

Ms. Ashley R. Farless, P.E., AICP
NEPA Compliance Specialist
Tennessee Valley Authority
1101 Market Street
BR 4A
Chattanooga, TN 37402

RE: Comments on the Draft Environmental Assessment
Kingston Fossil Plant, Bottom Ash Dewatering Facility

The following groups (collectively referred to as Commenters) appreciate the opportunity to provide the following comments on the Draft Environmental Assessment (Draft EA) TVA is undertaking pursuant to the National Environmental Policy Act (NEPA) for the Kingston Fossil Plant (KIF) Bottom Ash Dewatering Facility: the Southern Alliance for Clean Energy, Southern Environmental Law Center, Tennessee Clean Water Network, Statewide Organizing for Community eMpowerment, Earthjustice, Environmental Integrity Project and the Sierra Club. The attached technical findings from Mark A. Quarles, P.G. (Global Environmental, LLC Report), provide additional technical details supporting the above conclusions. Below, we elaborate on these technical findings and identify legal issues contained within the Draft EA.

TVA's proposed alternative, Alternative B – Construction/Operation of Dewatering Facility (Alternative B), ultimately falls short of TVA's claim that the selected alternative represents a "state-of-art, secure storage system that leads the industry in the management of CCPs (coal combustion products)" and "allows for future marketing of ash products." Instead, Alternative B dewatering and waste disposal plan results in:

- A bottom ash and pyrite handling system that is not "state-of-the-art" when compared to current trends in the industry. In fact, TVA did not seriously consider other, field-proven technologies that are industry-leading and state-of-the-art.
- Continued reliance on antiquated waste handling and disposal methods that threaten surface water and groundwater quality while unnecessarily using significant amounts of water.
- Continues insecure disposal methods for solids and liquids because the proposed plan continues to discharge contaminated water to an unlined settling pond and to an on-site landfill that is prone to subsurface collapse and liner failure.
- Loss of beneficial reuse and economic gains for future marketing of bottom ash because it contaminates potentially reusable (and sold) bottom ash with pyrite.

TVA originally planned to make a dry bottom ash conversion in 2012, and to construct a wastewater treatment facility and eliminate all liquid waste discharges to the ash pond by 2013.¹ Given the fact that TVA is already more than two years behind schedule, Alternative D, which is the only alternative that would accomplish the above-stated goal, must be fully evaluated and selected as the preferred alternative.

I. Legal Background

The National Environmental Policy Act (NEPA) is “our basic national charter for protection of the environment.”² Other environmental statutes focus on particular media (like air, water, or land), specific natural resources (such as wilderness areas, or endangered plants and animals), or discrete activities (such as mining, introducing new chemicals, or generating, handling, or disposing of hazardous substances). In contrast, NEPA applies broadly “to promote efforts which will prevent or eliminate damage to the environment.”³

To accomplish this expansive goal, NEPA requires that government agency decision-makers consider and weigh the environmental consequences of proposed actions “at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays late in the process, and to head off potential conflicts.”⁴ “[B]y focusing the agency’s attention on the environmental consequences of a proposed project, NEPA ensures that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.”⁵

Whereas the substantive environmental protection goals of NEPA provide some flexibility and responsible exercise of agency discretion, NEPA “also contains very important ‘procedural’ provisions—provisions which are designed to see that all federal

¹ See TDEC, draft NPDES Permit 0005452 for the Kingston Fossil Plant, R-7 (Oct. 11, 2010) (citing TVA, Kingston Ash Recovery Project, Non-Time Critical Removal Work Plan for the Embayment/Dredge Cell, 40 C.F.R. § 1500.1(a).

² NEPA § 2, 42 U.S.C. § 4321.

³ 40 C.F.R. 1501.2; see NEPA § 102, 42 U.S.C. § 4332; see also 40 C.F.R. § 1501.1(a).

⁴ *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989); see also *Jones v. District of Columbia Redev. Land Agency*, 499 F.2d 502, 512 (D.C. Cir. 1974), *cert. denied*, 423 U.S. 937 (1975) (“NEPA was intended to ensure that decisions about federal actions would be made only after responsible decision-makers had fully adverted to the environmental consequences of the actions, and had decided that the public benefits flowing from the actions outweighed their environmental costs.”).

agencies do in fact exercise substantive discretion given to them.”⁶ NEPA’s procedural protections “are not highly flexible. Indeed, they establish a strict standard of compliance.”⁷

The Environmental Impact Statement (EIS) is the centerpiece of the NEPA process, and it is the principal tool for insuring that agencies meet NEPA’s substantive and procedural goals. NEPA directs agencies to provide a coordinated public process and to prepare a detailed EIS for “every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the human environment.”⁸ The requirement to prepare an EIS fulfills two of NEPA’s essential mandates. First, it “ensures that the agency, in reaching its decision, will have available and will carefully consider detailed information concerning significant environmental impacts” before committing resources to a course of action.⁹ Second, “[p]ublication of an EIS, both in draft and final form, also serves a larger informational role. It gives the public the assurance that the agency ‘has indeed considered environmental concerns in its decisionmaking process,’ and, perhaps more significantly, it provides a springboard for public comment.”¹⁰ Where an agency is uncertain whether an EIS is required for a proposed action, it may first develop a concise public document known as an Environmental Assessment (EA) to help resolve the question and as an aid in preparing an EIS. But the decision whether to prepare an EIS “is not committed to the agency’s discretion.”¹¹

As explained in the comments that follow, TVA’s proposed installation of a bottom ash dewatering facility and associated equipment at KIF is a major federal action significantly affecting the human environment. Based on NEPA’s statutory directives, Council of Environmental Quality (CEQ) regulations, and TVA’s own NEPA guidelines,

⁶ *Calvert Cliffs Coord. Comm., Inc. v. Atomic Energy Comm’n*, 449 F.2d 1109, 1112 (D.C. Cir. 1971), *cert. denied*, 404 U.S. 942 (1972).

⁷ *Id.*

⁸ NEPA § 102(2)(C); 42 U.S.C. § 4332(2)(C).

⁹ *Robertson*, 490 U.S. at 349.

¹⁰ *Id.*; *see also Citizens for a Better Henderson v. Hodel*, 768 F.2d 1051, 1056 (9th Cir. 1982) (the “form, content and preparation [of the EIS] foster both informed decision-making and informed public participation”); 40 C.F.R. § 1502.1 (purpose of EIS is to “provide full and fair discussion of significant environmental impacts and . . . [to] inform the decisionmakers and the public of the reasonable alternatives which would avoid or minimize adverse impacts . . .”).

¹¹ *Foundation for N. Am. Wild Sheep v. Dept. of Agric.*, 681 F.2d 1172, 1177, n. 24 (9th Cir. 1982).

TVA must prepare an EIS following a full public process before deciding what action to take at KIF. And TVA must complete this process and issue a final EIS and record of decision (ROD) before committing resources to the proposed action.

II. TVA Committed Impermissible Segmentation by Failing to Include Analysis of Impacts Caused by Connected Projects

It is a bedrock principle of NEPA law that an agency must consider the entirety of a project, and may not regard a mere subset of an overall project; accordingly, TVA must include analysis of all actions that are “connected” or “similar” to the proposed project and must consider impacts of all “cumulative” actions involved in completing the goal of the project. Under NEPA, actions must be considered together if, for example, one action “[a]utomatically trigger[s]” another, one action “[c]annot or will not proceed unless” another action is “taken previously or simultaneously” or the actions “[a]re interdependent parts of a large action.”¹² Such actions must be considered together as part of a proper NEPA analysis. In other words, “[a]n agency may not segment a project into smaller projects . . . simply to expedite the NEPA process or avoid addressing environmental impacts.”¹³

Likewise, under NEPA regulations, an agency is required to include “connected actions,” “cumulative actions,” and “similar actions” in a project EA.¹⁴ “Connected actions” include those actions that are “interdependent parts of a larger action and depend on the larger action for their justification.”¹⁵ “Similar actions” are ones that “when viewed with other reasonably foreseeable or proposed agency actions, have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography.”¹⁶

In preparing an EA or EIS, an “agency need not foresee the unforeseeable, but . . . [r]easonable forecasting and speculation is . . . implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all

¹² 40 C.F.R. § 1508.25(a)(1); *see also* 40 C.F.R. § 1508.27(b)(7) (“Significance cannot be avoided by . . . breaking [an action] down into small component parts.”).

¹³ *W. N.C. Alliance v. N.C. Dep’t of Transp.*, 312 F. Supp. 2d 765, 774-75 (E.D.N.C. 2003).

¹⁴ 40 C.F.R. § 1508.25(a).

¹⁵ *Id.* § 1508.25(a)(1)(iii).

¹⁶ *Id.* § 1508.25(a)(3)

discussion of future environmental effects as ‘crystal ball inquiry.’”¹⁷ While the statute does not demand forecasting that is “not meaningfully possible,” an agency must fulfill its duties to “the fullest extent possible.”¹⁸

An agency impermissibly “segments” NEPA review when it divides connected, cumulative, or similar federal actions into separate projects and thereby fails to address the true scope and impact of the activities that should be under consideration.¹⁹ The Supreme Court has held that, under NEPA,

“proposals for . . . actions that will have cumulative or synergistic environmental impact upon a region . . . pending concurrently before an agency . . . must be considered together. Only through comprehensive consideration of pending proposals can the agency evaluate different courses of action.”²⁰

Consistently, courts have found that an agency may not segregate discrete stages of a project and must instead consider impacts of the entire project.²¹ Agencies must provide meaningful analyses of the cumulative impacts of projects that are connected, contemporaneous, closely related and interdependent of the project at issue in the NEPA analysis.²² By segmenting projects under NEPA, an agency can easily divide one project into “individual actions each of which individually has an insignificant environmental impact, but which collectively have a substantial impact.”²³

In this instance, TVA has improperly excluded several connected actions from its Draft EA, resulting in improper segmentation under NEPA regulations. Although the waste stream will change once the dry bottom stream is moved to the Gypsum Disposal Area, TVA has not included any analysis of the necessary changes needed for the Ash

¹⁷ *Scientists’ Inst. for Pub. Info., Inc. v. Atomic Energy Comm’n*, 481 F.2d 1079, 1092 (D.C. Cir. 1973).

¹⁸ *Id.*

¹⁹ *Delaware Riverkeeper Network, et al v. Federal Energy Regulatory Commission*, at 5, available at <http://www.troutmansandersenergyreport.com/wp-content/uploads/2014/06/Tennessee-Gas-Opinion.pdf> at 15.

²⁰ *Kleppe v. Sierra Club*, 427 U.S. 390, 410 (1976).

²¹ *See Huntington*, 850 F.2d at 1142-43 (holding a federal agency in violation of NEPA regulations for segmenting review of a dump site designation and a dump permit); *Thomas v. Peterson*, 753 F.2d 754, 758-59 (9th Cir. 1985) (striking down separate environmental reviews of timber road construction and timber sales because they are “connected” and “cumulative” actions that must be considered together, pursuant to 40 C.F.R. § 1508.25).

²² “Given the self-evident interrelatedness of the projects as well as their temporal overlap, the Commission was obliged to consider the other three other Tennessee Gas pipeline projects when it conducted its NEPA review of the Northeast Project.” *Delaware Riverkeeper Network, et al v. Federal Energy Regulatory Commission*, at 5.

²³ *NRDC v. Hodel*, 865 F.2d 288,297 (D.C. Cir. 1988)

Processing Area as a result of the actions taken under the Draft EA.²⁴ TVA also excluded impact analysis for changes to their outage washes from the Draft EA, despite acknowledgement that the ability to discharge these waste streams to the sluice trench will cease upon implementation of the dewatering system.²⁵ Likewise, TVA does not include impacts from changes to its surface impoundment management and treatment operations in this Draft EA.²⁶ And perhaps most egregious of all, TVA does not include analysis of impacts caused by its current, under-construction and unpermitted Class II landfill as it relates to the project in this EA.

It is clear that there is a physical, functional and temporal nexus between this EA project and actions made in response to operational and functional changes caused by construction and operation of the dewatering facility for TVA's surface impoundment management and treatment operations, Ash Processing Area as well as its current efforts to secure a permit for its unfinished Class II solid waste landfill that would receive waste from this dewatering process. Furthermore, as explained above, TVA has acknowledged the connectedness of all of these projects in this Draft EA, except for their complete failure to mention any consideration of impacts or cumulative impacts for the current under-construction Class II landfill.

III. The EA Fails to Adequately Consider Reasonable Alternatives

NEPA requires federal agencies to “study, develop, and describe appropriate alternatives to recommended courses of action.”²⁷ The alternatives analysis required by NEPA is the “heart” of the environmental review.²⁸ An agency must give alternatives

²⁴ “The preliminary plan for this area would be to remove the existing ash and to cap the storage area for other various uses that have yet to be fully evaluated. Impacts associated with this project will be evaluated at a later time in a subsequent NEPA evaluation and design process.” Draft EA at 13.

²⁵ “With the implementation of the dewatering system, the ability to discharge these waste streams to the sluice trench will cease. The preliminary plan to treat these discharges would be to re-route these flows to the coal yard run-off pond or to on-site holding tanks for treatment and ultimately to discharge these flows at Outfall 001. Impacts associated with these waste streams will be evaluated at a later time in a subsequent NEPA evaluation and design process.” Draft EA at 13.

²⁶ Draft EA at 32.

²⁷ 42 U.S.C. § 4332(2)(E).

²⁸ See 40 C.F.R. § 1502.14.

“full and meaningful consideration, whether the agency prepares an EA or an EIS.”²⁹ Further, guidance from the Council on Environmental Quality (CEQ) states that agencies must evaluate “a reasonable number of examples covering the full spectrum of alternatives.”³⁰ CEQ further states that: “Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant.”³¹

An EA must include a discussion of alternatives and “the environmental impacts of the proposed action and alternatives.”³² Alternatives analysis under an EA need not be as rigorous as under an EIS, but an agency must nonetheless “give full and meaningful consideration to all reasonable alternatives.”³³ Here, in lieu of a proper alternatives analysis, the Draft EA considers only two alternatives: the requisite No Action Alternative (Alternative A) and a single action Alternative (Alternative B). The failure to discuss other reasonable alternatives violates NEPA. The Sixth Circuit has stated that “[NEPA] prevents federal agencies from effectively reducing the discussion of environmentally sound alternatives to a binary choice between granting or denying an application.”³⁴

The purpose of the NEPA process is “to provide full and fair discussion of significant environmental impacts and to inform decision makers and the public of the reasonable alternatives which would avoid or minimize adverse impacts or enhance the quality of the human environment.”³⁵ As such, the core duty under NEPA is for an agency to “[r]igorously explore and objectively evaluate all reasonable alternatives” to a proposed action.³⁶ This required alternatives analysis “should present the environmental impacts of the proposal and the alternatives in comparative form, thus sharply defining

²⁹ *Ctr. for Biological Diversity v. Nat'l Highway Traffic Safety Admin.*, 538 F.3d 1172, 1217 (9th Cir. 2008) (internal quotation marks and citations omitted).

³⁰ *Forty Most Frequently Asked Questions Concerning CEQ's NEPA Regulations*, 46 Fed. Reg. at 18,027.

³¹ CEQ, *A Citizen's Guide to NEPA* at 16 (Dec. 2007).

³² 40 C.F.R. § 1508.9(b).

³³ *Western Watersheds Project v. Abbey*, 719 F.3d 1035, 1050 (9th Cir. 2013).

³⁴ *Save Our Cumberland Mountains v. Kempthorne*, 453 F.3d 334, 344 (6th Cir. 2006); see also *Davis v. Mineta*, 302 F.3d 1104, 1122 (10th Cir. 2002) (“[O]nly two alternatives were studied in detail: the no build alternative, and the preferred alternative. [The agency] acted arbitrarily and capriciously in approving an [environmental assessment] that does not provide an adequate discussion of [p]roject alternatives.”)

³⁵ *Natural Res. Def. Council, Inc. v. Fed. Aviation Admin.*, 564 F.3d 549, 556 (2d Cir. 2009) (internal quotation marks and alteration omitted)

³⁶ 42 U.S.C. § 4332(2)(C); 40 C.F.R. § 1502.14(a).

the issues and providing a clear basis for choice among the options by the decisionmaker and the public.”³⁷ Such analysis constitutes the “heart” or “linchpin” of the NEPA analysis,³⁸ and helps to:

ensure[s] that each agency decision maker has before him and takes into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit analysis. Only in that fashion is it likely that the most intelligent, optimally beneficial decision will ultimately be made.³⁹

Courts have recognized that “[n]o decision is more important than delimiting what these ‘reasonable alternatives’ are,”⁴⁰ and have made clear that a wide net should be cast in identifying and exploring such alternatives. For example, the alternatives analysis must include a consideration not only of individual actions, but also of a combination of actions that could satisfy the purpose and need of the project.⁴¹ In addition, “reasonable alternatives” should include feasible options even if they are “not within the jurisdiction of the lead agency.”⁴² And in order to ensure that the alternatives analysis is not hampered by a rigid concept of what is needed at the outset of the NEPA process, agencies must consider alternatives that meet only part of the stated purpose of the proposed action.⁴³ When an agency suggests that an otherwise achievable alternative is not “feasible” or “prudent,” the agency must back up that assertion with specifics such as “cost studies, cost/benefit analyses, or other barriers that warrant a conclusion that [the proposed] alternatives are unreasonable, standing alone or in conjunction with other

³⁷ 40 C.F.R. § 1502.14.

³⁸ 40 C.F.R. § 1502.14; *Monroe Cty. Conservation Council*, 472 F.2d 693, 697-98 (2d. Cir. 1972).

³⁹ *Calvert Cliffs’ Coordinating Comm., Inc. v. Atomic Energy Comm’n*, 449 F.2d 1109, 1114 (D.C. Cir. 1971).

⁴⁰ *Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664, 666 (7th Cir. 1997).

⁴¹ *Davis v. Mineta*, 302 F.3d 1104, 1121-22 (10th Cir. 2002) (finding that agency’s failure to evaluate a combination of alternatives “represents one of the most egregious shortfalls in the EA”)

⁴² 40 C.F.R. § 1502.14(c); *see also* 46 Fed. Reg. 18,026, 18,027 (March 23, 1981) (“An alternative that is outside the legal jurisdiction of the lead agency must still be analyzed in the EIS if it is reasonable.”).

⁴³ *North Buckhead Civic Ass’n v. Skinner*, 903 F.2d 1533, 1542 (11th Cir. 1990) (“A discussion of alternatives that would only partly meet the goals of the project may allow the decision maker to conclude that meeting part of the goal with less environmental impact may be worth the tradeoff with a preferred alternative that has greater environmental impact.”); *Natural Resources Defense Council v. Morton*, 458 F.2d 827, 836 (D.C. Cir. 1972) (“[It is not] appropriate . . . to disregard alternatives merely because they do not offer a complete solution to the problem.”).

alternatives.”⁴⁴

A. TVA Failed to Include Reasonable Alternatives to its Proposed Action

As noted above, the EA prepared by TVA contains only 2 alternatives: Alternative A-No Action, and Alternative B-Construction/Operation of Dewatering Facility. The EA acknowledges that Alternative A-No Action does not meet the stated purpose and need of phasing out the wet handling and storage of coal combustion products, but is discussed in the EA “to provide a benchmark against which to compare the impacts of the action alternative.”⁴⁵ Thus, the EA effectively considers only one alternative: Alternative B-Construction and Operation of Dewatering Facility. Without question, this consideration of only one alternative violates NEPA. While NEPA does not dictate the range of alternatives that an agency must consider, it does dictate that alternatives be considered.⁴⁶ Moreover, as noted in attached Global Environmental, LLC Report, there are a number of state-of-the-art, field proven technologies that would accomplish the stated purpose and need of phasing out the wet handling and storage of coal ash. Mr. Quarles identifies four different technologies that TVA failed to analyze in the EA:

1. Zero liquid discharge, recirculating system. Recirculates slurry water to eliminate the use of surface impoundments and eliminates wastewater discharges. Results in a dry ash for disposal.
2. Continuous dewatering and recirculating (CDR) system. System is incorporated into existing hoppers, results in minimal outage time, and eliminates the use of surface impoundments and any need for a wastewater discharge. Results in a dry ash.
3. Dry pneumatic conveying (PAX) hopper collection, dry transport, and dry disposal of bottom ash wastes. No water is needed. Belt-conveyed or gravity loaded onto a truck for disposal or reuse.
4. Vibrating ash conveying (VAX) uses a vibrating deck to move dry ash from the boiler for transport to a secure landfill or reuse.

According to the EA, the zero liquid discharge system, which TVA uses at its Bull Run facility, was considered but eliminated because current and future expected regulations would not require it, as well as because it has a higher cost.⁴⁷ However, as

⁴⁴ *Davis*, 302 F.3d at 1122.

⁴⁵ EA Section 2.1.1.

⁴⁶ 42 U.S.C. § 4332(2)(C)(iii), (E) (2006).

⁴⁷ EA, Section 2.1.3.2.

noted by TVA when it implemented this system at Bull Run, a zero discharge system would terminate *all wet* coal combustion product handling and disposal operations, provide a revenue source from the future sales of re-usable wastes and reduce the demand for native raw materials, and foster compliance with present *and* future regulatory requirements. The failure to analyze this and other state of the art and technologically feasible alternatives violates the “heart” of NEPA and renders the EA legally insufficient.

Although TVA briefly discusses the option of isolating and separating dry bottom ash and dry pyrite, it dismisses this option as a viable possibility due to its assertion that this process would require an unspecified “greater use of resources” and result in increased, but unquantified, impacts on air quality, noise and transportation.⁴⁸ Industry practices, however, has found that more modern, dry handling techniques can lead to increased thermal efficiency, reduction of unburned carbon and an improvement in ash quality.⁴⁹

TVA states that it eliminated a zero-water alternative from analysis in the Draft EA because 1) current regulations do not require zero liquid discharge; 2) future regulations, like EPA’s Effluent Limitation Guidelines (ELG), may not require zero liquid discharge; 3) unspecified higher cost of a zero liquid discharge system; and 4) unspecified impacts on the plant itself.⁵⁰ Due to the lack of information on the specifics of TVA’s decision to remove a zero liquid discharge, Commenters remain unclear on what costs and impacts TVA is identifying. In part because of this lack of clarity, TVA demonstrably failed to adequately analyze the benefits of a zero liquid discharge system.

A zero liquid discharge dry bottom ash system, like the DRYCON system,⁵¹ uses zero water, reduces the need for maintenance, completely eliminates the needs for ponds on-site, increases gains in boiler efficiency and can reduce power consumption.⁵² Using

⁴⁸ Draft EA at 13.

⁴⁹ “Ash handling: Why dry bottoms are better than wet bottoms.” Power Engineering International, January 2010, available at <http://www.powerengineeringint.com/articles/print/volume-18/issue-5/features/ash-handling-why-dry-bottoms-are-better-than-wet-bottoms.html>.

⁵⁰ Draft EA at 13.

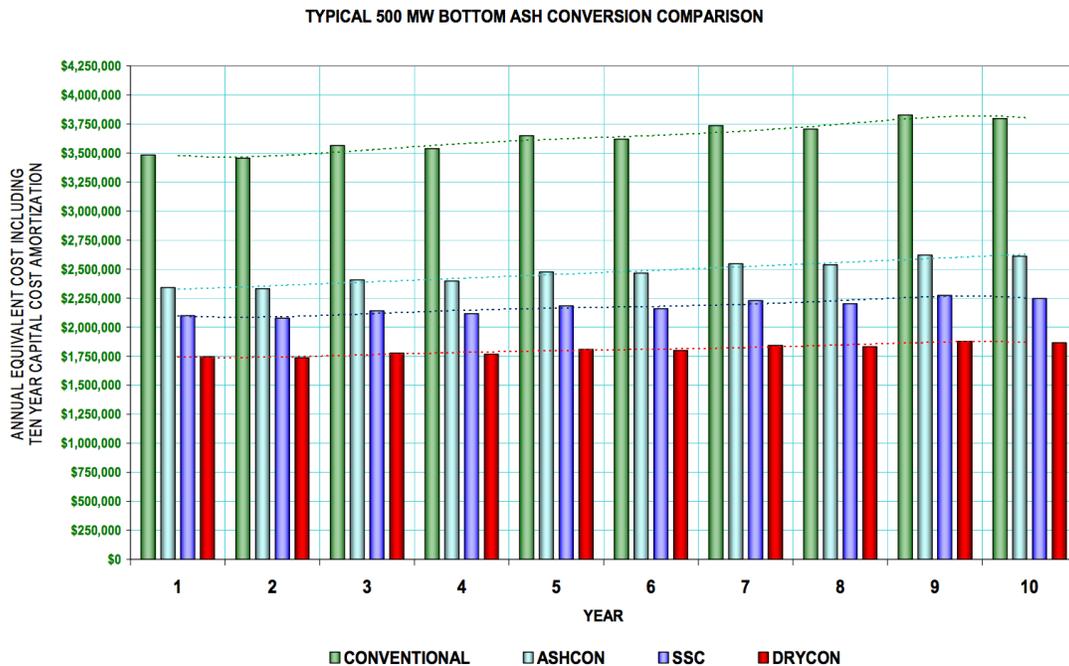
⁵¹ Clyde Bergemann’s Drycon System collects, crushes, air cools and then mechanically conveys bottoms ash without the need for water quenching.

⁵² “Technologies Available for Wet to Dry Bottom Ash Conversions,” Rob Grabowski, Clyde Bergeman Power Group Americas, Inc, pg 8, available at http://www.mcilvainecompany.com/Universal_Power/Subscriber/PowerDescriptionLinks/Ron%20Grabowski,%20Clyde%20Bergemann%20-%202010-3-13.pdf.

water, rather than air, as a cooling agent for bottom ash incurs additional costs. Water treatment, corrosion damage, higher disposal costs and environmental impacts must all be analyzed when deciding between a wet and dry bottom ash handling, along with the impacts due to increased cost of operation and maintenance.⁵³ By returning thermal energy to the boiler, this type of system can lower coal usage, leading to fewer emissions to produce the same amount of electric power.⁵⁴

Figure 1, below, illustrates the financial comparison of several bottom ash conversion options over a ten-year period of operation.

Figure 1: Financial Comparison of Dry Bottom Ash Conversion Technologies⁵⁵



⁵³ *Id.* at 13.

⁵⁴ When a DRYCON system is installed below the boiler, fully sealed to the combustion chamber, negative pressure inside the boiler sucks air into the bottom ash conveyer system. The air then moves in a counter flow direction along the surface of the ash, which rests on the conveyer pans. This activates a reburning process of the glowing ash, which reduces the unburned carbon level and frees up additional thermal energy. The air is heated up before it enters the combustion chamber and adds additional thermal energy to the steam generating process inside the boiler. Approximately 1% of the total combustion air is required for the dry cooling system and can be considered as a constant value in the boiler design. This ensures that the combustion process and the exhaust gas composition are not affected. *Id.* at 14.

⁵⁵ Technologies analyzed include Conventional Tank Farm Dewatering, ASHCON Remote Submerged Scraper Conveyors, Submerged Scraper Conveyor and costs are on a single unit conversion basis and include 1) ten year capital cost amortization; 2) operation and maintenance costs; 3) electric power costs; 4) boiler efficiency improvement (fuel savings); and 5) single unit conversion. *Id.* at 17.

Figure 2, below, summarizes the key impacts of the various bottom ash technologies.

Figure 2: Bottom Ash Technologies Comparison⁵⁶

BA CONVERSION SELECTION COMPARISON	CONVENTIONAL TANK FARM DEWATERING	REMOTE DEWATERING CONVEYOR SYSTEM - ASHCON™	SUBMERGED SCRAPER CONVEYOR (SSC)	DRYCON™ SYSTEM
Site Specific Limitations:				
Physical Layout	No Major Change Required within the boiler house	No Major Change Required within the boiler house	Removal of existing BA Hopper and conveying system with retrofit under the boiler.	Removal of existing BA Hopper and conveying system with retrofit under the boiler.
Boiler design type				
PC	Applicable for most units	Applicable for most units	Applicable for most units	Applicable for most units
CYCLONE	Applicable for most units	Applicable for most units	Not Applicable (generally due to space limitations)	Not Applicable (Boiler is Wet Bottom)
Environmental Considerations:				
Surface Impoundment Elimination	Yes	Yes	Yes	Yes
"Zero Discharge" (Water)	Closed Loop System - pH Conditioning required	Closed Loop System - pH Conditioning required	Closed Loop System - pH Conditioning and Heat Exchangers may be required	Not required - No water is used in the System
Maintenance Budget Considerations:				
O&M Cost Impact	~25 to 30 % Increase with the addition of the Tank Farm Dewatering	~5 to 10 % Increase with the addition of the ASHCON	~30-35% Decrease with SSC	~40-50% Decrease with DRYCON
Energy Efficiency Considerations:				
Energy Consumption	~80 to 90 % Increase with the addition of the Tank Farm Dewatering	~15 to 20 % Increase with the addition of the ASHCON	~45-55% Decrease with SSC	~60-70% Decrease with DRYCON
Boiler Efficiency	No Change	No Change	No Change	0.02% TO 0.07% Boiler Efficiency Increase

B. The Preferred Alternative Fails to Meet the Stated Purpose and Need

The failure to analyze technologically feasible alternatives such as the zero liquid discharge system and others identified by Mr. Quarles also results in a proposed action that may not even meet the purpose and need of the project. In 2009, following the disastrous failure at the TVA Kingston facility and the release of more than 1 billion gallons of coal waste, the TVA Board of Directors passed a resolution to phase out wet handling and storage of coal combustion products. Complying with this resolution is the stated purpose and need of this project. However, the proposed construction and operation of a dewatering plant fails to accomplish this goal of phasing out wet handling and storage of coal ash.

⁵⁶ *Id.* at 16.

The proposed action does not eliminate the wet handling of coal ash. To the contrary, it relies on water to transport the bottom ash and results in no reduction at all in the volume of wastewater. It proposes to withdraw millions of gallons of water each day from the river to wet the dry bottom ash and transport that now wet ash 1000 feet to be “dewatered.” The wastewater from the “dewatering” process—approximately 7.5 million gallons each day—will be disposed of in an unlined earthen pit containing decades of coal ash, pyrite, metal cleaning wastes, and other wastes from the plant.

The proposed action certainly does not result in a “state-of-the art, secure storage system that leads the industry in the management” of coal ash, as the EA claims. Rather, with this proposal, TVA continues to use an antiquated, wasteful, and environmentally detrimental method of handling its coal ash. With this proposal, TVA is not leading the industry in the management of coal ash, as it claims, nor is it complying with its Board’s directive to phase out the wet handling and storage of coal ash.

Finally, it is worth noting that the field proven technologies identified by Mr. Quarles—but not analyzed by TVA—would in fact meet the purpose and need of phasing out the wet handling and storage of coal ash. TVA should analyze those technologies and choose an alternative that will accomplish the purpose and need stated in the EA.

IV. The Preferred Alternative Will Result in Significant Adverse Impacts to Ground Water and Surface Water

Coal ash handling and disposal operations at Kingston have contaminated surface water and groundwater, continue to do so, and will continue to do so after implementation of TVA’s preferred alternative. In fact, ongoing environmental impacts will be virtually identical before and after TVA builds the dewatering facility. In contrast, Alternative D, Zero Liquid Discharge, would eliminate the liquid waste stream associated with bottom ash, dramatically reducing environmental impacts. TVA must evaluate Alternative D as thoroughly as it evaluated Alternative B in order to provide an accurate range of the environmental impacts associated with practicable alternatives.

According to the draft EA, under Alternative B TVA will continue to use water to sluice bottom ash, and the transport water will continue to be directed to the settling

pond. Bottom ash sluice water contains several metals and other pollutants that are harmful to human and ecological health. Arsenic is a known carcinogen, associated with cancers of the lung, bladder, skin and other tissues.⁵⁷ Recent evidence suggests that arsenic is more potent than previously thought: EPA is in the process of revising its cancer potency estimate, which will reflect that arsenic is 17 times more carcinogenic than indicated by previous estimates.⁵⁸ Other known or likely carcinogens in bottom ash sluice water include hexavalent chromium and lead.⁵⁹ Aluminum, 100 pounds of which TVA anticipates dumping in the ash pond each day after dewatering,⁶⁰ is a neurotoxin: The EPA has stated that “[o]ne of the greatest health concerns regarding aluminum is its neurological effects.”⁶¹

As with many neurotoxins, developing infants appear may be especially vulnerable.⁶² Other neurotoxins in bottom ash sluice water include lead,⁶³ mercury,⁶⁴ manganese,⁶⁵ and arsenic.⁶⁶ Selenium is known to bioaccumulate in aquatic ecological communities and cause adverse impacts including fish kills, reduced reproduction, and growth abnormalities.⁶⁷ Other pollutants in bottom ash sluice water with ecological impacts include aluminum, arsenic, boron, copper, iron, and nickel.⁶⁸ Although TVA predicts that these pollutants will not exceed water quality criteria, it is important to note that pollution can accumulate in sediment to the point that sediment is toxic to the aquatic

⁵⁷ U.S. EPA (1998), Integrated Risk Information System, Inorganic Arsenic, available at <http://www.epa.gov/iris/subst/0278.htm>.

⁵⁸ BCA at 3-6; see also U.S. EPA (2010), Draft Toxicological Review of Inorganic Arsenic in Support of Summary Information on the Integrated Risk Information System (IRIS) (cancer potency estimate increased from 1.5 cases per mg/kg-d to 25.7 cases per mg/kg-d). Although the EPA identified separate potency estimates for women (25.7 cases per mg/kg/d) and men (16.9 cases per mg/kg/d), it stated that the potency estimate for women should be used as the point of departure for the derivation of health criteria.

⁵⁹ U.S. EPA (2010), Draft Toxicological Review of Hexavalent Chromium in Support of Summary Information on the Integrated Risk Information System (IRIS), page 199; U.S. EPA (1993), Integrated Risk Information System, Lead and Compounds, available at <http://www.epa.gov/iris/subst/0277.htm>.

⁶⁰ Draft EA at 74.

⁶¹ U.S. EPA (2006), Provisional Peer-Reviewed Toxicity Values for Aluminum, page 6.

⁶² Id. at 28.

⁶³ 78 FR 34511.

⁶⁴ Id.

⁶⁵ See, e.g., ATSDR (2012), Toxicological Profile for Manganese; Grandjean and Landrigan (2014), Neurobehavioural Effects of Developmental Toxicity, *Lancet Neurol* 13:330-338.

⁶⁶ ATSDR (2007), Toxicological Profile for Arsenic; Grandjean and Landrigan 2014, Neurobehavioural Effects of Developmental Toxicity, *Lancet Neurol* 13:330-338.

⁶⁷ EPA, Environmental Assessment for the Proposed Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category, 3-5 (April 2013).

⁶⁸ Id. at 3-4.

food web even when surface water itself is not.⁶⁹ The Emory and Clinch Rivers are already in a vulnerable state after the 2008 coal ash spill at Kingston – methylmercury concentrations are up to three times higher in downstream sediment, for example⁷⁰ – and TVA should be doing all it can to eliminate surface water discharges, as it intended to do over two years ago,⁷¹ in order to allow the ecosystem to rebound. And not all pollutants will be below recommended water quality criteria – the predicted post-dewatering aluminum concentration at the Clinch River will be 483 ug/L, more than five times higher than EPA’s recommended chronic criterion for aquatic life (87 ug/L).

The predicted post-dewatering concentrations of these and other pollutants are essentially identical to current discharge concentrations. For example, aluminum concentrations will decline by 1% and arsenic concentrations will decline by 2%. TVA states that “future operations of the proposed dewatering facility would be expected to have minor effects in the receiving stream,”⁷² but this is clearly inaccurate. What TVA may have meant is that the dewatering project will not change the ongoing impacts that the settling pond discharges are already having. TVA is discharging, and will continue to discharge, roughly 38,000 pounds of aluminum, 5,500 pounds of manganese, 260 pounds of arsenic, 100 pounds of chromium, and 50 pounds of selenium each year. This is not a minor waste stream, and the effects of this pollution on aquatic life and human health are not negligible. There is clearly a difference between the pollution loads that TVA is proposing and what TVA could accomplish with zero liquid discharge and closure of the settling pond.

Groundwater contamination is another environmental impact that TVA has failed to fully consider. The discussion of groundwater impacts in the Draft EA omits the unlined settling pond entirely and states that the impacts of the gypsum disposal area, where the dewatered bottom ash would be disposed of, would be “insignificant.”⁷³ The

⁶⁹ See, e.g., A. Deonaraine et al., Environmental impacts of the Tennessee Valley Authority Kingston coal ash spill. 2. Effect of coal ash on methylmercury in historically contaminated river sediments, 47 Environ. Sci. Technol. 2100 (Feb. 19, 2013).

⁷⁰ *Id.*

⁷¹ TDEC, draft NPDES Permit 0005452 for the Kingston Fossil Plant, R-7 (Oct. 11, 2010) (citing TVA, Kingston Ash Recovery Project, Non-Time Critical Removal Work Plan for the Embayment/Dredge Cell, 8-4 (June 2, 2010)).

⁷² Draft EA at 72.

⁷³ Draft EA at 34.

settling pond, however, has already impacted underlying groundwater and continues to do so. As the Environmental Integrity Project reported in 2013, wells downgradient of the stilling pond, where the bottom ash sluice water would continue to be channeled, show unsafe levels of manganese, cobalt, and sulfate.⁷⁴ Well 6A had manganese concentrations hundreds of times higher than the Lifetime Health Advisory before it was destroyed in 2009. Boron, sulfate, and TDS concentrations in this well were elevated relative to other ash disposal area wells, suggesting that the contamination is attributable to coal ash. Well 6AR has also shown very high manganese concentrations, in addition to very high concentrations of cobalt – more than ten times higher than what would be safe to drink – and statistically elevated concentrations of beryllium, cadmium, and nickel.⁷⁵ TVA has conceded that this contamination may be due, at least in part, to coal ash:

Concentrations of metals in well 6AR have been slightly elevated since the first sampling event in September 2009, which could be due to naturally-occurring metals associated with the alluvial deposits surrounding the well screen, as indicated by metallic staining and nodules on the lithological boring log of this well. **Bottom ash, which was not present in the lithological boring log of this well, is present at a number of neighboring borings and could be a source for these elevated constituents.**⁷⁶ (emphasis added)

Groundwater contamination would be dramatically reduced if TVA were to adopt Alternative D, for two reasons. First, Alternative D would eliminate the bottom ash sluice water waste stream. Second, it would allow TVA to close the settling pond, which, as we have noted above, TVA intended to close years ago.

Given the fact that Alternative D would be associated with a substantial benefit to the environment, including the elimination of surface water discharges and reduced groundwater contamination, alongside the fact that Alternative B would have little or no environmental benefit, it is clear that TVA must evaluate Alternative D in order to

⁷⁴ Environmental Integrity Project, TVA's Toxic Legacy: Groundwater Contaminated by Tennessee Valley Authority Coal Ash (Nov. 2013), http://www.environmentalintegrity.org/news_reports/documents/20131107_TVAGroundwaterReport_FullDraft_000.pdf

⁷⁵ See Groundwater disposal reports for the Ash Disposal Area from June 2010 – December 2012.

⁷⁶ TVA, *Kingston Fossil Plant Ash Disposal Area Groundwater Compliance Report – June 2011* (Aug. 22, 2011) (emphasis added).

capture the full range of environmental outcomes associated with bottom ash handling and disposal.

For the reasons outlined above, we request that TVA completed a full EIS, including analysis of all connected, similar and cumulative actions, and including proper analysis of all reasonable alternatives and impacts to surface and groundwater.

Respectfully submitted,



Angela Garrone, Attorney
Southern Alliance for Clean Energy
P.O. Box 1842
Knoxville, TN 37901
phone: (865) 637-6055 x23
email: angela@cleanenergy.org

Delta Anne Davis, Managing Attorney
Southern Environmental Law Center
2 Victory Ave., Suite 500
Nashville, TN 37213
Phone: (615) 921-9470
email: adavis@selctn.org

Axel Ringe, Conservation Chair
Tennessee Chapter Sierra Club
phone (865) 397-1840
email: onyxfarm@bellsouth.net

Zachary Fabish, Staff Attorney
Sierra Club Environmental Law Program
50 F St NW, Eighth Floor
Washington, DC, 20009
Phone: (202) 675-7917
email: zachary.fabish@sierraclub.org

Stephanie Durman, Attorney
Tennessee Clean Water Network
P.O. Box 1521
Knoxville, TN 37901
phone: (865) 522-7007 x102
email: stephanie@tcwn.org

Abel Russ, Attorney
Environmental Integrity Project
1 Thomas Circle, Suite 900
Washington, DC 20005
phone: (202) 296-8800
email: aruss@environmentalintegrity.org

Mary Whittle, Attorney
Earthjustice
1617 John F. Kennedy Blvd., Ste. 1675
Philadelphia, PA 19103
phone: (215) 717-4524
email: mwhittle@earthjustice.org

Patrick Morales, President and Chair of E3
Committee
Statewide Organizing for Community
eMpowerment (SOCM)
2507 Mineral Springs Ave., Ste. D
Knoxville, TN 37917
phone: (423) 504-7314
email: wemaybeback@live.com



May 5, 2015

Ms. Ashley R. Farless, P.E., AICP
NEPA Compliance Specialist
Tennessee Valley Authority
1101 Market Street
BR 4A
Chattanooga, TN 37402

RE: Comments on the Draft Environmental Assessment
Kingston Fossil Plant, Bottom Ash Dewatering Facility (March 2015)

Dear Ms. Farless:

Global Environmental, LLC has prepared these comments relative to the Draft Environmental Assessment (EA) for the proposed bottom ash and pyrite dewatering facility at the Tennessee Valley Authority (TVA), Kingston, Tennessee fossil plant. These comments have been prepared for and are submitted on behalf of the Southern Environmental Law Center, Southern Alliance for Clean Energy, Tennessee Clean Water Network, Earthjustice, Environmental Integrity Project, and the Sierra Club.

In short, the proposed dewatering facility falls short of TVA's claim that the selected alternative will provide a "state-of-art, secure storage system that leads the industry in the management of CCPs (coal combustion products)" and "allows for future marketing of ash products." Instead, the selected Alternative B dewatering and waste disposal plan results in:

- A bottom ash and pyrite handling system that is not "state-of-the-art" when compared to current trends in the industry. In fact, TVA did not seriously consider other, field-proven technologies that are industry-leading and state-of-the-art.
- Continued reliance on antiquated waste handling and disposal methods that threaten surface water and groundwater quality while unnecessarily using significant amounts of water.
- Continued insecure disposal methods for solids and liquids because the proposed plan continues to discharge contaminated water to an unlined settling pond and to an on-site landfill that is prone to subsurface collapse and liner failure.
- Loss of beneficial reuse and economic gains for future marketing of bottom ash because it contaminates potentially reusable (and sellable) bottom ash with pyrite.

Specific technical point that support the above conclusions are included in the Technical Findings attached to this letter.

We trust that TVA will reconsider the proposed bottom ash handling alternative and will instead consider other industry-leading and field-proven bottom ash handling alternatives that will result in true state-of-the-art and secure processes that are economically viable and environmentally protective.

If you have any questions regarding these comments, please contact me at markquarles@comcast.net or 615-646-0969.

Sincerely,
**Mark
Quarles**
Mark A. Quarles, P.G.
Principal

Digitally signed by Mark Quarles
DN: cn=Mark Quarles, o, ou,
email=markquarles@comcast.net,
c=US
Date: 2015.05.05 12:26:05 -05'00'

Attachment: Technical Findings and Conclusions



Technical Findings and Conclusions

- 1. The proposed bottom ash handling system (Alternative B) selected by TVA is not “state-of-the-art” when compared to current trends in the industry. In fact, TVA did not seriously consider other, field-proven technologies that are industry-leading and state-of-the-art.**

The selected alternative (Alternative B - Construction / Operation of Dewatering Facility) for the bottom ash and pyrite handling and waste treatment system is not a “state-of-the-art” system at all, but instead continues to rely on antiquated “wet” sluice processes involving millions of gallons of water every day to transport bottom ash and pyrite to a dewatering treatment unit. Wastewater discharges from that unit will travel through an unlined earthen ditch to an unlined surface impoundment that is filled with decades of solid wastes.

When completing the EA, TVA failed to seriously consider or even include true “state-of-the-art” waste handling systems for treatment and disposal of bottom ash and pyrite. If TVA would have instead considered advanced, industry-leading processes and treatment technologies, TVA would have evaluated these field-proven technology alternatives, as examples:¹

1. Zero liquid discharge, recirculating system. Recirculates slurry water to eliminate the use of surface impoundments and eliminates wastewater discharges. Results in a dry ash for disposal.
2. Continuous dewatering and recirculating (CDR) system. System is incorporated into existing hoppers, results in minimal outage time, and eliminates the use of surface impoundments and any need for a wastewater discharge. Results in a dry ash.
3. Dry pneumatic conveying (PAX) hopper collection, dry transport, and dry disposal of bottom ash wastes. No water is needed. Belt-conveyed or gravity loaded onto a truck for disposal or reuse.
4. Vibrating ash conveying (VAX) that uses a vibrating deck to move dry ash from the boiler for transport to a secure landfill or reuse.

True state-of-the-art ash handling processes used by leaders in the field can result in the following operational efficiencies and benefits^{2 3} when compared to wet operations and surface impoundments chosen by TVA in the EA:

¹ EPA Regulations Accelerate Industry Shift from Wet to Dry Bottom Ash Solutions, EPA Regulations Accelerate Shift, December 2010, <http://www.powermag.com/epa-regulations-accelerate-industry-shift-from->

² Wet vs. Dry Bottom Ash Handling Compared: One Plant’s Experience, ModernPowerSystems.com, June 2007. <http://www.modernpowersystems.com/features/featurewet-vs-dry-bottom-ash-handling-compared-one-plant-s-experience/>

³ EPA Regulations Accelerate Industry Shift from Wet to Dry Bottom Ash Solutions, EPA Regulations Accelerate Shift, December 2010, <http://www.powermag.com/epa-regulations-accelerate-industry-shift-from-wet-to-dry-bottom-ash-solutions/>

1. Enhanced boiler efficiency due to the recovery of much of the heat leaving the boiler through the bottom - resulting in less coal consumption.
2. Elimination of surface impoundments that are prone to leak and contaminate surface water and groundwater.
3. Elimination of large surface water withdrawals that result in less internal power usage and the need for water treatment.
4. Higher reliability and better maintenance because of less corrosion and equipment jamming when compared to slurry operations.
5. Reclamation and sale of ash for beneficial uses.

Although TVA considered the Zero Liquid Discharge design option (Alternative D) in the EA, TVA did not seriously consider that option further – choosing instead to eliminate it from further discussion because, in its opinion:

1. Current regulations do not require zero liquid discharge - nor did TVA anticipate this being required in the future.
2. A zero discharge system would result in a higher cost - without publishing the cost of that option compared to the selected alternative.
3. A zero discharge system would require “operational impacts” - without specifying what those impacts would be compared to the selected alternative.

Strangely, recently TVA chose to upgrade its wet ash handling operations at its nearby Bull Run Fossil Plant and to use the higher technology Zero Liquid Discharge option – for reasons that contradict the above excuses for the Kingston Plant.⁴ TVA chose the zero discharge alternative for the Bull Run Plant in order to:

1. Terminate *all wet* coal combustion product handling and disposal operations.
2. Provide a revenue source from the future sales of re-usable wastes and reduce the demand for native raw materials.
3. Foster compliance with present *and* future regulatory requirements.

The selected dewatering Alternative B will take a previously dry pyrite – a *dry* waste that is generated during the coal pulverizing process *prior to combustion* – and instead create a *wet* pyrite slurry of up to 6.5 tons per hour in order to transport the waste approximately 1,000 feet. After that transportation, additional technology and energy is then needed to remove the once-dry pyrite, and then to dispose of the separated solid and liquid wastes.

Although TVA concluded that there are substantial benefits of separating pyrite from bottom ash, TVA did not select that option (Alternative C) in the EA for further, more in-depth consideration. TVA concluded that isolation and separation of pyrite from the combined waste stream provided two benefits:

1. Allows for marketability of the bottom ash
2. “Help(s) mitigate surface water quality issues associated with pyrites.”

⁴ Environmental Assessment, Bull Run Fossil Plant, Bottom Ash and Gypsum Mechanical Dewatering Facility. TVA, May 2012.

Even with these benefits, TVA did not seriously consider Alternative C because of the additional unspecified costs; a greater use of unspecified resources; longer construction periods (without specifying the duration); and unspecified impacts on air quality, noise, and transportation.

2. The selected ash dewatering system (Alternative B) still relies on antiquated waste handling and disposal methods that threaten surface water and groundwater quality while unnecessarily using significant amounts of water.

Burning coal results in “dry” bottom ash unless it is “wetted” for collection and transport. As such, a true “state-of-the-art” process would keep bottom ash dry from combustion to disposal in a landfill. Instead, the proposed Alternative B withdraws millions of gallons of water from the river every day to create a slurry to transport the bottom ash a mere approximately 1,000 feet to the treatment unit.

As a result, the proposed waste treatment process for selected Alternative B creates 7.5 million gallons a day (5,200 gallons per minute design slurry flow rate) of wastewater that will be disposed into an unlined, earthen Ash Settling Pond surface impoundment that contains decades of slurried bottom and fly ash, pyrite, metal cleaning wastes, boiler blowdown, and other coal combustion wastes. Those previously disposed wastes contain constituents known to be associated with coal combustion wastes (e.g. arsenic, boron, and sulfate, as examples) that are soluble in water.

Moreover, the proposed dewatering system of the combined bottom ash and pyrite waste streams will still direct essentially the same amount of partially treated wastewater created under the current process (Alternative A – No Action) to the unlined Ash Settling Pond. The design of the system also directs process stormwater from the dewatering system to the unlined pond. The proposed dewatering system allows for precipitation to fall onto previously dried bottom ash and pyrite – resulting in re-wetting some of the ash - because the expected 45-foot tall piles will remain uncovered for up to 3 days prior to being hauled to the landfill.

In addition, TVA relies on its current NPDES permit to claim that the wastewater will have no adverse impact. TVA states that one benefit of the selected dewatering Alternative B is that wastewater from the dewatering system will be properly treated to be protective of the environment – relying on the current National Pollutant Discharge Elimination System Permit (NPDES) and its permit limitations in order to protect the receiving stream. However, the only wastewater treatment parameters that TVA mentioned in the EA that the dewatering system would adequately treat were pH and metals - based on a 2011 study of Kingston and Widow’s Creek combined bottom ash and pyrite samples. Further, the NPDES permit has limits only on total suspended solids (TSS) and pH.

Finally, TVA fails to explain in the EA why pyrite from the Widow’s Creel plant was used to predict the wastewater characteristics from the Kingston plant. Pyrite and the combined waste stream can vary from plant-to-plant, depending on the source coal. As a result, the predicted waste stream characteristics from the 2011 study may not be representative of the Kingston wastewater that will be produced.

The proposed dewatering system of Alternative B will consist of a submerged flight conveyor and clarifiers to remove solids. The EA did not discuss the ability of the process equipment to remove dissolved metals or sulfate – constituents that are commonly found in coal combustion wastes and in contaminated groundwater beneath and hydraulically downgradient of disposal areas at the Kingston plant.

A review of the current NPDES permit (September 2003 issuance date) for the Kingston plant illustrates that any reliance on the NPDES permit and the treatment plant's ability to treat contaminants in accordance with the permit and be protective of the environment is in fact, a fallacy. The permit does not require any monitoring whatsoever for any metals, sulfate, or boron, as examples.

Although not selected by TVA for the Kingston plant, TVA is using a zero discharge process at the Bull Run Fossil Plant. Such a zero discharge process results in zero-discharge to earthen impoundments and receiving streams because clarified sludge water is capable of being reused in the plant operations.

Once the bottom ash and pyrite is dewatered from the Alternative B treatment, additional energy and resources will be required to load and haul the combined bottom ash and pyrite waste stream by truck (1 to 10 trucks per day) to the Gypsum Disposal Area landfill. That transportation route will include the same 1,000 feet that the slurry was previously pumped from the boilers – resulting in an additional 2,000 feet of round-trip transportation from the boilers rather than simply hauling dry ash directly to the landfill from the boilers.

3. Alternative B does not result in the “secure” disposal of waste solids and liquids but instead, continues to discharge contaminated water to an unlined settling pond and to an on-site landfill that is prone to subsurface collapse and liner failure.

The selected Alternative B dewatering facility continues to send millions of gallons of partially treated waste water to the unlined, earthen Ash Settling Pond by use of an unlined earthen ditch. Groundwater monitoring of the Ash Processing Area (APA, also known as the “ballfield”) and the adjacent Ash Settling Pond indicate that the groundwater is already contaminated by wet waste handling activities. Such contamination alone should warrant the elimination of continued wet slurry operations.

Specifically, groundwater monitoring results of wells in the ballfield and Ash Settling Pond areas demonstrate that wet handling operations at the Kingston plant have already contaminated groundwater with coal combustion constituents. In fact, arguably, the worse results are found in the well most hydraulically downgradient from the Ash Settling Pond (well 6AR) and the ballfield area (well AD-3). Groundwater sampling^{5 6} by TVA demonstrates that the unlined settling pond and ash disposal areas in the vicinity have resulted in groundwater contamination as follows:

⁵ Groundwater Compliance Report, TVA, Matthew D. Williams, P.E., August 2011.

⁶ Groundwater Compliance Report, TVA, Matthew D. Williams, P.E., January 2014.

- Sulfate – concentrations above the Secondary Maximum Contaminant Level (SMCL, 250 mg/L) in well AD-3 (559 mg/L).
- Dissolved Oxygen – anoxic conditions as low as 0.2 mg/L of dissolved oxygen in wells 6AR and 22.
- pH - acidic conditions as low as 4.5 in well 6AR compared to the SMCL (6.5 to 8.5 units).
- Arsenic, beryllium, cadmium, cobalt, nickel, and zinc - have been detected at statistically significant concentrations in one or more hydraulically downgradient wells (AD-3, 6AR, and 22).
- Total Dissolved Solids - concentrations above the SMCL (500 mg/L) in well AD-3 (1,210 mg/L).
- Manganese - concentrations above the SMCL (0.05 mg/L) in well AD-3 (15.1 mg/L); well 22 (1.83 mg/L); and well 6AR (35.8 mg/L).
- Boron – concentrations higher than the most hydraulically upgradient well (AD-1, 0.135 mg/L) in well AD-3 (1.29 mg/L); well 22 (1.14 mg/L); and well 6AR (0.645 mg/L).

TVA has acknowledged that groundwater downgradient from wet sluice waste disposal areas can become contaminated with heavy metals and have low pH. In fact, TVA is initiating a detailed investigation at the Gallatin fossil plant to determine the source of contamination. TVA has hypothesized that pyrite, coal pile runoff, the chemical pond, or residual contamination from a historic source might be contaminating the groundwater with low pH and elevated metals – the same issues being observed at the Kingston plant.⁷

Although TVA considered measures and practices to protect surface water and groundwater were necessary for the planned Alternative B, the only mitigation measures proposed in the Kingston EA to protect them are preparation of a Storm Water Pollution Prevention Plan and implementation of Best Management Practices (BMPs). TVA does not discuss the risks and implications of discharging millions of gallons of process wastewater associated with the dewatering alternative into a waste-filled, unlined surface impoundment. Further, TVA does not discuss any planned investigations to determine the nature and extent of groundwater contamination at the Kingston plant, even though the Kingston contamination is similar to what is observed at the Gallatin plant.

TVA's selected Alternative B plans to dispose of the dewatered pyrite and bottom ash combined waste streams at the on-site Gypsum Disposal Area landfill – with the intention of providing a “secure” disposal area for the new waste stream. There are doubts about whether or not that landfill is in fact “secure.” A liner collapse in December 2010 resulted

⁷ Preliminary Investigation Work Plan, Gallatin Fossil Plant, David Skaggs, P.E., Gabriel Lang, P.E., and Vernon Keys, February 20, 2015. TVA proposes to initiate a detailed subsurface investigation at the Gallatin plant to include:

1. Ground Conductivity geophysical surveys to identify potential subsurface source areas.
2. Electrical Resistivity Imaging to identify groundwater with high metals concentrations.
3. Seismic Refraction surveys to determine the depth of coal ash, soil, and bedrock.
4. Geoprobe investigation to drill soil borings and groundwater wells within the ash to determine areas with the highest amount of contamination.

in the release of solid wastes directly into the Clinch River,⁸ and dye tracing at the landfill demonstrated karst geologic conditions in the bedrock underlying the landfill.⁹ The stability of the landfill and its ability to securely contain all wastes is so questionable that the Tennessee Department of Environment and Conservation has required that TVA initiate the following investigation¹⁰ prior to re-opening the public comment period associated with the proposed modification of the landfill permit:

- Evaluate the liner system again based upon the assumption that voids or soft soils exist beneath the liner system, the geologic buffer, and any structural fill.
- Develop a mitigation work plan to discuss how over-excavation of unstable areas will result in a structurally sound foundation beneath the landfill to prevent future collapses.

Given the above issues at the Kingston plant, the Alternative B plan to dispose of wastewater and de-watered solids cannot be considered a “secure” option.

4. Alternative B does not result in the future marketing of ash products that will be created because it contaminates potentially reusable (and sellable) bottom ash with pyrite.

Although TVA admitted there is an economic benefit for reclaimed (and sold) bottom ash and TVA stated in the Introduction / Background of the EA that “the proposed changes would allow for the future marketing of ash products that are not currently feasible with the wet storage system,” the selected alternative still does *not* result in the future marketing of the bottom ash because the bottom ash will be co-mingled with pyrite.

TVA concluded that the selected Alternative B and the dried bottom ash generated in the dewatering process “would not be commercial grade and would have limited marketable uses” because of “the co-mingled pyritic material.” As such, the planned alternative deprives TVA the economic benefit of recouped costs of a beneficial reuse, as opposed to disposal.

The volume of pyrite - originally in dry form and is distinctively separate from the bottom ash that will be mixed with and co-disposed with the bottom ash - is significant. Pyrite accounts for up to 6.5 of the 23 tons per hour (28 percent) of slurry that will require treatment with the proposed treatment unit. The pyritic material can instead be loaded and hauled as a dry waste from its point-of-inception to the landfill and be segregated within the landfill because of its problematic tendency to contaminate groundwater.

⁸ Root Cause Analysis Report for December 15, 2010 Construction Drop-Out, Geosyntec Consultants, March 2011.

⁹ Dye Trace Investigation Report, Flue Gas Desulfurization (FGD) Disposal Facility, Geosyntec Consultants, July 19, 2011.

¹⁰ Request for Additional or Revised Content, letter to Sam Hixson, TVA, Major Modification Permit Application, Paula Plont, Revendra Awasthi, TDEC, February 20, 2015.

5. Conclusions

In short, the proposed dewatering facility falls short of TVA's claim that the selected alternative will provide a "state-of-art, secure storage system that leads the industry in the management of CCPs (coal combustion products)" and "allows for future marketing of ash products." Instead, the selected Alternative B dewatering and waste disposal plan results in:

- A bottom ash and pyrite handling system that is not "state-of-the-art" when compared to current trends in the industry. In fact, TVA did not seriously consider other, field-proven technologies that are industry-leading and state-of-the-art.
- Continued reliance on antiquated waste handling and disposal methods that threaten surface water and groundwater quality while unnecessarily using significant amounts of water.
- Continued insecure disposal methods for solids and liquids because the proposed plan continues to discharge contaminated water to an unlined settling pond and to an on-site landfill that is prone to subsurface collapse and liner failure.
- Loss of beneficial reuse and economic gains for future marketing of bottom ash because it contaminates potentially reusable (and sellable) bottom ash with pyrite.

We trust that TVA will reconsider the proposed bottom ash handling alternative and will instead consider other industry-leading and field-proven bottom ash handling alternatives that will result in true state-of-the-art and secure processes that are economically viable and environmentally protective.