NOTE

Subject: EPA Comments on AEP Clinch River,
Carbo, VA
Round 9 Draft Assessment Report

To: File

Date: August 11, 2011

1. On p. ii, paragraph 2, last line – "are FAIR" makes no allusion to ranking. May want to change to "are ranked FAIR."

2. On p. 1-4: In Section 1.3,
   - Jim Kohler, United States Environmental Protection Agency (remove 's' in Protection)
   - Patrick Kelly, United States Environmental Protection Agency (remove 's' in Protection)
   - Remove "*Public Health Services"* from under Patrick Kelly's name.

3. On p. p. 2-2, Figure 2.1-2 – May want to identify (red outline) Ash Pond 1 and Ash Pond 2.

4. On p. 3-1, under Section 3.1, "Ash Pond 1" should be relabeled "Dam Safety Program" or some other relevant label. This section applies to both Ash Pond 1 and Ash Pond 2.

5. General - No mention is made of run-on conditions at the site. There was a large spillway which collected from a drainage basin above Ash Pond 1 and outletted on the eastern edge of Ash Pond 1. There was some notice given to the spillway during the inspection, but no mention made in the report.

M E M O R A N D U M

TO: Jana Englander

FROM: Jerry Strauss

cc:

Date: December 30, 2011

SUBJECT: AEP/AP, Clinch River, Response to Comments

EPA Comments:

- made editorial changes
- Ratings changed. We now believe the assumptions used in the stability analyses are not representative of current conditions. We are asking AEP to re-analyze structural stability.
- Section 1.3 – changes made to personnel list
- Red outline has been added to Figure 2.1-2 to identify Ash Pond 1 and Ash Pond 2.
- Section 3.1 re-organized
- Discussion of offsite run-off at Ash Pond 1 and Ash Pond 2 has been included, see Section 6.1.2

Utility Comments:

- First 3 comments - no action required
- *Table 2.1 and Section 2.3 have been modified to include height as noted*
- *Section 2.5.1 has been modified to include elevations as noted*
- *Note 1 for Table 2.3 has been updated to clarify that the pool surface area and normal pool level values correspond to when Ash Pond 2 was active*
- *Section 6.1.4, Emergency Action Plan contents, has been modified*
- *At the time of the site visit, the final closure plans had yet to be implemented. The upper dike has been breached with the intent of preventing ponding water after storm events. The State believes the pond dikes and placed ash in the basin are possibly still exposed to structural instability from saturation. State of Virginia will explore this concern.*
- *The inspection and monitoring program for Ash Pond 2 was revised per AEP comments.*
- *Only documents utilized in the development of this report have been included in the Appendix. All remaining documents provided by the Owner were excluded from the report.*

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA
DEPARTMENT OF CONSERVATION AND RECREATION
203 Governor Street
Richmond, Virginia 23219-2010
(804) 786-1712

December 29, 2011

Dewberry
Attn: Jerome Strauss P.E.
8401 Arlington Boulevard
Fairfax, Virginia 22031

Re: Comments for Coal Combustion Residue Impoundment Round 9 – Dam Assessment Report, Clinch River Power Plant, Clinch River Flyash Dam No.2, #16702

Dear Jerry,

Thank you for providing Virginia Department of Conservation and Recreation Dam Safety Region 4 the opportunity of including some comments on the Clinch River Power Plant Ash Pond Management Units for possible inclusion in the above referenced report. The following are my comments:

Summary

Under the provisions of 4VAC50-20-220 Unsafe Conditions, C. Nonimminent danger…" the of the Virginia Department of Conservation and Recreation Impounding Structure Regulations, Thomas I. Roberts, P.E., C.F.M. Regional Dam Safety Engineer intends to provide American Electric Power (AEP), a draft report in January 2012 indicating known deficiencies in the dam, and in February 2012 recommend that the current Regular Certificate to Operate the dam be replaced with a Conditional Certificate to Operate the dam. The Conditional Certificate to Operate the dam will contain a listing of requirements and completion dates that must be met by AEP. Once AEP has satisfactorily met the minimum safety requirements for their dam, AEP may apply for a new Regular Certificate to Operate and Maintain the dam.

Current Conditions

The Clinch River Flyash Dam No. 2, NID #VA16702, currently has a Regular Certificate to Operate and Maintain issued March 20, 2008 and expires March 31, 2014. Our records indicate that it is 65 feet high and has a potential storage capacity of 157 acre-feet. Currently there is not any permanent pool and capacity for very little ponding above the settled ash. The dam had functioned by pumping flyash/water slurry into the impoundment in the past but the piping is currently disconnected. About 40 acres of offsite drainage drains into the impoundment with no safe functioning outlet. Based on information mentioned by AEP personnel onsite and old

plansheet showing crossections of the impoundment (in possession of AEP but copies not provided as promised) it appears that the bulk of the embankment is made of coal combustion residue materials. Woody vegetation control on the dam does not comply with the minimum standards in the regulations. There is no Auxiliary Spillway (Emergency Spillway) nor a functioning principal spillway. Though AEP staff have indicated in recent years, and as recently as September 2011, that there is an intent to decommission the dam and make it no longer a regulated impounding structure, the required alteration permit and plans have not been provided to VA DCR Dam Safety & FM to date on this.

Hazard Classification

The facility has been listed for many years as a Low Hazard Dam due to the proximity of the New River. Only this year did it come to the attention of VA DCR Dam Safety that this dam had failed once before in 1967. AEP, though asked, has not o provided any information on this failure, though it has been claimed by others that the failure caused a large discharge of ash into the Clinch River resulting in killing off all life in the river for 23 miles downstream in 1967. Currently this same stretch of Clinch River has the largest collection of species of endangered species of muscles than any other location in the United States. The Hazard Classifications for dams in Virginia is based on the Virginia Impounding Structure Regulations (Dam Safety) 4VAC50-20-40 "**Hazard potential classifications of impounding structures.**

A. Impounding structures shall be classified in one of three hazard classifications as defined in subsection B of this section and Table 1.

B. For the purpose of this chapter, hazards pertain to potential loss of human life or damage to the property of others downstream from the impounding structure in event of failure or faulty operation of the impounding structure or appurtenant facilities. Hazard potential classifications of impounding structures are as follows:

1. High Hazard Potential is defined where an impounding structure failure will cause probable loss of life or serious economic damage. "Probable loss of life" means that impacts will occur that are likely to cause a loss of human life, including but not limited to impacts to residences, businesses, other occupied structures, or major roadways. Economic damage may occur to, but not be limited to, building(s), industrial or commercial facilities, public utilities, major roadways, railroads, personal property, and agricultural interests. "Major roadways" include, but are not limited to, interstates, primary highways, high-volume urban streets, or other high-volume roadways.

2. Significant Hazard Potential is defined where an impounding structure failure may cause the loss of life or appreciable economic damage. "May cause loss of life" means that impacts will occur that could cause a loss of human life, including but not limited to impacts to facilities that are frequently utilized by humans other than residences, businesses, or other occupied structures, or to secondary roadways. Economic damage may occur to, but not be limited to, building(s), industrial or commercial facilities, public utilities, secondary roadways, railroads,

personal property, and agricultural interests. "Secondary roadways" include, but are not limited to, secondary highways, low-volume urban streets, service roads, or other low-volume roadways.

3. Low Hazard Potential is defined where an impounding structure failure would result in no expected loss of life and would cause no more than minimal economic damage. "No expected loss of life" means no loss of human life is anticipated

C. The hazard potential classification shall be proposed by the owner and shall be subject to approval by the board. To support the appropriate hazard classification, dam break analysis shall be conducted by the owner's engineer. Present and planned land-use for which a development plan has been officially approved by the locality in the dam break inundation zones downstream from the impounding structure shall be considered in determining the classification.

D. Impounding structures shall be subject to reclassification by the board as necessary."

With the knowledge of economic costs and environmental damage caused by failures of other Coal Combustion Residue Impoundments, the currently listed "Low Hazard" classification might not be the correct current hazard classification based on the Virginia regulatory definitions. One important issues that arises from the Hazard Classification is the minimum required safe spillway capacity.

Minimum Required Safe Spillway Capacity

Once the actual hazard classification has been determined, Table 1 of 4VAC50-20-50 "Performance Standards Required for Impounding Structures" is used to determine the minimum safe spillway capacity.

Hazard Potential Class of Dam	Spillway Design Flood (SDF)[B] For New Structures [F]	Spillway Design Flood (SDF)[B] for Existing Impounding Structures [F,G]	Minimum Threshold for Incremental Damage Analysis
High	PMF[C]	0.9 PMP[H]	100-YR[D]
Significant	.50 PMF	.50 PMF	100-YR[D]
Low	100-YR[D]	100-YR[D]	50-YR[E]

Since the main hazard in this dam is the material impounded and the material in the dam, an Incremental Damage Analysis under the provisions of 4VAC50-20-52 would not be applicable for this dam.

An analysis of the inflow and safe outflow needed for this structure is required. **Currently there is no operable outflow structure for this impoundment. Failure of this structure could result from this deficiency.**

Structural Stability

The structural stability analysis report provided by AEP had not been signed by a P.E. licensed in Virginia and is not considered as a valid submittal. The report is falsely based on the assumption that only rainwater from the sky over the footprint of the impoundment flows to the impoundment and does not account for approximately 40 acres of offsite drainage area that drains to the impoundment. An "As-Built" drawing of the facility was provided by AEP, signed by a P.E. licensed in Virginia, that completely misrepresented the drainage conditions, showing a nonexistent drainage system to keep off-site drainage from entering the impoundment. Rainwater over the footprint of the impoundment and runoff onto the impoundment are trapped onsite with no outlet at all other than saturating the fill. The structural analysis does not address the hundreds of truckloads of shale illegally dumped on top of the North end of the impoundment without the lawfully required Alteration permit through Virginia DCR Dam Safety. With the history of this structure failing in 1967, extremely poor drainage conditions, lack of operable monitoring wells onsite, dumped surcharge material on top, and embankments constructed of Coal Combustion Residue material, AEP needs to have an adequate and correct structural analysis done of the dam as soon as possible.

Conclusion

With the better understanding of the inherent environmental and economic dangers posed by a the failure of a Coal Combustion Residue Impoundments, especially one that is at least partially constructed of Coal Combustion Residue materials, AEP as owner, should immediately take action to bring this dam at least in compliance with the minimum safety standards in the Virginia Impounding Structure Regulations.

Please contact me if there are questions on my comments above at: Thomas I. Roberts, P.E., C.F.M., Region 4 Dam Safety Engineer, VA DCR Dam Safety & Floodplain Management, 8 Radford Street, Christiansburg, Virginia, 24073. Phone 540-394-2550, and e-mail Thomas.Roberts@dcr.virginia.gov.

Sincerely

Thomas I. Roberts P.E., C.F.M.

cc Robert Bennett, P.E, R.A., C.F.M., Div. Director VA DCR Dam Safety & Floodplain Management

Douglas W. Domenech
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Sincerely

Thomas I. Roberts P.E., C.F.M.

cc Robert Bennett, P.E, R.A., C.F.M., Div. Director VA DCR Dam Safety & Floodplain Management

Comments on Draft Dam Assessment Report – Clinch River Plant

- June 3, 2011 -

AEP has reviewed the draft report provided by Dewberry & Davis, LLC as part of their assessment of the ash impoundment facilities at the Clinch River Plant and would like to offer the following comments. Each comment is denoted in italics that follows a quoted section of the report.

1.1 CONCLUSIONS

1.1.1 Conclusions Regarding the Structural Soundness of the Management Unit(s)

> Ash Pond 1 and Ash Pond 2 did not show any areas of significant structural concern during the one-day site visit. The stability analysis report for Ash Pond 1 was prepared, signed and sealed by the Owner's engineers and indicates that the main perimeter dike for Ash Pond 1 is structurally sound. The stability analysis report for Ash Pond 2 was prepared, signed and sealed by BBC&M engineers and indicates that the main perimeter dike for Ash Pond 2 is structurally sound. It should be noted, however, that the stability analysis report for Ash Pond 2 assumed that only the ash in contact with the existing water table was saturated and not saturated to the top of the ash in the impoundment. This was assumed because at the time the Owner was considering a closure permit for Ash Pond 2 and that it would be capped and would function as a landfill. The Owner submitted the closure plan for Ash Pond 2 for regulatory approval in 2009 but has since retracted the plan.

No comment

1.1.7 Conclusions Regarding the Adequacy of the Surveillance and Monitoring Program

Current surveillance and monitoring program procedures appear adequate for Ash Pond 1. Surveillance and monitoring procedures were discontinued at Ash Pond 2 when it became inactive in 1998.

Surveillance of Pond 2 by certified engineers is still in effect and is conducted at the time of inspection of Pond 1. However, a report is not written regarding Pond 2.

1.2 RECOMMENDATIONS

1.2.1 Recommendations Regarding the Structural Stability

Maintain frequent inspections of Ash Pond 1 and resume inspections of Ash Pond 2 in accordance with Owner's current inspection program.

No comment

1.2.2 Recommendations Regarding the Hydrologic/Hydraulic Safety

A hydrologic and hydraulic analysis should be performed to evaluate the hydrologic/hydraulic safety of Ash Pond 1 and Ash Pond 2. The analysis should consider off-site drainage to Ash Pond 1 and Ash Pond 2 and should be in accordance with all requirements for such analyses as required by Virginia Department of Conservation and Recreation (VA DCR), Division of Dam Safety, including spillway capacity.

No comment

1.2.3 Recommendations Regarding the Maintenance and Methods of Operation

It is recommended that the Owner's inspection program be resumed for Ash Pond 2 until such a time the facility is formally closed through VA DCR, Division of Dam Safety.

It is recommended that all underbrush and trees be removed from the Ash Pond 2 perimeter dike in accordance with VA DCR, Division of Dam Safety requirements.

It is recommended that all animal burrows located along the perimeter dike of Ash Pond 1 and Ash Pond 2 be backfilled in accordance with standard geotechnical engineering practices for dams, and monitored for future reoccurrence.

It is recommended that the Owner perform an interior inspection of all outfall pipes from the Ash Pond 1 & 2 outlet structures to the reclaim pond as well as an interior inspection of the pipe systems that bypass off-site drainage through Ash Pond 1. Interior inspections should focus on the structural integrity of the pipes as well as seepage paths into and out of the pipes. The inspection report should summarize findings and remedial action required, if any.

No comment.

2.1 LOCATION AND GENERAL DESCRIPTION

Table 2.1: Summary of Approximate Dimensions and Size of Ash Ponds 1 & 2

	Ash Pond 1 (Pond 1A/Pond 1B)	Ash Pond 2
Dam Height (ft)	55	56
Crest Width (ft)	35	20
Length (ft)	3150	1650
Side Slopes (upstream) H:V	1.75:1	3:1
Side Slopes (downstream) H:V	2:1	3:1

2.3 SIZE AND HAZARD CLASSIFICATION

According to the VA DCR, Division of Dam Safety inventory reports (Appendix A, Document 1) Ash Pond 1 has a maximum capacity of 1,240 acre-feet with a maximum design height for storage of 55 feet. Ash Pond 2 has a maximum

Maximum height of Pond 1 dike is 65 ft

2.5 PRINCIPAL PROJECT STRUCTURES

2.5.1 Earth Embankment

Ash Pond 2

crest elevations of 1560 and 1535, respectively.

...

Low crest elevation of Pond 2 dike is 1559 ft as per regrading in late 2009/early 2010.

2.4 AMOUNT AND TYPE OF RESIDUALS CURRENTLY CONTAINED IN THE UNIT(S) AND MAXIMUM CAPACITY

The volume of CCRs stored in Ash Pond 1 and Ash Pond 2 at the time of the one-day field assessment was not available by the Owner. Table 2.3 summarizes the storage capacity for Ash Pond 1 and Ash Pond 2.

Table 2.3: Approximate Maximum Capacity of Ash Ponds 1 & 2

	Ash Pond 1 (Pond 1A/Pond 1B)	Ash Pond 2[1]
Maximum Pool Surface Area (acre)	21.0	12.5
Maximum Capacity (cubic yards)	2,000,534	203,280
Maximum Capacity (acre-feet)	1240	126
EL Top Dam, min (ft)	1570	1565
Normal Pool (ft)	1568/1556	1557

[1]When pond was active.

Pool level and surface area for Pond 2 should be blank. Currently there is no free water in this pond.

2.5 PRINCIPAL PROJECT STRUCTURES

2.5.1 Earth Embankment

Ash Pond 2

...

dikes consist of shale fragments, silty clays, clayey silt and sand. The top of the upper dike has a crest elevation of 1565, although a portion of the

The crest of the Upper Dike is at elevation 1570 ft

6.1 SUPPORTING TECHNICAL DOCUMENTATION

6.1.4 Downstream Flood Analysis

Data reviewed by Dewberry did not contain a downstream flood analysis.

The Emergency Action Plan for the facility contains copies of flood inundations map and a dam break analysis summary.

7.1 SUPPORTING TECHNICAL DOCUMENTATION

7.1.4 Factors of Safety and Base Stresses

Ash Pond 2

As discussed in Section 7.1.1, safety factors from the slope stability analysis completed by BBC&M Engineering cannot be used for the purpose of this report based on design parameters used and inappropriate assumptions concerning saturated ash levels.

AEP considers the BBCM Engineering stability report appropriate and representative of the existing condition of Pond 2. AEP will not reactivate the pond. However, AEP concurs that a new analysis would be appropriate if the pond was returned to operation.

In 1990 a stability analysis was performed by AEP engineers where the phreatic water level in Pond 2 was assumed to be at the maximum operating level. This analysis considered the stability of each dike of the three dike system, as well as progressive failure of the three dike system. The minimum factor of safety of the dike system was found to be 1.3. As discussed above, the condition of Pond 2 has changed since then and the factor of safety calculated by BBCM is representative of the current condition.

8.2 MAINTENANCE OF THE DAM AND PROJECT FACILITIES

In 1983, the Owner adopted a Dam and Dike Inspection and Maintenance Program (DIMP), where all earthen dams and dikes used for ash storage or disposal, waste water ponds, and large cooling water storage facilities under the Owner's management are routinely inspected, documented, and monitored. Under this program, there are four separate levels of inspection. First is to routinely make inspections by plant personnel to monitor visible changes; second is to make formal 'checklist type' inspections completed by plant personnel on a quarterly basis; third is to routinely schedule engineering inspections supervised by a professional engineer according to the risk classification of the dam; and, fourth are non routine inspections completed after heavy rains, seismic activity or other major events. The inspection and maintenance program continues today for Ash Pond 1 but was discontinued for Ash Pond 2 in 1998 when it became inactive.

Inspection and monitoring program of Pond 2 was revised but not discontinued.

APPENDIX A & APPENDIX B

We note that D&D has chosen to include a copy of all documents provided to them by AEP as appendices to the report. While we have not raised a claim of business confidentiality for these documents, we do not believe it is necessary to include the several hundred pages of supporting documents that we provided for D&D's review. In reviewing the final reports posted by EPA on their website for other facilities, most reports from the earlier rounds of site assessments contain none of these types of documents and question why it is now being done.

We strongly recommended that Appendices A and B be deleted and as an alternative that a list of the documents that were provided be given as a bibliography in an appendix, similar to what was done by Paul C. Rizzo Associates, Inc. for Duke Energy's Dan River Steam Station, (see Appendix E):

http://www.epa.gov/epawaste/nonhaz/industrial/special/fossil/surveys2/dan-river-final.pdf