FEDERAL ENERGY REGULATORY COMMISSION
Office of Energy Projects
Division of Dam Safety and Inspections - Chicago Regional Office
230 South Dearborn Street, Suite 3130
Chicago, Illinois 60604
(312) 596-4430 Office

In reply, refer to: P-401

May 21, 2024

VIA Electronic Mail

Mr. Gene F. Sirca, Jr., Ph.D., P.E., S.E.
Chief Hydro Dam Safety Engineer
American Electric Power
gfsirca@aep.com

Re: Review of the Ninth (9th) Part 12D Consultant's Safety Inspection Report (CSIR)
Mottville Hydroelectric Project, FERC No. 401

Dear Mr. Sirca:

The Ninth (9th) Independent Consultant's Safety Inspection Report (CSIR) for the Mottville Hydroelectric Project (FERC No. 401) was submitted with a March 27, 2023 letter. The report was prepared by Mr. Edwin Luttrell, P.E., of HDR Engineering (HDR). A plan and schedule to complete the Independent Consultant's (IC's) recommendations was submitted on December 8, 2023.

The IC found no indications or evidence with respect to the potential failure modes that the project structures require immediate remedial action and concludes that the project is considered safe and reliable for continued operation. The 9th CSIR fulfills the requirements of Part 12, Subpart D, of Title 18 of the Code of Federal Regulations. The 8th CSIR conforms to the outline contained in Appendix H of Chapter 14 of the FERC Engineering Guidelines, Part 12D Safety Inspection Report. The plan and schedule is accepted.

Enclosure 1 contains the Commission's comments following review of the 9th CSIR and the Supporting Technical Information Document (STID) and should be addressed as indicated. Enclosure 2 contains a table summary of the IC's recommendations.

File your submittal using the Commission's eFiling system at https://www.ferc.gov/ferc-online/overview. When eFiling, select Hydro: Dam Safety and Chicago Regional Office from the eFiling menu. The cover page of the filing must indicate that the material was eFiled. For assistance with eFiling, contact FERC Online

Support at FERCOnlineSupport@ferc.gov, (866) 208-3676 (toll free), or (202) 502-8659 (TTY).

You may contact Mr. Adam Christy at 312.596.4462 (adam.christy@ferc.gov) or me at 312.596.4430 if you have any questions.

Sincerely,

KEVIN GRIEBENOW

Digitally signed by KEVIN GRIEBENOW
Date: 2024.05.21 09:37:20 -05'00'

Kevin Griebenow, P.E.
Regional Engineer

Enclosure 1: FERC Review Comments on 9th CSIR and STID – Mottville P-401

Enclosure 2: Summary of the Recommendations and the Accepted Plan & Schedule for Implementation – Mottville P-401

Enclosure 1: FERC Review Comments on 9th CSIR and STID– Mottville P-401

CSIR Comments:

1. A discussion of the vertical datums used over the history of the project should be provided in Section 2 of the STID.

2. The DSSMP should be updated to provide the flow and/or headwater elevation for the significant flood event in which daily piezometer readings are required. Additionally, consideration should be given to taking photographs and videos of peak flows being passed during significant flood events through the spillway and tailrace. These photographs could be provided in the DSSMR submittal for that year.

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Recommendation	Response/Status
Recommendations regarding the Project Description	
1. Add a description of the 10-inch clay tile drain through Bays 1 and 2 that outlets into the fish passageway and Bay 3.	*AEP Response:* We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
2. Add a description of the air vent shaft at the left end of the spillway. Confirm that it is covered by a grating which provides ventilation and indicate this fact (if correct) in the description.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
3. Revise the description of the left embankment to include the stability berm addition and modification of the embankment drainage system completed in October 2022. Add the filter compatibility check calculation to the STID.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
4. Review the number of right embankment drains with IMPC staff. The STID says five outlets exist, but IMPC monthly inspection forms suggest six drains exist. In addition, determine if another drain outlet in the tailrace wall exists (as depicted on Holland, Ackerman, and Holland Drawing No. 4410) during the next underwater inspection.	*AEP Response*: We will verify the information and include as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
5. In the paragraph describing the intake-powerhouse, clarify that there are two sets of head gates at the Project available for dewatering two intake passages at a time.	*AEP Response*: We will verify and include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
6. Elevations and dimensions shown on the figures are difficult to read. The figures should be replaced with higher resolution images (if available) that are legible within the electronic and hard copies of the STID.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
7. Add record drawings depicting final ground surface elevation contours and cross sections of the left embankment when construction of the downstream stability berm is complete.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
8. The previous Part 12 Inspection Report recommended conducting a new top of protection survey for the embankments and abutments which is reiterated in this report. This survey should be completed, or	*AEP Response*: We will perform the survey and include this information as part of the STID updates before

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available records from the last ten years should be researched to provide documentation of the crest elevation for the Project description. Include drawings used to address this recommendation to the STID.	December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
Recommendations regarding the PFMA Report	
9. Update Section 1 of the STID to incorporate the following documents: a. 2017 PFMA Addendum No. 2 (Barr Engineering Co., 2017) b. 2022 PFMA Review Report (HDR, 2022)	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
Recommendations regarding the Surveillance and Monitoring Plan	
10. The left embankment modifications completed in 2022 included construction of a toe drain zone with an internal seepage collection pipe. Monthly flow rate monitoring of the left embankment toe drain discharge pipe should be added to the DSSMP. Visual monitoring is sufficient if the flow rates are less than one gallon per minute. Otherwise, a bucket and stopwatch should be used to measure the flow rate, and the monthly measurements should be presented in future DSSMRs. The clarity of the flow should also be noted monthly.	*AEP Response*: We will add procedures for monitoring internal seepage to the DSSMP and include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
11. Record right embankment drain flushing maintenance on its own inspection form (separate from monthly dam safety inspection forms) with each drain given a unique designation. Document the observed seepage conditions before and after flushing on the form. The clear length of each drain should be probed (one time measurement or when directed by CDSE) and documented on the form to better understand where they are routing flow from.	*AEP Response*: We will add drain flushing maintenance procedures to the DSSMP and include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
12. Develop a more comprehensive dive inspection scope for the upstream face and interior of the spillway buttress slabs to improve monitoring for PFM 4. The scope should include the upstream side of the slab where it bears on the intermediate piers, the underside of the slabs at the middle of the pier-to-buttress span, and the underside of the slab where it bears on the shear keys in the main piers. Observations such as cracking, spalling, deformation, leakage, exposed reinforcing steel, and rust stains should be documented. It is recommended that a structural engineer develop an inspection procedure for conveying the inspection scope to the divers. An additional good practice would be for an AEP or third-party representative to oversee and review the diver observations in real time during future inspections. The more comprehensive inspection scope should be performed during alternating dive inspections (once every six years) starting with the next scheduled inspection.	*AEP Response*: We will add more comprehensive dive inspection scope to the DSSMP and include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
13. The most recent underwater inspection provided for development of this report, performed in 2020, did not include the area at the left side of the powerhouse in front of Unit 4 and the right side of the spillway in front of Spillway Bays 1 and 2 because the gates were open. A process should be instituted for opening other gates to	*AEP Response*: We will include the area next detailed dive inspection in 2025 to be completed before December 31, 2025 and results of the inspection to

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facilitate annual inspections of this area to improve monitoring for PFMs 5A and 5B. Most historic scour damage has occurred at this location and these two spillway gates are opened more frequently.	be included in the 2025 DSSMR. *Status:* Not Complete. Due **December 31, 2025.**
14. Divers inspect a 12-inch square opening at the downstream side of the fish passage for seepage/cloudy discharge conditions discussed in PFM 8's description. The opening is believed to be the downstream exit point for flow exiting the 10-inch longitudinal drain passing through Spillway Bays 1 and 2. The Independent Consultant reviewed design Drawing No. 4418 and believes the opening that the 10-inch pipe is connected to is between El. 753 and approximately El. 754.5 below the 12-inch square opening. This should be reviewed during the next underwater inspection and noted in the DSSMP if correct.	*AEP Response*: We will include the area next detailed dive inspection in 2025 to be completed before December 31, 2025 and results of the inspection to be included in the 2025 DSSMR. *Status:* Not Complete. Due **December 31, 2025.**
15. A new method for monitoring the end of the lateral clay tile pipe that discharges into the fish passageway should be considered for PFM 8, such as installing a conduit into the fishway for insertion of a drain camera. This would potentially eliminate the need for inspecting the downstream end of the fish passageway under tailwater	*AEP Response*: We will determine a new method for monitoring the drain and add to the DSSMP and include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
16. Improved presentation of annual bathymetry surveys is recommended for PFM 5A/5B to simplify evaluation of scour concerns. Add outlines of the structures, extents of the aprons, and downstream alignment of the sheet piles on the bathymetry survey contour map (See example in Figure C.18 of this report). Develop cross sections of the channel bottom and features of the scour protection system from the contour data to clearly illustrate scour depth relative to the bottom of the downstream sheet pile cut off. A design basis value for sheet pile stability and threshold value for addressing scour should be shown on the cross sections. All data should be presented in terms of elevation in a consistent datum.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
17. Piezometer 6&7 readings increased in 2017 and have remained elevated since that time. The piezometer was installed 35 years ago and is believed to be malfunctioning based on standard time lag test results. If attempts to restore the piezometer functionality are unsuccessful, then the piezometer at pier 6&7 should be replaced or a new piezometer should be installed at pier 7&8 to provide an adequate basis for monitoring PFM 9.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
18. The following additional updates and revisions should be addressed in the next DSSMP update and future DSSMRs. a. Add a description of the annual CDSE inspection in Section 7.I and append blank copies of the most recent monthly and annual inspection forms at the end of the Section 7. b. Monitoring zones are not identified for piezometers 2&3 or 6&7 in the "Mottville Hydro Piezometer Information" table and this information is noted as being unavailable in the DSSMP. Use a downhole camera to inspect these piezometers and attempt to determine depths of the screened interval. c. Remove Piezometer 5 from the "Mottville Hydro Piezometer Information"	*AEP Response*: We will update the DSSMP as suggested and include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**

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table and the Design Basis and Theoretical Limits tables since it is no longer actively monitored. d. Show well depths based on field measurements and well depths based on well installation records for all active piezometers on column 4 of the "Mottville Hydro Piezometer Information" which have available installation records. e. Clarify the difference between design basis elevations and theoretical limits for piezometers shown in Section 7.II.1.1 and describe the source of these values (reference calculations, uplift assumptions, etc., made in development of values). Consider revising the names to be consistent with terminology used in Chapter 14, Appendix J, Section 2.1.1 of the FERC Engineering Guidelines. f. Summarize actions taken by IMPC personnel and/or AEP staff when the Design Basis or Theoretical Limits are exceeded in Section 7.II.1.1. g. Update Section III of the DSSMP to summarize the surveillance and monitoring performed for each Category II PFM identified during the 2022 PFMA.	
Recommendations regarding the Field Inspection	
19. A wet area was noted at the embankment/retaining wall interface near the toe of the embankment on the right side of the fence that was visible from the spillway deck (Appendix E, Photo E-16). The area is not noted on the monthly inspection forms reviewed for this report and should be checked for signs of seepage in the future as surveillance for PFM 7E.	*AEP Response*: We will continue to monitor the area in question and report any signs of seepage as appropriate. *Status:* Ongoing.
Recommendations regarding the STID	
20. Include references to reports describing the original construction of the Project or add a statement indicating that reports describing construction of the Project are not available.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
21. Add a description of the left embankment stability berm and toe drain construction to the construction chronology listed in Section 3. Cite the final construction report prepared by AEP.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
22. Add a concise selection of construction photographs to the end of Section 3 depicting the following information based on their availability: a. Original construction of pile foundation, powerhouse sub and superstructure, spillway, retaining walls, embankments, and embankment drains. b. Modifications to the right embankment drain system. Based on discussions with IMPC, the drain system is believed to have been extended and/or rerouted after construction. c. Construction of the left embankment stability berm, including excavation photos documenting the existing embankment fill and foundation soil composition, abandonment process for the existing underdrain system, and installation of the new toe drain.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
23. In Section 4 or Section 7.II.2, describe how the automated float system for spillway gates 1 and 2 works in more detail. Explain any	*AEP Response*: We will include this

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necessary maintenance, inspection, or testing required (if any).	information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
24. In Section 4 or Section 7.II.2, list IMPC responsibilities for verifying the functionality of the bubbler system and the side seal heater system for spillway gates 1 and 2 (Currently none are defined in Section 7.II.2). Review these responsibilities during annual dam safety training presentations.	*AEP Response*: We will add procedures for verifying the functionality of the bubbler system and include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
25. Briefly describe the subsurface investigation of the embankments performed in 1986 and 1987 (i.e., locations of borings and soil types encountered) as sources for the foundation conditions currently described in Section 5 and any other soil types of present.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
26. Boring logs from the 1987 spillway investigation are not currently appended to Section 5. Determine if the records exist and append them to Section 5 if available.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
27. Update the discussion regarding PGA in Section 5.4 and the PGA map and historic earthquake search results appended to the end of Section 5 to reflect the 2018 USGS ground motion parameters and seismic hazard maps data.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
28. Update Section 6.1 to include data related to the February 2018 flood event that occurred at the Project.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
29. Add a reference for the flood frequency table in Section 6.1.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**

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30. Add headwater and tailwater levels to the peak discharge estimates for each flood referenced in Section 6.1 if this information is available.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
31. Add a description of the "unit" hydrograph used in AEP's 1999 IDF study in Section 6.3. Add a figure of the IDF study hydrograph and hydrographs from flood events at the Project as verification of the calibration that was performed as part of the study.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
32. The spillway rating curves in Section 6.6 cites a discharge capacity of 20,600 cfs based on rating curves presented on Sheet 6-14 at the end of Section 6, but it does not discuss findings of multiple previous reviewers who have questioned the discharge rating for spillway gates 3 through 10. The STID should be updated with a revised spillway discharge rating curve or a reference/calculation justifying the existing curves.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
33. The vertical and lateral pile capacity calculations were revised in 1999 by increasing the friction angle from 35 to 38 degrees. A 1987 investigation report is cited as the basis for the updated value. The laboratory test data is not presented in the STID or attachments. The friction angle of 38 degrees is reasonable for a dense sand and gravel foundation assuming the laboratory data can be found, and the strength envelopes supports this value. Add the 1987 report to the STID as a reference.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
34. AEP's 1999 revisions to the 1987 elastic pile analysis increased the horizontal pile capacity by approximately 12 percent to account for the revised foundation friction angle. This revision is not supported by review of the original calculation method which is based on the subgrade modulus of the soils and structural rigidity of the soil/pile system. A correlation between friction angle and subgrade modulus could potentially be used to justify an increased capacity using the equations shown in Corns 1987 analysis (Appendix VII, Sheet VII-1). Address this discrepancy and update the factors of safety in the STID if necessary or present a justification for the approach used.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
35. The STID does not present conclusions regarding the timber foundation pile shear capacity. This information should be added to the STID, if already available, or calculated from information in the analyses of record.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
36. Update the slope stability analysis in Section 8 to reflect the as-built configuration of the left embankment and berm. Include with the update a table of material properties, table of safety factors, a figure depicting analysis section geometry, a figure depicting the location of the analysis section in plan view, and critical slip circles from the	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025.

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slope stability software corresponding for each loading condition.	*Status:* Not Complete. Due **December 31, 2025.**
37. Add figures portraying the right embankment slope stability analysis results from AEP (1997). Include with the update a figure depicting analysis section geometry, a figure Ninth Part 12 Inspection Report depicting the location of the analysis section in plan view, and slip circles from the slope stability software corresponding for each loading condition.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
38. Sections 8.2 and 8.5 currently include material properties and results from A. R. Blystra's (1992) spillway facing slab structural analysis. Replace with properties and results from the most recent analysis prepared by AEP (1997).	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
39. Several revisions to Section 9.0 are needed to understand the inspection requirements, testing requirements, and analysis results for the spillway gates. a. Indicate that the original spillway gates were replaced in 2012 in the first paragraph of this section and provide summary information regarding the gate operation system, including the hoist motors and sources of primary and backup power, and any other means of opening the spillway gates. b. Describe requirements for annual 1-foot gate opening tests, and five-year full height gate opening tests should be described. c. The requirements for performing detailed structural inspections of the spillway gates every ten years should be developed and added to the STID. Since the gates are currently ten years old, the first structural inspection of the spillway gates should be scheduled for completion in 2023. All critical structural gate members (as deemed by the structural engineer) should be identified based on review of the gate design and loading conditions. A summary of the inspection findings should be discussed in Section 9.0, and the report should be added to the STID as a digital reference. d. The stress analysis of the spillway gates was performed in 2002 for the original spillway gates. Verify that the 2012 replacement gate design matches the original gate design (or if changed would not adversely affect stresses). If true, a statement should be added to the STID explaining that the gates were replaced "in kind" and that the 2002 stress analysis results are representative of the spillway gates installed in 2012. e. The 2002 AEP Stress Analysis calculation sheets contain utilization ratios for the top and bottom gate arms which demonstrate that their design is adequate. It is not clear how stresses in the other gate members were judged to be adequate. The analysis results should be reviewed for completeness after the next detailed structural inspection. Results for all critical gate members identified in the structural inspection report should be developed from the existing analysis outputs or new calculations.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**
40. Add any pertinent correspondence with the FERC received since February 2018 in the next STID revision.	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December**

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	31, 2025.
41. The references listed in Section 11.0 should be updated to include any investigation reports concerning the Mottville Project that were published after 2007. The following references should be added at a minimum: a. 2007, 2012, 2017, and 2022 Part 12 Inspection Reports b. 2006 PFMA Report c. 2012 PFMA Addendum d. 2016 PFMA Addendum e. 2021 PFMA Review Memo f. 2018 East Embankment Internal Drainage System Investigation g. Final construction report documenting Left Embankment stability berm construction	*AEP Response*: We will include this information as part of the STID updates before December 31, 2025. *Status:* Not Complete. Due **December 31, 2025.**