Comments - AEP Cardinal

EPA HQ - No comments

EPA Region -

From:	Nate Nemani/R5/USEPA/US
To:	James Kohler/DC/USEPA/US@EPA
Cc:	Jose Cisneros/R5/USEPA/US@EPA
Date:	11/13/2009 03:32 PM
Subject:	Re: Fw: Comment Request on EPA's Draft Coal Ash Impoundment Assessment Reports

Jim:

I have reviewed both reports, namely Sherburne County power station in **Becker , Minn.** and Cardinal power station in Brilliant, Ohio. As stated earlier, I oversee contractor work for the **Minn. facility only** with a site visit.

The report seems to capture all the observations made during the inspection for the Becker, Minn. site. the final conclusions and recommendations seem to be accurate and consistent with my impressions following my site visit.

I have read through the report for the **Brilliant, Ohio** site without the benefit of a site visit, However , I can state that the report is well organized and its conclusions/ recommendations seem logical and reasonable.

I have no other comments on the reports.

Nate

State - Comments made to attached report (see yellow highlights).

Company - See document dated November 23, 2009.

Comments on Draft Dam Assessment Report - Cardinal

- November 23, 2009 -

American Electric Power has reviewed the draft assessment report for the Cardinal Plant Bottom Ash Complex, Fly Ash Dam No. 1, and Fly Ash Dam No. 2 prepared by CHA. We have the following comments on that report:

Section 1.3 (page 4) - Residual Solid waste landfill is located on decommissioned FAR I. Report states FAR II. The bottom ash dikes were raised but constructed over prepared subgrade. The previous basin was developed by excavating the original ground to form an incised pond. Please reword this description so that the report does not imply the dikes were constructed over a saturated pond.

Section 2.6 (page 32) - Instrumentation data is collected and summarized twice a year. The report states summarized annually.

Section 4.0 – AEP has the following comments on the recommendations in this section. For reference, we have repeated each specific recommendation, followed by AEP's response.

4.2 Maintaining and Controlling Vegetation Growth

Recommendation - The grass cover on Fly Ash Dam No.2 appeared to reasonably maintained with only isolated areas of mild cover loss. This practice should continue. Vegetation did, however, become more evident in the rock lined abutment groins and downstream slope ditch line where mowing is not possible. In these areas herbicide (in accordance with applicable laws/rules) is recommended to control weed growth. Woody plants may require hand removal.

A grass cover on the Bottom Ash Pond and Recirculation Pond dikes will likely be difficult to establish and maintain, due to the granular surface, operations traffic, and routine grading operations. An exception is the east dike facing the Ohio River where vegetation has been able to grow. In this area the plant growth should be cut and reseeded as required. The heavier brush and woody vegetation at the northern extent of the east dike should be cut down and appropriately seeded with grass.

CHA recommends that vegetation be cut prior to each quarterly inspection performed by AEP representatives so that adequate visual inspections can be made.

AEP Response - *AEP concurs that maintenance and control of vegetation growth is required to ensure adequate inspection and evaluation of the dam. All vegetation within ditches and groins will be addressed by the proper methods and vegetation on the slopes will be mowed regularly.*

4.3 Bottom Ash Pond and Recirculation Pond – General Crest Areas and Slopes

Recommendation - These areas typically had intermittent erosion rills, likely exacerbated when grading activities pushed loose material to the crest edge and sheet flow became concentrated during rain events. These erosion rills should be filled in with compacted material and otherwise stabilized. When grading activities push material to the crest edge, a concerted attempt should be made to compact these areas prior to the next rain event.

AEP Response - *AEP concurs and all erosion rills will be filled, graded and compacted.*

4.4 Recirculation Pond Outlet Area

Recommendation - Fairly large, deep erosion gullies were observed on the inside slope of the Recirculation Pond adjacent to the outlet approximately where the incised portion of the pond transitions to the east dike. At the time of the site visit, the pool elevation was such that the water was not going into the gullies. This will likely change as the pool elevation rises to its maximum pool. CHA recommends that these gullies be filled in and stabilized. This area should also be graded to direct run off away from this area.

AEP Response - *AEP concurs and all erosion rills will be filled, graded and compacted.*

4.5 Bottom Ash Pond – Primary Spillway/Decanting Tower

Recommendation - Vegetation had started to establish itself in the skimmer for this unit. Although it has not become a problem presently, removal is recommended to maintain this area before the vegetation fouls the tower outfall or prevents the skimmer from working effectively.

AEP Response - *AEP concurs and the accumulated cenospheres and vegetation will be removed from within the skimmer structure.*

4.6 Bottom Ash Pond and Recirculation Pond – East Dike

Recommendation - Normal pool of the Ohio River is at about elevation 644 as shown on the design drawings. These drawings also indicate a 100 year flood level at about elevation 664 suggesting that routine high water levels are likely to submerge the

downstream toe. During the site visit, slope protection such as rip rap was not observed in this area. CHA recommends an analysis of the flood level water velocities in the area of the down stream slope to determine if rip rap or some similar slope protection is warranted.

AEP Response - *The ordinary high water for this reach of the Ohio River is approximately elevation 648. AEP recently completed a similar study for another facility located along the Ohio River. The results of that study indicated that velocities along the riverbank range from 0.5 – 1.7 feet per second. This velocity is lower than the scour velocity for a grassed, soil embankment (generally 3 -5 fps). This information was presented and approved by another state's regulatory agency, and is available for review. Since the construction of the dikes, there has not been any scour due to high river conditions. AEP will document this study in its Cardinal Plant files. If erosion or scour conditions develop, AEP will implement a program to repair and protect the slopes.*

4.7 Fly Ash Dam No. 2 – Erosion

Recommendation - An erosion rill and subsequent loss of grass cover was observed on the downstream slope between the upper bench and west groin. Thinning and loss of grass cover due to sheet flow was noted in other isolated areas on the downstream slope as well. CHA recommends filling the rill and reseeding the areas.

AEP Response - *AEP concurs and will address rill erosion and revegetation.*

4.8 Fly Ash Dam No.2 – Steel Weir Repair

Recommendation - One of the steel V-notch weirs had become undermined so that water does not flow through the notch where it can be measured. CHA recommends replacing the weir or removing it.

AEP Response - *AEP concurs and will evaluate the need for the specific weir. A plan to repair or remove the weir will be developed.*

4.9 Bottom Ash Pond and Recirculation Pond Hydraulic Analysis

Recommendation - AEP was not able to provide CHA with a hydraulic analysis showing the Bottom Ash Complex's ability to safely pass the 50 % PMP event. However, preliminary analyses performed by CHA suggest there is enough storage capacity at the current operating pool to safely withstand this rainfall event. We recommend AEP perform a complete study to confirm this, and update the study if operating levels of the pond change in the future.

AEP Response - *An evaluation of the bottom ash pond complex during less severe flood events was completed several years ago. This study will be used as a basis to evaluate the regulatory design flood of 50% PMP, which is approximately 13 inches of*

precipitation. AEP concurs and expects that there is adequate storage capacity to handle the design flood.

4.10 Additional Stability Analyses – Bottom Ash Pond and Recirculation Pond

Recommendation - Based on our review of available information for the Bottom Ash Complex we recommend that the following tasks be performed to confirm that the embankments are indeed stable under the various loading conditions outlined in Section 3.3.

- CHA recommends that a stability analysis model be developed for the maximum surcharge pool (flood) condition.
- CHA recommends modeling the upstream slope stability for seismic and steady state seepage load cases.
- CHA recommends that the rapid draw-down load case be evaluated for the bottom ash complex.
- We recommend that a liquefaction analysis be performed in light of some of the loose to very loose alluvial soils encountered during the subsurface investigation for the site.

AEP Response - *AEP will plan to revise the seepage and stability analyses for the bottom ash complex for the loading conditions noted above.*

Several screening techniques are commonly used to determine if materials have a potential for liquefaction. In general, liquefaction potential decreases with increasing fines content and increasing plasticity index. Soils having a clay content (particles finer than 0.005 mm) greater than 20 percent are considered as non- liquefiable (Seed and Idriss, 1982). A review of the laboratory testing data of the alluvium soils reveals that the average clay fraction is 27 percent finer than 0.005mm. There are thin lenses of material within the alluvium deposits that have clay contents less than the 20 percent value. Overall, AEP believes that the alluvium soils at this site have a low potential for liquefaction, particularly under the seismic action of a credible earthquake for this region which is listed as very low seismisivity.

4.11 Fly Ash Dam No. 2 Recommendations for Additional Stability Analyses

Recommendation - Based on our review of available information for Fly Ash Dam No.2 we recommend that the following tasks be performed to confirm that the embankments are indeed stable under the various loading conditions outlined in Section 3.3.

- CHA recommends a maximum surcharge stability evaluation be performed for the steady state conditions on the upstream and downstream slopes.

- CHA recommends modeling the upstream and downstream slope stability for seismic and steady state seepage load cases from the maximum storage pool elevation.

- CHA recommends a rapid drawdown analysis be performed for the current conditions.

AEP Response - *The report, "Final Design Report for Proposed Earth Fill-Roller Compacted Concrete Raising of Dam, March 1997" included stability analyses for conditions defined in the first two bullets for the design configuration. The results showed that the factors of safety were equal to or greater than the required minimum values. The same analyses were not part of the documentation for the repair design of the downstream slide that occurred during construction since an additional stabilizing berm was added to the original design configuration. The addition of the berm enhanced the stability of the dam so AEP expects the results of the suggested analyses will be greater than originally designed and approved. However, the analyses will be performed as recommended.*

Rapid drawdown is defined in the USACOE EM 1110-2-1902, 31 Oct 03, as a condition when the" Embankment may become saturated by seepage during a prolonged high reservoir stage. If subsequently the reservoir pool is drawn down faster than the pore pressure can escape, excess pore pressures and reduced stability will result."
There is no low level drain for the facility that will allow a rapid draw down of the water. To lower the pool level at this facility, stop logs must be removed from the discharge tower one at a time. AEP has performed this work at some other facilities for partial drawdown, when needed to perform repairs to the decanting structure, without upsetting environmental limits imposed by NPDES permits. The work effort takes about 4 hours to remove the initial stop log (generally a height of about 6 inches, but it could be in the range of 4 to 8 inches) and a full day to remove the second stop log, due to the flow depth over weir. Two stoplogs are the maximum number that are removed at a time because it is not possible or safe to remove any more stoplogs until the pool level recedes to the level of the stoplog. This time period is about 2 days to drop the reservoir level by about 12 to 16 inches, depending on the size of the individual stoplog and reservoir area. General practice considers an acceptable rate to lower a reservoir to be usually 12 inches over a 24-hour period. Due to safety and operational constrains AEP can only drop the reservoir at a rate that is not considered a rapid drawdown condition.

The condition of the Fly Ash Dam No. 2 (FAR II) has been rated as FAIR in this Assessment Report based on the apparent recommendation for additional stability analyses. AEP believes that documentation for all applicable analytical conditions have been performed for FAR II as part of design report as approved by the Ohio DNR Dam Safety Section. Therefore, AEP respectfully requests that the consultant re-evaluate the overall condition rating. AEP Engineers, independent consultants and the ODNR Dam Safety Section consider the facility to be in SATISFACTORY condition. Such conditions have been documented since construction was completed in 1998.