NRR-DRMAPEm Resource

From: Sebrosky, Joseph
Sent: Tuesday, July 9, 2019 3:01 PM
To: Lee.Grzeck@duke-energy.com; winston.stewart@duke-energy.com
Cc: Uribe, Juan; Quinlan, Kevin; See, Kenneth
Subject: Clarification questions associated with staff assessment of Robinson flooding integrated assessment dated December 19, 2018

Mr. Grzeck, and Mr. Stewart,

By letter dated December 19, 2018 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML18353A435), Duke Energy Progress LLC (the licensee) provided the flooding integrated assessment (IA) for H.B. Robinson Steam Electric Plant, Unit 2 (Robinson). The Robinson flooding IA was provided in response to Enclosure 2 of the March 12, 2012, 10 CFR 50.54(f) letter (ADAMS Accession No. ML12053A340). By letter dated July 18, 2017 (ADAMS Accession No. ML 17192A452), the NRC issued a generic audit plan and entered into the audit process described in Office Instruction LIC 111, "Regulatory Audits," dated December 29, 2008 (ADAMS Accession No. ML082900195) to assist in the timely and efficient closure of activities associated with the staff's review of flooding responses provided in response to the March 12, 2012, 50.54(f) letter. To support the staff's audit of the December 19, 2018, Robinson IA the staff has developed the clarification questions found below. After you have time to review the clarification questions, please let me know if you would like to make arrangements for an audit phone call to discuss these questions.

Sincerely,

Joe Sebrosky
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Beyond-Design-Basis Management Branch
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301-415-1132

Precipitation Frequency Analysis

Request for Supplemental Information Met #1 through Met # 5 relate to the Robinson precipitation frequency analysis. The staff requests the following files be provided on a DVD or Hard Drive to support staff review and confirmatory analysis:

Request for Supplemental Information Met #1: Storm Typing – Database of Daily Storm Types (DDST)

Provide the complete Database of Daily Storm Types (DDST) used for the Robinson precipitation frequency analysis. The DDST should include all identified storm types (i.e., not limited to the assumed controlling storm type), such as:

- TSR: Tropical Storm Remnants
- MLC: Mid-Latitude Cyclone
- MEC: Mesoscale Storms with Embedded Convection
- LS: Local Storms

Request for Supplemental Information Met #2: Precipitation Annual Maximum Series (AMS) Data

Provide the complete annual maximum series (AMS) data that feed into the Robinson precipitation frequency analysis. The identified AMS, their timing, and other gauge related information such as unique gauge identifier, latitude, longitude, elevation, and data source should be provided for every selected precipitation gauge station in the calculation package.

Request for Supplemental Information Met #3: Regional L-Moment Analysis

Provide the following data related to regional L-moment analysis, including:

- Geographical information system (GIS) shapefiles of the Robinson precipitation frequency analysis grids (Figure 5–4 of Calculation No. RNP-18-001)
- The final GIS raster files of at-site mean (Figure 5–7 of Calculation No. RNP-18-001)

Request for Supplemental Information Met #4: Final Point Precipitation Frequency Estimates

Provide GIS raster files of the final 72-hour, point precipitation frequency estimates with annual exceedance probabilities (AEPs) of 10^{-1}, 10^{-2}, 10^{-3}, 10^{-4}, 10^{-5}, 10^{-6} and 10^{-7}. An example of 10^{-3} AEP is shown in Figure 6-1 of Calculation No. RNP-18-001.

Request for Supplemental Information Met #5: Storm Transposition

Provide GIS raster files of the original and transpositioned storms analyzed by MetStorm (discussed in Sections 5.2.1 and 5.2.2 of Calculation No. RNP-18-001). The five historical tropical storms include:

- Hurricane Matthew
- Syphon from Hurricane Joaquin
- Hurricane Earl
- Tropical Storm Jerry
- Tropical Storm Marco

Model Analysis

Request for Supplemental Information Model #1 through Model #5 relate to the modeling of streams and rivers flood mechanism described in the Robinson integrated assessment

Request for Supplemental Information Model #1: Model Setup

Background: To support the Robinson IA, calculation ROB-17-001 Rev0 was provided for staff to review. In Attachment 4, Section 5, Item HEC-HMS Model Calibration, (p. 168) the licensee noted that the HEC-HMS model was delineated by a single subbasin (W595-B), which was modeled as an impervious area with an imperviousness of 17.89%. Staff are unclear as to the use of imperviousness to represent hydrologic characteristics of Lake Robinson.

Request: Clarify how a reservoir would have an imperviousness less than 100%. Clarify how the value of 17.89% was determined?

Request for Supplemental Information Model #2: Model Setup

Background: To support the Robinson IA, calculation ROB-17-001 Rev0 was provided for staff to review. In Calculation ROB-17-001 Rev0, Attachment 4, Section 4, Item 10 (p. 162), the licensee states that the tailwater elevation will exceed the spillway sill elevation of the Lake Robinson Dam (i.e., the spillway is submerged)

when the flow is greater than 1000 cfs. Hence, it is assumed that the reference elevation is 185 ft NGVD29. The maximum flows reported the Robinson IA (Enclosure 3, Table 4.2.2-1 (p. 64) are as large as 33,338 cfs, which indicates the spillway is submerged. The rating curves (or methods) to handle the submerged condition are not clearly identified.
Request: Provide documentation/information used to support the dam specifications used in the analysis that cover the range of possible conditions during extreme flooding. Provide any sensitivity analyses to assess the impact of submergence on flood height.

Request for Supplemental Information Model #3: Model Analyses

Background: To support the Robinson IA, calculations ROB-14-003 Rev1 and ROB-17-001 Rev0 were provided to staff. In ROB-14-003 Rev1 (Section 6.8, p. 21), the licensee provides a calculation of the flow overtopping Lake Robinson dam due to wave action. This calculation includes as assessment of whether the calculated rate will cause dam failure based on the guidance developed in the USACE Greater New Orleans Hurricane and Storm Damage Risk Reduction System (HSDRRS). In ROB-17-001 Rev0 (Section 6, Item Black Creek Watershed Modeling Results, p. 34), it is stated that while the PMF WSE is greater than the clay core of the dam for approximately 24 hrs, the dam integrity will not likely be affected. In ROB-17-001 Rev0 (Attachment 4, Section 4, Item 16, p. 165), it is stated that the WSE of 230.5 ft NGVD29 is “just below the value for which the dam breaches, 230.63 ft NGVD29.” Additionally, it is stated that “the flow velocities associated with the overtopping of the dam at the pool elevation 230.5 ft NGVD [sic] elevations are assumed to be not sufficient to erode the downstream face of the dam and cause a breach of the dam.”

Request: Is the HSDRRS guidance applicable to Lake Robinson dam? What is the basis for stating that the dam integrity will not likely be affected by the PMF WSE being greater than the clay core of Lake Robinson dam? What is the basis for stating that the flow is insufficient to cause a breach of the Lake Robinson dam?

Request for Supplemental Information Model #4: Stream Flow Frequency Analysis

Background: To support the Robinson IA, calculations RNP-18-002 Rev0 was provided to staff. In Section 6.2 (p. 16), a comparison of the data in Table 6-3 to the discussion does not seem to reflect the statements that the mean and upper 95% CL from the precipitation analysis are 17.05 inches and 20.05 inches. Staff note that some values in the table are greater than these rainfall volumes.

Request: Clarify why the runoff volumes differ from the 1E-04 AEP precipitation depth for the mean and 95% CL.

Request for Supplemental Information Model #5: Error and Uncertainty Analyses

Background: To support the Robinson IA, calculations ROB-14-003 Rev1 was provided to staff. In the Robinson IA (Enclosure 2: Section 4.0, first full paragraph Page 11 of 22), the calculated overtopping rate of the Lake Robinson dam is stated as being small enough that no breach will occur. In the calculation ROB-14-003 Rev 1, staff could find no discussion of any sensitivity analyses made on the overtopping flow rate of Lake Robinson dam.

Request: Is there enough/any margin in the calculated overtopping rate to reliably conclude that no breach will occur?

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