Comments on AEP's Philip Sporn Plant*

EPA HQ Comments: None

EPA Region Comments: None

State Comments: None

Company Comments: See document dated November 23, 2009

*Note: see additional documentation including:

1) AEP's Reports/Studies in Response to EPA's Draft Site Assessment Report
2) EPA Contractor (Dewberry and Davis, Inc.) Analysis of AEP's Report/Studies
3) EPA Information Request Letter to AEP

Comments on Draft Dam Assessment Report – Philip Sporn

- November 23, 2009 -

American Electric Power has reviewed the draft assessment report for the Philip Sporn Plant Fly Ash Pond and Bottom Ash Pond prepared by Dewberry. By way of reference, AEP specifically incorporates all previous comments and supplemental information provided to EPA as a result of the Agency's earlier requests regarding this report. This includes all information related to the Clean Water Act Section 308 request for additional studies that was issued by EPA on November 13, 2009. In addition to all of the aforementioned materials, we have the following comments on the report:

General - Based on the supplemental information previously provided by AEP, we note that Dewberry has recommended revisions to the report including a change in the ratings for the ponds from "Poor" to "Fair." AEP requests that all relevant sections of the report be revised to reflect the supplemental information on liquefaction potential, and other stability-related issues (e.g., Section 7.1.5 – Liquefaction Potential).

Specific Comments - For reference, we have repeated each relevant section of the report dealing with Technical Documentation in Section 7.1, followed by AEP's response. We request that Sections 7.2 and 7.3 similarly be revised to reflect these comments:

7.1.2 Design Properties and Parameters of Materials

Fly Ash Pond – An Engineering Report for the Philip Sporn Electric Generating Plant, Unit 5 Fly Ash Facility, was prepared by the Geotechnical Engineering Section of American Electric Power Service Corporation in 1998. The 1998 Engineering Report includes documentation of the shear strength design properties for the Fly Ash Pond, which is included in this report and is presented in the following section; see Appendix A (Doc 14: Fly ash complex-North Dam Modification ShawStoneWebster Marc.pdf) for the complete document. Design properties and parameters of materials were reportedly "back calculated" using an assumed factor of safety. This assumption may result in an overestimation of the existing factors of safety for the embankment.

Design Shear Strength

"During the selection of the design shear strength the following items were considered:

- Location of the different layers that form the dike and provide their foundation support;
- Whether or not a given material has allowed the dissipation of the excess pore-pressure, due to the weight of the dike, since the dike's construction; thus being fully consolidated and drained
- Behavior of the soil with respect to the location of the specific seepage surface and seepage forces.

In an effort to represent an accurate profile of the dikes, the presence of different layers, and the probable spatial variability of the thickness of the layers forming the dikes, it was decided to analyze sections of this dike in as many locations as where subsurface information was obtained….

Bottom Ash Pond – A Supplemental Engineering Report for the Philip Sporn Electric Generating Plant, Bottom Ash Facility, was prepared by the Geotechnical Engineering Section of American Electric Power Service Corporation in 1998. The 1998 Engineering Report includes documentation of the shear strength design properties for the Bottom Ash Pond, which is included in this report and is presented in the following section; see Appendix A (Doc 3: AEPSC Civil Engineering - Bottom Ash Pond - Engineering Repo.pdf) for the complete document. Design properties and parameters of materials were reportedly "back calculated" using an assumed factor of safety. This assumption may result in an overestimation of the existing factors of safety for the embankment.

AEP Response - *The 1998 Engineering Report provided embankment and soil strength parameters based on laboratory testing, field tests and reported literature. This information is quoted within Section 7.1.2 of the Assessment Report. The referenced document 14: "Fly ash complex-North Dam Modification by ShawStoneWebster" states that strength parameters from the 1998 report were used for consistency. No design parameters for the fly ash dam were established by back-calculation methods. The computed factors of safety in both reports represent the site specific data and would not be considered as an overestimation of the existing conditions at the facility. Actually, some of the computed factors of safety from the 1998 Design Report were less than desirable and AEP modified the facility in 2002 to improve the factors of safety. Please refer to portions of the 1998 Design Report previously submitted (Filename: Sporn FA & BA Pond Modifications.pdf ; page# AEPSPP000498 – 000518).*

Please see AEP comments to Section 7.1.4, below, related to the design parameters for the bottom ash pond.

7.1.3 Uplift and/or Phreatic Surface Assumptions

Fly Ash Pond – The 2009 Inspection Report for the Fly Ash Pond Complex, prepared by H. C. Nutting Company, a Terracon Company, provides recent instrumentation

data for the Fly Ash Pond, and is presented below. See Appendix A (Doc 2: 2009 Inspection Report.pdf) for the complete report.

Internal drainage collection and discharge piping is not present. The lack of an internal drainage collection and discharge system precludes the ability to monitor seepage and relieve excess pore water pressure. However, piezometric readings indicate that the phreatic surface has been stable and is consistent with the assumptions made in the slope stability models….

Bottom Ash Pond – The 2008 Inspection Report for the Fly Ash Pond Complex and Bottom Ash Pond Complex, prepared by the Geotechnical Engineering Division of AEP Service Corporation, indicates that there is no monitoring instrumentation data (i.e. monitoring wells or piezometers) associated with the annual inspection program of the Bottom Ash Pond. The pond levels are measured during inspections, and this information is presented below. See Appendix A (Doc 1: 2008 Sporn DIMP Inspection Report) for the complete report. Internal drainage collection and discharge piping is not present.

Internal drainage collection and discharge piping is not present. The lack of an internal drainage collection and discharge system precludes the ability to monitor seepage and relieve excess pore water pressure.

AEP Response - *Seepage from approximately two thirds of the eastern dike of fly ash pond is collected by a blanket drain along the exterior slope. The blanket drain is directed into a toe drain along the eastern dike. The toe drain alignment parallels the riverbank and daylights along the top of the natural riverbank as shown on the 2003 as-built drawing (previously submitted). The remaining one third of the eastern dike has an internal drainage pipe that daylights near the outfall pipe. In addition, there are two manholes located along this pipe to allow for inspection and cleanout if necessary. Internal drains around the conveyor foundations on the northern dike of the facility contain pipes that daylight into the riprap face.*

The seepage collection system is capable of relieving any excess pore pressures that may develop. Several piezometers are also located in the dikes to monitor changes in the pore pressure. Historical data recorded by the piezometers is contained in the inspection reports provided with earlier submittals. Since the fly ash dam is an upground reservoir, rapid loading conditions are limited to the capacity of the pumping system that delivers the sluice and waste water influents. This condition may occur every other year since portion of the pond complex is dewatered and excavated when filled with ash. Generally, it takes approximately 1 week to fill the excavated volume with process sluice water. However, the pool level is only filled to the previous operating level. Any rise in pool level due to precipitation events is limited to the volume of precipitation that falls within the confines of the diking system.

Similarly, seepage from the bottom ash pond embankments is collected to toe drains. The toe drain along the eastern dike drains into the coal yard runoff pond. The toe drain

along the western dike drains towards the south and discharges into a drainage feature that is part of the plant's yard drainage system.

7.1.4 Factors of Safety and Base Stresses

Fly Ash Pond –A stability analysis report for the Fly Ash Pond, prepared in 2009, by American Electric Power, with Geotechnical Testing performed by H.C. Nutting Company, a Terracon Company, provides information on the factors of safety and is presented below. See Appendix A (Doc 15: Fly ash dam Stability Analysis AEP March 2009.pdf) for the complete report.

It is inconclusive that the stability of the embankments meets the minimum recommended values due to potential discrepancies in soil strength parameters used and lateral acceleration values under earthquake loading conditions. In addition, a section of the embankment system was not evaluated under earthquake loading conditions….

The safety factors presented in the table show that the slopes of the fly ash facility at the Philips Sporn Power Plant have satisfactory safety factors under static and earthquake conditions. The safety factors computed herein are in the same range as those obtained during the 1996 engineering evaluation.

Impoundment	Dike	Section	Safety Factor			
			Normal Loading Conditions		Earthquake Loading Conditions	
			Upstream Slope	Downstream Slope	Upstream Slope	Downstream Slope
Fly Ash	Northern	F-F	1.6	1.7	1.2	1.4
	Western	H-H	2.4	2.0	1.6	1.2
	Southern	J1-J1	2.3	2.2	1.8	1.9
	Eastern	M-M Upper Dike	1.7	2.1	1.4	Not Analyzed
		M-M Lower Dike	NA	1.6	NA	1.4
		M-M Global	NA	1.94	NA	Not Analyzed

Based on the results of the analyses presented in this report, all the dams and dikes that form the fly ash disposal facility at the Philips Sporn plant were found to have stability safety factors at or above the minimum recommended values.

AEP Response - *The 2009 stability analyses performed by AEP used the same material parameters as those determined in the 1998 Design Report. The geotechnical explorations by H.C. Nutting Company in 2009 was undertaken to verify that the parameters from the 1998 report are still valid. The material strength parameters determined from the 2009 laboratory tests were determined to be similar or higher values than those used in the 1998 design report. Therefore, AEP did not revise the parameters in the 2009 stability analysis. The results of the 2009 analyses of the current conditions*

are similar to the results from the 1998 analyses for the proposed modifications that were completed in 2002. Results of the field and laboratory tests performed in 2009 are available for review.

AEP acknowledges that the 1998 stability analyses of all dikes, including the upper section of the eastern dike, for seismic conditions used a ground acceleration value slightly lower than the current guidelines. The seismic ground acceleration of 0.05g used in 1990's report was taken from the then current earthquake maps. In late 1998, the earthquake maps were revised to include two different probabilities of 2 and 5 percent. The 2% probability earthquake map showed a potential ground acceleration of 0.06g while the 5% probability earthquake map showed a potential ground acceleration of 0.05g. The seismic evaluations, using a potential ground acceleration of 0.06g, will be addressed under separate cover as part of the information requested as a follow-up to this draft report.

7.1.4 Factors of Safety and Base Stresses

Bottom Ash Pond –A stability analysis report for the Bottom Ash Pond, prepared in 2009, by American Electric Power, with Geotechnical Testing performed by H.C. Nutting Company, a Terracon Company, provides information on the factors of safety and is presented below. See Appendix A (Doc 21: Response to Item 2 of Order Related to Stability - AEPSC Civ.pdf) for the complete report.

It is inconclusive that the stability of the embankments meets the minimum recommended values due to potential discrepancies in soil strength parameters used and lateral acceleration values under earthquake loading conditions.

"The calculated safety factors presented in the table show that the slopes of the selected sections of the bottom ash pond at the Philips Sporn Power Plant has satisfactory stability under static and earthquake conditions. The safety factors computed herein are in the same range as those obtained during the 1996 engineering evaluation.

Impoundment	Dike	Section	Safety Factor			
			Normal Loading Conditions		Earthquake Loading Conditions	
			Upstream Slope	Downstream Slope	Upstream Slope	Downstream Slope
Bottom Ash	Western	A-A	1.6	2.0	1.4	1.7
	Eastern	C-C	1.5	1.5	1.2	1.3

Based on the results of the analyses presented in this report, all the dams and dikes that form the bottom ash disposal facilities at the Philips Sporn power plant were found to have stability safety factors at or above the minimum recommended values.

AEP Response - *In 1996, AEP prepared a design report for modifications to the bottom ash pond dikes. The design report listed embankment and soil strength parameters based on laboratory testing, field tests and reported literature. This information is quoted within Section 7.1.2 of the Assessment Report. During the 1996 engineering analysis, the computed factors of safety for the eastern dike (along the coal yard) were less than desirable and AEP proposed modifications to the facility to improve the factors of safety. The report also included an analysis of the western dike (along the railroad) and concluded that the factor of safety met the minimum requirement. The 1996 design report was submitted to the WV Dam Safety Section for review and approval. As part of their review, the Agency requested AEP to increase the factor of safety of the western dike by 25 percent even though the calculations indicated an acceptable value. To achieve this, AEP and WV Dam Safety decided to back-calculate the strength parameters that would be required to obtain a factor of safety equal to 1.2 for static operating conditions (mutually agreed factor of safety of then existing conditions). As a result, modifications to the western dike were proposed to increase the factor of safety to/greater than the minimum requirement. This calculation and proposed modification to the western dike was presented in the 1998 Supplemental Analyses that was submitted to the Agency. Please refer to portions of the 1996 Design Report and 1998 Western Dike Supplemental Engineering Report (file name: AEPSC Civil Engineering –Bottom Ash Pond-Engineering Report-1996.pdf; page # AEPSPP001515 – 001544 and AEPSPP001456-1469, respectively).*