



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

November 8, 2017

Mr. Adam C. Heflin
President, Chief Executive Officer,
and Chief Nuclear Officer
Wolf Creek Nuclear Operating Corporation
P.O. Box 411
Burlington, KS 66839

SUBJECT: WOLF CREEK GENERATING STATION - STAFF ASSESSMENT OF
FLOODING FOCUSED EVALUATION (CAC NO. MF9964;
EPID L-2017-JLD-0019)

Dear Mr. Heflin:

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, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.54(f), "Conditions of Licenses" (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 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 10, 2014 (ADAMS Accession No. ML14077A280), supplemented by letter dated January 19, 2016 (ADAMS Accession No. ML16032A190), Wolf Creek Nuclear Operating Corporation (the licensee) responded to this request for Wolf Creek Generating Station (Wolf Creek).

By letter dated December 24, 2015 (ADAMS Accession No. ML15357A179), the NRC issued an interim staff response (ISR) letter for Wolf Creek. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the current design basis (CDB) for Wolf Creek 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) and failure of dams and onsite water control/storage structures flood-causing mechanisms at Wolf Creek 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 June 28, 2017 (ADAMS Accession No. ML17188A402), the licensee submitted a focused evaluation (FE) for Wolf Creek. 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. By letter dated October 30, 2017 (ADAMS Accession No. ML17311A149), the licensee supplemented the FE

by providing additional information. The purpose of this letter is to provide the NRC's assessment of the Wolf Creek FE.

As set forth in the enclosed staff assessment, the NRC staff has concluded that the licensee has demonstrated that effective protection exists for the LIP and dam breaches and failures flood-causing mechanisms during a beyond-design-basis external flooding event at Wolf Creek, assuming appropriate implementation of the regulatory commitment identified in the licensee's supplemental letter dated October 30, 2017. This closes out the licensee's response for Wolf Creek for the reevaluated flooding hazard portion of the 50.54(f) letter and the NRC's efforts associated with CAC No. MF9964.

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

Sincerely,

A handwritten signature in black ink that reads "Peter Bamford". The signature is written in a cursive style with a large, looped "P" and "B".

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

Enclosure:
Staff Assessment Related to the
Flooding Focused Evaluation for Wolf Creek

Docket No: 50-482

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STAFF ASSESSMENT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO THE FOCUSED EVALUATION FOR

WOLF CREEK GENERATING STATION

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

RECOMMENDATION 2.1 - FLOODING

CAC NO. MF9964

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, pursuant to 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 stated that an integrated assessment should be submitted, and described the information that the integrated assessment should contain. On November 30, 2012 (ADAMS Accession No. ML12311A214), the NRC staff issued Japan Lessons-Learned Division (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 focused evaluation 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 Wolf Creek Generating Station (Wolf Creek) 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 10, 2014 (ADAMS Accession No. ML14077A280), supplemented by letter dated January 19, 2016 (ADAMS Accession No. ML16032A190), Wolf Creek Nuclear Operating Corporation (WCNOC, the licensee) responded to the 50.54(f) letter for Wolf Creek and submitted the FHRR. By letter dated December 24, 2015 (ADAMS Accession No. ML15357A179), the NRC issued an interim staff response (ISR) letter for Wolf Creek. The ISR letter provided the reevaluated flood hazard mechanisms that exceeded the CDB for Wolf Creek and parameters that are a suitable input for the MSA. As stated in the letter, because the local intense precipitation (LIP) and failure of dams and onsite water control/storage structures flood-causing mechanisms at Wolf Creek are not bounded by the plant’s CDB, additional assessments of the flood hazard mechanisms are expected to be performed by the licensee. The ISR letter concluded that the licensee’s reevaluated flood-causing mechanism information was appropriate input to the additional assessments as described in the 50.54(f) letter and COMSECY-15-0019. The staff issued a final staff assessment of the FHRR by letter dated July 5, 2017 (ADAMS Accession No. ML17174B243). The staff’s conclusions regarding LIP and failure of dams and onsite water control/storage structures flooding mechanisms exceeding the Wolf Creek CDB remained unchanged from the information provided in the NRC’s ISR letter.

Mitigation Strategies Assessment

By letter dated November 8, 2016 (ADAMS Accession No. ML16321A424), WCNOC submitted its MSA for Wolf Creek. 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 March 15, 2017 (ADAMS Accession No. ML17033A340), the NRC issued its assessment of the Wolf Creek MSA. The NRC staff concluded that the Wolf Creek MSA was performed consistent with the guidance described in Appendix G of Nuclear Energy Institute 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 hazards conditions for beyond-design-basis external events.

Focused Evaluation

By letter dated June 28, 2017 (ADAMS Accession No. ML17188A402), the licensee submitted the FE for Wolf Creek. 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. By letter dated October 30, 2017 (ADAMS Accession No. ML17311A149), the licensee supplemented the FE by providing additional information. The purpose of this staff assessment is to provide the results of the NRC's evaluation of the Wolf Creek 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 dam breaches and failures flooding mechanisms were found to exceed the CDB flood at Wolf Creek, and were discussed by the licensee in the Wolf Creek 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.

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 and were not revised as part of the Flooding Impact Assessment Process (FIAP). In the powerblock area, the most bounding LIP elevation is 1100.5 feet mean sea level (MSL), with various locations around the site having different flooding depths. This exceeds the CDB elevation for the LIP hazard of 1099.9 feet MSL, as described in the staff's ISR letter. The licensee's FE states that the site will have 1 hour of warning time for the LIP event, with 1.24 hours of inundation, and approximately 8 hours of recession. Regarding the dam breaches and failures mechanism, the licensee noted that the FHRR concluded that the dam failure analysis yielded a flood level that did not reach site grade, which is approximately 1099.5 feet MSL in the powerblock area.

The FE generally credits passive protection features to demonstrate that key structures, systems, and components (SSCs) are protected from the LIP flooding mechanism, with 11 doorways being identified for the application of temporary protection features ("quick dam flood barriers") during the LIP event warning time. For the failure of dams and onsite water control/storage structures mechanism¹, the licensee's MSA submittal states that the reevaluated flood hazard results do not encroach into the area of Coffey County Lake (Wolf Creek Lake), such that flood waters from dam failure never approach the site.

The NRC staff reviewed the LIP parameters listed in the licensee's FE and confirmed that they were consistent with the parameters that were presented in the MSA for the LIP event. Based

1. The Wolf Creek failure of dams and onsite water control/storage structures mechanism relates to the Neosho River and its associated dams, an adjacent but separate watershed area from the Wolf Creek site. In its FHRR, the licensee evaluated failure of dams in the Neosho River watershed to determine whether, under reevaluated hazard conditions, the Neosho River watershed could flood to the extent that it could connect to Coffey County Lake (Wolf Creek Lake).

on the review that was previously performed for the MSA, the staff concludes that the licensee's characterization of the LIP event in the FE is appropriate. The licensee's FE refers to the dam breaches and failure mechanism that was discussed in the MSA submittal. As discussed in Section 3.3 of this assessment, the staff re-reviewed the licensee's MSA submittal and concluded that the dam breaches and failure mechanism was characterized consistent with the ISR letter, and is therefore appropriately characterized for the FE.

3.2 Evaluation of Flood Impact Assessment for LIP

3.2.1 Description of Impact of Unbounded Hazard

The Wolf Creek LIP analysis for the reevaluated hazard describes flood evaluation levels that range up to approximately 1100.5 feet MSL at representative locations around the main powerblock structures. In general, the finished floor elevations for the critical plant buildings are at 1100.0 feet MSL. Based on the detailed site LIP model for the reevaluated hazard, the licensee identified 11 doorways where water ingress could potentially occur, and has targeted these locations to receive temporary barriers that would be installed during the LIP event warning time. Assuming a successful deployment of the temporary barriers, along with the plant's existing flood protection features, the licensee's FE states that the key SSCs would be protected.

3.2.2 Evaluation of Available Physical Margin

The licensee's FE described the APM available during the LIP event. For the doorways where the temporary barriers would be installed the licensee identifies a minimum of 1.1 inches between the top of the barrier and the projected peak water height. Other doorways that provide a pathway to key SSCs where temporary barriers are not installed because the entryway elevation is above the projected LIP elevation have a minimum APM of 0.6 inches.

In addition to doorways, the licensee's FE recognizes that building penetrations could also provide a pathway to key SSCs. The FE states that such penetrations are designed to be leak tight, have been evaluated, and found to be adequate. It further states that the penetration seals' APM was evaluated and found to be adequate. The FE also states that water in-leakage at joints and penetrations is inspected via the structures monitoring program every 5 years. It also states that non-conforming conditions are entered into the site corrective action program. Since the reevaluated LIP elevations generally exceed the CDB elevation, the staff sought to confirm that the licensee's seal evaluation included seals that may be above the CDB elevation, but below the reevaluated LIP elevation. Using the audit process, performed in accordance with a generic audit plan dated July 18, 2017 (ADAMS Accession No. ML17192A452), the staff reviewed the licensee's FE assessment contained in WCAP-18221-P, "Wolf Creek Nuclear Generating Station Flooding Focused Evaluation," Revision 0. According to WCAP-18221-P, the licensee's assessment of the penetration APM utilized the LIP flooding parameters from the FHRR, and it therefore includes the reevaluated LIP elevations. The staff's audit review of WCAP-18221-P could not confirm whether building penetration walkdowns credited in the licensee's assessment included elevations above grade, up to the reevaluated LIP level. Based on this observation, by letter dated October 30, 2017, the licensee submitted a regulatory commitment to conduct a site walkdown of building penetrations up to the reevaluated hazard level. This walkdown would evaluate whether a potential pathway(s) exists for LIP water to possibly impact key SSCs. Based on the licensee's FE statements regarding seal design, inspection, and adequacy, as well as the regulatory commitment, the staff concludes that the

seals have adequate APM because the applicable seals have a flood protection function, are designed to be leak tight, and are maintained appropriately.

Regarding the temporary barriers, the licensee performed a separate flooding evaluation assuming that the barriers were not installed for a projected LIP event. For this evaluation, the licensee calculated the in-leakage that would occur based on the projected LIP water elevations along with the event duration. The licensee then compared the volume of in-leakage water to the available building volume that could be filled prior to adversely impacting key SSCs. In the Auxiliary Building there was a calculated APM of 43 inches; in the Control Building the APM was calculated to be 32.9 inches; and in the Fuel Building it was 9.9 inches. The LIP water is not projected to enter the other key structures. In each case, the projected accumulated water volume was below the site's internal flooding design basis.

The licensee also notes some conservatisms in both the LIP flooding evaluation and the FE impact evaluation. For example, the LIP evaluation does not credit the underground drainage piping and the impact evaluation does not credit the operation of sump pumps.

The staff reviewed the licensee's APM justification for the areas receiving temporary protection. Most significantly, the most susceptible location for in-leakage (doorways) has been shown to be acceptable even if the barriers are not installed. Based on the ability to tolerate the door barriers not being in place, and the conservative analysis assumptions, the staff concludes that the APM is acceptable.

For the LIP event, the site areas away from the powerblock, such as where the Essential Service Water (ESW) manhole covers are located, were described in the staff's ISR letter separately from areas around the powerblock due to variations in the site's topography. The ISR letter states that the reevaluated hazard elevation of 1099.9 feet MSL should be used for assessments away from the powerblock. The staff noted that the licensee's FE did not address the ESW manhole covers, but the licensee's FHRR provides flood information for these structures. In the LIP event, most of the manhole covers will have peak flood elevations above the critical elevation, with a maximum submergence of approximately 0.7 feet. The licensee's FHRR notes that the manholes are designed to be watertight. The staff consulted the licensee's Updated Safety Analysis Report (USAR) and noted that Table 3.4-2 states that the manholes have waterstops for in-leakage protection and the ESW power cables inside the manholes are designed for use in wet conditions. The USAR also states that there are sump pumps in manholes that require frequent dewatering. Since the ESW manhole covers provide in-leakage protection for safety-related components, the staff also reviewed the licensee's response to Enclosure 4 of the 50.54(f) letter (NTTF Recommendation 2.3, regarding flooding walkdowns). In that submittal, dated November 27, 2012 (ADAMS Accession Nos. ML12340A397 and ML12340A398), the licensee stated these manholes have interior waterstops and an exterior seal. The waterstop seals rely on caulking at the cover joint. The caulking must be reapplied each time the cover is lifted. The walkdown report also stated there have been instances where the cover has not been properly resealed, and as a result rainwater has entered the manhole. Based on its review of the available documentation for the ESW manholes, the staff concludes that the combination of design and proper maintenance, as well as the short-term nature of the LIP event limiting any cable wetting to a limited duration, provides sufficient assurance that the ESW cables will not be adversely impacted by the LIP event.

3.2.3 Reliability of Flood Protection Features

Site topography and building external flood boundaries up to the CDB LIP flooding level are passive features. Since these features are already credited as part of the Wolf Creek design-basis flood protection, the NRC staff concludes that a reliability analysis of these features is not necessary in accordance with the guidance found in NEI 16-05, Revision 1.

Regarding the temporary flood barriers, the licensee's FE states that they are installed using procedural controls. Successful barrier simulations have been performed and the installation is part of initial operator training and is subject to refresher training at a similar frequency to the site's FLEX strategy. In addition, the barriers are readily available in designated storage locations. In terms of operational experience, the licensee's trigger point for a LIP event is the declaration of a flash flood warning by the National Weather Service. The licensee's FE states that the expected timeline for deployment of the temporary barriers was verified during an actual event in 2016. Using the audit process, the staff reviewed the licensee's procedural controls contained in procedure OFN SG-048, "Flash Flood Warning," Revision 4B. The staff was able to confirm that the procedure's entry condition, a Coffey County flash flood warning, matches the description in the licensee's FE. In addition, the staff was able to confirm that not only does the procedure direct placement of the temporary barriers at specific locations, it provides a feedback mechanism to monitor and correct placement, as necessary, during the period where the external water level is above the floor elevation. Also, the staff confirmed that the doors identified in the licensee's procedure for installation of temporary barriers were consistent with the FHRR results regarding LIP water elevation, as compared to the threshold elevation at the critical doorway locations.

By letter dated October 30, 2017, the licensee identified that since the reevaluated LIP elevations exceed the CDB, there may be penetrations not covered by the walkdowns conducted for Enclosure 4 to the 50.54(f) letter (Fukushima NTTF Item 2.3, Flooding Walkdowns). These penetrations could provide a potential pathway for water at the reevaluated LIP elevation to possibly impact key SSCs. An activity to identify and evaluate such penetrations has not yet been formally completed, and thus the licensee has identified a regulatory commitment to perform this work. The staff views this commitment as a key activity that needs to be performed properly to support a reliability conclusion for the potentially affected key SSCs

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 established procedural controls, training, demonstration of acceptable timing during an actual event, structural monitoring program, and continued use of the site operating experience and corrective action programs, and assuming successful completion of the licensee's regulatory commitment identified in the FE supplement, the NRC staff concludes that the Wolf Creek flood protection features described above are reliable to maintain key safety functions, as described in Appendix B of NEI 16-05, Revision 1.

3.2.4 Overall Site Response

The licensee's FE strategy credits personnel actions to erect temporary flood protection features in order to respond to the beyond-design-basis LIP event. While the barrier placement may not be a task normally performed by site operators, the licensee's FE states that the instructions for the barrier placement have been placed in site procedures and validated. In its MSA review, the staff evaluated the licensee's procedural controls for the triggering criteria to install the barriers and found them to be acceptable. The licensee's FE describes the trigger point for barrier installation, an evaluation of available warning time, a site response timeline with a conservative estimate of manpower availability, barrier storage accessibility, and the feasibility of the actions to be performed. Based on the licensee's FE description, as confirmed by the NRC staff's review of the licensee's procedural controls, the staff concludes that the licensee's site response evaluation has been performed in accordance with NEI 16-05, Appendix C, and is therefore acceptable.

3.3 Evaluation of Flood Impact Assessment for Dam Breaches and Failures

3.3.1 Description of Impact of Unbounded Hazard

The licensee's reevaluated hazard for this flooding mechanism exceeds the CDB flood elevation. Thus, as specified in the NRC's ISR letter, the reevaluated dam breaches and failures 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 NRC staff notes that even though the reevaluated hazard is higher than the CDB, it is still calculated to be below the site grade and existing flooding protection level for the plant.

The licensee's FE states that since the FHRR calculated a dam failure flood level that did not reach site grade, that this mechanism is not considered a credible hazard. Based on this conclusion, the licensee did not provide a separate assessment for this hazard in the FE. The staff notes that this is contrary to the provisions of NEI 16-05, Revision 1, which state that once a hazard mechanism is found to be unbounded, the FIAP would be applied. For Path 2 of the FIAP, this would involve an assessment of APM, reliability, and overall site response in the FE. In lieu of such a discussion being provided in the licensee's FE, the staff evaluated this unbounded mechanism for Wolf Creek based on docketed information obtained throughout the reevaluated flooding hazard assessment process.

3.3.2 Evaluation of Available Physical Margin

The staff confirmed that the FE reference to the MSA for this flood-causing mechanism describes parameters consistent with those specified in the NRC's staff's ISR letter. The APM for this mechanism can be determined from the information in the NRC's ISR letter. The staff concludes

that the APM described in the ISR letter is acceptable because it exceeds the guidance found in NEI 16-05, Revision 1, Section B.1, which refers to Federal Emergency Management Agency flood insurance studies to define "adequate APM" for a river flood as 2.5 feet.

3.3.3 Reliability of Flood Protection Features

The staff further concludes that the reliability of the site provisions for the dam breaches and failures mechanism are acceptable because the reevaluated elevation is below the design-basis flood protection level for the plant. Since the necessary design-basis flood protection measures, including site topography and grading were verified in accordance with the flooding walkdowns performed pursuant to NTTF Recommendation 2.3 at Wolf Creek, the staff concludes that sufficient reliability of flood protection for this mechanism has been established.

3.3.4 Overall Site Response

The licensee does not rely on any personnel actions or new modifications to the plant in order to respond to the beyond-design-basis dam failure event. As described above, the licensee's evaluation relied on passive existing features to demonstrate adequate flood protection. Therefore, there is no need to review overall site response for this flooding mechanism.

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 Wolf Creek included a review of the licensee's FE submittal (as supplemented), MSA submittal, USAR, site FE assessment, and flash flood procedure, 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 has concluded that, with one exception, WCNOG performed the Wolf Creek FE in accordance with the guidance described in NEI 16-05, Revision 1, as endorsed by JLD-ISG-2016-01. Regarding the exception, contrary to NEI 16-05, Revision 1 guidance, the licensee did not provide a FE assessment of the unbounded dam breaches and failures flood-causing mechanism. Based on its review of the licensee's FE, along with other docketed information, the staff concludes that the licensee has demonstrated that effective flood protection exists from the reevaluated flood hazards. This conclusion is contingent upon the appropriate implementation of the licensee's regulatory commitment identified in the FE supplement. Furthermore, the NRC staff concludes that Wolf Creek screens out of performing an integrated assessment based on the guidance found in JLD-ISG-2016-01. As such, 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 mitigation strategies assessment, are not warranted. The licensee has satisfactorily completed providing responses to the 50.54(f) activities associated with the reevaluated flood hazards.

WOLF CREEK GENERATING STATION – STAFF ASSESSMENT OF FLOODING FOCUSED EVALUATION DATED November 8, 2017

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