Comments

EPA HQ – None. Notes: The contractor was not provided with the stability analysis for both ponds and recommends that subsurface investigations be performed at both ponds to determine existing soil parameters in the embankments and foundation soils. The contractor also recommends installation of piezometers to determine the current pheratic surface.

EPA Region – None.

State -

| | |
|---|---|
| From: | "Brian Queen" <brian.queen@epa.state.oh.us> |
| To: | James Kohler/DC/USEPA/US@EPA |
| Cc: | "Craig Butler" <Craig.Butler@epa.state.oh.us>, "Dan Harris" <dan.harris@epa.state.oh.us>, "Dave Chenault" <dave.chenault@epa.state.oh.us>, "Dave Schuetz" <dave.schuetz@epa.state.oh.us>, "George Elmaraghy" <George.Elmaraghy@epa.state.oh.us>, "Jeff Hines" <Jeff.Hines@epa.state.oh.us>, "Jim Sferra" <jim.sferra@epa.state.oh.us>, "Jim Simpson" <Jim.Simpson@epa.state.oh.us>, "Jon Bernstein" <Jon.Bernstein@epa.state.oh.us>, "Pam Allen" <pam.allen@epa.state.oh.us>, "Paul Novak" <Paul.Novak@epa.state.oh.us>, "Rich Fox" <rich.fox@epa.state.oh.us> |
| Date: | 01/05/2010 10:41 AM |
| Subject: | Draft Coal Ash Impoundment Assessment Reports |

Dear Mr. Kohler

Thank you for providing Ohio EPA the opportunity to review the Draft Coal Ash Impoundment Assessment Reports. We appreciate you keeping us involved in this process. If US EPA decides to issue press releases for these facilities we would appreciate seeing them before they're released as you did for AEP Philip Sporn.

The reports' descriptions of the facilities field evaluations and the assessments of the loading conditions appear to be accurate for all six facilities and we have no comments at this time.

Thanks

Brian Queen
(740) 380-5420
brian.queen@epa.state.oh.us

**Also: See letter dated January 28, 2010 (comments from Ohio State Dam Safety Engineering Program).**

Company – See letter dated January 27, 2010.

# Ohio Department of Natural Resources

TED STRICKLAND, GOVERNOR SEAN D. LOGAN, DIRECTOR

David Hanselmann • Chief

Division of Soil & Water Resources


January 28, 2010

Jim Kohler, P.E.
Environmental Engineer
LT, U.S. Public Health Service
U.S. Environmental Protection Agency
Office of Resource Conservation and Recovery
(Letter provided by email)

RE: Assessment of Dam Safety Coal Combustion Surface Impoundments Draft Reports for Conesville Generation Station, Muskingum River Power Plant, JM Stuart Station, W.C. Beckjord Station, Miami Fort Generating Station, and Kyger Creek Power Station

Dear Mr. Kohler:

Thank you for the opportunity to join Clough, Harbour, & Associates (CHA) on their inspections of the dams at the power stations referenced above and to provide comments on the draft report. The reports were very thorough in the areas of dam safety that were reviewed. Although some typographical errors were noted, they have not been listed in this letter and it is expected that they will be recognized and corrected during CHA's final revisions to the reports. The comments provided below are in reference to more general concepts for the evaluations.

Hydrologic and Hydraulic Design – General

Section 3.2 of each report provides an evaluation of hydrologic and hydraulic design of each impoundment. The reports refer to Ohio Administrative Code (OAC) Rules for design flood and freeboard. The Dam Safety Engineering Program interprets these rules as follows. For a Class II upground reservoir with at least half of its impoundment as open water, the structure can inherently store the 50% probable maximum flood, and the appropriate evaluation considers overfilling prevention (OAC Rule 1501:21-13-03) and available freeboard (OAC Rule 1501:21-13-07). Also, the required freeboard is not added to pool elevation during the design flood – it is based on the maximum operating level.

> *1501:21-13-03 (D) Every upground reservoir shall have an overflow or other device to preclude overfilling the reservoir during normal filling operations. Local watershed drainage into the reservoir must also be included in the design of the overflow device if applicable.*
>
> *1501:21-13-07 Sufficient freeboard shall be provided to prevent overtopping of the top of the dam due to passage of the design flood and other factors including, but not limited to, ice and wave action. The chief may approve a lower freeboard requirement if the dam is armored against overtopping erosion.*

*(A) For class I and class II dams that are upground reservoirs, the minimum elevation of the top of the dam shall be at least five feet higher than the elevation of the designed maximum operating pool level unless otherwise approved by the chief.*

Structural Stability and Adequacy - General

Section 3.3 of each report provides an evaluation of structural stability and adequacy. The reports refer to Table 3-1 of the US Army Corps of Engineer's Engineering Manual 1110-2-1902. A copy of a portion of this section from the Miami Fort Generating Station report has been included for reference as well as a copy of Table 3-1 from the manual.

In performing a review of the structural adequacy and stability of Ash Pond A and Ash Pond B, CHA has compared the computed factor of safety provided in the original design documents for the ash ponds with minimum required factors of safety as outlined by the U.S. Army Corps of Engineers in EM 1110-2-1902, Table 3-1. The guidance values for minimum factor of safety are provided in Table 3.

**Table 4 - Minimum Safety Factors Required**

| Load Case | Required Minimum Factor of Safety |
|---|---|
| Steady State Conditions at Present Pool or Maximum Storage Pool Elevation | 1.5 |
| Rapid Draw-Down Conditions from Present Pool Elevation | 1.3 |
| Maximum Surcharge Pool (Flood) Condition | 1.4 |
| Seismic Conditions from Present Pool Elevation | 1.0 |
| Liquefaction | 1.3 |

*From the Miami Fort Generating Station report*

**EM 1110-2-1902**
**31 Oct 03**

Table 3-1
Minimum Required Factors of Safety: New Earth and Rock-Fill Dams

| Analysis Condition[1] | Required Minimum Factor of Safety | Slope |
|---|---|---|
| End-of-Construction (including staged construction)[2] | 1.3 | Upstream and Downstream |
| Long-term (Steady seepage, maximum storage pool, spillway crest or top of gates) | 1.5 | Downstream |
| Maximum surcharge pool[3] | 1.4 | Downstream |
| Rapid drawdown | 1.1-1.3[4,5] | Upstream |

[1] For earthquake loading, see ER 1110-2-1806 for guidance. An Engineer Circular, "Dynamic Analysis of Embankment Dams," is still in preparation.
[2] For embankments over 50 feet high on soft foundations and for embankments that will be subjected to pool loading during construction, a higher minimum end-of-construction factor of safety may be appropriate.
[3] Pool thrust from maximum surcharge level. Pore pressures are usually taken as those developed under steady-state seepage at maximum storage pool. However, for pervious foundations with no positive cutoff steady-state seepage may develop under maximum surcharge pool.
[4] Factor of safety (FS) to be used with improved method of analysis described in Appendix G.
[5] FS = 1.1 applies to drawdown from maximum surcharge pool; FS = 1.3 applies to drawdown from maximum storage pool.
For dams used in pump storage schemes or similar applications where rapid drawdown is a routine operating condition, higher factors of safety, e.g., 1.4-1.5, are appropriate. If consequences of an upstream failure are great, such as blockage of the outlet works resulting in a potential catastrophic failure, higher factors of safety should be considered.

*From the Engineering Manual*

The analysis condition for end-of-construction has been eliminated from the tables in CHA reports, which is appropriate considering the age of these structures. However, CHA has included analysis conditions for seismic and liquefaction, which are not specifically addressed in Table 3-1. Table 3-1 does refer to ER 1110-2-1806; this document provides guidance but does not note specific factors of safety. The appropriate references for these factors of safety should

be noted. In addition, it is important to note that the table is intended for new construction, and the manual provides allowances for reducing the factors of safety for dams that have been in operation for long periods of time.

> c. *Factors of safety.* Acceptable values of factors of safety for existing dams may be less than those for design of new dams, considering the benefits of being able to observe the actual performance of the embankment over a period of time. In selecting appropriate factors of safety for existing dam slopes, the considerations discussed in Section 3-1 should be taken into account. The factor of safety required will have an effect on determining whether or not remediation of the dam slope is necessary. Reliability analysis techniques can be used to provide additional insight into appropriate factors of safety and the necessity for remediation.

In particular, the slope stability analysis for the Muskingum River Units 1-4 Bottom Ash Pond included four scenarios that have factors of safety below 1.5 but above 1.42. Considering the age of the structure, the current and historic operation of the impoundment as a pumped-storage facility with a static pool, and the location of the failure planes with respect to releasing the impoundment, further discussion for considering these factors of safety acceptable should be provided.

Muskingum River Power Plant Report

Section 4.2 should include monitoring the seeps at the downstream toe of Muskingum River Lower Fly Ash Dam.

W.C. Beckjord Station

According to the as-built plans for Beckjord Ash Pond C Extension Dam and field investigtion, the 30-inch-diameter concrete pipe that connects to Ash Pond C has not been plugged. However, the overflow pipe in the southwest corner that consists of a 54-inch-diameter CMP riser and 36-inch-diameter Corban reinforced fiberglass pressure pipe has been plugged with concrete.

Table 2 should be corrected to include a normal pool elevation of 518.0 for Beckjord Ash Pond C Extension Dam.

The Division of Soil & Water Resources looks forward to continuing cooperation with US Environmental Protection Agency in investigating and improving the conditions of coal ash impoundments. Please contact me at 614/265-6738 if you have any questions.

Sincerely,

Keith R. Banachowski, P.E.
Program Manager
Dam Safety Engineering Program
Division of Soil & Water Resources

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January 27, 2010

**OVERNIGHT DELIVERY**

Mr. Stephen Hoffman
US Environmental Protection Agency
Two Potomac Yard
2733 South Crystal Drive
5th Floor, N-5237
Arlington, VA 22202-2733

Dear Mr. Hoffman:

Re: Ohio Valley Electric Corporation
Kyger Creek Station
Response to CHA Draft Assessment of
Coal Ash Impoundments

Please find attached the Ohio Valley Electric Corporation's (OVEC's) responses to the CHA draft site assessment of the coal combustion residual impoundments at the Kyger Creek Station. Also attached are OVEC's general comments related to the report. The draft assessment was received in a report and cover letter from the U.S. EPA December 28, 2009.

If you have any questions, please contact Matthew Smith of my staff at (740) 289-7249 or msmith@ovec.com.

Sincerely,

Donald T. Fulkerson
Environmental Affairs Director

DTF:men

Attachment

bcc: (w/Attachment)
G. A. Hope/G. Edwards - Kyger
M. W. Smith

(w/o Attachment)
D. L. Hart - Columbus
D. E. Jones

**Ohio Valley Electric Corporation (OVEC)**
**Kyger Creek Station**
**Response to CHA Draft Assessment of Ash Impoundments**

4.1 CHA's assessment of the Bottom Ash Pond and south Fly Ash Pond embankments indicate that they are in poor condition. As described in the following sections, maintenance and monitoring will further enhance the condition of these dams.

**OVEC concurs that there is limited data available to establish a factor of safety for the existing embankments. However, based on visual inspections performed by CHA, ODNR, AEP and STANTEC (OVEC's independent consultant) there were no reported safety deficiencies or needed remedial measures that would justify a poor condition rating of these embankments. While OVEC agrees that a geotechnical evaluation should be completed on the embankments, OVEC requests that a rating not be assigned to the embankments prior to completion of this geotechnical evaluation. The embankments in question are engineered structures that have functioned properly in their current capacity for over 55 years.**

4.2 CHA recommends that vegetation be cut on a regular basis to ensure that adequate visual observations are being made during routine inspections.

**We Agree**

4.3 CHA recommends repairing these areas by filling all rills with compacted material and re-seeding to establish grass where applicable (i.e. exterior embankment slopes).

**We Agree**

4.4 CHA recommends OVEC personnel make note of areas disturbed by animal activity, trap animals, and make repairs to areas to protect the integrity of the dikes. Although not seen on other dikes, vegetation cover hides these features.

**We Agree**

4.5 It is recommended that detailed stability analyses be performed for the Bottom Ash Pond and South Fly Ash Pond. CHA was not provided with information regarding stability analyses performed prior to or following construction of the ponds nor was information regarding properties of the embankment and foundation soils provided.

The stability analyses for each pond should include a subsurface investigation to determine existing soil parameters in the embankments and foundation soils and the installation of piezometers to determine the current pheratic surface. Loading conditions that should be modeled should include those listed in Table 3 in Section 3.3

**We Agree**

**Ohio Valley Electric Corporation (OVEC)**
**Kyger Creek Station**
**General Comments on CHA Draft Assessment of Ash Impoundments**

1.3.1 Bottom Ash Pond

**1st paragraph, last line: …..the configuration of the ~~South Fly~~ Bottom Ash ….**

2.2.1 Bottom Ash Pond

**1st paragraph, 7th line: ….~~predominately~~ predominantly….. (same correction in Photo #1)**

2.2.2 Bottom Ash Pond Outlet Control Structures

**1st paragraph, 6th line, …….splitter dike (Photo 25).: (this appears to be east dike not splitter dike)**

Page 43 photo template: **The title should refer to Bottom Ash Pond instead South Fly Ash Pond.**

2.3 Visual observation – South Fly Ash Pond

**4th paragraph: It appears that the description should be for the east dike because photographs illustrate east dike, but this paragraph refers to south dike.**

Photographs

**Several photographs are included in the report. Some of the photographs had no reference in the report or included in the report description.**

3.4 Foundation Conditions

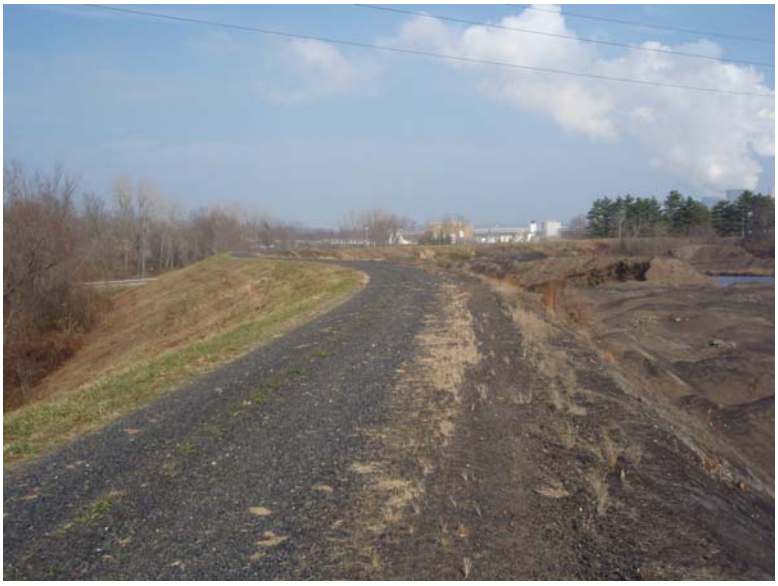
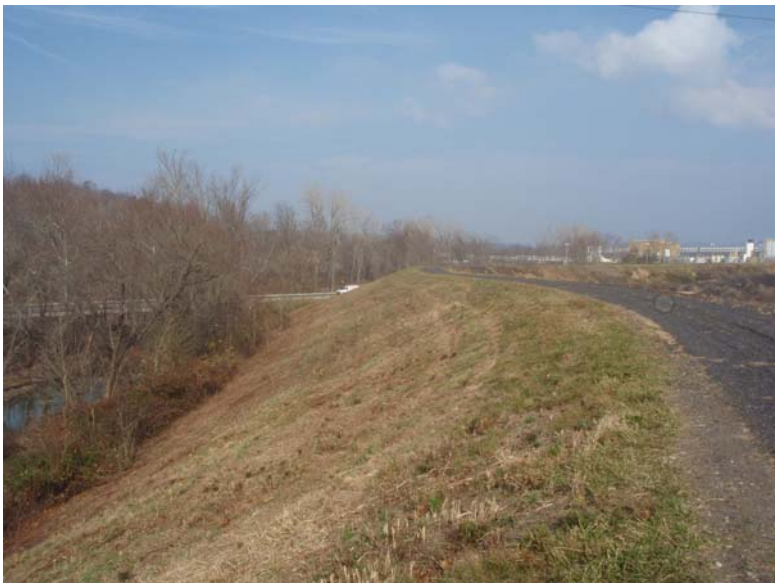
**1st paragraph, 1st line: …..~~constriction~~ construction**

4.2 CHA recommends that vegetation be cut on a regular basis to ensure that adequate visual observations are being made during routine inspections.

**After the USEPA inspection (October 15, 2009), OVEC completed several operational and maintenance activities at the Bottom Ash and South Fly Ash ponds. The upper section of the exterior slopes that had trees and brush have been cleared and the animal holes have been filled (refer to the photographs of west dike below for illustration, taken from 2009 (fall) Annual Dam and Dike Inspection report, inspection date 11/16/09, prepared by American Electric Power, dated December 23, 2009).**

5.0 Closing

**1st paragraph, 1st line: …..~~Cardinal~~ Kyger Creek**

| Photo # 1 |  |
| --- | --- |
| A typical view of the crest illustrating good and stable base with a surface course material. | |
| Photo # 2 |  |
| This photograph illustrates a typical downstream slope. The slope appeared stable and generally in good condition with controlled vegetation. | |