EA-12-049
10 CFR 50.54(f)
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102-07521-MLL/MDD
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U.S. Nuclear Regulatory Commission
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References:
1. NRC Letter, *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 Insights from the Fukushima Dai-ichi Accident*, dated March 12, 2012 [Agencywide Documents Access and Management System (ADAMS) Accession No. ML12056A046]
2. Arizona Public Service Company (APS) Letter 102-06967, Flood Hazard Reevaluation Report, dated December 12, 2014 (ADAMS Accession No. ML14350A466)
3. NRC Letter, *Palo Verde Nuclear Generating Station, Units 1, 2, and 3 – Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation,* dated November 14, 2016 (ADAMS Accession No. ML16306A444)

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station**
Units 1, 2, and 3
Docket Nos. STN 50-528, 50-529, and 50-530
Flooding Focused Evaluation Summary

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for Flooding, including direction for licensees to submit a *Flood Hazard Reevaluation Report* (FHRR). The Palo Verde Nuclear Generating Station (PVNGS) FHRR was submitted to the NRC in Reference 2. The NRC staff concluded the PVNGS FHRR did not bound the current design basis (CDB) flood hazard for the local intense precipitation (LIP) event scenario in Reference 3. The LIP event scenario is the sole reevaluated flood-causing mechanism that was not explicitly bounded by the CDB for PVNGS, Units 1, 2, and 3.

As stated in Reference 3, APS was to perform and document a focused evaluation for LIP since it was a flood-causing mechanism that was not explicitly bounded by the CDB. The enclosure to this letter contains the focused evaluation for the LIP mechanism for PVNGS Units 1, 2 and 3. This submittal completes the actions related to external flooding required by Reference 1.

No commitments are being made in this letter. Should you need further information regarding this response, please contact Michael D. DiLorenzo, Licensing Section Leader, at (623) 393-3495.

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

Executed on June 29, 2017
(Date)

Sincerely,

Andrews, George W(Z99748)

Digitally signed by Andrews, George W(Z99748)
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Reason: I am approving this document as delegated for Maria Lacal
Date: 2017.06.29 18:05:45 -07'00'

Enclosure: Palo Verde Nuclear Generating Station Units 1, 2, and 3, Flooding Focused Evaluation Summary

MLL/MDD/sma

cc:
K. M. Kennedy	NRC Region IV Regional Administrator
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PALO VERDE NUCLEAR GENERATING STATION UNITS 1, 2, and 3, FLOODING FOCUSED EVALUATION SUMMARY

LETTER NO. 102-07521
ENCLOSURE

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PALO VERDE NUCLEAR GENERATING STATION FLOODING FOCUSED EVALUATION SUMMARY

1 EXECUTIVE SUMMARY

Arizona Public Service Company (APS) has reevaluated the Palo Verde site flooding hazard in accordance with the NRC March 12, 2012, 10 CFR 50.54(f) request for information (RFI) (Reference 1). The RFI was issued as part of implementing lessons learned from the Fukushima Dai-ichi accident; specifically, to address Recommendation 2.1 of the NRC Near-Term Task Force Report. This information was submitted to the NRC in a flood hazard reevaluation report (FHRR) on December 12, 2014 (Reference 2) for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3.

The NRC staff assessed the PVNGS FHRR and established the mitigating strategies flood hazard information (MSFHI) documented in the NRC *Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation*, dated November 14, 2016 (Reference 9). No changes to the flooding reanalysis have been performed since the issuance of the MSFHI letter and this flooding analysis served as the input to this flooding focused evaluation (FE). There is one mechanism that was found to exceed the current design basis (CDB) flood level at PVNGS. This mechanism is listed below and is included in this flooding FE:

- Local Intense Precipitation (LIP)

Associated effects (AE) and flood event duration (FED) parameters were assessed and submitted as a part of the Mitigating Strategies Assessment (MSA), dated December 8, 2016 (Reference 12). The flooding FE concludes that all vulnerabilities due to the LIP flooding mechanism are addressed by permanent passive flood protection features, and available physical margin was demonstrated to be adequate to protect key structures, systems, and components (SSCs). This flooding FE followed Path 2 of NEI 16-05, *External Flooding Assessment Guidelines,* Revision 1 (Reference 7), and utilized Appendix B for guidance on evaluating the site protection features. This submittal completes the actions related to external flooding required by Reference 1.

2 BACKGROUND

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force (NTTF) Recommendation 2.1 for flooding. The RFI directed licensees, in part, to submit a FHRR to reevaluate the flood hazards for their sites using present-day methods and guidance used for early site permits and combined operating licenses. For PVNGS, Units 1, 2, and 3, the FHRR was submitted on December 12, 2014. Additional information was provided with References 3, 4, and 5. In accordance with Reference 3, the NRC considers the reevaluated flood hazard to be "beyond the current design/licensing basis of operating plants."

Following the Commission's directive to the NRC staff in Reference 5, dated March 30, 2015, the NRC staff issued a letter to the industry (Reference 6), dated September 1, 2015, indicating that new guidance was being prepared to replace instructions in Reference 4 and provided for a graded approach to flooding reevaluations and more focused evaluations of local intense precipitation and available physical margin in lieu of proceeding to an integrated assessment.

NEI prepared the new *External Flooding Assessment Guidelines* in NEI 16-05, which was endorsed by the NRC in Reference 8. NEI 16-05 Revision 1 indicates that each flood-causing mechanism not bounded by the CDB flood (using only stillwater and/or wind-wave run-up level) should follow one of the following five assessment paths:

- Path 1: Demonstrate Flood Mechanism is Bounded through Improved Realism
- Path 2: Demonstrate Effective Flood Protection
- Path 3: Demonstrate a Feasible Response to LIP
- Path 4: Demonstrate Effective Mitigation
- Path 5: Scenario Based Approach

Non-bounded flood-causing mechanisms in Paths 1, 2, or 3 would only require a FE to complete the actions related to external flooding required by the March 12, 2012 10 CFR 50.54(f) letter. Mechanisms in Paths 4 or 5 require an Integrated Assessment.

3 REFERENCES

1. NRC Letter, *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 Insights from the Fukushima Dai-ichi Accident*, dated March 12, 2012 (ADAMS Accession No. ML12056A046)

2. APS Letter 102-06967, *Flood Hazard Reevaluation Report*, dated December 12, 2014 (ADAMS Accession No. ML14350A466)

3. NRC Letter, *Supplemental Information Related to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) regarding Flooding Hazard Reevaluations for Recommendation 2.1 of the Near Term Task Force Review of Insights from the Fukushima Dai-ichi Accident*, dated March 1, 2013 (ADAMS Accession No. ML13044A561)

4. Letter from David L. Skeen, NRC, to Joseph E. Pollock, *Nuclear Energy Institute – Trigger Conditions for Performing an Integrated Assessment and Due Date for Response*, dated December 3, 2012 (ADAMS Accession No. ML12326A912)

5. NRC Staff Requirements Memoranda to COMSECY-14-0037, *Integration of Mitigating Strategies for Beyond-Design-Basis External Events and the Reevaluation of Flooding Hazards*, dated March 30, 2015 (ADAMS Accession No. ML15089A236)

6. NRC Letter, *Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events*, dated September 1, 2015 (ADAMS Accession No. ML15174A257)

7. Nuclear Energy Institute (NEI), Report NEI 16-05 [Revision 1], *External Flooding Assessment Guidelines*, dated June 2016 (ADAMS Accession No. ML16165A178)

8. NRC Document, JLD-ISG-2016-01, *Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation; Focused Evaluation and Integrated Assessment*, Revision 0, dated July 11, 2016 (ADAMS Accession Number ML16162A301)

9. NRC Letter, *Palo Verde Nuclear Generating Station, Units 1, 2, and 3 –Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation*, dated November 14, 2016 (ADAMS Accession No. ML16306A444)

10. Palo Verde Nuclear Generating Station, Units 1, 2, and 3, Study 13-MS-A135, *Evaluation of Internal Flooding in Safety Related Structures as a Result of Localized Ponding at the Power Block During a LIP Event in support of NRC 50.54(f) letter and the PVNGS Flood Hazard Reevaluation Report*, Revision 0, dated December 11, 2014

11. Palo Verde Nuclear Generating Station, Units 1, 2, and 3 Record Log Number CN396-A00005 (Westinghouse Electric Company/Paul C. Rizzo Associates Calculation 13-5002-F02, Revision 1), *Palo Verde Nuclear Generating Station - Effects of Local Intense Precipitation Using FLO-2D*, Revision 0, dated May 30, 2014

12. APS Letter 102-07388, *Mitigating Strategies Assessment (MSA) Report Submittal*, dated December 8, 2016 (ADAMS Accession No. ML16343B070)

4 TERMS AND DEFINITIONS

- AE - Associated Effects
- APM – Available Physical Margin
- CDB – Current Design Basis
- FE – Focused Evaluation
- FHRR – Flood Hazard Reevaluation Report
- FLEX – Diverse and flexible coping strategies covered by NRC order EA-12-049
- Key SSC – A system structure or component relied upon to fulfill a key safety function
- KSF – Key Safety Function, i.e. core cooling, spent fuel pool cooling, or containment function.
- LIP – Local Intense Precipitation
- MSA – Mitigating Strategies Assessment as described in NEI 12-06 Rev 2, App G
- MSFHI – Mitigating Strategies Flood Hazard Information
- NTTF – Near Term Task Force commissioned by the NRC to recommend actions following the Fukushima Dai-ichi accidents
- PMF – Probable Maximum Flood
- RFI – Request for Information
- TSA – Time Sensitive Action, as described in NEI 16-05, Appendix C

5 FLOOD HAZARD PARAMETERS FOR UNBOUNDED MECHANISMS

NRC staff completed the "Staff Assessment of Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation" which contains the reevaluated flood hazard information related to the PVNGS Flood Hazard Reevaluation Report. In Reference 9, the NRC staff concluded "the licensee conducted the hazard reevaluation using present-day methodologies and regulatory guidance used by the NRC staff in connection with ESP (early site permits) and COL (combined operating license) reviews." Further, the NRC staff concluded that the licensee's reevaluated flood-causing mechanism information is appropriate input for additional assessments (focused evaluation) associated with Near-Term Task Force Recommendation 2.1 "Flooding." Table 3.1-1 to Reference 9 includes a summary of the current design basis and reevaluated flood hazard parameters, respectively. The following is a list of flood-causing mechanisms compiled by the NRC staff in Reference 9 for the design basis flood:

- Local Intense Precipitation;
- Streams and Rivers;
- Failure of Dams and Onsite Water Control/Storage Structures;
- Storm Surge;
- Seiche;
- Tsunami;
- Ice Induced Flooding; and
- Channel Migrations/Diversions.

In Tables 4.1-1 and 4.2-1 of Reference 9, the NRC staff lists PVNGS flood hazard information (specifically stillwater and wind-wave run-up elevations and duration) for the following flood-causing mechanism that is not bounded by the CDB flood level:

- Local Intense Precipitation (LIP)

This is the sole reevaluated flood-causing mechanism that will be addressed in this external flooding FE. The non-bounded flood mechanism (LIP) for PVNGS is described in detail in Reference 2, the FHRR submittal. Table 1 summarizes how the unbounded mechanism was addressed in this external flooding assessment. See Table 2 below for calculated flood levels and the acceptable flood height for the compartments where safe shutdown equipment is located.

Table 1 – Summary of Flood Impact Assessment

	Flood Mechanism	Summary of Assessment
1	Local Intense Precipitation	Path 2 was determined to be applicable for PVNGS since passive protection features are solely relied upon to maintain key safety functions (KSFs) (see Flooding Impact Assessment Process, FIAP, Path Determination Table, Section 6.3.3 of Reference 7).

Table 2 – Detailed Parameters for the LIP FHRR (Reference 10, Table 1)

Summary of Internal Flooding in the Safety Related Structures from Localized Ponding

Building Compartment No. (Arch. Room No.)	Flood Source (Doors)	Maximum Water Inventory (Gallons)	Peak Flood Height (ft.)	Max Allowed Height (ft)	Affect Safe Shutdown EQPT
OSB	Yard (10 thru 20)	41,176	0.22	N.R.	No
Corridor (J-122, J-124)	OSB		0.21		No
Control (J-123)	J-122 (J1-32)		0.21		No
DG. Building Train B Trenches (G-111 & G113)	Yard (8)	3108	1.69	6	No
	J-114 (J1-17)	248[1], 572[2]	1.83[1], 2[2]	6	No
DG. Building Train A Trenches (G-109 & G112)	J-114 (J1-17)	248[1], 572[2]	0.23[1],0.53[2]	6	No
DG Train B Engine & CR Rooms (G-104 & G105)	Yard (8)	3108	0	0.75	No
Control Building J-123	Breezeway (21)	2822	0.17	N.R.	No
J-123	J-122 (J1-32, OSB)	3789	0.21	N.R.	No
J-114	J-123 (J1-25)	6611	0.06[1]	0.125	No
			0.08[2]	0.125	No
J-103	Yard (4)	5824[1]	0.03[1]	0.125	No
	J-114 (J1-18, J1-10)	5871[2]	0.05[2]	0.125	No
J-A05, J-A07 &J-A02	Yard(9), drains & J-A08	38606[1]	0.83[1]	1.5	No

Summary of Internal Flooding in the Safety Related Structures from Localized Ponding (Cont.)

Building Compartment No. (Arch. Room No.)	Flood Source (Doors)	Maximum Water Inventory (Gallons)	Peak Flood Height (ft.)	Max Allowed Height (ft)	Affect Safe Shutdown EQPT
Auxiliary Building 31A, 31B, 42A,42B, 24 & 25, Elev. 100 ft.	Breezeway (23,24 & 25), F.B. (F1-06), R.B. (A1-07)	20,672	0.05[4]	0.17	No
23 Elev. 88 ft.	A-131 (A1-23) & A-132 (A1-24)	7354	0.073	0.13	No
22B Elev. 77 ft.	same as above	3676	0.42	1.16	No
EPDT Elev. 85.6 ft.	same as above	3676	0.15	3.08	No
22A, Elev. 70 ft.	A-130 (A1- 03) & A-133 (A1-19), Tendon Shaft (55), 22B (AB-11)	31,009	0.074	0.15 to 0.50	No
12 & 13A, Elev. 51.5 ft.	A-C02 (AB-03) & A-C11 (AB-13) & hatches gaps	31,009	0.06	0.10 to 0.50	No
7 thru 11E, Elev. 40 ft.	Stairs, hatches from 51.5 ft & (8) floor drains water inventory from 100 ft.	40,633	1.05	3.51	No
1 thru 6, Elev. 40 ft	ESF sump Drain header check valves	21,208	0[6] 0.52[6]	1 to 2 1 to 2	No No
Fuel Building F-101 & F-102, Elev. 100 ft.	Yard (35, 40, 41)	12,942	0.18	0.5	No
F-104, F-110, Elev. 94 ft.	(4) Floor Drains	11,440	6	6.5	No
Radwaste Building[5] A1 thru A10 & A12, Elev. 100 ft	Yard (52, 53, 54)	9367	0.04	N.R.	No
R-A01, Elev. 88 ft.	A1 thru A10 & A12 (R1-19)	6895	11.95	12	No

Summary of Internal Flooding in the Safety Related Structures from Localized Ponding (Cont.)

Building Compartment No. (Arch. Room No.)	Flood Source (Doors)	Maximum Water Inventory (Gallons)	Peak Flood Height (ft.)	Max Allowed Height (ft)	Affect Safe Shutdown EQPT
MSSS Building C-105 & C-107, Elev. 100 ft	Yard (27 & 28)	3302	0.41	17.5	No
C-A09 & C-A10, Elev. 81 ft.	Stairwell K(CA-01 & CA-06), Penetrations & Hatches at Elev. 100 ft	0	0[7]	1.38	No
EPDT Tunnel	Yard (43 & 44) & Aux Bldg 88ft elev	5225	0.21	3.08	No
CST Tunnel	Yard (31)	5564	0.53	2 to 6	No
DG Fuel Storage Hatches G1H01 & G1H03	Yard (1 & 2)	0	0.15	0[8]	No
DG Fuel Storage Hatches G1H01 & G1H03	Yard (50 & 51)	0	0.11	0[8]	No
Hand hole EZCJFNKKH01	Yard (29)	N.R.	N.R.	N.R.	No
Tendon Gallery	Yard (30)	0	0.37	1	No
Containment Air Lock AZCNDC401	Yard (33)	0	0.44	0.5[9]	No
RWT Valve Pits Y1H01A & Y1H01B	Yard (36 & 37)	0	0.26	0.33[10]	No
RWT Valve Pits Y1H01C	Yard (38)	0	0.24	0[10]	No
Spray Pond Instrument Pits Y1H07A	Yard (39)	1846	3.66	3.77-4.0[11]	No.
Spray Pond Instrument Pits Y1H07B	Yard (56)	628	3.02	3.77-4.0[11]	No.
Tendon Gallery	Yard (42)	0	0.6	0.75	No
Equipment Access Hatch A1H01C	Yard (47)	0	0.28	1.50	No

Notes:

1. Assumes 75% drain capacity for the Switchgear room drains

2. Assumes drains are plugged in the Switchgear rooms

3. Not Required (N.R.)

4. Assumes 50% of floor drains available for the Auxiliary & Fuel Buildings.

5. The Radwaste Building is a non safety related structure but it is included for completeness to show amount of inflow from outdoor ponding. No credit is taken for the floor

drains.

6. The ESF pump rooms in the Auxiliary Building, compartments 1 thru 6, are protected from reverse flow via the drain header check valves and as such any flooding outside the pump rooms, compartments 7 thru 11E, is expected to not cause any flooding inside the pump rooms, see assumption 16. However, for conservatism if one assumes that one or all of the check valves leaked, the maximum flood height in the smallest pump room (HPSI) is calculated which also has the smallest maximum allowable flood height of 1 ft.

7. Credit is taken for the water tight doors, gasketed hatches and penetration seals, see assumptions 17 and 18. Any potential leakage would be removed by the floor drains.

8. Credit is taken for the seals and gasket features of the plugs and vault to preclude water ingression into the DG Fuel tank vault.

9. Credit is taken for the leak tightness of the Containment air lock doors (assumption 22).

10. Credit is taken for the seals and gasket features of the RWT pit hatches and RWT tank penetrations to preclude water migration into the pits and EPDT tunnel (assumption 21).

11. The spray pond instruments pits has flow transmitters housed within them that are not expected to be submerged under the evaluated LIP event. However, given the lack of leak tightness of the hatches and relatively small available margin for submergence, it has been determined that their potential malfunction would not affect safe shut-down of the plant (assumption 23).

6 OVERALL SITE FLOODING RESPONSE

6.1 DESCRIPTION OF OVERALL SITE FLOODING RESPONSE

Permanent protection features such as characterized topographic and man-made features that affected runoff from a LIP event were modeled. Included in the model was the assumption that the Security Owner Controlled Area vehicle barrier system had no spaces between the blocks (i.e., water was not allowed to flow between adjacent blocks). As a result, calculated LIP accumulation depths at entrances to safety-related structures were higher than the inlet elevations of some doors and hatches for limited durations. Potential pathways for water intrusion into buildings/structures through gaps in doors and hatches were evaluated for each unit (FHRR, section 3.2.1).

The key SSCs affected by this water intrusion into buildings/structures phenomenon are the "B" Train 4160 kV Class 1E switchgear and associated components/equipment in the area. A room-by-room internal flooding analysis (Reference 10 and summarized in FHRR, Section 3.2.1) of these critical areas of the plant was performed to assess the potential impact to these key SSCs when water enters several buildings through door thresholds and gaps in hatches. This room-by-room internal flooding analysis simulated (conservatively – worst case) that the floor drains of both "A" and "B" Train Class 1E switchgear rooms were plugged. The NRC audit of the FHRR reviewed the internal flooding analysis and concluded that the information provided by APS was sufficient (Reference 9). Therefore, it was determined there are no adverse effects on key SSCs based on existing permanent passive plant features and the room-by-room internal flooding analysis.

6.2 SUMMARY OF PLANT MODIFICATIONS AND CHANGES

No modifications or changes were necessary to address the LIP event.

7 FLOOD IMPACT ASSESSMENT

7.1 LOCAL INTENSE PRECIPITATION (PATH 2 ASSESSMENT)

7.1.1 Description of Flood Impact

Table 4.1-1 of the MSFHI letter documents the following elevations for each of three PVNGS Units: 957.7 ft for Unit 1, 955.0 ft for Unit 2, and 952.4 ft for Unit 3. These elevations are associated with maximum ponding elevations due to the LIP flooding mechanism. The leakage due to the flood potentially leads to water accumulation in the areas containing "B" Train 4160 kV Class 1E switchgear and associated components/equipment. Site topographic and man-made features (areas of fill) combined with the short duration of the LIP event prevent water accumulation from impacting key SSCs in this area. The available physical margin (APM) calculated from the maximum flood elevation in the switchgear room to the lowest elevation that will impact the switchgear is 0.54 inches based on a conservative internal flooding evaluation (References 2 and 10). The internal flooding evaluation included floor drains, leakage under internal doors, and building layout. Since the maximum flood elevation does not impact any key SSCs, there was no need to determine the consequential flood.

7.1.2 Adequate APM Justification and Reliability Flood Protection

Site topography and man-made fill areas are Type 1 (Reference 7, Appendix B) features that were designed and constructed to mitigate (or minimize) the effects of a probable maximum flood (PMF) from the surrounding washes and ponding effects of a LIP. APS reviewed the information documented in the FHRR against the criteria of NEI 16-05, Revision 1, and confirmed that these passive features meet the criteria of reliability.

The room-by-room internal flooding analysis (Reference 10) performed several cases in which the floor drains were partially credited for mitigating the effects of rain water inflow into the key SSC compartments. However, the controlling case (reported in this document) simulated that the floor drains of both "A" and "B" Trains of the Class 1E switchgear rooms were plugged and, therefore, floor drain reliability is not applicable.

The site peripheral drainage system is assumed blocked at the culverts and, therefore, its reliability is not applicable. There are no active flood protection features.

The APM is considered adequate based on the results for the LIP analysis developed ponding depths and inundation amounts derived from a conservative evaluation performed by Westinghouse/Rizzo (Reference 11 and summarized in the FHRR). The inputs, assumptions, and methods in this LIP analysis were conservative based on the use of an older version of the FLO-2D software. This older version of the software does not have the ability to model the storage of rainwater on roof tops, and control the

rainwater discharged from the roofs onto the surrounding grid elements through scuppers/downspouts. This resulted in modeling the rainwater falling on the roofs and immediately pouring off the roofs in all directions into the surrounding grids. Conservative higher ponding depths adjacent to the Category 1 buildings were calculated by the LIP model, which increased flow rates into the buildings. Also, limited actual survey data was included in the model, in lieu of more detailed survey information, resulting in some inaccuracies in some of the grid element elevations. The impacts related to Associated Effects (AEs) were determined to be negligible (FHRR, section 3.2.1.3).

Finally, transient ponding effect duration (or flood event duration) from a LIP reduces to a surface elevation of zero feet or trending towards zero feet at approximately 7 hours. This ponding duration is based on the hydrographs generated for the critical pathways (Units 1, 2, and 3 – pathways 10 or 11 through 21) around the safety-related buildings in the powerblock (Reference 11, Figures A-10 through A-20 [Unit 1], A-64 through A-74 [Unit 2] and A-117 through A-123 [Unit 3]).

7.1.3 Adequate Overall Site Response

No manual actions are required for this flood mechanism at PVNGS.

8 CONCLUSION

Conclusions from the FHRR (section 4.4) determined that no plant response (either operator or mitigation actions) is required to ensure plant safe shutdown equipment will be capable of performing their key safety functions. The FHRR further states that no additional actions or interim evaluations were planned to be taken. The effect of the LIP event was not bounded by the CDB of the plant. This was the only flooding mechanism that was not bounded.

The site passive permanent flood protection features were determined to be reliable, which include the site topography and man-made fill areas that mitigate the effects of LIP in and around the powerblock. There are no active flood protection features or required site response.

APS determined that all vulnerabilities due to the LIP mechanism are considered to be addressed by protection, and APM was demonstrated to be adequate to protect key SSCs. This evaluation verified the reliability of the flood protection features. This places PVNGS in Path 2 to address this unbounded flooding mechanism.

This completes the actions related to external flooding required by Reference 1.