UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

March 26, 2018

Mr. Ken J. Peters
Senior Vice President and Chief
Nuclear Officer
Attention: Regulatory Affairs
Vistra Operations Company, LLC
Comanche Peak Nuclear Power Plant
6322 N FM 56
P.O. Box 1002
Glen Rose, TX 76043

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2 - STAFF ASSESSMENT OF FLOODING FOCUSED EVALUATION (CAC NOS. MG0218 AND MG0232; EPID NOS. L-2017-JLD-0031 AND L-2017-JLD-0032)

Dear Mr. Peters:

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f) (hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force report (ADAMS Accession No. ML111861807). Enclosure 2 to the 50.54(f) letter requested that licensees reevaluate flood hazards for their sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A048). By letter dated March 12, 2013 (ADAMS Accession No. ML13074A058), Luminant Generation Company, LLC (now Vistra Operations Company, LLC, the licensee) responded to this request for Comanche Peak Nuclear Power Plant, Units 1 and 2 (Comanche Peak). The licensee supplemented the 50.54(f) response in letters dated April 4, 2014, August 14, 2014, September 22, 2015, and February 3, 2016 (ADAMS Accession Nos. ML14100A049, ML14245A136, ML15278A306, and ML16041A029, respectively).

By letter dated February 11, 2016 (ADAMS Accession No. ML16041A228), the NRC issued an interim staff response (ISR) letter for Comanche Peak. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the current design basis (CDB) for Comanche Peak and parameters that are a suitable input for the mitigating strategies assessment (MSA). As stated in the ISR letter, because the local intense precipitation (LIP), as well as the streams and rivers flood-causing mechanisms at Comanche Peak were not bounded by the plant's CDB, additional assessments of those flood hazard mechanisms are expected to be performed by the licensee.

By letter dated September 7, 2017 (ADAMS Accession No. ML17268A147), the licensee submitted a focused evaluation (FE) for Comanche Peak. The FEs are intended to confirm that

licensees have adequately demonstrated, for unbounded mechanisms identified in the ISR letter, that: 1) a flood mechanism is bounded based on a reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the unbounded mechanism; or 3) a feasible response is provided if the unbounded mechanism is local intense precipitation. The purpose of this letter is to provide the NRC's assessment of the Comanche Peak FE.

The NRC staff concludes that the Comanche Peak FE was performed consistent with the guidance described in Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178). Guidance document NEI 16-05, Revision 1, has been endorsed by Japan Lessons-Learned Division (JLD) interim staff guidance (ISG) JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16090A140). The NRC staff further concludes that the licensee has demonstrated that they have effective flood protection during beyond-design-basis external flooding events at Comanche Peak. This closes out the licensee's response for Comanche Peak for the reevaluated flooding hazard portion of the 50.54(f) letter and the NRC's efforts associated with CAC Nos. MG0218 and MG0232 (EPID Nos. L-2017-JLD-0031 and L-2017-JLD-0032).

If you have any questions, please contact me at 301-415-2833 or by email at Peter.Bamford@nrc.gov.

Sincerely,

Peter Bamford

Peter J. Bamford, Senior Project Manager
Beyond-Design-Basis Management Branch
Division of Licensing Projects
Office of Nuclear Reactor Regulation

Docket Nos: 50-445 and 50-446

Enclosure:
Staff Assessment Related to the
Flooding Focused Evaluation for
Comanche Peak

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE FOCUSED EVALUATION FOR

COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2

AS A RESULT OF THE REEVALUATED FLOODING HAZARD NEAR-TERM TASK FORCE

RECOMMENDATION 2.1 - FLOODING

CAC NOS. MG0218 AND MG0232

EPID NOS. L-2017-JLD-0031 AND L-2017-JLD-0032

1.0 INTRODUCTION

By letter dated March 12, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12053A340), the U.S. Nuclear Regulatory Commission (NRC) issued a request for information to all power reactor licensees and holders of construction permits in active or deferred status, under Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f)(hereafter referred to as the "50.54(f) letter"). The request was issued in connection with implementing lessons learned from the 2011 accident at the Fukushima Dai-ichi nuclear power plant, as documented in the NRC's Near-Term Task Force (NTTF) report (ADAMS Accession No. ML111861807).

Enclosure 2 of the 50.54(f) letter requested that licensees reevaluate flood hazards for their respective sites using present-day methods and regulatory guidance used by the NRC staff when reviewing applications for early site permits and combined licenses (ADAMS Accession No. ML12056A048). If the reevaluated hazard for any flood-causing mechanism is not bounded by the plant's current design basis (CDB) flood hazard, an additional assessment of plant response would be necessary. Specifically, the 50.54(f) letter states that an integrated assessment should be submitted, and describes the information that the integrated assessment should contain. By letter dated November 30, 2012 (ADAMS Accession No. ML12311A214), the NRC staff issued Japan Lessons-Learned Project Directorate (JLD) interim staff guidance (ISG) JLD-ISG-2012-05, "Guidance for Performing the Integrated Assessment for External Flooding."

On June 30, 2015, the NRC staff issued COMSECY-15-0019, describing the closure plan for the reevaluation of flooding hazards for operating nuclear power plants (ADAMS Accession No. ML15153A104). The Commission approved the closure plan on July 28, 2015 (ADAMS Accession No. ML15209A682). COMSECY-15-0019 outlines a revised process for addressing cases in which the reevaluated flood hazard is not bounded by the plant's CDB. The revised process describes a graded approach in which licensees with hazards exceeding their CDB flood will not be required to complete an integrated assessment, but instead will perform a focused evaluation (FE). As part of the FE, licensees will assess the impact of the hazard(s) on their site and then evaluate and implement any necessary programmatic, procedural, or plant modifications to address the hazard exceedance.

Nuclear Energy Institute (NEI) 16-05, Revision 1, "External Flooding Assessment Guidelines" (ADAMS Accession No. ML16165A178), has been endorsed by the NRC as an appropriate

methodology for licensees to perform the FE in response to the 50.54(f) letter. The NRC's endorsement of NEI 16-05, including exceptions, clarifications, and additions, is described in JLD-ISG-2016-01, "Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation" (ADAMS Accession No. ML16162A301). Therefore, NEI 16-05, Revision 1, as endorsed, describes acceptable methods for demonstrating that Comanche Peak Nuclear Power Plant, Units 1 and 2 (Comanche Peak) has effective flood protection.

2.0 BACKGROUND

This NRC staff assessment is the last staff assessment associated with the information that the licensee provided in response to the reevaluated flooding hazard portion of the 50.54(f) letter. Therefore, the background section includes a discussion of the reevaluated flood information provided by the licensee and the associated staff assessments. The reevaluated flood information includes: 1) the flood hazard reevaluation report (FHRR); 2) the mitigation strategies assessment (MSA); and 3) the FE.

Flood Hazard Reevaluation Report

By letter dated March 12, 2013 (ADAMS Accession No. ML13074A058), supplemented by letters dated April 4, 2014, August 14, 2014, September 22, 2015, and February 3, 2016 (ADAMS Accession Nos. ML14100A049, ML14245A136, ML15278A306, and ML16041A029, respectively), Luminant Generation Company, LLC (now Vistra Operations Company, LLC, or Vistra OpCo, the licensee) responded to the 50.54(f) letter for Comanche Peak and submitted the FHRR. By letter dated February 11, 2016 (ADAMS Accession No. ML16041A228), the NRC issued an interim staff response (ISR) letter for Comanche Peak. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the CDB for Comanche Peak and parameters that are a suitable input for the MSA and other assessments associated with NTTF Recommendation 2.1 "Flooding." The ISR letter is also referred to as the Mitigating Strategies Flood Hazard Information (MSFHI) letter in the licensee's FE submittal. As stated in the ISR letter, because the local intense precipitation (LIP), as well as the streams and rivers flood-causing mechanisms at Comanche Peak are not bounded by the plant's CDB, additional assessments of the flood hazard mechanisms are expected to be performed by the licensee. The staff issued a final staff assessment of the FHRR by letter dated June 13, 2017 (ADAMS Accession No. ML17067A166). As detailed in the FHRR assessment, the staff's conclusions regarding the LIP and streams and rivers flooding mechanisms exceeding the Comanche Peak CDB remained unchanged from the information provided in the NRC's ISR letter.

Mitigation Strategies Assessment

By letter dated February 9, 2017 (ADAMS Accession No. ML17044A009), the licensee submitted its MSA for Comanche Peak. The MSAs are intended to confirm that licensees have adequately addressed the reevaluated flooding hazards within their mitigating strategies for beyond-design-basis external events. By letter dated May 9, 2017 (ADAMS Accession No. ML17111A960), the NRC issued its assessment of the Comanche Peak MSA. The NRC staff concluded that the Comanche Peak MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute (NEI) 12-06, Revision 2, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide" (ADAMS Accession No. ML16005A625). The NRC's endorsement of NEI 12-06, Revision 2, is described in JLD-ISG-

2012-01, Revision 1, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events" (ADAMS Accession No. ML15357A163). The NRC staff further concluded that the licensee has demonstrated that the mitigation strategies, if implemented as described, are reasonably protected from reevaluated flood hazard conditions for beyond-design-basis external events.

Focused Evaluation

By letter dated September 7, 2017 (ADAMS Accession No. ML17268A147), the licensee submitted an FE for Comanche Peak. The FEs are intended to confirm that licensees have adequately demonstrated, for unbounded mechanisms identified in the ISR letter, that: 1) a flood mechanism is bounded based on a reevaluation of flood mechanism parameters; 2) effective flood protection is provided for the unbounded mechanism; or 3) a feasible response is provided if the unbounded mechanism is LIP. These 3 options associated with performing an FE are referred to as Path 1, 2, or 3, respectively, as described in NEI 16-05, Revision 1. The purpose of this staff assessment is to provide the results of the NRC's evaluation of the Comanche Peak FE.

3.0 TECHNICAL EVALUATION

The licensee stated that its FE followed Path 2 of NEI 16-05, Revision 1, and utilized Appendices B and C for guidance on evaluating the site strategy. The LIP and streams and rivers flooding mechanisms were found to exceed the CDB flood at Comanche Peak, and were discussed in the licensee's FE. This technical evaluation will address the following topics: characterization of flood parameters; evaluation of flood impact assessments; evaluation of available physical margin (APM); reliability of flood protection features; and overall site response. All elevations described in this assessment are referenced to mean sea level (MSL), consistent with the licensee's submittal. According to the licensee's FE, this datum is equivalent to National Geodetic Vertical Datum of 1929 (NGVD29) for the Comanche Peak site. Elevations referenced to NGVD29 are described in the NRC's ISR letter.

3.1 Characterization of Flood Parameters

According to the licensee, the LIP parameters that are used as inputs to the FE are based on the FHRR and the NRC ISR. The licensee's FE also states that the flood elevations for LIP were reassessed since the issuance of the ISR letter due to a modeling error discovered after the MSA submittal. However, according to the licensee, their evaluation of the modeling error determined that the ISR flood elevation for LIP bounds the parameters computed in the revised LIP analysis (that corrects the modeling error) and thus the licensee chose to use the ISR levels in the FE. The most bounding LIP elevation as stated in the ISR letter is 810.6 feet. This elevation exceeds the CDB elevation for the LIP hazard which is listed as "not included in the plant design basis," in the staff's ISR letter. The licensee's FE states that there are no site preparation or response procedures for LIP and therefore no LIP warning time is credited.

The NRC staff reviewed the LIP parameters listed in the licensee's FE and confirmed that they were consistent with the parameters that were specified in the ISR letter. Based on the use of the approved LIP parameters and the licensee's assessment of the impact of the modeling error as stated in the FE, the staff concludes that the licensee's characterization of the LIP event in the FE is appropriate.

The FE credits active and passive protection features to demonstrate that key structures, systems, and components (SSCs) are protected from the LIP flooding mechanism. Since the peak ponding elevation of 810.6 feet exceeds the safety-related building entry elevations of 810.5 feet, the licensee assessed the applicable buildings regarding the lowest key SSC elevation and determined that the key SSCs remain protected during the LIP event. The non-safety-related Turbine Building for Unit 2 has one doorway that has a threshold elevation below 810.5 feet (809.5 feet). Since the Unit 1 and Unit 2 Turbine Buildings communicate with each other and also can communicate with the safety-related Electrical and Control Building (ECB) via non-watertight doors, the licensee evaluated flooding in the Turbine Building(s) for the LIP event. Using the time duration of floodwaters above the threshold elevation, as well as the hydraulic characteristics of the entry point, the licensee assessed the volume of inflow water against the capacity of the Unit 1 and Unit 2 condenser hot well pits, which would have to fill up before the ECB would be impacted. The licensee's evaluation calculated that the margin available before impacting the ECB would be 137,204 cubic feet (approximately 1,026,357 gallons).

Regarding the streams and rivers mechanism, the licensee noted that the FHRR analysis shows that the reevaluated hazard analysis does not reach the site grade of approximately 810 feet, which applies to the majority (other than portions of the Service Water Intake Structure (SWIS)) of the site structures. According to the licensee, floor entryway elevations for all buildings/structures that house safety-related equipment are at elevation 810.5 feet. For the SWIS, which is hydraulically connected to Squaw Creek Reservoir (SCR) through the Safe Shutdown Impoundment (SSI), the operating deck elevation of 796 feet corresponds to the lowest floor elevation of safety-related equipment.

For the streams and rivers flooding mechanism, the licensee's submittal states that since the reevaluated flood hazard results do not reach the site grade or the operating deck of the SWIS, the key SSCs are protected by the site grade, SSI dam, and/or building exterior walls. The licensee also identified a scenario where if certain circulating water system components are removed from the system for maintenance, coincident with a high SCR level, there is a potential to flood the Turbine Building(s) (and subsequently the ECB, as previously described). This type of maintenance evolution would typically occur during an outage at one of the two units. For this scenario, the licensee uses administrative controls over the maintenance evolution to ensure that conditions (SCR levels, weather conditions) are appropriate prior to a system breech, and that actions to close the circulating water system can be taken before a critical SCR level is reached.

The NRC staff reviewed the key parameters used in the licensee's FE regarding the streams and rivers flooding mechanism and confirmed that the parameters were consistent with the staff's ISR letter. Thus, the licensee's characterization of the streams and rivers flooding event in the FE is appropriate.

3.2 Evaluation of Flood Impact Assessment for LIP

3.2.1 Description of Impact of Unbounded Hazard

The LIP evaluation generated a maximum ponding level of 810.6 feet, which exceeds the safety-related building entry point levels of 810.5 feet. Based on this potential for in-leakage, the licensee reviewed the key SSCs in each potentially affected building. The licensee concluded that all key SSCs would remain protected, but identified six locations in the ECB,

Safeguards Buildings, and Auxiliary Building, where the APM was less that one inch, ranging from 0.3 inches to 0.8 inches.

Regarding the SWIS, the building has an entry point at the 810.5 foot level consistent with the other safety-related structures; however, the grading around the building quickly slopes down to the SSI impoundment elevation. Thus, the licensee's FHRR does not identify the area surrounding the SWIS to be affected by ponding. Consistent with the MSA submittal, the licensee evaluated the SWIS to be not susceptible to LIP based on the building layout and open grating on the operating deck. The open grating would allow any water that entered the building to drop into the intake below. Since no key SSCs are located below the operating deck level, the licensee concluded that none would be affected by the LIP event. Consistent with the MSA evaluation, the staff concludes that the licensee has demonstrated that the SWIS is reasonably protected from the LIP event.

3.2.2 Evaluation of Available Physical Margin

The licensee's FE described the APM available during the LIP event. Some of the locations identified for key SSCs have very small APM (less than one inch). According to the licensee, the small margin is considered adequate based on a review of the site internal flooding calculations, assessments performed in the MSA of the components, and the conservatisms imbedded in the determination of the inflow volumes.

Guidance document NEI 16-05, Revision 1, Appendix B, states that negligible or zero APM can be justified as acceptable if the use of conservative inputs, assumptions and/or other methods in the flood hazard evaluation can be established. The licensee's FE discusses conservatisms imbedded in the determination of the impact of the LIP event. These include the use of Hydrometeorlogical Report No. 52 (HMR-52), as opposed to a site-specific PMP analysis; use of a 6-hour event for the LIP analysis versus the definition of LIP being a 1-hour event; not crediting roof storage or attenuation of rainfall from roofs; assuming impervious grading in the power block; and not crediting the underground storm drainage piping in the power block and some surface drainage features (e.g., swales and drainage ditches). The NRC staff reviewed the FE submittal and concludes that the licensee's use of the ISR LIP flood levels satisfies the conservative inputs, assumptions, and/or other methods provision of NEI 16-05, and therefore the small APM assessments identified by the licensee are acceptable.

Regarding the potential Turbine Building(s) ingress route, the licensee identifies the condenser hot well pits as an available volume that would have to be filled before flood waters can impact the ECB. The licensee concludes that the 34 percent margin in the condenser hot well pit provides adequate APM. Based on the available volume, the limited duration of the LIP event, and the conservative considerations previously discussed regarding the LIP analysis, the NRC staff concludes that the potential Turbine Building(s) ingress pathway contains adequate APM.

3.2.3 Reliability of Flood Protection Features

Demonstrating reliability of the flood protection features is described in NEI 16-05, Appendix B, for both passive and active features. Passive features in NEI 16-05 include earthen embankments, floodwalls, seawalls, concrete barriers, plugs and penetration seals and storm drainage systems. The licensee's FE describes protection from a mixture of active and passive components such as: onsite drainage; vault and manhole covers; floor drain and wall check valves; building walls, roofs, and floors; sump pumps; and watertight doors.

According to the licensee's FE, credited portions of the storm drainage system now have associated preventative maintenance features to ensure that they are adequately maintained. The FE further states that the other credited flood protection features were assessed and determined to be adequate. In order to confirm the licensee's FE reliability evaluation, the staff reviewed the licensee's site FE assessment contained in WCAP-18227-P, "Comanche Peak Nuclear Power Plant Units 1 and 2 Flooding Focused Evaluation," Revision 0, dated August 2017. The staff's review of WCAP-18227-P used the audit process for flooding focused assessments, performed in accordance with a generic audit plan dated July 18, 2017 (ADAMS Accession No. ML17192A452). WCAP-18227-P contains a detailed listing of the components and features that could be used to mitigate a LIP event at Comanche Peak and assesses the APM and reliability of each. Several of the features described (exterior walls, roofs and floors, manhole covers, and certain backflow prevention check valves) were also described in the Comanche Peak MSA, for which the staff has already issued its evaluation and found the protection offered by these features to be reasonable. The licensee's assessment of the other components and features describes controls associated with other site programs such as internal flooding, external flooding, and missile protection that would ensure reliability. The staff's review of the licensee's FE submittal, supplemented by the audit review of WCAP-18227-P, found the reliability assessment to be reasonable. Regarding onsite drainage, WCAP-18227-P describes the culverts credited in the licensee's evaluation and the staff notes that the licensee's inclusion of these components into the preventative maintenance program should ensure that they continue to function as assumed in the LIP analysis.

Because increased focus has been placed on flood protection since the accident at Fukushima, licensees and NRC inspectors have identified deficiencies with equipment, procedures, and analyses relied on to either prevent or mitigate the effects of external flooding at a number of licensed facilities. Recent examples include those found in Information Notice 2015-01, "Degraded Ability to Mitigate Flooding Events" (ADAMS Accession No. ML14279A268). In addition, the NRC is cooperatively performing research with the Electric Power Research Institute to develop flood protection systems guidance that focuses on flood protection feature descriptions, design criteria, inspections, and available testing methods in accordance with a memorandum of understanding dated September 28, 2016 (ADAMS Accession No. ML16223A495). The NRC staff expects that licensees will continue to maintain flood protection features in accordance with their current licensing basis. The staff also expects that licensees will use the site corrective action program to disposition flood-related maintenance, operations, and design issues, consistent with the provisions of NEI 16-05 and NEI 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features," as endorsed by the NRC, where appropriate. Continued research involving flood protection systems will be performed and shared by the NRC staff with licensees in accordance with the guidance provided in Management Directive 8.7 "Reactor Operating Experience Program" (ADAMS Accession No. ML122750292).

Based on the features described in the licensee's FE, and continued use of the site operating experience and corrective action programs, the NRC staff concludes that the Comanche Peak flood protection features described above are reliable to maintain key safety functions for the LIP event, as described in Appendix B of NEI 16-05, Revision 1.

3.2.4 Overall Site Response

The licensee does not rely on any personnel actions or new modifications to the plant in order to respond to the postulated beyond-design-basis LIP event. Therefore, there is no need to review overall site response for this flooding mechanism.

3.3 Evaluation of Flood Impact Assessment for Streams and Rivers

3.3.1 Description of Impact of Unbounded Hazard

The licensee's reevaluated hazard for the streams and rivers flooding mechanism, which can be described as a probable maximum flood (PMF) evaluation, exceeds the CDB flood elevation. Thus, as specified in the NRC's ISR letter, the reevaluated streams and rivers mechanism was expected to be addressed in the FE in order to be responsive to the 50.54(f) letter, as clarified by COMSECY-15-0019.

The reevaluated hazard for this flood-causing mechanism resulted in a calculated stillwater elevation of 792.7 feet at the SSI (792.6 feet at the circulating water intake structure (CWIS)). At applicable locations, the maximum wave run-up elevations vary from 794.6 feet to 795.8 feet, depending on the location of the affected structure. The site grade elevation at Comanche Peak is 810 feet. The top of the SSI Dam is at 796 feet and the SWIS that is hydraulically connected to the SSI has no key SSCs below an elevation of 796 feet. Thus, except for certain maintenance-related evolutions described below, the reevaluated flood hazard does not significantly challenge the key SSCs for Comanche Peak.

The licensee's FE describes a scenario applicable to the streams and rivers flooding mechanism relating to circulating water system maintenance. This type of work is normally done when a nuclear unit is shutdown. Specifically, when circulating water system components are removed such that the normally closed system is open, SCR could potentially flood the Turbine Building(s) and then propagate to the adjacent ECB via non-watertight doors. This scenario would only apply to system breaches whose elevation is below the surface level of SCR. This mechanism is evaluated in the plant's existing licensing basis and is described in the Comanche Peak Updated Final Safety Analysis Report (UFSAR), Sections 2.4.14, 3.4.1, and 13.5.1.3. The impact of the higher stillwater elevation for the reevaluated hazard thus has a potential impact to key SSCs when the circulating water system is opened. Therefore, this possibility is evaluated in the licensee's FE.

The plant Technical Requirements Manual (TRM) contains administrative controls that are designed to protect the site from this potential flooding mechanism. Specifically, when the SCR surface elevation rises above a pre-determined level, components that create a circulating water system opening must be capable of being reinstalled within a specified timeframe such that the projected SCR level rise will not impact (safety-related) equipment before the circulating water system integrity is restored. This is accomplished by closing the system opening prior to SCR level rising to 777.5 feet, thus preventing a potential key SSC impact that could occur if the surface elevation of SCR reaches a threshold elevation of 778 feet. The licensee's FE submittal states that the site has initiated procedure changes to increase the margin for closure of pathways to SCR for the PMF-based event to account for the reevaluated hazard. These controls were developed using the criteria in NEI 16-05, Appendix C. During the audit process, the staff reviewed the revised administrative controls to confirm the licensee's FE statement. The staff observed that procedure STA-696, "Hazard Barrier Controls," Revision 2, outlines a process where a Barrier Impairment Form (BIF) is initiated. The BIF guides an evaluation of potential circulating water system openings, computes projected restoration times, and evaluates SCR levels to ensure that the timeframes for the actions specified in the TRM can be met. Further discussion of STA-696 is contained in Section 3.3.3 of this assessment.

3.3.2 Evaluation of Available Physical Margin and Reliability

According to the licensee's FE, the PMF-based event would potentially challenge the SSI Dam, the SWIS, and the safety-related equipment located within the SWIS. The APM for the SSI Dam is 1.4 feet for wave run-up and 3.3 feet for stillwater. For the SWIS, the APM is 0.2 feet for wave run-up (SWIS structure exterior) and 3.3 feet for stillwater (SWIS interior).

According to the licensee, the APM for the SSI Dam is adequate since it is greater than 3 feet, based on the projected stillwater level for the reevaluated hazard. The licensee based this determination on the provisions of 44 CFR 65.10, the standard cited in NEI 16-05, Revision 1. For the SWIS exterior walls, the licensee cites the analysis conservatism, the margin in the design of a Seismic Category I structure and the configuration at the exterior of the structure that would inhibit wave run-up. For the SWIS interior flooding potential, the licensee cites the 3.3 feet of APM as sufficient based on the structural margin in the building's design.

The staff confirmed that the FE uses the same flood parameters as the licensee's MSA for this flood-causing mechanism and that the parameters were consistent with those specified in the NRC's staff's ISR letter. Consistent with the staff's determination of reasonable protection from this flood-causing hazard in the MSA, with consideration for the conservatism in the supporting analysis of flood levels, the staff concludes that the licensee has demonstrated that there is adequate APM and reliability of the passive SSCs credited in the FE that protect against the PMF-based flood, when the scenario with an opening in the circulating water system is not applicable.

For the case of an opening in the circulating water system, the licensee's strategy is dependent on administrative controls. In terms of APM and reliability, the licensee cites the APM of 3.2 to 3.3 feet for the SSI and CWIS level instrumentation, which would be used to trigger the necessary system closure activities and provide feedback to the operations staff as closure activities progress. For reliability of this feature, the licensee cites the redundancy of the level instrumentation as well as the diversity of the indications. In addition, the licensee's FE states that the closure activities are designed to achieve closure prior to SCR reaching 777.5 feet. Since no adverse impact would occur prior to SCR level reaching 778 feet, the margin of 0.5 feet would translate to a time margin of 1.6 hours. Based on the licensee's FE discussion of the level instrumentation and description of site administrative control over the circulating water system openings, the staff concludes that the licensee has demonstrated that operational awareness will be maintained such that closure activities can be reliably performed according to the licensee's plan. The staff notes that reliability of the re-installed components is dependent on the successful restoration of the pressure boundary function under a time constraint, and thus using the methodology of Appendix C to NEI 16-05 to develop the restoration plan, as described in the following section of this assessment, is critical to a reliability determination.

3.3.3 Overall Site Response

The licensee does not rely on any personnel actions or new modifications to the plant in order to respond to the beyond-design-basis streams and river flooding event for the case that does not involve circulating water system openings.

For events involving circulating water system openings, the licensee's FE states that an overall site response evaluation was performed in accordance with Appendix C to NEI 16-05. The plant response strategy has been enhanced by modifying the hazard barriers controls program to add in additional controls and increased water level monitoring frequency when a pathway from SCR

to the Turbine Building(s) has been created by removal of a circulating water component and there is rainfall occurring in the watershed.

The licensee's evaluation has identified two time sensitive actions (TSAs). The first is to trend the SCR/SSI level and forecast when the level will exceed 777.5 feet. The second is to close open pathway(s) to SCR prior to flood level reaching 777.5 feet. In order to accomplish these TSAs, the licensee's FE described the evaluation process used, which included demonstrating that the TSAs were feasible, establishing unambiguous procedural triggers, creating a procedure-driven and clear organizational response to a flood, development of a detailed flood response timeline, and accounting for the expected environmental conditions. The licensee concluded that for the limiting case of two circulating water discharge valves removed, that a time margin of 1.6 hours is available between when the circulating water system integrity is restored and when SCR level reaches an elevation that could have an impact to key SSCs.

The staff reviewed the licensee's FE describing the evaluation for this evolution. The staff notes that the licensee's strategy is consistent with a previously developed strategy to respond to potential flooding conditions, with some modification for the reevaluated hazard. Therefore, the actions to monitor SCR levels and close system openings are not new tasks for site personnel. The program changes developed as a result of the reevaluated hazard analysis provide enhanced administrative controls that would consider the event timing and the moderately higher reevaluated flood height.

According to the licensee's FE, if a circulating water component located below 792.7 feet is removed from service for maintenance in one or both Turbine Buildings, then there is the potential for flooding of the ECB if a PMF occurs. The licensee states that this flooding potential is prevented through procedural controls. In order to confirm this assertion, the staff reviewed the licensee's procedural controls during the audit process. The staff reviewed procedures ABN-907, "Acts of Nature," Revision 15, Section 3.0, Flooding, and ODA-308-13.7.34-S01, "Standard LCOAR [Limiting Condition for Operation Action Requirement] for TR 13.7.34 Flood Protection," Revision 3. The NRC staff confirmed that the licensee's operations personnel would monitor SCR level and assess ongoing maintenance in the circulating water system prior to, and during, an external flooding scenario. For each applicable system opening, the licensee's BIF forms, as controlled by procedure STA-696, would direct the appropriate closure activities.

Based on the FE review, the staff concludes that the licensee has identified the proper TSAs. In addition, the staff notes that the licensee has identified the most limiting maintenance scenario and performed a simulation to evaluate reinstallation feasibility. The staff reviewed the summary of the simulation of the reinstallation of two 108 inch circulating water discharge valves contained in WCAP-18227-P and found the review establishing the limiting time margin to be reasonable. The staff also reviewed the procedural triggers described in the FE for initiating enhanced level monitoring and circulating water system closure activities and confirmed that these values are consistent with those in the TRM.

Therefore, based on the licensee's FE statements that the site response strategy has been developed in accordance with NEI 16-05, Appendix C, and the licensee's assertion that procedural controls exist to prevent flooding for circulating water system openings up the 792.6 foot elevation, the staff concludes that the licensee should be able to adequately respond to the reevaluated streams and rivers flooding event.

4.0 AUDIT REPORT

The generic audit plan dated July 18, 2017, describes the NRC staff's intention to issue an audit report that summarizes and documents the NRC's regulatory audit of the licensee's FE. The NRC staff's audit for Comanche Peak included a review of the licensee's FE submittal, MSA submittal, UFSAR, site FE assessment, and selected procedures, as described above. Because this staff assessment appropriately summarizes the results of the audit, the NRC staff concludes a separate audit report is not necessary, and that this document serves as the audit report described in the NRC staff's letter dated July 18, 2017.

5.0 CONCLUSION

The NRC staff concludes that Vistra OpCo performed the Comanche Peak FE in accordance with the guidance described in NEI 16-05, Revision 1, as endorsed by JLD-ISG-2016-01. Based on its review of the licensee's FE, the staff concludes that the licensee has demonstrated that they have effective flood protection from the reevaluated flood hazards, if properly implemented. Furthermore, the staff concludes that Comanche Peak screens out for an integrated assessment based on the guidance found in JLD-ISG-2016-01. As such, the staff concludes that in accordance with Phase 2 of the process outlined in the 50.54(f) letter, additional regulatory actions associated with the reevaluated flood hazard, beyond those associated with the MSA, are not warranted. The staff further concludes that the licensee has satisfactorily completed providing responses to the 50.54(f) activities associated with the reevaluated flood hazards.

SUBJECT: COMANCHE PEAK NUCLEAR POWER PLANT, UNITS 1 AND 2 – STAFF ASSESSMENT OF FLOODING FOCUSED EVALUATION DATED March 26, 2018

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