Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

January 30, 2014
NOC-AE-13003068
10 CFR 50.54(f)

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

South Texas Project
Units 1 & 2
Docket Nos. STN 50-498, STN 50-499
STPNOC Update to Response to NRC 10 CFR 50.54(f) Request for Information Regarding Near-Term Task Force Recommendation 2.3, Flooding – Review of Available Physical Margin (APM) Assessments
(TAC Nos. MF1110 and MF1111)

References:

1. Letter from NRC to All Power Reactor Licensees, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3 and 9.3, of the Near-Term Task Force Review of the Insights from the Fukushima Dai-ichi Accident", March 12, 2012 (ML12056A046)
2. Letter from NRC to A.P. Heymer, NEI, "Endorsement of Nuclear Energy Institute (NEI) 12-07, 'Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features'", May 31, 2012 (ML12144A142)
3. Letter from D.W. Rencurrel, STPNOC, to NRC Document Control Desk, "Final Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident", November 26, 2012 (ML12340A156)
4. Letter from NRC to All Power Reactor Licensees, "Request for Additional Information Associated with Near-Term Task Force Recommendation 2.3, Flooding Walkdowns", December 23, 2013 (ML13325A891)

On March 12, 2012, the NRC staff issued Reference 1 requesting information pursuant to Title 10 of the Code of Federal Regulations 50.54(f). Enclosure 4 of that letter contains specific Requested Information associated with Near-Term Task Force Recommendation 2.3 for Flooding. Per Reference 2, the NRC endorsed Nuclear Energy Institute (NEI) 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features," dated May 31, 2012. By Reference 3, South Texas Project Nuclear Operating Company (STPNOC) submitted the final report in response to the request for information.

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NEI 12-07 requires that licensees define "small margin", assess the available physical margin (APM) associated with flood protection features, determine if the margin provided is small, and evaluate whether any of the margins have potentially significant consequences. Those with potential consequences are to be documented and resolved through the corrective action process. The results of this effort are to be maintained on site for future NRC audits.

Following the NRC staff's initial review of the walkdown reports, regulatory site audits were conducted at a sampling of plants. Based on the walkdown report reviews and site audits, the staff identified additional information necessary to allow them to complete its assessments. Accordingly, by Reference 4 the NRC staff has issued a request for additional information (RAI) which licensees are required to respond by January 31, 2014.

The RAI questions and the STPNOC responses are provided in the enclosed attachment.

There are no commitments in this letter.

If there are any questions regarding this letter, please contact Wendy Brost at (361) 972-8516 or me at (361) 972-7566.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on January 30, 2014

G.T. Powell
Site Vice President

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Attachment: 1. STPNOC Update to Response to NRC 10 CFR 50.54(f) Request for Information Regarding Near-Term Task Force Recommendation 2.3, Flooding – Review of Available Physical Margin (APM) Assessments

cc:

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Note: References described in this Attachment are found at the end of the Attachment.

APM RAI Question 1:

Confirmation that the process for evaluating APM was reviewed

STPNOC Response:

STPNOC has reviewed the process used to evaluate the APM of flood protection features (FPF) at the South Texas Project Electric Generating Station (STP 1 & 2).

APM RAI Question 2:

Confirmation that the APM process is now or was always consistent with the guidance in NEI 12-07 and discussed in this RAI.

STPNOC Response:

The original walkdown effort, documented in Reference 1, was performed in accordance with the guidance provided in NEI 12-07. This RAI response provides additional clarifications which confirm consistency of the physical margin analysis with NEI 12-07 and the NRC guidance discussed in the RAI.

APM RAI Question 3:

If changes are necessary, a general description of any process changes to establish this consistency.

STPNOC Response:

No changes are necessary to establish consistency with NEI 12-07.

APM RAI Question 4:

As a result of the audits and subsequent interactions with industry during public meetings, NRC staff recognized that evaluation of APM for seals (e.g., flood doors, penetrations, flood gates, etc.) was challenging for some licensees. Generally, licensees were expected to use either Approach A or Approach B (described below) to determine the APM for seals:

a) If seal pressure ratings were known, the seal ratings were used to determine APM (similar to example 2 in Section 3.13 of NEI 12-07). A numerical value for APM was documented. No further action was performed if the APM value was greater than the pre-established small-margin threshold value. If the APM value was small, an assessment of "significant consequences" was performed and the guidance in NEI 12-07 Section 5.8 was followed.

b) If the seal pressure rating was not known, the APM for seals in a flood barrier is assumed to be greater than the pre-established small-margin threshold value if the following conditions were met: (1) the APM for the barrier in which the seal is located is greater than the small-margin threshold value and there is evidence that the seals were designed/procured, installed, and controlled as flooding seals in accordance with the flooding licensing basis. Note that in order to determine that the seal has been controlled as a flooding seal, it was only necessary to determine that the seal configuration has been governed by the plant's design control process since installation. In this case, the APM for the seal could have been documented as "not small".

As part of the RAI response, state if either Approach A or Approach B was used as part of the initial walkdowns or as part of actions taken in response to this RAI. No additional actions are necessary if either Approach A or B was used.

If neither Approach A or B was used to determine the APM values for seals (either as part of the walkdowns or as part of actions taken in response to this RAI), then perform the following two actions:

- Enter the condition into the CAP (note: it is acceptable to utilize a single CAP entry to capture this issue for multiple seals). CAP disposition of "undetermined" APM values for seals should consider the guidance provided in NEI 12-07, Section 5.8. The CAP disposition should confirm all seals can perform their intended safety function against floods up to the current licensing basis flood height. Disposition may occur as part of the Integrated Assessment. If an Integrated Assessment is not performed, determine whether there are significant consequences associated with exceeding the capacity of the seals and take interim action(s), if necessary, via the CAP processes. These actions do not need to be complete prior to the RAI response.

- Report the APM as "undetermined" and provide the CAP reference in the RAI response.

STPNOC Response:

The STPNOC analysis of the flooding protection feature (FPF) program compliance with NEI 12-07 is based on several elements.

- *The site configuration management and design change programs assure the FPFs for STP 1 & 2 are designed, procured, installed, maintained and controlled to the required protection for the design-basis flood level.*
- *The review of the APM performed for this RAI confirmed that these FPFs provide the APM necessary to assure the plant design-basis flood level, established in the UFSAR, will not be exceeded.*
- *Due to the availability of recent additional flooding analyses for the site, the analysis also evaluated the conservatism of the current licensing basis flood levels and established there is additional margin due to this conservatism, further demonstrating that the design-basis flood level will not be exceeded.*

NEI 12-07, Section 5.8, "Documentation of Available Physical Margin" indicated that the size of the margin should be evaluated and based on issues such as complexity and uncertainty of the licensing basis flood evaluation (Reference 2). STP 1 & 2 has access to three recent flood analyses for the site, based on more recent flooding analysis methodologies and modeling technologies, which reduce the uncertainty associated with the design-basis flood level and demonstrate that the design-basis flood level is higher than would be required by the use of current analysis techniques. These more recent analyses establish that the flooding levels are not expected to reach the current licensing basis flood level.

The impact of this conclusion in the APM analysis for STP1 & 2 is that, while APM is a comparison against the design-basis flood level, there is additional margin associated with the conservatism of the design-basis flood level which should be added to the APM and considered in the evaluation of whether the design-basis flood level is sufficient to provide protection against postulated flooding events.

On this basis, the STPNOC program meets the requirements of Approach A, as defined in this RAI. The pressure ratings of all of the FPFs are known and documented in the flooding protection design documents and the corresponding technical information is available in plant records. The review performed in this RAI has established a single bounding APM value applicable to all of the site FPFs.

The bounding APM confirms that the design-basis flood level is not exceeded. While the margin for most items is significantly larger than the "small margin" established in Reference 3, there are a limited number of items where the design-basis for the FPFs is equal to, but does not exceed, the design-basis flood level. The analysis, based on using current methodologies and recently available flooding analyses, has established there are no "significant consequences" for these installations, since the excessive conservatism of the design-basis flood level provides sufficient additional margin so the design-basis flood level is not expected to be exceeded.

STP Configuration Management and Design Change Programs

At STP 1 & 2, FPF design characteristics and pressure ratings are known and contained in controlled design documents that define the key characteristics of each FPF, including technical information about the flooding pressure rating. The FPFs in these programs have been, and continue to be, designed, procured, installed, and controlled in accordance with the flooding licensing basis.

The site procedures detailing these programs are as follows:

- *Site procedure 0PGP03-ZA-0109, "Configuration Management Program", defines the components of the STPNOC configuration management program (CMP).*
  - *The CMP consists of a set of controlled processes to ensure that designated facility Structures, Systems, Components and Supporting Software (SSCS) conform to license and design requirements and that their physical and functional characteristics are correctly reflected in design, operating, maintenance, procurement and training documents.*
  - *The CMP applies a graded approach to scope and control of SSCS via Design Control, Configuration Control, and Exemptions.*
    - *Design Control – A formal process for controlling design attributes, requirements and basis changes to the physical plant and design documentation which ensures adherence to the requirements of 10CFR50.*

- *Configuration Control - The process of maintaining conformance between documentation and associated SSCS.*
- *Exemptions - SSCS or portions thereof, which have been specifically approved by the Vice President, Engineering to be excluded from CMP entirely or to various degrees. These SSCS or portions thereof may therefore be subject to Design Control and/or Configuration Control and/or Exempt from all CMP controls.*

- *Site procedure 0PGP04-ZA-0328, "Engineering Document Processing", establishes general administrative requirements for classifying, preparing, revising, retiring, voiding, and superseding engineering related documents.*
  - *Part of this procedure requires assignment of a Priority to station documents – documents associated with the "flood protection features" fall within priority 2-5. Therefore, documentation for these features is defined as "design controlled" and the flood protection features are in design control.*
- *Site procedure 0PGP04-ZE-0309, "Design Change Package", provides the controls and processes to implement permanent design changes (both physical and non-physical) to the plant. This procedure applies to the processing of permanent Design Changes to Structures, Systems, and Components (SSCs) within Design Control per the CMP.*
  - *All changes to the flood protection features are performed and implemented under the design and configuration management program.*
- *Site procedure 0PGP04-ZE-0312, "Design Change Implementation", establishes requirements for controlling the implementation, testing, and processing of documentation associated with physical changes to Systems, Structures and Components (SSCs) in the plant. This procedure is applicable to all Major and Minor Modifications, and Minor Change Design Change Package (DCP), as determined by the cognizant Implementation and/or Design Organizations.*
  - *Any change to a flood protection feature due to redesign or maintenance activities is evaluated for impact to the design/licensing basis.*
- *Site procedure 0PGP03-ZA-0090, "Work Control Program", describes the high level requirements and process for managing work at the station through work identification, work screening and processing, work activity scheduling, work activity planning, and work activity execution and closeout. The Work Process Program applies to activities performed on plant SSCs included in the CMP.*

The controlled FPF design documents identify the key characteristics of each item, including information such as location, type, supplier, model number. The corresponding technical information for each type of FPF, such as pressure rating, pressure test results, and supplier technical information is available in the design documents.

Since all FPFs are controlled by an approved site configuration management and design change program, it can be concluded that they meet the flooding design-basis requirements. Therefore, STPNOC is able to conclude that the bounding value for APM for the STP 1 & 2 site is greater than or equal to zero feet and meets the design-basis.

Analysis of the Available Physical Margin

STPNOC has determined there are no significant safety consequences associated with the small bounding site APM due to the conservative design-basis flood for STP 1 & 2. This additional conservative margin can be shown by more recent flood analyses for the site.

As described in the Updated Final Safety Analysis Report (UFSAR) for STP 1 & 2, the design-basis flood for the plant was established by considering an extremely improbable failure of the Main Cooling Reservoir (MCR). This MCR breach modeling analysis incorporated a number of conservative assumptions that produced conservative and bounding design-basis flood levels at the safety related facilities. Some of the notable assumptions include:

- *A several hundred feet long section of the failed MCR embankment would translate downstream several tens of feet off from its original location. This failure scenario was initially modeled by assuming the removal of a 400ft long embankment section. To provide further conservatism, the postulated breach section was increased from 400ft to 4000ft, incrementally, to determine the most critical flooding impact to the site. An approximately 2000ft breach was found to produce the highest flood levels, which were subsequently adopted as the design-basis flood levels.*
- *Although historical embankment and dam failure events typically involve a time lapse from the onset of failure to full development of breach, an instantaneous removal of the section of the embankment was conservatively adopted for the STP analysis instead of a more realistic breach rate.*
- *The MCR breach analysis did not take any credit for flow retardation and dispersion that, in reality, would be provided by the circulating water intake pipes, circulating water intake and discharge structures, and various other obstructions between the embankment and plant structures.*
- *The upstream model boundaries were specified to correspond to a constant initial water level of the MCR (50.5ft MSL). The use of a static water level boundary condition is highly conservative, in that the water level at the breach is expected to drop with time with the reservoir storage is being depleted during an actual embankment failure event.*

As described in the Flood Hazard Reevaluation Report (Reference 3), significant new flooding level information is available to demonstrate the conservatism of the current design-basis flood levels discussed above. This conservatism is corroborated by a qualitative comparison with the results from three recent MCR breach model studies. The three recent model studies are:

(1) A MCR breach modeling analysis using the FLDWAV breach computer program developed by the National Weather Service (NWS) in conjunction with the RMA2 hydrodynamic computer program developed by the United States Army Corps of Engineers (USACE), adopted a conservative but more realistic breaching scenario, both in the length of the breach section and the breach rate (i.e., typically expressed as time to full breach), than the UFSAR analysis.

(2) An independent MCR breach model analysis using the Delft3D-FLOW hydrodynamic computer program. It adopts the same conservative approach as the UFSAR analysis. In particular, the length of the breach section (also referred to as the breach width) was incrementally increased in the simulation to maximize the resulting flood levels at the points of interests, and full breach was assumed to occur instantaneously. This analysis is included here as another point of reference to demonstrate the conservatism in the current flood design-basis for STP 1 & 2.

(3) A 2012 MCR breach flooding analysis conducted for STP 1 & 2 to acquire a better understanding of the site conditions that would be expected following the very unlikely event of a failure of the MCR embankment (Reference 4). The simulations were performed using the BREACH modeling program of NWS and the USACE RMA2 hydrodynamic computer program.

These recently completed modeling studies show reductions in the maximum water levels using current modeling techniques and bases versus the design-basis flood level established when the plant was initially licensed

Conclusion

In summary, the analysis of the physical margin has achieved the following:

- *The flooding protection features control program has been confirmed to assure that these features are designed, procured, installed, maintained and controlled to assure they continue to provide the protection required to assure the current design-basis flood levels is not exceeded.*
- *The review of the physical margin has confirmed that the current licensing-basis flood level will not be exceeded by the flooding level which the plant will experience.*
- *Recent site flood analyses have been used to establish that the current licensing-basis flood levels are very conservative.*

Due to the conservative design-basis flood for STP 1 & 2STPNOC has determined that there are no significant safety consequences associated with the small bounding site APM.

References

1. *Letter from D.W. Rencurrel, STPNOC, to NRC Document Control Desk, "Final Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding the Flooding Aspects of Recommendation 2.3 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident", November 26, 2012 (ML12340A156)*

2. *Letter from J.H. Riley, NEI, to NRC Document Control Desk, NEI 12-07, Revision 0, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features", May 2012 (ML12144A401)*

3. *Letter from G.T. Powell, STPNOC, to NRC Document Control Desk, "Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 Flooding of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, Enclosure 2, Required Response 2, Flood Hazard Reevaluation Report", March 11, 2013 (ML13079A806)*

4. *South Texas Project Units 1 & 2 Flood Analysis, prepared by Atkins, Austin, Texas for STPNOC, Document No. 120021, March 2012.*