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Dear Ms. Farless:

The undersigned groups are writing to provide scoping comments on the Tennessee Valley Authority (TVA) Environmental Impact Statement for the Closure of CCR Impoundments (EIS). We are specifically responding to the request for comments that accompanied your August 19, 2015 Notice of Intent.[1]

In our view, a programmatic EIS is not an appropriate vehicle for consideration of the environmental impacts associated with closure in place or closure by removal at TVA's CCR impoundments. As explained in more detail below, each of the eleven sites identified in the Notice of Intent have unique features, such as karst, relationship to the floodplain, seismic issues, proximity to the water, unique construction features, and long, varied histories. Each of these factors, and others, must be considered for each site and therefore, a programmatic EIS will not suffice. Indeed, a programmatic decision to adopt a specific approach to closure would predetermine the result of the required site-specific analysis in contravention of the informed decision-making mandate of NEPA.

Under NEPA, TVA is required, at a minimum, to analyze the impact on each of the following environmental factors at the individual, site-specific level:

Water resources (surface water, groundwater quality, and use);

Vegetation;

Wildlife;

Aquatic ecology;

Endangered and threatened species;

Geology;

Land use;

Transportation;

Recreational and managed areas;

[1] http://www.tva.gov/environment/reports/ccr/.

Visual resources;

Archaeological and historic resources;

Solid and hazardous waste;

Public health and safety;

Noise;

Air quality and climate change;

Socioeconomics and environmental justice.

To the extent TVA decides to proceed with its proposed programmatic approach, the EIS must, at the very least, address the above list of issues at a programmatic and cumulative level. Subsequent site-specific analyses will be required as TVA takes action at each site. Keeping these global comments in mind, we raise the following additional and/or specific concerns:

1. TVA must provide for appropriately timed public participation.

We appreciate TVA's intention to host site-specific public hearings after the Draft EIS has been completed, but we ultimately feel that waiting until after the environmental impacts analysis has been completed does not afford the public an opportunity for meaningful engagement. All of the coal ash impoundment sites have unique concerns and different potential and existing contamination pathways. If TVA is committed to providing the public with a meaningful opportunity to engage, it should host site-specific public hearings after the scoping comment period has ended but before the Draft EIS has been completed.

2. TVA cannot rely on EPA's risk assessment to support closure-in-place.

As TVA weighs two closure options—closing ash ponds in place or closing them by removing the ash—TVA must make a detailed investigation of how local hydrology will influence post-closure contamination pathways. In its Notice of Intent, TVA assumes that closure in place is as safe as closure by removal of ash, citing EPA's coal ash rulemaking.[2] However, EPA's rulemaking, specifically the risk assessment used to estimate risks to human health and the environment,[3] does not even remotely support this assumption. This is because most, if not all, of TVA's coal ash impoundments are at least partially inundated with groundwater, a situation that EPA did not model.

2.1 EPA did not model coal ash impoundments in contact with groundwater

[2] *See, e.g.*, Notice of Intent at 5 ("EPA determined that once a CCR impoundment is dewatered and closed, the risks are no greater than those of an inactive CCR landfill that is not subject to additional requirements under the rule").
[3] U.S. EPA, Human and Ecological Risk Assessment of Coal Combustion Residuals (Dec. 2014) (hereinafter "EPA Risk Assessment").

In its risk assessment, EPA modeled coal ash impoundments and coal ash landfills separately, and it modeled pre- and post-closure time periods in different ways depending on the method of closure. EPA appears to have assumed that all impoundments were closed by removing the ash: "It is assumed that all waste is removed from most units prior to closure (i.e., clean closure)."[4] EPA goes on to say that impoundments closed by capping in place would behave like landfills,[5] but EPA only looked at that scenario in its sensitivity analysis.[6]

The most important limitation of EPA's risk assessment, however, is that it did not model any coal ash units—impoundments or landfills, pre- or post-closure—that were in contact with groundwater. This is clearly and repeatedly stated in the risk assessment. For example,

> The selected [depth below grade] value was constrained to be no deeper than the water table present in that model iteration. During a given model iteration, if the resulting depth below grade resulted in a unit below the ground water table, a new value was selected until the unit fell at or above the water table.[7]

In another section of the risk assessment EPA states that "[t]he probabilistic analysis limited the depth of every WMU to the boundary of the water table because EPACMTP is not designed to solve for leaching from within the water table."[8]

EPA also explicitly acknowledged that its model was unrealistic: "Some damage cases occurred for disposal practices that could not be modeled in the risk assessment. For example, disposal below the water table."[9] That section of the risk assessment goes on to discuss its attempt to validate the model using field data and damage cases, and concludes that "[w]here differences [between the risk assessment and field data] were observed, these were likely due to site-specific considerations that were not modeled in the risk assessment (e.g., placement of waste below the water table)."[10]

In other words, coal ash below the water table, a common scenario in the TVA fleet (see below), creates much higher risks than those modeled by EPA. This makes intuitive sense when one considers the fact that pollutants leach out of coal ash when it is in contact with water: Capping a landfill only reduces the infiltration of water from above, not from below. If the capped landfill is below the water table—if the coal ash is sitting in water during some or all of the year—then pollutants will continue to leach out of the coal ash regardless of the cap.

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[4] EPA Risk Assessment, 2-3. *See also id*. at 4-6 ("[o]nly the operational phase of a surface impoundment was modeled").
[5] *Id*.
[6] *Id*. at 5-28.
[7] EPA Risk Assessment at 4-9.
[8] *Id*. at 5-10.
[9] *Id*. at 5-48.
[10] *Id*. at 5-49.

The risk of having coal ash below the water table is why EPA has required that both new and existing surface impoundments, and new landfills, be built not just above the water table, but at least five feet above the "upper limit of the uppermost aquifer."[11]

In short, the EPA risk assessment is silent about the relative risks of closure in place or closure by removal for surface impoundments that are below the water table. Where ash is in contact with groundwater, closure by removal would have a substantially lower environmental impact than closure in place, and TVA's preferred option should be closure by removal. As discussed below, most or all of TVA's coal ash impoundments are below the water table.

2.2 Most of TVA's coal ash impoundments are in contact with groundwater

TVA will have to show that its impoundments are at least five feet above the upper limit of the uppermost aquifer, or close the impoundments, pursuant to the Resource Conservation and Recovery Act (RCRA).[12] The deadline for that determination is in 2018, but TVA should include all of the relevant information in its EIS, as that information has a direct bearing on whether closure in place can be done in an environmentally sensitive way. Based on the information available to us, it appears that most of TVA's impoundments will fail this requirement.

We have already commented on this issue with regard to TVA's Bull Run plant.[13] In pertinent part, our comments stated the following:

> The fly ash impoundment and stilling pond are constructed with a base at an elevation of roughly 780 feet.[14] The local water table could be defined as the elevation of water in the ponds (roughly 805 feet) or the elevation of nearby groundwater (roughly the same elevation) or, at a minimum, the elevation of the Clinch River (roughly 795 feet). In any case, the base of this unlined impoundment complex is well below the water table, which facilitates the migration of leachate from the thick layer of accumulated coal ash in the impoundment.

Since many of TVA's coal ash impoundments are next to large bodies of water, frequently in a flood plain, the water table is often quite high, and as is the case at Bull Run, the bottom of each impoundment is frequently below the water table. The following list is not exhaustive, but provides some illustrative examples:

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[11] 40 C.F.R. § 257.60. EPA originally proposed a two-foot buffer between ash and groundwater, but determined that this was not sufficiently protective. 80 Fed. Reg. 21361-62.
[12] 40 C.F.R. § 257.60.
[13] Southern Alliance for Clean Energy et al., Scoping Comments on TVA's Environmental Impact Statement for the Disposal of Coal Combustion Residuals from the Bull Run Fossil Plant (July 2, 2015).
[14] Stantec Consulting Services, Inc., Report of Geotechnical Exploration – Bull Run Fossil Plant, pdf pages 889 *et seq*. (Apr. 12, 2010).

- At the Allen plant, the floodwater elevation of McKellar Lake is 232.5 feet, essentially the same elevation as the water in Allen's active coal ash impoundment (233 feet).[15] According to TVA, the local water table rises and falls with McKellar Lake,[16] so it must at times be higher than the bottom of the ash pond. The same is true of Allen's inactive (west) ash pond: as shown in Figure 1 below, surface water was high enough to cause partial flooding of the inactive ash pond at least once in the past five years. Capping these ponds in place will clearly do nothing to prevent water from coming into contact with coal ash.

Figure 1: Inactive Ash Pond at the Allen Fossil Plant, May 9, 2011.[17]

- The Bottom Ash Pond at TVA's Colbert Fossil Plant is filled with ash to a depth (elevation) of roughly 420 feet.[18] The local bedrock water table sits at an elevation of

[15] Stantec Consulting Services, Inc., Report of Geotechnical Exploration – Report and Evaluation of Slope Stability – Northern Perimeter Dike – East Active Ash Pond – Allen Fossil Plant, Appendix F (March 25, 2010).
[16] TVA, *Groundwater Monitoring Report – Allen Fossil Plant – February 2008* (Aug. 22, 2008) ("Groundwater levels measured at Allen fluctuate with changes in McKellar Lake levels, driven by changes in Mississippi River elevation, which suggest a strong communication between groundwater under the site and nearby surface water.")
[17] Google Earth image obtained September 10, 2015.
[18] Stantec Consulting Services, Inc., Report of Geotechnical Exploration and Slope Stability Evaluation – Ash Pond 4 – Colbert Fossil Plant, Appendix F (January 22, 2010).

425-435 feet.[19] This means that even after the pond is dewatered, approximately 5 to 15 feet of ash will continue to be saturated with groundwater.

- Engineering reports for the ash pond at the Cumberland Fossil Plant show ash to a depth (elevation) of approximately 365 feet.[20] Local groundwater levels are as high as 385 feet.[21] Again, it is safe to assume that 20 feet of ash will be saturated with groundwater after dewatering.

- At the Gallatin Fossil Plant, the ash ponds contain ash to a depth (elevation) of roughly 442 feet,[22] and local groundwater levels range between 446 and 456 feet.[23]

- Engineering documents for John Sevier Fossil Plant show up to 30 feet of sluiced fly ash below the water table in former ash ponds that are now used as a dry fly ash stack.[24] It is unclear whether any part of the bottom ash pond sits below the water table.

- The active ash pond at the Johnsonville Fossil Plant is an artificial island in Kentucky Lake. We presume that groundwater levels in the island after dewatering will correspond to the level of Kentucky Lake. An engineering report for the site states that the original dikes around the pond were raised "[b]ased on a concern that the dike could possibly be overtopped by waves on Kentucky Lake."[25] This leads us to assume that the Lake, and therefore the local groundwater level, will sometimes rise above the bottom of the ash pond in the future.

- The Shawnee Fossil Plant coal ash disposal area contains ash to a depth (elevation) of 310 feet.[26] A 2010 engineering report provided Ohio River and onsite piezometer readings for February-May 2010, which showed that the Ohio River was as high as 321 feet (11 feet higher than the bottom of the ash pond), and that local groundwater within the pond and dry stack areas was as high as 330 feet.[27] Groundwater levels in the monitoring wells surrounding the disposal area show groundwater as high as 324 feet.[28]

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[19] TVA, Groundwater Monitoring Report October 2014 (Colbert Fossil Plant), Figures 4 and 5 and Table 3 (Feb. 6, 2015).
[20] Stantec Consulting Services, Inc., Report of Geotechnical Exploration and Slope Stability Evaluation – Ash Pond - Cumberland Fossil Plant, pdf pages 542 et seq. (March, 2010).
[21] TVA, Groundwater Assessment Monitoring Report January 2015 (Cumberland Fossil Plant), 5 (Mar. 11, 2015).
[22] Stantec Consulting Services, Inc., Report of Geotechnical Exploration and Slope Stability Evaluation – Ash Pond / Stilling Pond Complex, Gallatin Fossil Plant, pdf page 281 (May 27, 2010).
[23] TVA, Groundwater Assessment Monitoring Report October 2014 (Gallatin Fossil Plant), 5 (Dec. 18, 2014).
[24] Stantec Consulting Services, Inc., Report of Geotechnical Exploration – Dry Fly Ash Stack, Bottom Ash Disposal Area 2, and Ash Disposal Area J – John Sevier Fossil Plant, Appendix i (Feb. 8, 2010).
[25] Stantec Consulting Services, Inc., Report of Geotechnical Exploration and Slope Stability Evaluation – Ash Disposal Areas 2 and 3 – Johnsonville Fossil Plant, 6 (April 13, 2010).
[26] Stantec Consulting Services, Inc., Report of Geotechnical Exploration and Slope Stability Evaluation – Ash Pond 1 & 2 and Consolidated Waste Dry Stack - Shawnee Fossil Plant, Appendices A and G (July 14, 2010).
[27] *Id*. at Appendix B.
[28] *See, e.g*., TVA, Groundwater and Surface Water Monitoring Sample Data Reporting Form for Shawnee Fossil Plant, 2nd quarter 2011.

> As with the other plants discussed above, a significant portion of the Shawnee coal ash appears to be below the water table.

It should be clear from all of the above examples that capping an ash pond in place is not nearly as safe as removing the ash when the ash is in contact with groundwater. TVA must assess the extent to which each coal ash disposal area is beneath the "upper limit of the uppermost aquifer."[29] Where TVA does find this to be the case, removal of ash must be the preferred option for closure, as it is the only option that will meaningfully reduce risk.

In addition to the coal ash located within each coal ash disposal area, TVA must also consider the extent to which the dikes around the disposal areas are constructed with ash. We know TVA frequently used coal ash in dike construction in the past.[30] Where ash dikes are saturated with groundwater, not only are they less stable, they also provide a constant source of leachate.

3. TVA must assess current concentrations of all coal ash pollutants, and estimate future concentration trends under each option.

The coal ash rule, which we discuss in more detail below, will require TVA to monitor groundwater for certain parameters, including known coal ash indicators like boron and sulfate. We commented on this issue in our scoping comments on an EIS for TVA's Bull Run plant,[31] and those comments bear repeating here:

> As an overarching matter, TVA must take responsibility for existing contamination. In the past, TVA has attempted to evade the issue. TVA has asserted that the level of current groundwater contamination is not in violation of groundwater quality standards (which ignores high levels of pollutants, like boron, that do not currently have standards), or has tried to argue that contamination is naturally occurring. Additionally, TVA has failed to monitor groundwater for coal ash indicator pollutants.[32]

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[29] 40 C.F.R. § 257.60.

[30] *See, e.g.*, TVA, *John Sevier Steam Plant – Inspection of Ash Disposal Pond Dikes*, memo to file from R. J. Bowman, Principal Civil Engineer (June 8, 1973) (reproduced in Stantec Consulting Services Inc., *Report of Geotechnical Exploration – John Sevier Fossil Plant*, Appendix A – historical documents, Feb. 8, 2010)("A large percent of ash was used as material to raise the dikes. DED had recommended that ash not be used in dike building at John Sevier since the ash there is not suitable for this purpose because a significant portion is not stable when wet and it erodes easily.").

[31] Southern Alliance for Clean Energy et al., Scoping Comments on TVA's Environmental Impact Statement for the Disposal of Coal Combustion Residuals from the Bull Run Fossil Plant (July 2, 2015).

[32] *See generally* Environmental Integrity Project, TVA's Toxic Legacy: Groundwater Contaminated by Tennessee Valley Authority Coal Ash (November 2013); see also TVA, Bull Run Fossil Plant Gypsum/Coal Ash Landfill February 2014 Groundwater Monitoring Report (Apr. 3 2014) (stating that "constituent concentrations reported for all samples were below TDEC maximum contaminant levels" and finding "no GWPS [Groundwater Protection Standards] exceptions at the site," but ignoring elevated and unsafe concentrations of coal ash pollutants boron, molybdenum, and sulfate).

For example, in the February 2014 report for Bull Run's Dry Fly Ash Landfill, TVA concluded that "[g]roundwater analytical data for the February 3-6, 2014, sampling event show no evidence of contamination from the dry fly ash landfill."[33] This statement is plainly false, and is contradicted by TVA's own monitoring results. Downgradient well F45R was sampled twice in February 2014. TVA found boron concentrations of 19.4 and 19.5 mg/L, the highest concentrations measured to date in a well that has shown steadily increasing boron levels since it was installed in 2008.[34] These concentrations are 100 times higher than background concentrations in upgradient well I (consistently less than 0.2 mg/L), so they are clearly caused by the coal ash landfill, and they are unsafe, being much higher than the EPA Child Health Advisory for boron (3 mg/L). As described in more detail below, manganese, sulfate and molybdenum concentrations in this well were also unsafe and also exceed upgradient concentrations by large margins.

In the EIS, TVA should provide an honest assessment of all of the information that it has on hand regarding the extent of coal ash-related groundwater contamination at Bull Run.[35] An example of the straightforward language the public will expect to see in the EIS exists in the February 2014 groundwater monitoring report for the Shawnee plant, where TVA admitted that "statistical findings indicate coal-combustion by-product effects on groundwater beneath and downgradient of the special waste landfill" based on high concentrations of boron, molybdenum, sulfate, and other pollutants.[36]

Our comments on the Bull Run EIS can be read as applicable to the TVA fleet as a whole: it is impossible to adequately characterize existing contamination, or to model future contamination under the alternatives that TVA chooses to analyze, without accounting for all known coal ash pollutants.

4. TVA must incorporate the requirements of the Resource Conservation and Recovery Act (RCRA) coal ash rule into the EIS.

In April of this year, EPA promulgated a coal ash disposal regulation under RCRA.[37] The regulation imposes a number of important requirements on TVA, requirements that affect both

[33] TVA, Groundwater assessment monitoring report – February 2014, 8 (Mar. 25, 2014).
[34] We recently received sampling data from August 2014, when the boron concentration in well 45R reached a new high of 20.1 mg/L, roughly seven times higher than the EPA Child Health Advisory of 3 mg/L.
[35] In order to provide this assessment, TVA should not discontinue monitoring for coal ash indicator pollutants in wells that have previously shown high levels of these pollutants.
[36] TVA, letter to Deborah DeLong, Kentucky Division of Waste Management, transmitting February 2014 quarterly groundwater report for Shawnee Fossil Plant Special Waste Landfill (Apr. 25, 2014)
[37] US EPA, Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule, 80 FR 21302 (Apr. 17, 2015); 40 CFR 257.

current and future coal ash disposal and storage. These include, but are not limited to, the following:

- Existing coal ash ponds, and all new coal ash disposal areas, must be built at least five feet above the uppermost groundwater aquifer.
- New coal ash disposal areas cannot be built in wetlands, fault areas, or seismic impact zones.
- New coal ash disposal areas cannot be built in geologically unstable areas, such as areas with karst bedrock. TVA should more generally assess the extent of karst bedrock beneath its existing coal ash disposal areas and select ash removal as the preferred remedy in those areas (see below).
- New coal ash landfills must have composite liners and leachate collection systems.
- TVA (and other owners and operators) must prepare and follow fugitive dust control plans for all coal ash disposal areas.
- TVA must design and maintain run-on and run-off control systems for all coal ash landfills.
- TVA must monitor the groundwater around all active coal ash disposal areas for boron, calcium, chloride, fluoride, pH, sulfate, and Total Dissolved Solids (TDS).
- If downgradient groundwater wells show any of the above-listed monitoring parameters at concentrations that exceed background, TVA must also monitor for antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226/228; these are collectively defined as "assessment monitoring" constituents in the rule.
- Existing, unlined surface impoundments must be closed if they cause assessment monitoring constituents to exceed the groundwater standards prescribed by the rule.
- For all landfills that cause assessment monitoring exceedances, TVA must undertake corrective measures "to prevent further releases, to remediate any releases and to restore affected areas to original conditions."[38]
- The rule also provides requirements for how TVA must close its coal ash disposal areas, including requirements for post-closure care.

In its EIS, TVA must explain how it will comply with this rule, and how compliance will affect its selection of an alternative closure process for each disposal area at each site.

[38] 40 C.F.R. § 257.96(a).

5. TVA must incorporate the requirements of the Tennessee Department of Environment and Conservation Order into the EIS.

On August 6, 2015, the Tennessee Department of Environment and Conservation (TDEC) issued a Commissioner's Order that will require TVA to undertake certain investigative and remedial actions at its Tennessee coal plants. Among other things, the order requires TVA to:

- Investigate and, where necessary, remediate "all areas where CCR [coal ash] disposal has occurred, including without limitation, all permitted landfills, all "non-registered" landfills (landfills that existed before they were subject to regulation), and all current and former surface water impoundments that contain CCR."[39]

- Provide information about groundwater quality, including all of the monitoring parameters required by the federal coal ash rule.

- Provide information about soil borings at each site, including the presence of coal ash in any soil borings. Since many of TVA's soil borings were made in the dikes around disposal areas, we assume that TDEC intends to have TVA disclose all areas where coal ash was used in dike construction.

- Provide information about seeps.

- Submit a Corrective Action/Risk Assessment plan that will "restore any natural resources damaged as a result of the CCR waste water treatment and on-site CCR disposal."

The EIS that TVA develops must be as broad in scope as the TDEC Order; specifically, the EIS must include all active and former ash disposal landfills and surface impoundments. TVA will have to undertake the above-listed actions in Tennessee, and should undertake the same investigative and remedial actions in Alabama and Kentucky as well. In its EIS, TVA must explain how it will comply with this Order, and how compliance will affect its selection of an alternative closure process for each disposal area at each site.

6. TVA must identify all coal ash disposal areas located over karst bedrock and select ash removal as the preferred remedy for those areas.

Many of the TVA plants are located over soluble limestone bedrock. When this kind of bedrock becomes weathered by water, leaving dissolved spaces throughout the solid matrix, it is known as "karst." The U.S. Geological Survey describes karst as "extremely vulnerable to contamination" due to "springs, caves, [and] sinkholes."[40] EPA has prohibited the construction of new coal ash disposal areas over karst bedrock due to the high risk of groundwater contamination that accompanies this practice. In its coal ash rule, EPA stated that

[39] TDEC, Commissioner's Order No. OGC15-0177 (Aug. 6, 2015).
[40] U.S. Geological Survey, What is Karst?, http://water.usgs.gov/ogw/karst/pages/whatiskarst.

> The Agency is finalizing, as proposed, the unstable area location restriction for existing CCR landfills because the record clearly shows that failure of CCR units in these areas (e.g., due to instabilities in Karst terrains) have and in all likelihood would continue, in the absence of the restrictions in the final rule, to result in damage caused by the release of CCR constituents, affecting both groundwater and surface waters.[41]

Karst has already caused a number of problems at several TVA coal plants. The Colbert plant, for example, sits atop karst bedrock known to contain many dissolved cavities. As described in one groundwater monitoring report, "[e]vidence of karst terrain is abundant with numerous sinkholes across the site and several caves along the river bluff."[42] This kind of terrain presents an ongoing risk that the coal ash disposal areas (or other areas) will suffer local collapses. TVA has long known about this risk: A 1982 memorandum regarding the future Ash Pond 5 noted that "[s]udden collapse of a small portion of the soil layer overlying the cavernous limestone could occur," but that it was "impossible to predict when or where they might occur."[43] Consultants recognized that Colbert posed a "moderate risk to water resources" as early as 1987.[44]

As predicted, Colbert has experienced a series of sinkhole-related accidents over the years:

- In October of 1984, as mentioned above, a "sinkhole complex" caused the new Ash Pond 5 to drain at a rate of 1 foot per hour;[45] this was part of a series of sinkholes in this area between 1983 and 1985.[46]
- TVA lined the coal yard drainage basin with clay in 1988 after "water level measurements in the [basin] indicated subsurface leakage."[47]
- In December of 1991, a meter-wide sinkhole caused the chemical treatment pond to lose 2 million liters of water.[48]
- In February of 2012, a sinkhole caused process water from the coal unloading area to drain into the river, causing a 150-foot plume.[49]

The Gallatin plant is another notable example. In its Phase I engineering assessment for Gallatin, Stantec Consulting Services observed that "karst bedrock and sinkhole activity is

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[41] 80 Fed. Reg. 21,361.
[42] TVA, *Colbert Fossil Plant Groundwater Monitoring Report – October 2008*, at 4 (Jan. 20, 2009).
[43] TVA, Memorandum from M. N. Sprouse to H. S. Fox, *Colbert Steam Plant – Additional Ash Disposal Area No. 5 – Engineering Report* (Dec. 21, 1982); *see also* TVA, *Geology of the Colbert Steam Plant*, at 10 (Nov. 1951) ("[T]he major structural features are the small faults and joints, with the solution accompanying these features being of more than passing interest.").
[44] TVA, *Colbert Fossil Plant Groundwater Assessment*, at 1 (Oct. 1994).
[45] TVA, *Colbert Steam Plant – Ash Pond 5 Engineering Report*, at 1 – 4 (Apr. 1985).
[46] Letter from TVA to ADEM, *Response to Groundwater Incident Number GW 93-6-4 and Notice of Violation (NOV)* (Oct. 6, 1993).
[47] TVA, *Colbert Fossil Plant Groundwater Assessment*, at 1 (Oct. 1994).
[48] *Id*. at 4.
[49] Letter from TVA to ADEM, *Tennessee Valley Authority (TVA) – Colbert Fossil Plant (COF) – NPDES Permit No. AL0003867 – Sinkhole Development* (Feb. 6, 2012).

present plant-wide and is a concern."[50] In response to the identified karst-related risk, Stantec recommended that TVA "install[] lining systems beneath all ponds or convert[] to dry disposal operation."[51] The risk of sinkholes is not a merely conjectural concern; many sinkholes have formed at Gallatin in the past: from 1970-1978, all of the water put into the currently active ash pond complex drained through sinkholes—up to 111 of them—and the pond never reached the level of the permitted outfall.[52] Although TVA filled enough sinkholes to bring the pond up to the level of the outfall, it is not clear how many sinkholes were left unrepaired, or how much ash pond leachate has drained through existing or new sinkholes since then.[53] More recently, sinkholes were identified during the 2006 expansion of the fly ash pond, and another sinkhole was discovered in 2010.[54]

Karst has also been a problem at the Kingston plant, where a 2010 sinkhole in the gypsum disposal area allowed gypsum waste with high concentrations of selenium (measured at up to 412 ug/L in groundwater wells) to drain into the already-fragile Clinch River.[55] This was one of eleven known "dropouts" in the Kingston gypsum disposal area.[56]

At the Widows Creek plant, TVA assessed the potential groundwater impacts of a gypsum stack expansion in 1990.[57] The report is useful in several ways. First, it describes the site's geologic vulnerability, noting that "Widows Creek Fossil Plant is situated on karst terrain," and that "[a]s in all karst terrains, solution activity along faults, bedding planes, joints and fractures produces enlarged openings and effective routes for groundwater movement."[58] The report later makes this observation:

> It is important to realize that a potential exists for piping of liner material into the karst subsurface drainage system. This type of undermining activity can result in a sudden collapse of the remaining liner material and pirating of the contents of

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[50] Stantec Consulting Services, Inc., *Report of Phase 1 Facility Assessment, Tennessee, Appendix E – Gallatin Fossil Plant*, Bottom Ash Pond A pages 5-6 of 6, Fly Ash Pond E page 6, Stilling Ponds B, C and D pages 5-6 (June 24, 2009).
[51] *Id*.
[52] *See* TVA memorandum, *Gallatin Steam Plant – Ash Disposal Pond – Leakage Problems* (Jan. 25, 1979); *see also* TVA, *Magnitude of Ash Disposal Pond Leakage Problem – Gallatin Steam Plant* (Apr. 1977).
[53] *See* TVA, *Magnitude of Ash Disposal Pond Leakage Problem – Gallatin Steam Plant*, 3 (Apr. 1977) ("If the present leaks from the pond were plugged and the water level in the pond rose to the elevation of the outfall weir, one or more of another 52 sinkholes could begin to leak. In addition, sink holes which are not presently leaking could begin to leak because of increased hydrostatic pressure. . . . [P]lugging the presently leaking sinkholes would give no assurance that other sinkholes would not begin to leak.").
[54] Stantec Consulting Services, Inc., *Report of Geotechnical Exploration and Slope Stability Evaluation: Ash Pond / Stilling Pond Complex, Gallatin Fossil Plant* 8 (May 27, 2010).
[55] *See, e.g.*, TVA, *Kingston Fossil Plant – Gyspum Disposal Area – Groundwater Quality Assessment Plan* (May 6, 2011).
[56] *Id*.
[57] TVA, *Widows Creek Fossil Plant – Assessment of Potential Effects on Groundwater of the Phase II FGD Pond* (Dec. 1990).
[58] *Id*. at ii and 6.

overlying ponds or basins. TVA has experienced several such problems at their facilities located in karst terrains.[59]

Given the widespread and well-known risks from stacking ash over karst bedrock, it would be irresponsible for TVA to close any coal ash disposal areas where karst is a concern. There is no reason to believe that the kinds of releases described above would not happen again. TVA must identify all areas with karst bedrock and select removal of ash as the preferred closure method in these areas.

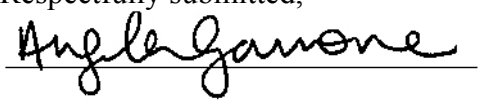
7. TVA must assess the impacts of the ultimate destination of all coal ash removed from its disposal areas.

Since TVA will have to remove a large quantity of coal ash from existing disposal areas in order to protect groundwater quality, it will have to find a new location to dispose of its ash. TVA must explain how these new destinations will be selected, how it will comply with state and federal law in constructing new disposal areas, and the extent to which communities residing near these new disposal areas will be affected by coal ash. In particular, TVA must assess all environmental justice issues that selecting new disposal areas could raise. In other words, TVA must ensure that the burden of coal ash disposal does not fall disproportionately on low-income communities or communities of color.

The undersigned groups would like to thank you for the opportunity to submit these scoping comments. Please do not hesitate to reach out with any questions.

[59] *Id*. at 9.

Respectfully submitted,



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