UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

June 27, 2011

OFFICE OF
SOLID WASTE AND
EMERGENCY RESPONSE

VIA E-MAIL AND FEDERAL EXPRESS

Mr. Jerry Purvis, Manager Environmental Affairs
East Kentucky Power Cooperative
4775 Lexington Road
PO Box 707
Winchester, Kentucky 40392-0707

Dear Mr. Purvis,

On August 4, 2010 the United States Environmental Protection Agency ("EPA") and its engineering contractors conducted a coal combustion residual (CCR) site assessment at the Dale facility. The purpose of this visit was to assess the structural stability of the impoundments or other similar management units that contain “wet” handled CCRs. We thank you and your staff for your cooperation during the site visit. Subsequent to the site visit, EPA sent you a copy of the draft report evaluating the structural stability of the units at the Dale facility and requested that you submit comments on the factual accuracy of the draft report to EPA. Your comments were considered in the preparation of the final report.

The final report for the Dale facility is enclosed. This report includes a specific condition rating for each CCR management unit and recommendations and actions that our engineering contractors believe should be undertaken to ensure the stability of the CCR impoundment(s) located at the Dale facility. These recommendations are listed in Enclosure 2.

Since these recommendations relate to actions which could affect the structural stability of the CCR management units and, therefore, protection of human health and the environment, EPA believes their implementation should receive the highest priority. Therefore, we request that you inform us on how you intend to address each of the recommendations found in the final report. Your response should include specific plans and schedules for implementing each of the recommendations. If you will not implement a recommendation, please explain why. Please provide a response to this request by July 27, 2011. Please send your response to:

Mr. Stephen Hoffman
U.S. Environmental Protection Agency (5304P)
1200 Pennsylvania Avenue, NW
Washington, DC 20460

If you are using overnight of hand delivery mail, please use the following address:

Mr. Stephen Hoffman
U.S. Environmental Protection Agency
Two Potomac Yard
2733 S. Crystal Drive
5th Floor, N-5838
Arlington, VA 22202-2733

You may also provide a response by e-mail to hoffman.stephen@epa.gov

You may assert a business confidentiality claim covering all or part of the information requested, in the manner described by 40 C. F. R. Part 2, Subpart B. Information covered by such a claim will be disclosed by EPA only to the extent and only by means of the procedures set forth in 40 C.F.R. Part 2, Subpart B. If no such claim accompanies the information when EPA receives it, the information may be made available to the public by EPA without further notice to you. If you wish EPA to treat any of your response as "confidential" you must so advise EPA when you submit your response.

EPA will be closely monitoring your progress in implementing the recommendations from these reports and could decide to take additional action if the circumstances warrant.

You should be aware that EPA will be posting the report for this facility on the Agency website shortly.

Given that the site visit related solely to structural stability of the management units, this report and its conclusions in no way relate to compliance with RCRA, CWA, or any other environmental law and are not intended to convey any position related to statutory or regulatory compliance.

Please be advised that providing false, fictitious, or fraudulent statements of representation may subject you to criminal penalties under 18 U.S.C. § 1001.

If you have any questions concerning this matter, please contact Mr. Hoffman in the Office of Resource Conservation and Recovery at (703) 308-8413. Thank you for your continued efforts to ensure protection of human health and the environment.

Sincerely,
/Suzanne Rudzinski/, Director
Office of Resource Conservation and Recovery

Enclosures

4.2 Ash Pond 2

4.2.1 Hydrologic and Hydraulic Recommendations

An August 2010 report by S&ME Inc., titled *Engineering Study for Dale Power Station Ash Pond No. 2 Evaluation of Risks of 100-Yr Rain Event & Freeboard Requirement*, provides a hydrologic analysis that is specific to Ash Pond 2. This analysis uses the 100-year, 6-hour event as the maximum storm. The report also notes about 70% of the crest is below the 100-year flood elevation of the Kentucky River (595.0 feet), and areas on the upstream and downstream slopes are steeper than designed. The maintenance items listed in the report should be performed, especially items concerning raising the crest and repairing the slopes. Ash Pond 2 is currently used for disposal and processing of CCW. Historically, the dam was, for all practical purposes a ring dike and the watershed was the area of the impoundment. With the ash stacking activity in Ash Pond 3, some additional runoff will be tributary to Ash Pond 2. Ash is primarily deposited in the south and east portions of the pond; the northern portion of the pond is primarily occupied by water. The impoundment does not have an emergency spillway. AMEC recommends that an appropriately conservative design storm rainfall and freeboard depth in accordance with MSHA guidelines be applied to the impoundment‘s watershed to assure that the dam and decant system can safely store, control, and discharge the design flow. Based on the size and rating for Ash Pond 2, the MSHA design storm would be the ½ PMF. The watershed should include runoff originating in the proposed adjacent ash stack and coal pile. Hydraulic calculations should also be completed to determine the rate at which the discharge structure and associated piping could pass the design storm, if necessary, or draw down elevated water surfaces following such an event. The study should consider all critical stages over the life of the pond including pond full conditions.

4.2.2 Geotechnical and Stability Recommendations

September 2010 Draft Report

In the opinion of the assessing professional engineer, the criteria for minimum safety factors should be in accordance with USACE EM 1110-2-1902 with a minimum seismic safety factor of 1.2 as recommended by 2007 *MSHA Coal Mine Impoundment Inspection and Plan Review Handbook*, page 88. Likewise, if the dam does not meet the above seismic factor of safety, then the stability of the embankment should be analyzed and the amount of embankment deformation or settlement that may occur should be evaluated to assure that sufficient section of the crest will remain intact to prevent a release from the impoundment.

The provided stability analyses by S&ME Inc., dated August 24, 2010 (DS-CBI 000609-000619) analyzed two cross-sections, one on the north dike and one on the south portion of the west dike. There is insufficient information in this report to assess the stability of Ash Pond 2. Discussion was not provided on the program and its method used for the analyses[6]. In addition, no data was provided showing the analyses input and calculations. Statements of historical observed stability due to rapid drawdawn conditions is not a substitute for the analyses, especially when the flood elevation of the river is within one-half foot of the design crest elevation. AMEC also has concerns with the strength parameters used in the analyses and lack of adjustment for inconsistencies or exhibited lower strength layers. Typical ash friction values are 28 degrees for compacted, 24 degrees for loosely compacted, and 11 degrees for uncompacted material. Consideration should be given for lowering strength values to account for exhibited lower strengths or inconsistencies within the fill or foundation materials. Lowering the friction value, by one or two degrees, or more for weaker soils would be conservative and more appropriate. More layering of the embankment materials may be needed to model lower strength materials, such as the lower ash in the embankment. The presence and material properties of the ash in the embankment, especially the lower layer, creates concerns for susceptibility to erosion and piping that should be addressed in the Hydrologic and stability analyses.

In the opinion of the assessing professional engineer, the analyses should be revised in

accordance with these recommendations. The analysis should consider all critical stages over the life of the pond including pond full conditions. These conditions would need to be determined in conjunction with the hydrologic and hydraulic recommendations above. The hydrologic and hydraulic analysis will provide maximum water levels in the pond and a phreatic surface through the embankment.

Final Report
Comments included in the January 12, 2011 response to the draft report by EKPC take exception to the use of MSHA guidelines to evaluate CCW impoundments. AMEC followed the guidelines presented in our scope of work for assessment of CCW impoundments which was provided by EPA

AMEC acknowledges the design stability studies performed for Ash Pond 2 indicate the impoundment meets KDOW minimum requirements for all cases on the west section and the seismic case on the north section, but falls short of these requirements on the north section for the static case/normal pool. The additional static case/100-year pool also does not meet the minimum requirements.

AMEC recommends EKPC evaluate the need to revise the stability analyses (and hydraulic analyses as stated above) considering worst case conditions (i.e. highest pond water level and pond full of ash).

4.2.3 Monitoring and Instrumentation Recommendations
September 2010 Draft Report
Instrumentation has not been historically used at Ash Pond 2 and is not used at the current time. AMEC recommends EKPC evaluate the need to install piezometer instrumentation to provide a means of internally monitoring conditions within the dam. Monitoring should also include documenting associated pond and river levels.

Final Report
AMEC continues to recommend the monitoring and instrumentation approach described in the Draft report.

4.2.4 Inspection Recommendations
September 2010 Draft Report
EKPC plant personnel currently perform a daily inspection that is documented by date, inspector name, and time of inspection. Although daily inspection by EKPC is commendable, a more detailed and documented record would be more appropriate. AMEC recommends that the current inspection program by the plant be expanded to include at least monthly documented inspections which identify potential problems, areas inspected, instrumentation monitoring (when installed) and pond and river levels.
AMEC has reviewed the 2009 inspection reports and determined EKPC has adequate annual inspections by a Profession Engineer. We recommend this type of annual inspection program and report by a Professional Engineer be continued at least yearly, in addition to the recommended monthly inspections by facility personnel.

Final Report
AMEC continues to recommend the inspection regimen described in the Draft report.

4.3 Ash Pond 3
4.3.1 Hydrologic and Hydraulic Recommendations
September 2010 Draft Report
A hydrologic or hydraulic study was not provided for Ash Pond 3. Ash Pond 3 is currently being used to stack ash dredged from Ash Pond 2. Based on a known release that occurred in 1975, its location adjacent to the Kentucky River, and current and proposed activity for the pond, AMEC recommends a hydrologic and hydraulic analysis following MSHA guidelines be

performed for Ash Pond 3.

Final Report
No additional documentation was provided for Ash Pond 3 following submittal of the Draft Report.

4.3.2 Geotechnical and Stability Recommendations
September 2010 Draft Report
A stability analyses was not provided for Ash Pond 3. Based on the reasons stated in Section 4.3.1, AMEC recommends stability analyses following USACE and MSHA guidelines, as stated in the first paragraph of 4.2.2, be performed for Ash Pond 3.

Final Report
No stability analyses documentation was provided for Ash Pond 3 following submittal of the Draft Report.

4.3.3 Monitoring and Instrumentation Recommendations
Draft Report
Instrumentation has not been historically used at Ash Pond 3 and is not used at the current time. AMEC recommends at least piezometer instrumentation be installed to provide a means of internally monitoring conditions within the dam. Monitoring should also include documenting associated pond and river levels.

Final Report
Comments included in the January 12, 2011 response to the draft report by EKPC state “Ash Pond 3 is used for dry storage of compacted ash. It is unclear what useful information such instrumentation would provide”. In AMEC’s opinion, the area contains ash and water and is therefore a coal combustion waste impoundment. AMEC revises the second sentence above to: AMEC recommends EKPC evaluate the need to install piezometer instrumentation to provide a means of internally monitoring conditions within the embankment(s) of the dam.

4.3.4 Inspection Recommendations
EKPC plant personnel currently perform a daily inspection that is documented by date, inspector name, and time of inspection. It is not known whether Ash Pond 3 is included in these inspections. AMEC recommends that the current inspection program by the plant be expanded to include Ash Pond 3 in the daily inspections and perform at least monthly documented inspections which identify potential problems, areas inspected, instrumentation monitoring (when installed) and pond and river levels. In addition, EKPC should include Ash Pond 3 in annual inspections by a Profession Engineer.

4.4 Ash Pond 4
4.4.1 Hydrologic and Hydraulic Recommendations
September 2010 Draft Report
An August 2010 report by S&ME Inc., entitled *Engineering Study for Dale Power Station Ash Pond No. 4 Evaluation of Risks of 100-Yr Rain Event & Freeboard Requirement*, provides a hydrologic analysis that is specific to Ash Pond 4. This analysis uses the 100-year, 6-hour event as the maximum storm. The report indicates a minimum dike elevation of 603.0 feet, or 2 feet below the design elevation of 605.0 feet with about 90% of the crest an average of 1 foot below design. The report recommends “correcting any interior slope deficiencies, including erodible areas, etc…” S&ME recommends a minimum freeboard height of 16 inches. Construction is currently being performed for a seepage repair. The seepage repair was not considered in the hydrologic evaluation.
AMEC recommends that an appropriately conservative design storm rainfall and freeboard depth in accordance with MSHA guidelines be applied to the impoundment‘s watershed to assure that the dam and decant system can safely store, control, and discharge the design flow. Based on the size and rating for Ash Pond 4, the MSHA design storm would be the ½ PMF.

Hydraulic calculations should also be completed to determine the rate at which the discharge structure and associated piping could pass the design storm, if necessary, or draw down elevated water surfaces following such an event. The study should include modifications to the interior of the pond by current or planned construction. The analysis should consider all critical stages over the life of the pond including pond full conditions.

Final Report
EKPC provided Draft Report comments for Ash Pond 4 that are identical to those provided for Ash Pond 2. The same design storm event (100-year 6-hour) and freeboard (12 inches) were applied to the impoundment. Additionally, due to the environmental impacts to the Kentucky River that would result from a failure of the impoundment, it is AMEC's opinion that sound engineering judgment would dictate that the minimum design storm hydrologic criteria used for these impoundments should be increased to a more critical minimum storm event, such as, at a minimum, the 100-year 24-hour storm. Increasing the minimum design storm event, as well as the freeboard to more than 12 inches above the design storm event, would provide a higher, more conservative level of protection against overtopping of the crest of the impoundment.
The Fair rating maintains that no deficiencies exist for normal loading conditions (KDOW minimum design storm/freeboard requirements). In AMEC's opinion, assignment of a satisfactory rating to Ash Pond 4 is not possible due to the pond's limited level of hydrologic protection.

4.4.2 Geotechnical and Stability Recommendations

September 2010 Draft Report
In the opinion of the assessing professional engineer, the criteria for minimum safety factors should be in accordance with USACE EM 1110-2-1902 with a minimum seismic safety factor of 1.2 as recommended by 2007 *MSHA Coal Mine Impoundment Inspection and Plan Review Handbook*, page 88. Likewise, if the dam does not meet the above seismic factor of safety, then the stability of the embankment should be analyzed and the amount of embankment deformation or settlement that may occur should be evaluated to assure that sufficient section of the crest will remain intact to prevent a release from the impoundment.
A recent stability analysis was not performed for the Ash Pond 4 embankments. However, EKPC provided the design stability analyses performed by Bowser-Morner Testing Laboratories, Inc. (DS CBI 000151-000327), dated February 25, 1975. The report discusses wet conditions of the proposed fill materials and construction practices to place embankment fill wet of the optimum moisture content and the presence of a natural ditch within the interior of the proposed pond. The results of the analyses dictated the design of the slopes and provisions for a 30 feet buffer between the toe of the slope and the Kentucky River. In addition, the computed factors of safety for the long term analyses through the river bank for shallow circle and deep circle are below and about equal to the minimum factor of safety of 1.5, respectively. Although the other computed factors of safety were above USACE and MSHA seismic minimums, AMEC has issues with the interior hydrology and loading conditions and strength values used in the analyses.
A recent stability analysis study completed in 2010 by S&ME dated June 2010 (DS-CBI 000553-000561) was performed to evaluate the berm area between the toe of Ash Pond 4 and the location where a 2004 landslide had occurred. The study suggests the strength factors used in the report may be too conservative based on the rapid drawdown results and no failure within the past six years. However, the 2009 River Bank Stability performed by Stantec (DS-CBI 000121-000150) notes the slide has moved up the slope about 2.5 feet toward the toe of Ash Pond 4.
The thirty year old design stability study for Ash Pond 4 was performed under different guidelines than recommended herein, and does not accurately represent the as-built structure. In the opinion of the assessing professional engineer, a current stability analyses for Ash Pond 4 should be performed in accordance with the recommended guidelines stated herein, and the following recommendations. The analysis should consider all critical stages over the life of the pond including pond full conditions. These conditions would need to be determined in conjunction with the hydrologic and hydraulic recommendations above. The hydrologic and

hydraulic analysis will provide a phreatic surface through the embankment. AMEC concurs with the recommendation in the S&ME 2010 report that the existing slope be improved to increase the stability of the berm and reduce the potential for progressive sliding uphill that would eventually involve the embankment.

Final Report
Comments included in the January 12, 2011 response to the Draft report by EKPC take exception to the use of MSHA guidelines to evaluate CCW impoundments. AMEC followed the guidelines presented in our EPA provided scope of work for assessment of CCW impoundments.
AMEC acknowledges the 1975 Bowser-Morner design stability analyses performed for Ash Pond 4 was approved by KDOW for construction of the impoundment. The study meets current KDOW standards, except for the long term case for the river bank section.
AMEC recommends EKPC evaluate the need to perform a current stability analyses (and hydraulic analyses as stated above) considering present as-built embankment soil conditions, current (and/or repaired) embankment configurations. The analyses should include worst case conditions (i.e. highest pond water level and pond full of ash).
The Fair rating maintains that no deficiencies exist for normal loading conditions (KDOW minimum design requirements). In AMEC's opinion, assignment of a satisfactory rating to Ash Pond 4 is not possible due to the pond's limited level of stability protection represented by recent analyses, history of releases, and current interior and planned exterior (river bank) repairs.

4.4.3 Monitoring and Instrumentation Recommendations
September 2010 Draft Report
Instrumentation has not been historically used at Ash Pond 4 and is not used at the current time. AMEC agrees with the monitoring recommendations provide in the 2009 inspection report by Stantec. A monitoring plan with at least piezometer instrumentation should be initiated. The plan could also include slope inclinometers and surface monuments as deemed appropriate. The implementation of the plan should be concentrated along the southern and west dike segments of the pond and other problem areas, such as the slide below the toe of the slope. The instrumentation will provide a means of establishing baseline criteria and monitoring of conditions within the dam. Monitoring should also include documenting associated pond and river levels.

Final Report
AMEC continues to recommend the monitoring and instrumentation approach described in the Draft report.

4.4.4 Inspection Recommendations
September 2010 Draft Report
EKPC plant personnel currently perform a daily inspection that is documented by date, inspector name, and time of inspection. Although daily inspection by EKPC is commendable, a more detailed and documented record would be more appropriate. AMEC recommends that the current inspection program by the plant be expanded to include at least monthly documented inspections which identify potential problems, areas inspected, instrumentation monitoring (when installed) and pond and river levels. In response to the existing landslide, EKPC should begin the weekly inspections of the affected area and the remainder of the riverbank immediately, and include or add inspections for significant rainfall events.
AMEC has reviewed the 2009 inspection reports and determined EKPC has adequate annual inspections by a Profession Engineer. We recommend this type of annual inspection program and report by a Professional Engineer be continued at least yearly, in addition to the recommended monthly inspections by facility personnel.

Final Report
AMEC continues to recommend the inspection regimen described in the Draft report.