Tennessee Valley Authority, 1101 Market Street, Chattanooga, TN 37402

CNL-17-147

November 28, 2017

10 CFR 52, Subpart A

ATTN: Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Clinch River Nuclear Site
NRC Docket No. 52-047

Subject: Clarification of Supplementation Information Associated with Hydrologic Engineering in Support of the Clinch River Nuclear Site Early Site Permit Application

References:
1. Letter from TVA to NRC, CNL-16-081, "Application for Early Site Permit for Clinch River Nuclear Site," dated May 12, 2016
2. Letter from TVA to NRC, CNL-17-070, "Submittal of Supplemental Information Associated with Hydrologic Engineering in Support of the Clinch River Nuclear Site Early Site Permit Application," dated June 5, 2017

By letter dated May 12, 2016 (Reference 1), Tennessee Valley Authority (TVA) submitted an application for an early site permit for the Clinch River Nuclear (CRN) Site in Oak Ridge, TN. By letter dated June 5, 2017 (Reference 2), TVA provided supplemental information to the CRN Site Early Site Permit Application (ESPA), Part 2, "Site Safety Analysis Report (SSAR)," Section 2.4, "Hydrologic Engineering. During a November 13, 2017, public teleconference call, the Nuclear Regulatory Commission (NRC) requested clarification regarding: a) the reference to "HMR 47" in the revised SSAR Subsection 2.4.3.2, "Probable Maximum Precipitation," provided in Attachment 3 of the Enclosure to Reference 2, and b) the peak discharge for Melton Hill as depicted in SSAR Figure 2.4.3-17, "Unit Hydrographs, Sub-basins 26, 27, 34 & 35 (Sheet 3 of 8)," added in Attachment 3 of the Enclosure to Reference 2.

The enclosure to this letter provides supplemental information regarding items a and b above and proposed SSAR markups. The SSAR markups will be incorporated in a future revision of the ESPA.

There are no new regulatory commitments associated with this submittal. If any additional information is needed, please contact Dan Stout at (423) 751-7642.

I declare under penalty of perjury that the foregoing is true and correct. Executed on this 28th day of November 2017.

Respectfully,

J. W. Shea
Vice President, Nuclear Regulatory Affairs & Support Services

Enclosure:

Supplemental Information Regarding Site Safety Analysis Report Section 2.4, "Hydrologic Engineering"

cc (w/Enclosure):

A. Fetter, Project Manager, Division of New Reactor Licensing, USNRC
M. Sutton, Project Manager, Division of New Reactor Licensing, USNRC

cc (w/o Enclosure):

Regional Administrator, Region II
F. Akstulewicz, Director, Division of New Reactor Licensing, USNRC
J. Colaccino, Branch Chief, Division of New Reactor Licensing, USNRC
P. Vokoun, Project Manager, Division of New Reactor Licensing, USNRC
T. Dozier, Project Manager, Division of New Reactor Licensing, USNRC
M. M. McIntosh, Regulatory Specialist, Eastern Regulatory Field Office, Nashville District, USACE

ENCLOSURE

Supplemental Information Regarding
Site Safety Analysis Report Section 2.4, "Hydrologic Engineering"

By letter dated May 12, 2016 (Reference 1), Tennessee Valley Authority (TVA) submitted an application for an early site permit for the Clinch River Nuclear (CRN) Site in Oak Ridge, TN. By letter dated June 5, 2017 (Reference 2), TVA provided supplemental information to the CRN Site Early Site Permit Application (ESPA), Part 2, "Site Safety Analysis Report (SSAR)," Section 2.4, "Hydrologic Engineering." During a November 13, 2017, public teleconference call, the Nuclear Regulatory Commission (NRC) requested clarification regarding: a) reference to "HMR 47" in the revised SSAR Subsection 2.4.3.2, "Probable Maximum Precipitation," provided in Attachment 3 of the Enclosure to Reference 2, and b) the peak discharge for Melton Hill as depicted in SSAR Figure 2.4.3-17, "Unit Hydrographs, Sub-basins 26, 27, 34 & 35 (Sheet 3 of 8)," added in Attachment 3 of the Enclosure to Reference 2.

This enclosure provides supplemental information regarding items a and b described above.

Supplemental Information a:

The reference to "HMR 47" as provided in the revised SSAR Subsection 2.4.3.2 was discovered to be an incorrect reference. The correct reference should be "HMR-51." Attachment 1 of this Enclosure provides an SSAR markup to Subsection 2.4.3.2 indicating this correction. The SSAR markup will be incorporated in a future revision of the ESPA.

Supplemental Information b:

In SSAR Figure 2.4.3-17 Sheet 3 of 8, the sub-basin 14 and 15 Cherokee Local unit hydrograph was inadvertently inserted for the sub-basin 27 Melton Hill Local unit hydrograph. SSAR Figure 2.4.3-17 Sheet 3 of 8 is revised to insert the corrected sub-basin 27 unit hydrograph. SSAR Figure 2.4.3-17 Sheet 3 of 8 is being revised and the updated figure is in the SSAR markup provided in Attachment 2 of this Enclosure. The SSAR markup will be incorporated in a future revision of the ESPA.

Both of these items have been entered into TVA's Corrective Action Program.

References:

1. Letter from TVA to NRC, CNL-16-081, "Application for Early Site Permit for Clinch River Nuclear Site," dated May 12, 2016
2. Letter from TVA to NRC, CNL-17-070, "Submittal of Supplemental Information Associated with Hydrologic Engineering in Support of the Clinch River Nuclear Site Early Site Permit Application," dated June 5, 2017

Attachments:

1. Site Safety Analysis Report Subsection 2.4.3.2 Markup
2. Site Safety Analysis Report Figure 2.4.3-17 Sheet 3 of 8 Markup

Attachment 1
Site Safety Analysis Report Subsection 2.4.3 Markup

The third paragraph of SSAR Subsection 2.4.3.2 is being revised as indicated. Strikethroughs indicate text to be deleted. Underlines indicate text to be added.

2.4.3.2 Probable Maximum Precipitation

The candidate storms having the potential to create maximum flood conditions at the CRN Site consist of four events: a PMP storm centered over the watershed upstream of the CRN Site; a PMP storm centered over the watershed upstream of Norris Dam; a PMP storm centered over the watershed upstream of the CRN Site and downstream of Norris Dam; and one additional PMP storm with the potential to maximize the flood levels on the Tennessee River system at the Watts Bar Reservoir. These PMP storms define depth-area-duration characteristics of rainfall and their seasonal variations and antecedent storm potentials. Because the watershed lies in the temperate zone, snowmelt is not a factor in generating maximum floods at the CRN Site (See page 97 of Reference 2.4.3-1).

The first event is a PMP storm centered over the 3382 sq mi watershed upstream of the CRN Site at CRM 16. The Norris and Melton Hill projects are located in this watershed and provide flood control for the downstream areas. The Hydrometeorological Branch of the NWS, in HMR-51 (Reference 2.4.3-2) and HMR-52 (Reference 2.4.3-3) as well as 1973 correspondence between TVA and the National Oceanic and Atmospheric Administration (NOAA), have provided guidance on defining this event. These publications outline the methods to use in the calculation and application of PMP storms for watersheds of 10 to 20,000 sq mi in size and are generalized for areas east of the 105th meridian.

The stepwise process followed to distribute the storm-area averaged PMF from HMR-51 over the 3382 sq mi watershed is described in HMR-52, Section 7. PMP depths for 10 sq mi to 20,000 sq mi basins and durations from 6 hours to 72 hours are scaled from Figures 18 through 47 in HMR-51 ~~47~~. Using this PMP depth data, curve fits are used to define the area versus precipitation depth relationships for 6-hour, 12-hour, 24-hour, 48-hour, and 72-hour storm durations. With these relationships, precipitation depths are applied to standard isohyet area sizes defined in HMR 52, Section 7.1.A and precipitation depth versus storm duration curves are developed for each standard isohyet. Cumulative and incremental precipitation depths at 6-hour intervals up to 72 hours are then determined for four HMR-52 standard drainage areas smaller and four standard drainage areas larger than the 3382 sq mi watershed. The next step in the HMR-52 process is to determine the bounding storm size using the initial three 6-hour incremental precipitation depths and applying the adjustment factors provided in HMR-52, Tables 15 through 17. After determining the critical isohyetal pattern of rotation as described in HMR-52, Section 7.1.B and centering the isohyet pattern over the basin centroid, GIS is used to determine the area associated with each of the standard HMR isohyets on the watershed which, multiplied by the incremental rainfall depth, provides the precipitation volume. This process provides the volume associated with the four standard HMR-52 storms smaller and the four standard storms larger than the 3382 sq mi watershed. Of the eight standard storms, the 6500 sq mi storm area places the maximum precipitation volume on the 3382 sq mi watershed. Using the 6500 sq mi storm area depth-duration curve and applying the HMR-52 Tables 15-18 adjustment values, the controlling precipitation depth for each HMR-52 standard isohyet at 6-hour intervals up to 72 hours can be determined. GIS is then used to determine the incremental average precipitation depth applied to each sub-basin contributing to the 3382 sq mi watershed.

Attachment 2
SSAR Figure 2.4.3-17 Sheet 3 of 8 Markup

Figure 2.4.3-17, Sheet 3 of 8 is being revised and replaced with the following figure:

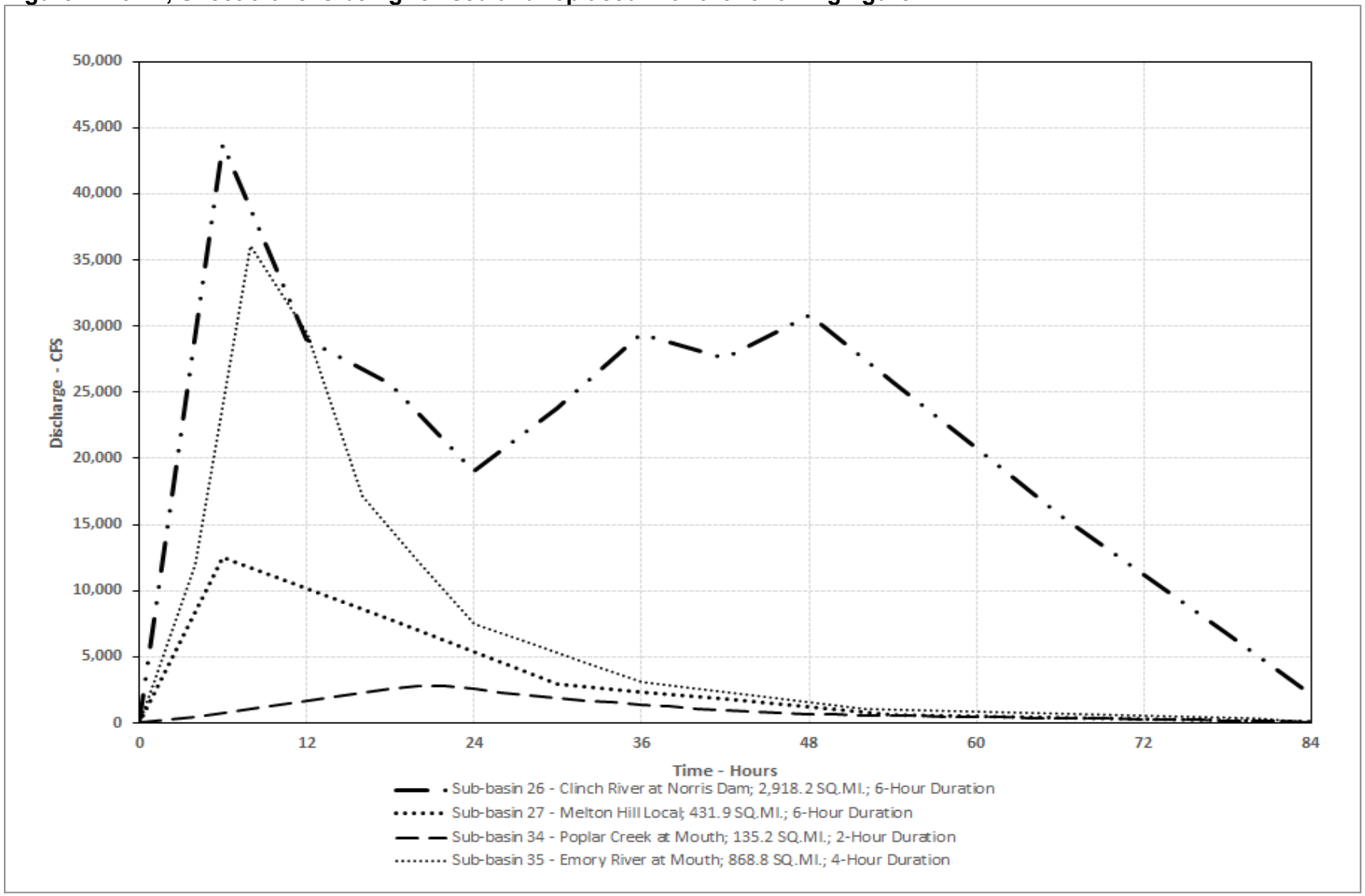

Figure 2.4.3-17 (Sheet 3 of 8). Unit Hydrographs, Sub-basins 26, 27, 34 & 35