This report and associated indexes detail the toxic nature of coal ash and document the shortcomings of current storage and disposal methods. This report and associated materials can be accessed at: <http://www.environmentalintegrity.org/pub577.cfm>.

Finally, I would direct you to Earthjustice’s January 2009 report entitled *Waste Deep: Filling Mines with Coal Ash is Profit for Industry, But Poison for People*. This report details the toxicity of CCW, how it impacts human health and the environment and documents the risks associated with the disposal of CCW by dumping it into abandoned coal mines. The report also details the effects of improper disposal of CCW on numerous communities and ecosystems throughout the U.S. The full report is available at: http://www.earthjustice.org/library/reports/earthjustice_waste_deep.pdf.

Questions from Senator Tom Udall

Question # 1: Mr. Smith, what is the potential for bio-accumulation of heavy metals as a result of wet-storage of fly-ash? Do you know of incidents of bio-accumulation of heavy metals related to coal combustion waste storage?

Response to Question # 1:

Senator Udall, the bioaccumulation of contaminants from CCW in ecosystems surrounding CCW storage and disposal sites is a significant concern. In many states — at ponds, landfills, and pits where coal ash gets dumped — a slow seepage of the ash’s metals has poisoned water supplies, damaged ecosystems, and jeopardized citizens’ health. In a July 2006 report entitled *Managing Coal Combustion Residues in Mines*, the National Academy of Sciences identified 24 potentially hazardous metals in coal ash. Commissioned by the EPA, the study catalogues the way CCW can pollute communities and ecosystems by leaching heavy metals into ground and surface waters. The report states:

As a consequence of CCR [Coal Combustion Residue, referred to here as Coal Combustion Waste] disposal in surface impoundments, contaminants have been found to accumulate in the tissues of organisms utilizing the impoundments or downstream habitats. Contaminants originating in CCR enter food chains by a variety of mechanisms. These mechanisms include direct uptake by plants, epithelial accumulation by organisms in contact with the sediments and/or porewater (e.g., benthic invertebrates), and direct sediment ingestion by grazing (e.g., amphibian tadpoles) or dabbling wildlife (e.g., waterfowl). Uptake of

some contaminants can be high, exceeding the concentrations known to be toxic to many organisms.

The report further states:

Accumulation of metals and metalloids in animal tissues is important because it can have a variety of adverse health consequences in organisms. For example, studies on fish inhabiting reservoirs contaminated with effluent from surface impoundments reveal high tissue levels of selenium associated with liver and kidney necrosis, inflammation of heart tissue, disruption of respiratory tissue, and abnormal female reproductive tissue (Sorensen et al., 1982a,b, 1983a,b, 1984; Garrett and Inman, 1984; Sorenson, 1988). More recent studies have demonstrated that predators that feed on fish from CCR disposal sites are also at risk of tissue damage. ...Taken together, the diverse physiological disruptions described above may contribute to the changes in growth, survival, and reproductive success that have been observed in organisms exposed to CCR.

The report then concludes:

Taken together, available landfill and surface impoundment case studies clearly indicate that environmental impacts can emerge when CCR reacts with water and constituents are mobilized in significant concentrations and volume. Surface impoundments represent an extreme example of such an interaction, because the CCR is slurried directly with water for disposal purposes and the impoundments themselves often serve as suboptimal wildlife habitat or discharge directly into streams.

In addition to the National Academy of Sciences report, a litany of researchers such as Rowe et al. (2002)ⁱ have documented the negative effect of coal combustion waste on the physiology, morphology and behavior of aquatic organisms and the health of aquatic ecosystems. According to Rowe et al (2002), the “release of CCR into aquatic systems has generally been associated with deleterious environmental effects. A large number of metals and trace elements are present in CCR, some of which are rapidly accumulated to high concentrations in aquatic organisms. Moreover, a variety of biological responses have been observed in organisms following exposure to and accumulation of CCR-related contaminants. In some vertebrates and invertebrates, CCR exposure has led to numerous histopathological, behavioral and physiological (reproductive, energetic and edocrinological) effects.”

In all, I can say with relative certainty that the bioaccumulation of heavy metals in the environment as a result of the mishandling of coal combustion waste is a serious problem and the resulting effects on ecosystems around the country is just now beginning to be understood. The enormous discharge of CCW into the surface waters surrounding Harriman, TN will almost certainly lead to serious ecological damage as a result of continuing bioaccumulation.

Question # 2: Mr. Smith, in your experience, have individual States and industry been capable of effectively regulating coal combustion waste? To what extent is federal regulation necessary to ensure that coal combustion waste is disposed of in a manner that is not harmful to the public or the environment?

Response to Question # 2:

Senator Udall, The regulatory approach of many states to CCW storage and disposal is simply inadequate to protect human health and the environment from serious contamination. With no minimum federal standards, the states have been free to regulate as they please, or more often, abstain from effective regulation altogether. The absence of national standards has resulted in environmental damage at disposal sites throughout the country and damage will continue to occur in the absence of minimum federal standards.

If one compares how EPA regulates the disposal of ordinary household trash with its hands-off approach to CCW, the results defy logic. While newspapers, soda cans and banana peels under no circumstances qualify as RCRA hazardous waste, EPA has established detailed federal disposal standards for the landfills that contain them, including performance standards, siting restrictions, monitoring, closure requirements, bonding, and post-closure care.ⁱⁱ In contrast, enormous quantities of coal waste that exceeds hazardous waste levels for toxic metals can be dumped with relative impunity in many states. In all, the lack of federal standard for the storage and disposal of CCW has resulted in an inconsistent patchwork of largely inadequate state regulation.

The utility industry, as well as some states, claim that the states are doing a good job of regulating coal ash despite the absence of federal standards. Earthjustice, along with several other environmental organizations, submitted analyses of the laws and regulations of 20 states in response to EPA's Notice of Data Availability in February 2008. The analyses show definitively that state solid waste programs do not provide consistent and adequate safeguards sufficient to protect human health and the environment. Most states fail to require the basic safeguards essential for waste management, including liners, leachate collection systems, groundwater monitoring, corrective action (cleanup), closure and post-closure care.

In addition, in 2005, a report prepared for EPA's Office of Solid Waste, entitled *Estimation of Costs for Regulating Fossil Fuel Combustion Ash Management at Large Electric Utilities Under Part 258*, included a survey on state disposal regulations that verified the states' failure to prohibit the most dangerous CCW disposal practices. The report examined the top 25 coal-consuming states to determine how much CCW is prohibited from disposal below the natural water table. Since isolation of ash from water is critical to preventing toxic leachate, it is axiomatic that disposal of ash must occur above the water table. The report found that only 16% of the total waste volume being regulated by these 25 states is prohibited from disposal below the natural water table when waste is disposed in surface impoundments. For landfills, the total waste volume that is prohibited from disposal below the water table is only 25%.ⁱⁱⁱ Thus, 84% of CCW disposed in surface impoundments and 75% of CCW disposed in landfills in these 25 states is permitted to be disposed below the natural water table, seriously threatening contamination to ground and surface waters.

Furthermore, A 2005 report published jointly by EPA and the U.S. Department of Energy (DOE), entitled *Coal Combustion Waste Management at Landfills and Surface Impoundments, 1994 – 2004* documents that nearly a third of the net disposable CCW generated in the U.S. is potentially totally exempt from solid waste permitting requirements.^{iv} After lengthy analysis, the DOE/EPA Report finds that “overall, the portion of the net disposable CCW that is potentially exempt from solid waste permitting requirements is approximately 24 million tons, which corresponds to 29% of the total net disposable CCW generated in the United States during 2004.”^v The report also explains that in terms of electric generating capacity, the six States that have solid waste permitting exemptions for certain on-site CCW landfills generated a total of approximately 66,000 MW, which is approximately 20% of the total coal-fired electric generating capacity in the United States in 2004.^{vi} Thus the DOE/EPA Report demonstrates that a significant portion of the CCW generated in the U.S. is potentially not subject to any solid waste permitting.

Finally, some 23 states have “no more stringent” provisions in their statutes that prohibit the states from enacting stricter standards than are found in federal law. Thus for those states, without federal regulation, there can be no regulation of CCW beyond what few safeguards there are now.^{vii} Among states with “no more stringent provisions” are Colorado, Kentucky, Montana, New Mexico, Tennessee and Texas.

Under these circumstances, it is ridiculous to continue relying on state regulations for proper oversight of the storage and disposal of CCW. At this time, EPA should at a minimum:

1. Establish a specific timetable for establishing federal regulations.
2. Conduct a timely review to determine the extent of the risk posed by dangerous CCW storage and disposal, including inspection of all CCW impoundments to ensure that they are not constructed of coal ash.
3. Phase out surface impoundments at existing coal-fired plants and the construction of surface impoundments at new plants must be prohibited.
4. Require the use of landfills engineered for CCW disposal that include impermeable liners, performance standards, monitoring, closure requirements, bonding and post-closure care.

Question # 3: Mr. Smith, what is TVA’s maximum capacity for recycling coal ash? Is TVA recycling as much coal ash as could be recycled? What are the obstacles preventing more recycling of the ash produced by TVA?

Response to Question # 3:

Senator Udall, the requested information is not readily available to my organization. However, the recycling of coal ash is dependant on several factors that will vary over time, including the

content of the coal ash and various financial factors depending on the end-use intended. In the current national economic condition, where construction activity is less than in previous years, it is my understanding that the market for coal ash is diminished and TVA's capacity for recycling coal ash may be limited.

However, by failing to impose disposal standards, EPA fails to encourage beneficial CCW reuse. When cheap dumping is no longer available, power plants will have far greater incentive to recycle their ash.^{viii}

In Wisconsin, for example, adequate regulation of CCW has raised recycling rates significantly. Wisconsin CCW regulations are some of the most comprehensive in the nation. The stringent regulatory scheme for CCW has resulted in a recycling rate in Wisconsin for CCW of 85%, more than double the national average recycling rate of 36%.^{ix} Similar to the case in Wisconsin, if the true cost of CCW storage and disposal were borne by electric utilities throughout the nation, there would be far greater incentive to find beneficial uses for the ash.

In all, a comprehensive regulatory approach to the storage and disposal of coal combustion waste is not only necessary to protect human health and environment, but would enhance the incentive to find beneficial uses for CCW and likely lead to increased rates of recycling.

Questions from Senator James M. Inhofe:

Question # 1: Erin Brockovich, environmental groups, including yours, and teams of New York lawyers have descended upon Harriman, Tennessee talking about suing TVA over this tragic accident. TVA is a self-funded entity, whose only revenues come from ratepayers. There are no shareholders. Any awards from such lawsuits can only be born by the ratepayers in the Valley. Obviously, families directly affected by the incident must be fairly compensated. But beyond that, what is being accomplished?

Response to Question # 1: Senator Inhofe, I cannot speak for others who are pursuing legal action against the TVA as a result of the Harriman, TN disaster. However, beyond fair compensation to those injured by TVA's failure, the civil legal system also provides an enforcement tool for many of our nation's environmental laws. The citizen suit provisions of the CWA, RCRA and CAA, among others, have protected human health and the environment from countless harms over the previous 30 years and the present case is another example where the judicial system may be necessary to hold polluters accountable and prevent further damage.

Beyond the immense physical damage caused by the disaster, it is also unfortunate that TVA's legal liability and massive cleanup costs will likely impact the rates of TVA's customers.^x In our current economic situation, unnecessary increases in energy costs as a result of TVA's failure of responsibility are especially difficult. However, TVA should not be allowed to avoid the legal ramifications of their negligence by holding the residents of the Tennessee Valley hostage over potential rate increases. A balance must be struck that allows those with legal standing to hold TVA accountable but does not result in excessive or unnecessary costs to be passed on to ratepayers.

Question # 2: I understand your organization, Southern Alliance for Clean Energy, is considering suing TVA. If your organization is successful and wins or settles, can you tell me what percentage will you be sharing with the victims of this spill and what percentage will you be using in the spill location for habitat restoration? How much will be retained by your organization?

Response to Question # 2: Senator Inhofe, the Southern Alliance for Clean Energy has filed a notice of intent to sue the TVA for various violations under the CWA and RCRA as a result of the Harriman disaster. We have filed these notices as a precautionary measure to allow us the maximum leverage over TVA to ensure that cleanup and monitoring is done in a way that minimizes injury to human health and the environment.

Should my organization decide to pursue its legal remedies by filing suit under these notices of intent, we would not be seeking monetary damages, but would seek injunctive relief from the court to ensure adequate cleanup of the site and protection of the families and ecosystems affected by TVA's negligence. We would not be seeking a monetary award for either ourselves or victims of the spill.

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- ^{iv} U.S. Department of Energy (2004). Coal Combustion Waste Management at Landfill and Surface Impoundments 1994-2004. DOE/PI-004, ANL-EVS/06-4 at page 45.
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- ^{vii} U.S. EPA (2002). Mine Placement of Coal Combustion Waste, State Program Elements, Final Draft, Dec. 2002.
- ^{viii} It should be noted that the EPA should proceed cautiously in analyzing industry claims of the beneficial uses of CCW. While replacing Portland cement with coal ash can bind the contaminants and avoid the emissions resulting from the manufacture of Portland cement, the re-burning of coal ash in cement kilns further concentrates the contaminants and leads to dramatic increases on mercury emissions.
- ^{ix} U.S. Department of Energy (2004). Coal Combustion Waste Management at Landfill and Surface Impoundments 1994-2004. DOE/PI-004, ANL-EVS/06-4 at page 5.
- ^x Cleanup costs are currently estimated to reach \$850 million to \$1 billion, without consideration of legal liability.

Senator BOXER. Thank you very much.
Mr. Rose.

STATEMENT OF WILLIAM "HOWIE" ROSE, DIRECTOR OF EMERGENCY MANAGEMENT SERVICES, ROANE COUNTY, TENNESSEE

Mr. ROSE. Yes, ma'am. First of all, I would like to thank you, Madam Chairman, for the——

Senator BOXER. Is your mic on there, sir?

Mr. ROSE. It is now.

Senator BOXER. That is great. OK.

Mr. ROSE. First of all, I would like to thank you, Madam Chairman, for allowing me the opportunity to come and to speak.

I appreciate the opportunity from each of the Senators that are here for this chance to be able to discuss the emergency response phase of this disaster that took place on December 22d. I would first like to say that all disasters are local in their inception to the end of recovery, all emergencies are local.

The local government stands as the first line of defense and as oftentimes the last witness to the recovery of a disaster. I intend to speak today about what the county has done immediately following the event of December 22d and to raise the concerns that the county has today and will continue to have for the foreseeable future.

At 40 minutes past midnight on December 22d, 2008, the Roane County Emergency Communications Center received the first 911 call reporting a large mudslide that had collapsed houses and trapped occupants. Various emergency agencies, including the Roane County Office of Emergency Services, were dispatched to the location.

Roane County sheriff's units, while enroute, encountered a large wall of earth obstructing Swan Pond Road adjacent to the north entrance of the Kingston Fossil Plant. The sheriff's office units then advised all responding units that there had appeared to have been a failure of the ash pond obstructing Swan Pond Road. The first arriving responders arrived in the 100 block of Swan Pond Circle Road. There the road became impassable due to debris from the ash slide.

Emergency responders arrived near the first affected residential structure at 1:06 a.m. An incident command post was established near 175 Swan Pond Circle Road. Initial rescue crews were sent to the Schean residence where one adult male was found extricating himself from a partially collapsed home. Mr. Schean was not injured and did not request EMS treatment.

The initial scene assessment revealed Swan Pond Road, Swan Pond Circle Road, and the railway into the TVA Kingston Fossil Plant were impassable due to debris. Notification to Norfolk Southern's dispatch advising them of the situation was made at 2:17 a.m. Emergency response crews began a door to door search of all residential structures in the area. Homes along the lake shore were evacuated due to fears of secondary slide and the potential of ruptured gas lines to create fires in the area.

One additional home that had sustained damage was found to be occupied. One adult female, Mrs. James, was taken to a nearby

neighbor's home. At 3:49, the Roane County Emergency Operations Center was activated as well as a shelter at the Roane State Community College was opened for evacuees. Roane County utilized its emergency notification system to contact all residents in the affected area to inform them of the event at 3:52. The Roane County Basic Emergency Operations Plan was activated to bring on line all emergency assets of Roane County.

Myself and County Executive Mike Farmer established contact with TVA at the Kingston Fossil Plant at approximately 4:45 a.m. TVA personnel advised us that they were in the process of assessing the ash pond and mobilizing the emergency resources at that time. A final search of the area was completed at 4:56 a.m. and all emergency personnel were ordered out of the area to a staging area at Swan Pond Road and Swan Pond Circle.

At 6:36 a.m. the Roane County Emergency Communication Center received a 911 call from the Norfolk Southern Railroad stating that their train heading to the Kingston Fossil Plant had derailed. Upon our arrival with TVA Police at Swan Pond Road and Swan Pond Circle, communications was established with a Norfolk Southern representative that advised us there were no injuries and the train had impacted the slide area resulting in an emergency stop from the train crew. The train had not indeed derailed and was stuck in the debris.

Unified command was established between Roane County and TVA Fossil Plant at 7:42 a.m. Local utility crews were sent into the area to conduct damage assessment of critical infrastructure at 7:50. Harriman Utility Board reported ruptured gas, water, and sewer lines as well as numerous electrical lines down at 8:04. Roane County Office of Emergency Services terminated the emergency response phase at 9:30 and initiated recovery operations at that time, determining that all residents had been accounted for.

The recovery operations began with the Roane County building official and damage assessment teams beginning their assessment of residential properties at 10 a.m. The building official reported three homes with significant structural damage that would require the residential structures need be condemned due to structural instability. These were the only three residential structures found to have significant damage.

Further damage assessment revealed 42 pieces of personal property that had some sort of damage to docks or other ancillary structures. Utility crews reported that immediately following the event, there were approximately 60 homes with interrupted electrical power, 55 homes with interrupted gas service, and 37 homes with interrupted water service. TVA entered in various contracts with local service providers to rapidly restore these critical utility services immediately following the event. All utility repairs were completed on December 31st.

The highway department of Roane County, after performing a damage assessment of Swan Pond Road and Swan Pond Circle Road identified that there was enough debris covering those roads that the highway department lacked sufficient equipment and personnel to accomplish debris removal operations alone. The TVA was requested to assist by providing heavy equipment and per-

sonnel to begin debris removal. Debris removal began on the 23d and is still ongoing.

Roane County's Office of Emergency Services continues recovery operations within a Unified Command System co-located with TVA, the State of Tennessee, and EPA organizations at the TVA Fossil Plant.

Environmental concerns at Roane County recognized that this event presented several complex environmental issues for the residents of Roane County. We recognize the need for both long and short-term environmental monitoring to be performed. Roane County does not have an environmental monitoring capability at the level needed for this recovery operation. Therefore, Roane County has requested of the State of Tennessee that air, surface water, groundwater, and soil sampling be determine to help us determine the environmental effects from the ash spill that exist now or in the future.

Many unanswered questions about the environmental impact of this event still exist. It will take many months before we are able to fully characterize this event as it pertains to the impact on the environment and health of the area. Therefore, Roane County has requested from the State of Tennessee that an interagency oversight group consisting of State and local organizations be created for monitoring the recovery efforts.

On January 5th, 2009, an after-action review of events following the response to the dike failure at the TVA Kingston Fossil Plant was held with the local emergency response organizations. Several issues were identified that need addressed as corrective actions for future emergency preparedness activities.

The first challenge that was identified was immediately following the event, it was difficult to form a cohesive unified command system with the TVA due to the fact TVA at that time was not using the Incident Command System as defined by the National Incident Management System. A corrective action would be for TVA, like all Federal, State and local agencies to adopt, train, exercise, and conduct emergency response operations utilizing the Incident Command System as defined by the National Incident Management System.

The second challenge that was identified was to our knowledge there does not exist for the TVA Fossil Power Division the same stringent emergency preparedness and planning program as does for TVA's nuclear and hydroelectric facilities. The corrective action that was identified for TVA to implement a system-wide rigorous and comprehensive emergency preparedness program that incorporates all aspects of emergency management.

The third challenge that was identified was, to our knowledge, a comprehensive hazard analysis and risk assessment had not been performed at the TVA Kingston Fossil Plant that would have identified the potential of the dike failure. The corrective action that emergency response organizations requested is that TVA should conduct and make available to the emergency response local community a comprehensive hazard analysis and risk assessment for all TVA-owned and operated facilities.

In closing, I would like to say that the events of December 22d have changed the face of Roane County. I count it a blessing that

lives were not lost and that physical injuries were not sustained. On behalf of Roane County, I want to thank all the local, State and Federal organizations that have helped and will continue to help us deal with this event. I want to thank TVA for their response in repairing critical county infrastructure. I am pleased to say that as of today I feel that TVA has brought its entire cadre of resources to bear on this event.

Many challenges, both environmental and economic, exist now and many more will arise in the coming days and months. In closing, I want to say as a lifelong resident of Roane County that I have faith in the people of Roane County and I know them to be relentless when faced with a challenge. I know that given the opportunity they will rise to the occasion and create many solutions to the challenges that lie ahead.

Thank you.

[The prepared statement of Mr. Rose follows:]



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Response Synopsis:

At 0040 on December 22nd, 2008 the Roane County Emergency Communication Center received the first 911 call reporting a large mud slide that had collapsed houses and trapped occupants. Various emergency agencies including the Roane County office of Emergency Services were dispatched to the location. Roane County Sheriff's Office units, while en-route encountered a large wall of earth obstructing Swan Pond Road adjacent to the north entrance to the Kingston Fossil Plant. The Sheriff's Office units advised all responding units that there had appeared to have been a failure of the ash pond dike that runs parallel to Swan Pond Road and that all other responding units should use the alternate entrance of Swan Pond Circle. First arriving emergency responders arrived in the 100 block of Swan Pond Circle Road; there the road became impassable due to debris from the ash slide. Emergency responders arrived near the first effected residential structure at 0106. An incident command post was established near 175 Swan Pond Circle Road. Initial rescue crews were sent to the Schean residence where one adult male was found extricating himself from a partially collapsed home. Mr. Schean was not injured and did not request EMS treatment. The initial scene assessment revealed Swan Pond, Swan Pond Circle, and the railway into TVA Kingston Fossil Plant were impassable due to debris. Notification to Norfolk Southern dispatch advising them of the situation was made at 0217. Emergency response crews began a door to door search of all residential structures in the area. Homes along the lake shore were evacuated due to fears of secondary slide and the potential of ruptured gas lines in the area. One additional home that had sustained damage was found to be occupied. One adult female; Mrs. James was taken to a nearby neighbors home. At 0349 the Roane County Emergency Operations Center was activated as well as a shelter at Roane State Community College was opened for evacuees. Roane County utilized its emergency notification system to contact all residents in the affected area to inform them of the event at 0352. The Roane County Basic Emergency Operations Plan was activated bring on line all emergency assets of Roane County. Myself and County Executive Mike Farmer established contact with TVA at the Kingston Fossil Plant at approximately 0445 am. TVA personnel advised us that they were in the process of assessing the ash pond and mobilizing the emergency resources at that time. A final search of the area was completed at 456am and all emergency personnel were ordered out of the area and to stage at Swan Pond and Swan Pond Circle at 0625. At 0636 the Roane County Emergency Communication Center received a 911 call from Norfolk Southern Railroad stating that their train heading to the Kingston Fossil Plant had derailed. Upon our arrival with TVA Police at Swan Pond Road and Swan Pond Circle communications was established with a Norfolk Southern representative that advised us there were no injuries and that the train had impacted the slide area resulting in an emergency stop from the train crew. The train had not derailed and was stuck in the debris. After returning all emergency units to service following the response to the 911 call concerning the train all



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emergency response units were moved to the Kingston Fossil Plant for staging at 0734. Unified command was established between Roane County and TVA Kingston Fossil Plant at 0742. Local utility crews were sent into the area to conduct damage assessment of critical infrastructure at 0750. Harriman Utility Board reported a ruptured gas, water, and sewer lines as well as numerous electrical lines down at 0804. Roane County Office of Emergency Services terminated the emergency response phase at 0930 and initiated recovery operations at that time.

Recovery Operations:

The Roane County Building Official and damage assessment teams began assessment of residential properties at 1000. The Roane County Building Official reported 3 homes with significant structural damage that would require the residential structures need be condemned due to structural stability issues. These were the only 3 residential structures found to have damage. Further damage assessment revealed 42 pieces of personal property that had some sort of damage to docks or other ancillary structures. Utility crews reported that immediately following the event there were approximately 60 homes with interrupted electrical power, 55 homes with interrupted gas service, and 37 homes with interrupted water services. TVA entered in various contracts with local service providers to rapidly restore critical utility services immediately following the event. All utility repairs were completed on December 31, 2008. The Roane County Highway Department after performing a damage assessment of Swan Pond Rd and Swan Pond Circle Rd identified that there was enough debris covering those roads that the Highway Department lacked sufficient equipment and personnel to accomplish debris removal operations alone. The TVA was requested to assist by providing heavy equipment and personnel to begin debris removal. Debris removal began on December 23 and is ongoing. Roane County's Office of Emergency Services continues recovery operations within a Unified Command System collocated with TVA, State of Tennessee, and EPA organizations at the TVA Kingston Fossil Plant.



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Environmental:

Roane County recognized that this event presented several complex environmental issues for the residents of Roane County. We recognized the need for both long and short term environmental monitoring is performed. Roane County does not have an environmental monitoring capability at the level needed for this recovery operation, therefore Roane County made a request of the State of Tennessee for air, surface water, ground water, and soil sampling to determine if any environmental effects from the ash spill exist now or in the future. Many unanswered questions about the environmental impact of this event still exist. It will take many months before we are able to fully characterize this event as it pertains to its impact on the environment and health of the area, therefore Roane County has requested from the State of Tennessee that an interagency oversight group consisting of state and local organizations be created for monitoring the recovery efforts.

After Action Review:

On January 5th, 2009 an after action review of events following the response to the dike failure at the TVA Kingston Fossil Plant was held with local emergency response organizations. Several issues were identified that need addressed as corrective actions for future emergency preparedness activities.

- **Challenge-**Immediately following the event it was difficult to form a cohesive Unified Command with TVA due to the fact TVA was not using the Incident Command System as defined by the National Incident Management System.
- **Corrective Action-** TVA, like all federal, state, and local agencies should adopt, train, exercise, and conduct emergency response operations utilizing the Incident Command System as defined by the National Incident Management System
- **Challenge-** There does not exist for the TVA Fossil Power Division the same stringent emergency preparedness and planning program as does for TVA's nuclear and hydroelectric facilities.
- **Corrective Action-** TVA should implement system wide a rigorous and comprehensive emergency preparedness program that incorporates all aspects of emergency management: preparedness, response, recovery, and hazard mitigation
- **Challenge-** A comprehensive hazard analysis and risk assessment had not be performed at the TVA Kingston Fossil Plant



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- **Corrective Action-** TVA should conduct and make available to the local community a comprehensive hazard analysis and risk assessment for all TVA owned and operated facilities.

Closing Comments:

The event of December 22nd has changed the face of Roane County. I count it a blessing that lives were not lost and that physical injuries were sustained. On behalf of Roane County I want to thank all the local, state, and federal organizations that have helped and will continue to help us deal with this event. I want to thank TVA for their response in repairing critical county infrastructure. I am pleased to say that as of today I feel that TVA has brought its entire cadre of resources to bear on this event. Many challenges both environmental and economic exist now and many more will arise in the coming days and months. In closing, I want to say as a lifelong resident of Roane County that I have faith in the people of Roane County and I know them to be relentless when faced with a challenge. I know that given the opportunity they will rise to the occasion and create many solutions to the challenges that lie ahead.

Respectfully,

William Howard Rose Jr.
Director
Roane County Office of Emergency Services

Senator Barbara Boxer

1. Mr. Rose, the Tennessee Valley Authority's testimony states that they used the National Incident Management System (NIMS) approach for onsite emergency response to address the spill. Could you please describe whether TVA used the NIMS following the release of coal combustion waste from the Kingston Plant?

Answer:

The morning of the spill, myself and the County Executive made contact with CEO Kilgore at the Kingston Fossil Plant at approximately 0530. There was not a recognizable command structure in place. CEO Kilgore was making all decisions at that point, however. Several senior officials from TVA were present at the Kingston Fossil Plant. I asked TVA to give me a command organizational chart that would allow us to be able to interface with the appropriate TVA personnel. I also asked for their Incident Action Plan for the first operational period. CEO Kilgore was unfamiliar with these requests as they were made following the National Incident Management System. TVA decided to hire a contractor to help them with their Incident Action Planning that would help them become compliant with NIMS. After the contractor was in place, all Incident Action Planning was performed following the NIMS standards.

Senator Tom Udall

1. Mr. Rose, has Roane County and TVA established a long term plan for coordination of efforts to address the continued environmental and public health impacts of the spill?

Answer:

Early on Roane County identified that we lacked the equipment and manpower to perform the level of environmental monitoring that would be required. Roane County requested assistance from the Tennessee Department of Environment and Conservation as well as the State Health Department. The State of Tennessee, Roane County, and TVA promulgated a coordinated monitoring plan that included sampling of ground water, surface water, and air quality. This environmental monitoring plan was incorporated in the Corrective Action Plan that TVA released last week.

Senator James M. Inhofe

1.. Mr. Rose. I've long been strong supporter of first responders. In fact, I co-sponsored along with Chairman Boxer, a resolution designating the National First Responders Appreciation Day (in 2007).

In your written comments, you say: "I am pleased to say that as of today I feel that TVA has brought its entire cadre of resources to bear on this event. II Is there anything else TVA could do not listed in your written testimony in response to this disaster or to better prepare for any possible future problems?"

Answer:

I feel that it is paramount for operators of such facilities to engage with the local emergency response organizations, in order to prepare them to deal with incidents/events that may impact the local community that are created by these facilities. I think that TVA or any other company should be proactive in identifying the hazards that they present to the local community and help that local community by partnering with the emergency services to help them better understand what might occur and to help them gain the resources and training needed to address those hazards. TVA specifically should engage in a system wide all-hazards emergency management program.

Senator BOXER. Thank you, Mr. Rose.

Let me just say, because my question is going to be for Mr. Smith, that what I intend to do is ask TVA to respond in writing to your recommendation, that they answer the question as to why their emergency plans are very different. You said the nuclear plants have a much more stringent plan than this plant.

Mr. ROSE. Yes, ma'am.

Senator BOXER. And given the magnitude of what has happened here, and as you point out, what could have happened here had this happened in the daylight, summer day. And all you have to do is look back at what happened in, it was West Virginia in the 1970s, how many lives were lost because of the timing of that event. I am going to share that information with you, sir.

Mr. Smith, scientists tell us that global warming will cause more extreme weather events, including heavier rains. Given what you know about this disaster so far, could more extreme weather events increase the likelihood of other impoundment failures?

Mr. SMITH. I think that is certainly a possibility. Again, the fundamental problem is that EPA has not fully characterized the extent of this problem. So until we have a comprehensive review and understanding of the extent of the problem and fully characterize it, I think that is a very real possibility.

Senator BOXER. Are you concerned about the potential for other impoundment wall failures at other coal-fired power plants?

Mr. SMITH. Well, we are concerned. I think this problem has not been fully addressed, and therefore we are eager to see the comprehensive review. The unfortunate silver lining in this is that it has seemed to stimulate interest in review. I have seen a number of utilities now that have said that they are going back and beginning to look at this.

But again, we need a regulatory approach to this, so that we don't leave it up to the power industry to self-regulate themselves.

Senator BOXER. And I think you were very clear in your testimony and I feel you have made an important point. We have wet storage and we have dry storage. Now, when we asked that question of Mr. Kilgore, he said, well, the wet storage is the older way to dispose, and the dry storage is the newer. But yet, there are still, as I understood it, some very live proposals for more wet storage out there.

So I think your point that we should consider asking, and I will ask Lisa Jackson this when she comes before us, there ought to be a way to say that that wet storage, we have enough proof to know that it is very dangerous.

So I guess I would ask you, for the record, to say to me now, I mean, I have seen what happened in the 1970s, I have read about it, I haven't actually gone and seen it. And I have certainly been briefed extensively on what happened in this case. Isn't that enough of a wake-up call for us to say that wet storage is simply not safe, unless there is a way to do it that you treat it as a hazardous waste?

So I would ask you what your thoughts are. I am not expecting you to give me the definitive answer today. But we have some options here. We could treat the wet storage as hazardous waste and require the kind of fill that they have for hazardous waste. We

could outlaw future wet storage methods of disposal and go to dry storage, phase out the wet storage.

What is your sense, having seen this terrible result of wet storage?

Mr. SMITH. My sense of reviewing the information that is available in the EPA records, we have included in our testimony the March 2000, where EPA came right up to the edge of regulating this as a hazardous waste and then shirked away from that, for I think economic reasons and lobbying pressure.

My sense is that we absolutely need to keep this ash out of the water. Keeping it wet is not the proper solution. Every instinct I have, I am a veterinarian by training, my science and biology and chemistry tells me, don't make this wet, as much as you can. If you slurry it out, get into a point where you dry it out. And I think storing it wet is unacceptable.

And in my comments, I think we need to phase that out. I think that needs to be a very clear directive. That is an unacceptable solution.

I don't know, in the full gamut, of what the regulatory options are. But I can very confidently tell you today that if we regulate it as a hazardous waste, that may be the direction to go. Some may argue that is too far. But I can promise you, the lack of regulation we have right now is unacceptable. And that is one of the reasons why this accident has happened.

Senator BOXER. And it seems to me, one of your biggest concerns and the concerns of the residents, in addition to the immediate problem of getting rid of this stuff, so I would ask you two final questions. The answer I got from Mr. Kilgore I found totally unacceptable, that they are going to clean up the river, of course they have to do that, but they are not going to go to the coves, and they are just going to cover it over and plant seeds in it.

Now, from your experience and your organization's study, because I know there were different studies done that showed more serious pollution problems, and in the surface water. I am not saying into the drinking water, I am saying surface water. So do you feel that the community should demand a restoration of these coves as opposed to agreeing to live there with some plants grown over this stuff, this hazardous stuff?

Mr. SMITH. Well, not to create a panic, but we issued a statement very early in this process that reminded people that there are multiple pathways by which people can be exposed to this. Largely TVA originally out of the blocks focused only on the drinking water pathway. And that is important. But there is the drinking water, there is the air, because as this dries out, the particulate matter, there is, when you can come into physical contact with it. And we strongly encourage people to avoid touching it right out of the blocks. TVA did not do that, they did about a week later. But out of the blocks, we need to be aware of that.

And then, this will buildup in the environment through biological accumulation in the aquatic life and others. So there are multiple pathways.

As my understanding of today, with all the information that I have seen is, this site has not been fully characterized. We do not know yet what is the proper way. I in my heart of hearts believe

that it is going to be a much more aggressive action than what I am hearing from the Tennessee Valley Authority. And we need to get that.

But we need to fully characterize that ash pile. That is 50 years' worth of different types of coal that have been stacked at that site. TVA has taken some samples, I was just talking to Howie earlier, it looks like they finally have done a core sample. There are going to be different concentrations at different levels, because there has been different types of coal burned. And until we fully characterize that and understand what the hot spots are, we should err on the side of caution.

Senator BOXER. I think that is very key. So one of your key demands, then, in speaking for the community, is to fully characterize what is in this muck.

Mr. SMITH. Exactly.

Senator BOXER. And you know, I wanted to point out, we saw a picture of kids walking through it.

Mr. SMITH. And that is totally unacceptable.

Senator BOXER. That is, Senator, really unfortunate, that TVA took a week before they said, stay out of it. I mean, yes. So let me thank you very much, both of you. I am going to turn the gavel over to Tom Carper and step out for just a moment. He will speak and then he will call on Senator Alexander and then he will close. I may come back, I think I will come back.

But I want to thank both of you. I think, Mr. Rose, if I might say, I hear in your voice this take-charge point of view. You don't want other people to come in and help, but you are admitting to the fact that you didn't have the equipment. This was a huge situation for you.

I so admire your work. I was a county supervisor when I got started in life, so everything happens right there on the ground.

Mr. Smith, I think you have been articulate in representing the concerns of the people. And I think you have said it in ways that are very calm but very concerning. We cannot forget all of the stuff that is in this muck is stuff that is so dangerous that we pass laws to get it out of the air. And there it is, concentrated. Now, if it gets back into the air or gets into the drinking water or even remains on the ground, it is a concern. We need that analysis deep into this muck, because of the different types of coal and the different types of problems they each present.

Thank you very much, and I will call on Senator Alexander, and Senator Carper, you have the gavel for now.

Senator CARPER [presiding]. I want to call on Senator Alexander as well. Senator Alexander.

Senator ALEXANDER. Thank you, Senator Carper. Mr. Rose, Mr. Smith, thank you both for coming.

Mayor Farmer is here from Roane County, the other residents of Roane County have been introduced, he hasn't. We thank you for your leadership.

Mr. Rose, first I want to, from all I can gather, you and the local officials did a really good job in emergency preparedness and reaction, given your resources. You moved quickly and you have been complimented by other people. I want to compliment you as well.

Mr. ROSE. Thank you.

Senator ALEXANDER. The situation we have is that this is a State-regulated class 2 landfill. And the Federal Government hasn't, for whatever reason, decided to regulate it. You have made some good suggestions. But based on this experience, what I hope you would let us see is apart from the cleanup, but what else should we be doing about emergency preparedness. You have suggested that TVA ought to move at least closer to the level of emergency preparedness that it has for nuclear power plants.

Mr. ROSE. That is correct.

Senator ALEXANDER. There may be something else that the State should be doing. I know Governor Bredeson would welcome that advice as well, and in fact, has said so. And if there is a Federal role on the emergency preparedness part, well, then Senator Carper and I and others of us ought to know that as well.

So as you have this on the ground experience, if you would let us know that, I would appreciate it.

Mr. ROSE. I will, sir.

Senator ALEXANDER. Mr. Smith, I am sorry Senator Boxer left, because TVA made a, this is a real environmental tragedy, period, and it needs to clean it up. But I don't want it to obscure some of the things that TVA has been doing lately that I applaud. You mentioned in your remarks that burning coal is a dirty business and we need alternatives. If I am not mistaken, TVA has recently asked or said it would ask for 2,000 megawatts of renewable energy, looking for a way to buy that. It has said that it wants to find a way to, within a few years, to install conservation and efficiency provisions that would equal the amount of the electricity produced by a nuclear power plant.

And it is building two new nuclear power plants, and contemplating a third. Now, those are big numbers. The nuclear power plants are 1,000 megawatts each, I guess, more or less, and the conservation is 1,000, and renewable will be 2,000. As you look toward the future, and you are pretty active student of energy and the environment in the Tennessee Valley, as you look to the fact that Tennessee already is 16th, Senator Carper, I would like for you to know this as well, among the States, Tennessee ranks 16th in production of carbon-free energy, about 7 or 8 percent from hydropower, the rest from nuclear power. Obviously, we would like for that to go up.

As you look toward the future, what do you think the realistic alternatives are, and how rapidly do you think we can move toward them?

Mr. SMITH. Thank you, Senator. I do want to acknowledge that TVA has taken some important steps in the recent past to begin to look seriously at energy efficiency. And we are heartened by that. There are some real investments that they are looking at. We also are aware of the RFP that has gone out for the 2,000 megawatts, and we look forward to getting those results back and seeing if TVA acts on them.

In my written testimony, one of the things that I asked for, and I have repeatedly asked for is, I think we need a system of integrated resource planning that is a requirement. Every investor-owned utility around the TVA service territory has to go through what is called integrated resource planning, where they look at the

demand side and the looked at the supply side options and they find the lowest cost.

I was part of the TVA IRP review group when they did their last RFP in 1995. They have not undertaken a new IRP since then. It is unacceptable that we are 14 years now past that and TVA has not updated that plan. I think that out in the Northwest, BPA, under the Northwest Power Planning Council, I think the Senator may be aware of this, they have a requirement for the Bonneville Power Administration to do regular check-ins. Investor-owned utilities have done it.

In order for us to know what is the right mix going forward, the right way to look at all the options necessary, we need to do that planning, and it needs to be done on a regular basis in a transparent fashion that involves stakeholders. So I would encourage this Committee to look at requiring that of TVA. It is not too hard of a lift, it is comparable to what other investor-owned utilities do. And it puts everything on a level playing field.

I personally think we are awash in energy in this Country. We just use it horribly inefficiently. We can be much more aggressive in meeting energy efficiency and using that. I am excited about your vision of electric cars, because they are not only the ability to clean up the transportation sector, but in smart grid technology, they become a way of actually having storage for cleaner, renewable technologies like solar and others that can be done. And we can have those cars talking to the grid and communicating on a regular basis.

These are the types of things that TVA, if they were a living laboratory of innovation, and we need them desperately going into the 21st century, that they could lead with if we empower them to do that and require them to have a bold vision and make sure we populate the board with people that have that vision. That is something that you can help us provide leadership on.

I am eager to see that vision go forward. You are exactly right, important steps are being taken, but we have to hold the agency accountable. There is not enough oversight to make sure that they follow through on the things they do. Just putting out an RFP does not mean we are getting 2,000 megawatts of renewable energy. That is the first important step. But there are other steps that must be followed. Just spending money on energy efficiency doesn't cause energy efficiency to happen. We need to work with the power distributors in the Valley to make sure that happens.

Senator ALEXANDER. Thank you, Mr. Chairman. Madam Chair, she is back.

Senator CARPER. Both of us would be pleased to say you are welcome, and obviously pleased to welcome Senator Merkley.

Senator MERKLEY. Thank you very much for your testimony.

There were some specific facts in some of the articles about this disaster that I don't think have been mentioned. I just wonder if either of you have insight or would like to comment on them. One is that the containment walls were made of ash. They have been referred to elsewhere as earthen, but elsewhere it is noted that they were made from ash.

Another factor that is noted in the articles is that there was a decision to remove trees from the walls and that the removal of

those trees may have weakened the wall, if that had not been done properly, because the water could follow the pathways of the roots. And once the water starts moving, it erodes its way through the wall and creates a disaster.

A third factor embedded in the articles was that while the TVA said they had no evidence of any fish kill, there were videos of significant fish kills downstream. I just wonder if you could comment on any of those factors.

Mr. ROSE. Senator, I can comment on the first and the third. Indeed, there were earthen walls that we encountered that were both left after the failure and before the failure. As to the specific composition and thickness of those walls, we could refer to the engineering diagram that would show you specific information as to what that is.

As far as the trees, I cannot speak to that. But as far as the fish kill incident, the county did receive several calls about fish kills and responded by sending folks into the field and requesting assistance from the Tennessee Wildlife Resource Agency, particularly their biological division. The information that we received back from them was that the fish that were killed were indeed killed by being either washed up onto dry land and left there or they were killed by the impact of the wave as it moved through the water. That is what we have been told.

Mr. SMITH. Senator, I would like to respond to that question. I am not an engineer, and I don't want to represent myself to be one. But we have talked to engineers about this. What I understand is that ash is a reactive element, or reactive substance, and that it is not a good substance to use for structural integrity, because over time, it changes. Engineers have told me that relying on a wall of ash that is changing over time is a very difficult thing to know the structural integrity of it. I think it is one of those fundamental questions that needs to be explored about how EPA regulates this, as to whether they ought to be using ash walls to hold the ash itself. Because it does change over time.

Now, as far as the fish kills, I think the story is still developing there. I don't disagree with Mr. Rose in his assessment. I think there was literally a tidal wave, maybe as much as 20 feet in some places, that could have mechanically thrown fish out of the water. My fear is not the immediate fish kill, my fear is the long-term ecological health of the region and what ends up bioaccumulating into the wildlife over time.

Senator MERKLEY. Thank you very much.

Senator CARPER. I have two questions. One is of a more personal nature, and the other is more on target with our hearing. On the personal side, sometimes when witnesses appear before us, they have a member of their family or members of their family that are with them. From time to time we ask them to recognize and identify and introduce members of their family. I am looking at this audience and I am wondering if there might be a member of either of your families that are here. Mr. Rose.

Mr. ROSE. Yes, I brought my wife and my 10-year-old daughter with me. I felt it was very important, it is not every day that someone from Roane County, Tennessee gets to appear before a Senate committee. I felt it was important for my wife and my daughter to

be here to see this. I would like for them to stand up if they would, Melissa and Jade. My daughter is a 10-year-old fifth grader at Midway Elementary, and she is very interested in the way government works. She comes from a long line of local politicians. I thought it would be good for her. Thank you.

Senator CARPER. That is good. What is your daughter's name?

Mr. ROSE. Jade.

Senator CARPER. Jade. Well, Jade, some day you may sit up here and chair this Committee. You never know. Thanks for coming, and thanks for bringing your mom, thanks for bringing your dad. Jade, I could just barely see your lips move when your dad spoke. You are pretty good at that.

Mr. Smith.

Mr. SMITH. Senator, I actually did not bring anyone. My wife is still in Knoxville and I have a two-and-a-half-year-old son who wasn't really able to make the trip up. I also was watching the banter back and forth about all the grandparents. I actually am now a new grandfather, so I am talking to my 2-year-old son, who is an uncle. It is kind of an interesting dynamic.

But I only have one grandson at this point in time, so I have to try to catch up with Senator Inhofe, I guess, at some point in time.

Senator CARPER. Good luck. He has a head start on you.

You are good to come today, and I might add, you are very well represented on this Committee by our colleague from Tennessee.

The question that I would like to ask is, there has been a fair amount of talk about mercury level in fly ash or in water. Could you comment on why that is? My understanding is as we do a better job of actually cleaning up the emissions stream, we end up with fly ash that is more toxic, including substances like mercury. But if you could, just give us some idea where there is so much talk about the level of mercury in fly ash on water.

Mr. SMITH. I think obviously mercury as a neurotoxin is a chemical of great concern. There is a lot of debate, as you all know, about the mercury maximum achievable control technology need to be implemented with coal-fired power plants. I disagree with Tom Kilgore that only relying on co-benefits is, when you have a selective catalytic reduction unit on the hot side of a scrubber, that is really all that utilities need to do to control mercury. I don't agree with that. I think we need to do more. Mercury is too dangerous a material not to be looking at other technologies to control it.

I think it is not an accurate statement to say that all of these co-benefits equal 90 percent. I think it depends on the types of coals that are being burned and the particular boilers and other things.

Senator CARPER. I thought 90 percent sounded pretty good.

Mr. SMITH. Well, it may be overly optimistic, I guess is what I am saying. But here is the fundamental issue that I think gets back to the very reason we are here, is you can't have it both ways, where you are saying that you are getting the co-benefits of pulling the mercury out of the air in the smokestacks and then say there is nothing in the ash. Because the mercury does not disappear. If it is pulled out into the fly ash or the scrubber ash, it is going to be captured and it is going to need to be dealt with.

So I think there is concern about what happens as we put more scrubbers on. I know both you and Senator Alexander have been strong leaders on clean air regulation. I think as we clean those up, we need to pay attention to where they ultimately go. Because if they don't go out of the stack, they are going somewhere, and they are ending up in the ash, and we need to be careful. As we deal with new technologies, we need to understand how those chemicals migrate in that ash, and make sure, that is why EPA must be on the beat. They cannot be asleep at the switch here. We have got to get them to regulate this material.

Senator CARPER. Well, we will have a new cop on the beat in about 2 weeks.

Again, let me just express my thanks to each of you for joining us today, and for the work that you do, the good that you do with your lives. We appreciate your families being with us, too, family members.

I just want to say one last time, as Senator Boxer and I have indicated, she is the Chairman of the full Committee, I as the chairman of the subcommittee that has jurisdiction over TVA, that intend to do our job with respect to oversight, both at the Committee level and the subcommittee level. We are going to continue to not only be present as we watch the work, the cleanup that is done in conjunction with this particular disaster.

But also I am reminded of the words of an old Roberta Flack song, *Killing Me Softly*. There are different ways to hurt or to kill people. One can be like right away. The other could be over a longer period of time. We have about 25,000 people this year that are going to die from the stuff that we breathe, not the stuff that we eat or ingest, but the stuff that we breathe, some of which is actually emitted by not only TVA but all the utilities that use particularly coal. So we want to be diligent there, too. And we fully intend to be.

My hope as we leave here is that TVA will leave with a renewed commitment to be the kind of steward that they are expected to be, and provide the kind of leadership that they are expected to provide, not just with respect to providing cost-effective electricity and energy, but also with respect to being a good environmental steward.

Again, with that having been said, we thank you all for joining us today and wish you well. Thanks so much.

This hearing is adjourned.

[Whereupon, at 12:25 p.m., the Committee was adjourned.]

[Additional material submitted for the record follows:]

**TESTIMONY FOR THE RECORD
U.S. ENVIRONMENTAL PROTECTION AGENCY
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE**

January 8, 2009

Madam Chairman and members of the Committee, thank you for the opportunity to provide testimony on the U.S. Environmental Protection Agency's (EPA's) role in the response to the recent release of coal ash from the Tennessee Valley Authority (TVA) Kingston Fossil Plant in Harriman, Roane County, Tennessee. In addition to a description of the actions EPA has taken as part of the response to this release, the testimony also discusses EPA's regulatory efforts regarding the management of coal ash in landfills and surface impoundments, such as the surface impoundment that was the source of the recent release in Tennessee. The testimony concludes with information on EPA's efforts to encourage the beneficial use of coal ash: a set of practices which are yielding significant environmental and economic benefits, including reducing greenhouse gas (GHG) emissions to the environment, as well as the need for land disposal of coal ash.

Response to Kingston Coal Ash Release

On December 22, 2008, at 1:00 a.m., a retaining wall in a surface impoundment at the TVA Kingston Fossil Plant breached, causing the release of an estimated 5.4 million cubic yards of fly ash to the Emory and Clinch Rivers and surrounding areas. The release extended over approximately 300 acres outside the ash storage area. The breached impoundment was one of three impoundments at the facility used for settling the fly ash and discharging the water that was

used to transport the fly ash to the disposal site. The initial release of material from the plant's surface impoundment created a wave of water and ash that destroyed three homes, disrupted electrical power, ruptured a natural gas line in a neighborhood located adjacent to the plant, covered railway and roadways, and necessitated the evacuation of a nearby neighborhood.

Shortly after learning of the release, EPA deployed an On-Scene Coordinator to the site of the TVA Kingston Fossil Plant coal ash release. EPA joined TVA, the Tennessee Department of Environment and Conservation (TDEC), the Roane County Emergency Management Agency, and the Tennessee Emergency Management Agency (TEMA) in a coordinated response (i.e., unified command in the National Incident Management System). EPA is providing oversight, as well as technical advice, for the environmental response portion of TVA's activities. TVA has conducted extensive environmental sampling and shared results with EPA personnel. As discussed in more detail below, EPA staff and contractors have also conducted extensive sampling and air monitoring to evaluate public health and environmental threats. In addition to providing information on environmental conditions at the site, EPA's data have also served as an independent verification of the validity of the TVA data.

EPA sampling has included: surface waters of the Clinch and Emory Rivers, municipal water supply intakes, and finished water (distributed from the water treatment plant) from potentially impacted public water systems, soils, private drinking water wells, and coal ash. EPA also monitored airborne particulate levels in areas of ash deposition. The multimedia data will be used to determine appropriate response measures that are protective of the environment and human health.

In the days following the breach, EPA and TVA jointly sampled multiple locations along the Clinch and Emory Rivers. Those sampling efforts detected heavy metals known to be contained in coal ash in the Clinch and Emory Rivers. Concentrations measured on December 23, 2008 near the intake of the Kingston Water Treatment Plant (WTP) were below federal Maximum Contaminant Levels (MCL) for drinking water with the exception of elevated thallium levels. Subsequent EPA testing on December 30, 2008 of samples at the same intake found that concentration levels for thallium had fallen below the MCL. On December 29, 2008, and again during the December 30, 2008 sampling event, EPA sampled the finished water at the Kingston WTP. These samples met all MCLs, as well. Additional testing conducted during the December 30th sampling event confirmed that samples from the Cumberland and Rockwood WTPs did not exceed any MCLs. A regular sampling program implemented by TDEC at Kingston WTP is in place.

Some residents near the site rely on private wells as their source of drinking water. EPA identified and sampled several potentially impacted residential wells in the immediate area on December 30, 2008. No contaminants above MCLs were detected. In coordination with EPA testing, TDEC offered to sample all residential wells within a four-mile radius of the facility. As of January 5, 2009, TDEC had sampled 27 residential wells. Results from 20 of these wells is complete, and all 20 wells met the MCLs. Results from the remaining seven are expected soon. Well sampling is a voluntary process that must be initiated by each resident, and TDEC continues to receive (and accommodate) sampling requests.

EPA and TVA recognize that windblown ash poses a potential risk to public health. With EPA oversight, TVA commenced air monitoring for coarse (10 microns in size) and fine (2.5

microns in size) particulate matter (PM₁₀ and PM_{2.5}, respectively). Concurrently, EPA commenced independent monitoring for PM₁₀ and PM_{2.5} to validate TVA's findings. To date, particulate levels in the air have measured below the National Ambient Air Quality Standards for these parameters. TVA has constructed five air monitoring stations in residential neighborhoods surrounding the site and developed a strategy for air monitoring throughout the duration of the clean up.

TVA also obtained several air samples on TVA property to measure potential levels of specific contaminants of concern in the air. No constituents were detected with the exception of silica in a single sample. After consultation with the Agency for Toxic Substances and Disease Registry (ATSDR), the level of silica detected was determined not to pose an imminent threat to public health.

While protection of public health and safety is the primary concern during the initial phase of emergency response, EPA's mission also calls for protection of the environment (including, the long-term ecological health of the Emory and Clinch Rivers). As part of its initial response, TVA constructed a rock weir across the Emory River to minimize sediment transport; a second weir is in the design phase. A detailed ecological assessment will determine appropriate future actions. EPA will continue to work with TDEC and TVA on the long term remediation effort

Regulation of Coal Ash Surface Impoundments

Wastewater discharges from surface impoundments are regulated by National Pollutant Discharge Elimination System (NPDES) permits that incorporate both technology-based requirements (i.e., effluent limitations guidelines) and water-quality based effluent limits. The effluent guidelines for steam electric power plants were last issued in 1982 and are codified in Part 423 of the Code of Federal Regulations (40 CFR part 423).

Since 2005, EPA has been carrying out an intensive review of wastewater discharges from coal-fired power plants to determine whether new Clean Water Act regulations are needed. As part of this effort, EPA has sampled wastewater from surface impoundments and advanced wastewater treatment systems, conducted on-site reviews of the operations at more than two dozen power plants, and issued a detailed questionnaire to thirty power plants using authority granted under section 308 of the Clean Water Act. EPA's data collection efforts are primarily focused on three target areas: (1) identifying treatment technologies for the wastewater generated by newer air pollution control equipment; (2) characterizing the practices used by the industry to manage or eliminate discharges of fly ash and bottom ash wastewater; and (3) identifying methods for managing power plant wastewater that allow recycling and reuse, rather than discharge to surface waters. We've engaged in extensive dialogue with our state partners to hear their views and ensure their concerns about power plant discharges are taken into account.

In August 2008, EPA published an interim report describing the status of the detailed study and findings to date. Much of the information EPA had collected, including the laboratory data from sampling and the questionnaire data were made available to the public. The study is

still in progress and in December 2008 EPA received the laboratory results from its most recent sampling event. Upon completion of the study this year, EPA will determine whether the current national effluent limitations guidelines for power plants need to be updated. EPA's interim study report, "*Steam Electric Power Generating Point Source Category: 2007/2008 Detailed Study Report*," can be found online at <http://epa.gov/waterscience/guide/304m/2006/steam-interim.pdf>.

EPA is also currently considering potential regulatory approaches under the Resource Conservation and Recovery Act (RCRA). In May 2000, EPA issued a "Regulatory Determination on Wastes from the Combustion of Fossil Fuels," which conveyed EPA's determination that coal combustion wastes, including coal ash, did not warrant regulation as hazardous waste under Subtitle C of RCRA. However, EPA also concluded that these wastes did warrant federal regulation as non-hazardous wastes under Subtitle D of RCRA and based this determination on the following findings: 1) the constituents present in these wastes include toxic metals that could present a danger to human health and the environment under certain conditions; 2) EPA identified 11 documented cases of proven dangers to human health and the environment through the improper management of these wastes in landfills and surface impoundments; 3) many sites managing these wastes lack controls, such as liners and groundwater monitoring; and 4) while state regulatory programs had shown improvement, gaps in state oversight existed. EPA also determined that beneficial uses of these wastes, such as the use of coal ash as a constituent in concrete, posed no significant risk and did not require additional federal regulation, except for possibly the placement of coal combustion products (CCPs) in minefill operations.

EPA based the May 2000 Regulatory Determination on information collected prior to 1995. Since the determination, EPA collected new information and conducted additional analyses that it believed should be considered as part of its evaluation regarding the development of regulations for the management of coal combustion waste in landfills and surface impoundments. Thus, in August 2007, EPA made this information available for public comment through a Notice of Data Availability (NODA, 65 FR 32214). In response to public requests, EPA extended the comment period on the NODA twice. The second extension for comments closed on February 11, 2008. EPA received close to 400 comments in response to this NODA.

The August 2007 NODA solicited comment on three documents – an updated EPA risk assessment characterizing potential human and ecological risks associated with the placement of coal combustion wastes in surface impoundments and landfills, an updated report on damage cases associated with disposal of coal combustion wastes, and a DOE-EPA survey of more recent disposal practices; in addition the NODA made available for comment alternative regulatory approaches recommended by a consortium of environmental groups and by industry. After the conclusion of the comment period on the August 2007 NODA, EPA commissioned a peer review of the draft risk assessment. The peer review concluded in September 2008. EPA is currently reviewing comments on the August 2007 NODA and the peer review comments to inform follow-up actions to the May 2000 Regulatory Determination.

Beneficial Use of Coal Ash

Through the Coal Combustion Products Partnerships (C2P2) program, EPA works in cooperation with the American Coal Ash Association, the Utility Solid Waste Activities Group,

the U.S. Department of Energy, the U.S. Department of Agriculture's Research Service, the U.S. Federal Highway Administration, and the Electric Power Research Institute to promote the safe beneficial use of CCPs and the environmental benefits that result from their use. As noted previously, the Agency's May 2000 Regulatory Determination concluded that the legitimate beneficial use of CCPs did not present a risk and did not need further federal regulation, except for possibly the placement of CCPs in minefill operations. The beneficial use of CCPs saves virgin resources, reduces energy consumption, reduces GHG emissions, and reduces the need for land disposal. In one example of beneficial use, coal ash can typically replace between 15 percent and 30 percent of the Portland cement used in concrete. The inclusion of coal ash can strengthen concrete and make it more durable than concrete made with only Portland cement. This beneficial use of coal ash also reduces energy use and other environmental impacts associated with Portland cement.

For example, in 2007, by recycling 13.7 million tons of fly ash and using it in place of Portland cement, the United States saved nearly 73 trillion BTUs of energy, equivalent to the annual energy consumption of more than 676,000 households. GHG emissions were also reduced by 12.4 million metric tons of carbon dioxide equivalent, equivalent to the annual GHG emissions of 2.3 million cars.

Conclusion

EPA will continue its oversight and technical assistance efforts associated with the Kingston coal ash release to help ensure protection of human health and the environment. The

Agency will continue to keep the Committee informed on progress related to the response and on its regulatory efforts related to power plant impoundments and coal combustion wastes.

**SOIL AND ASH SAMPLING RESULTS
KINGSTON FOSSIL FLY ASH RESPONSE
HARRIMAN, ROANE COUNTY, TENNESSEE**

Prepared for:



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EMERGENCY RESPONSE AND REMOVAL BRANCH
REGION 4
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Technical Direction Document TTEMI-05-001-0084

January 4, 2009

INTRODUCTION

The Tetra Tech EM Inc. (Tetra Tech) Superfund Technical Assessment and Response Team (START) is submitting this report summarizing soil and ash sampling activities conducted at the Kingston Fossil Fly Ash Response in Harriman, Tennessee. This report includes two tables: table 1 provides a figure illustrating the sampling locations; and table 2 provides a summary of the analytical results for the collected samples.

SITUATION

On December 22, 2008, at approximately 0100 hours, the northeastern dike at the TVA Kingston Power Plant, located in Harriman, Roane County, Tennessee, failed. The dike retained one of three cells at the facility used for dewatering fly ash. Subsequently, approximately 5.4 million cubic yards of fly ash were released into two sloughs which flow into the Emory River. The release extended approximately 300 acres outside of the ash storage areas. Local emergency officials first responded to the scene, and then shortly thereafter, began to assist residents affected by the fly ash flows. Three residential homes became condemned as a result of the release.

On December 22, 2008, the National Response Center (NRC), and subsequently the U.S. Environmental Protection Agency (EPA) Region 4, was notified of the incident. An On-Scene Coordinator (OSC) and Tetra Tech START were mobilized to the TVA Kingston Power Plant Facility the same day.

SAMPLING ACTIVITIES

EPA's contractor, Tetra Tech, conducted soil and ash sampling of impacted and potentially impacted areas. On December 23, 2008, EPA's contractor collected a fly ash sample (grab sample) from a sand bar on the Emory River. On December 27, 2008, EPA's contractor collected two 10-point composite ash samples from the ash pile in staging area C. In the same sampling event, EPA's contractor collected three grab samples of ash that had been deposited on the roadway.

Eleven 5-point composite samples of potentially impacted soil were collected from residential properties, and riverbanks. Analyses included: Target Analyte Metals (TAL) (SWS846 Method 6010B, 7471A), BTEX (gasoline constituents) (Method 8260B), and Silica (Method 6010B).

The sample locations, analyses performed and dates collected are shown in Table 1 below. Sample locations are also provided on the map labeled Figure 1.

Table 1: Ash and Soil Sample Descriptions

Sampling ID	Date	TAL Total Metals	BTEX	Silica	Location
TT-SS01	12/23/08	X	X		Fly ash sample collected from a sandbar on the Emory River at mile marker 1.9.
081227-DKC-SS-01	12/27/08	X	X	X	Undisturbed sample from top of ash pile located in staging area C.
081227-DKCL-SS-01	12/27/08	X	X	X	Disturbed ash sample from staging area C.
081228-KFPRW-01	12/28/08	X	X	X	Ash sample from shoulder of Swan Pond Rd, approx 500 ft north of TVA checkpoint.
081228-SPRRW-02	12/28/08	X	X	X	Ash sample from shoulder of Swan Pond Rd, near spring drainage way.
081228-SPCRW-03	12/28/08	X	X	X	Ash sample from shoulder of Swan Pond Cir, approx 200 ft North of damaged home.



Sampling ID	Date	TAL Total Metals	BTEX	Silica	Location
081228-EERBS-SS04	12/28/08	X	X	X	Soil sample from staging area on eastern Emory River bank.
081228-ERPL-SS05	12/28/08	X	X	X	Soil sample from beneath powerlines on NE bank of Emory River (near Emory River mile marker 1.75).
081228-ERPR-SS06	12/28/08	X	X	X	East bank of Emory River at 346 Peninsula Road.
081228-ERER-SS07	12/28/08	X	X	X	East bank of Emory River at 496 Emory River Road.
081228-ERER-SS07-DUP	12/28/08	X	X	X	East bank of Emory River located at 496 Emory River Road.
081228-ERER-SS08	12/28/08	X	X	X	East bank of Emory River located at 444 Emory River Road.
081228-SGVBR-SS09	12/28/08	X	X	X	Sugar Grove Valley Boat ramp, public area.
081228-KCPS-SS10	12/28/08	X	X	X	Kingston City Park South boat ramp, public area.
081228-KCP-SS11	12/28/08	X	X	X	Kingston City Park public area.

RESULTS

Tables 2 – 4 contain summary analytical data for all EPA collected data, sorted by date. For comparison, each table includes the EPA Region 4 Removal Action Levels (RALs) for residential and industrial soil. RALs identify contaminant levels at which response actions may be required (exposure pathway analysis must be included with the RAL to determine appropriate course of action). Arsenic was the only constituent detected above the RALs.

Arsenic values of the ash ranged from 45.8 mg/kg to 81.3 mg/kg. Data from both sample sets indicates that Kingston Fossil Plant ash exceeds the residential EPA Region 4 Removal Action Level (RAL), but not the industrial RAL, for arsenic. EPA's contractor collected two samples (DKC-SS-01 and DKCL-SS-02) from the ash cell, one undisturbed and one disturbed. These samples measured 45.8 and 59.9 mg/kg, respectively. Three ash samples were collected on the roadway along Swan Pond Road and Swan Pond Circle Road. These three samples (KFPRW-01, SPRRW-02, and SPCRW-03) measured arsenic levels at 54.2 mg/kg, 81.3 mg/kg, and 69.8 mg/kg, respectively. The sample collected on December 23, 2008 from the deposited ash in the Emory River (TT-SS01) measured 44.8 mg/kg, which exceeds the Region 4 residential RAL for arsenic (39 mg/kg). While ash samples were not collected on private property, the sample taken from deposited ash on a sandbar in the Emory River and the two samples (081228-SPRRW-02 and 081228-SPCRW-03) taken along the roadway are on public right of way; therefore, residential levels are used for comparative purposes.

See Figure 1 for sample locations.

All residential soil sample concentrations were below the RALs for all constituents, including arsenic. See the data tables for the complete data set. TDEC has provided a background analysis of native soils, available at:
<http://www.osti.gov/bridge/servlets/purl/1012023782LVNC/webviewable/10120237.PDF>.

From December 27-29, 2008, TVA sampled the affected portions of seven residential properties. TVA collected background soil samples from areas above the high-water levels on each property. One



additional residence was sampled on January 2, 2008. TVA analyzed the soil and ash for total metals, BTEX (gasoline constituents), and silica.

CONCLUSION

The results of the sampling reveal an elevated amount of arsenic in the ash. Further delineation of ash deposition outside the facility boundary is necessary to support removal of ash in residential and public areas. Sampling results of residential soils near the site did not exceed the RALs; however, a limited number of properties have been sampled to date. Sampling of off-site properties potentially impacted by the release is necessary.



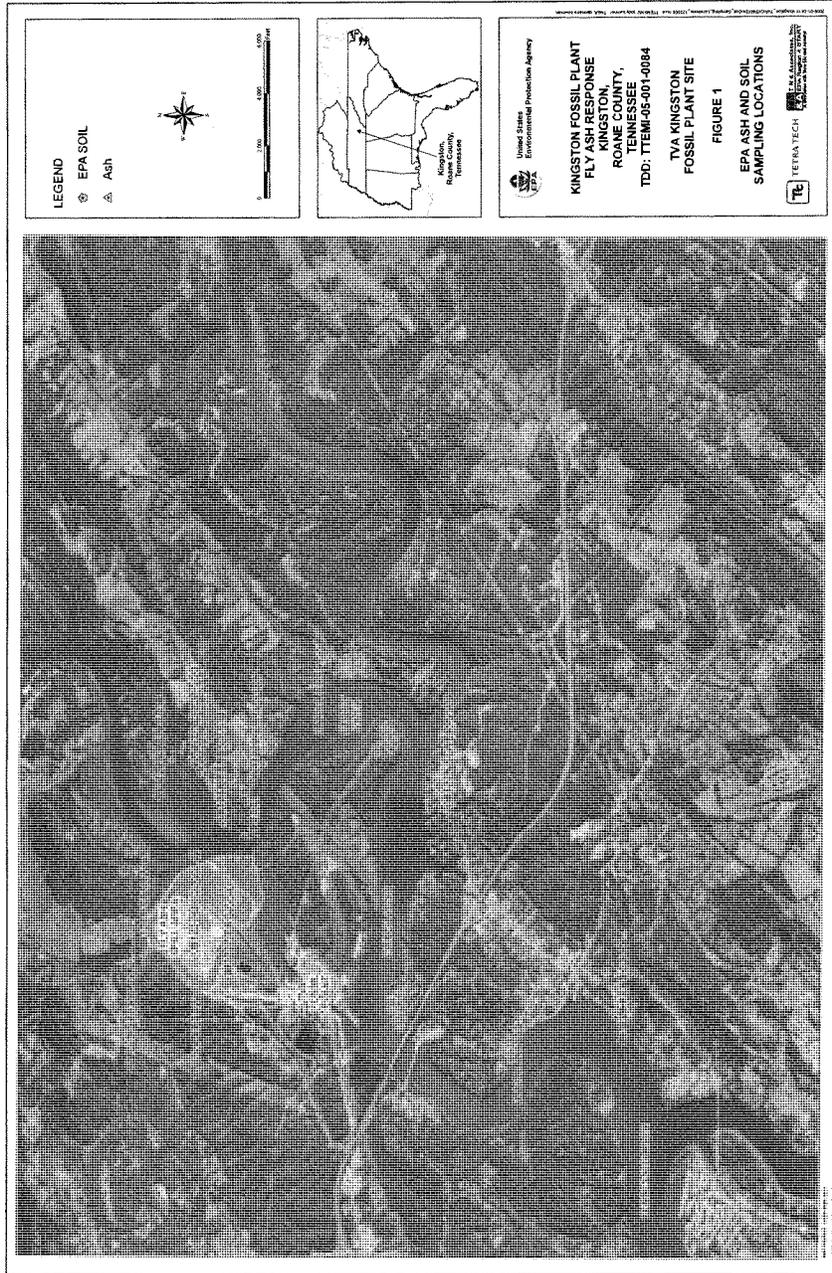


TABLE 2
EPA ASH SAMPLING RESULTS
SAMPLES COLLECTED DECEMBER 23, 2008

Sample Designation:	RAL	RAL	TLS8501
Sample Collection Date:	Residential	Industrial	12/23/2008
Field Quality Control:			
Percent Moisture (percent)	NL	NL	27.7
BTEX (ng/kg, dry weight)			
Benzene	113	656	1.3 U
Ethylbenzene	574	3100	1.3 U
m,p-Xylene	13800	64100	1.3 U
o-Xylene	16300	76100	1.3 U
Toluene	33400	155000	1.3 U
Total Metals (ng/kg, dry weight)			
Aluminum	76000	329000	24000
Antimony	239	1350	1.27 J
Arsenic	177	177	48.8
Barium	16300	61000	6.25
Beryllium	1410	5700	6.25
Cadmium	729	2700	0.577 J
Calcium	NL	NL	18300
Chromium	27600	154000	41.3
Cobalt	244	1010	17.7
Copper	NL	NL	59.9
Iron	575000	2300000	19000
Lead	807	3000	3000
Manganese	NL	NL	66.9
Mercury	20	93	0.0879 J
Nickel	16400	68100	25.4
Potassium	NL	NL	3280
Selenium	4110	17000	3.13 J
Silver	NL	NL	2.81 U
Sulfur	21	221	4.16 J
Tellurium	33	221	4.16 J
Vanadium	4140	17200	107
Zinc	246000	1020000	55.6
TCLP Metals (mg/L)*			
Arsenic	5.0		NA
Barium	100.0		NA
Calcium	1.0		NA
Chromium	5.0		NA
Copper	0.2		NA
Selenium	1.0		NA
Silver	5.0		NA

Notes:
 Detections are listed in BOLD. Results still waiting for Silica.
 Highlighted results exceeded the Region 4 RAL.
 BTEX = Benzene, toluene, ethylbenzene, and xylene
 J = The analyte was positively identified, the associated value is the 99 concentration of the analyte in the sample.
 ng/kg = Milligrams per kilogram
 mg/L = Milligrams per liter
 NL = Not listed

* = Comparison values are TCLP thresholds and not Region IX Preliminary Remediation Goals.
 RAL = Region 4 Removal Action Level
 TCLP = Toxicity characteristic leaching procedure
 U = The analyte was analyzed for, but was not detected at or above the associated value.
 µg/kg = Micrograms per kilogram



