



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

May 18, 2016

Mr. Randall K. Edington
Executive Vice President
Nuclear/CNO
Arizona Public Service Company
P.O. Box 52034, MS 7602
Phoenix, AZ 85072-2034

SUBJECT: NUCLEAR REGULATORY COMMISSION REPORT FOR THE AUDIT OF ARIZONA PUBLIC SERVICE COMPANY'S FLOOD HAZARD REEVALUATION REPORT SUBMITTAL RELATED TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1-FLOODING FOR: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3 (CAC NOS. MF5546, MF5547 AND MF5548)

Dear Mr. Edington:

The purpose of this letter is to provide you with the final audit report, which summarizes and documents the U.S. Nuclear Regulatory Commission's (NRC) regulatory audit of Arizona Public Service Company's (APS, the licensee) Flood Hazard Reevaluation Report (FHRR) submittal related to the Near-Term Task Force Recommendation 2.1-Flooding for Palo Verde Nuclear Generating Station, Units 1, 2 and 3 (Palo Verde). By letter dated July 7, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15177A149), the NRC informed you of the staff's plan to conduct a regulatory audit of APS's FHRR submittal for Palo Verde. The audit was intended to support the NRC staff review of the licensee's FHRR by providing the NRC staff with a better understanding of the analyses of the flooding hazards presented in the FHRR and the subsequent issuance of an interim hazard letter and staff assessment documenting the staff's review.

The audit was conducted over multiple sessions on August 2015 and was performed consistent with NRC Office of Nuclear Reactor Regulation, Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008, (ADAMS Accession No. ML082900195). The details of this audit report have been discussed with Mr. Michael DiLorenzo of your staff.

R. Edington

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If you have any questions, please contact me at (301) 415-3809 or by e-mail at Juan.Uribe@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read 'J. Uribe', written in a cursive style.

Juan Uribe, Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos. 50-528, 50-529 and 50-530

Enclosure:
Audit Report

cc w/ encl: Distribution via Listserv



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

AUDIT REPORT BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOR THE AUDIT OF ARIZONA PUBLIC SERVICE COMPANY'S

FLOOD HAZARD REEVALUATION REPORT SUBMITTAL

RELATED TO THE NEAR-TERM TASK FORCE RECOMMENDATION 2.1-

FLOODING FOR: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2 AND 3

DOCKET NOS. 50-528, 50-529, AND 50-530

BACKGROUND AND AUDIT BASIS:

By letter dated March 12, 2012, 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 license" (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 Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident. Recommendation 2.1 in that document recommended that the staff issue orders to all licensees to reevaluate seismic and flooding for their sites against current NRC requirements and guidance. Subsequent Staff Requirements Memoranda (SRM) associated with Commission Papers SECY 11-0124 and SECY-11-0137, instructed the NRC staff to issue requests for information to licensees pursuant to 10 CFR 50.54(f).

By letter dated December 12, 2014 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML14350A466), Arizona Public Service Company (APS, the licensee) submitted its Flood Hazard Reevaluation Report (FHRR) for Palo Verde Nuclear Generating Station, Units 1, 2 and 3 (Palo Verde). The staff has completed a regulatory audit of the licensee to better understand the development of the FHRR. Specifically, the audit sought to allow staff to better understand analyses (and supporting documentation) for areas such as: selection of model input(s) and parameters, calculations and methodologies, geographical characteristics and plant topography, among others. This audit summary is completed in accordance with the guidance set forth in NRC Office of Nuclear Reactor Regulation, Office Instruction LIC-111, "Regulatory Audits," dated December 29, 2008 (ADAMS Accession No. ML082900195).

By letter dated October 8, 2015 (ADAMS Accession No. ML15280A022), the staff issued an interim hazard letter, which summarized its review of the re-evaluated flood-causing mechanisms described in the FHRR.

Enclosure

AUDIT LOCATION AND DATES:

The audit was completed over multiple sessions over a period of 1 month, as described below:

- August 20, 2015, from 1:00pm to 3:00pm- webinar session
- August 26, 2015, from 4:00pm to 5:00pm- conference call

AUDIT TEAMS:

Title	Team Member	Organization
Team Leader, NRR/JLD	Juan Uribe	NRC
Branch Chief, NRO/DSEA	Christopher Cook	NRC
Technical Lead	Laura Quinn-Willingham	NRC
Technical Support	Mike Lee	NRC
Dept Leader, Nuclear Regulatory Affairs	Thomas Weber	APS
Director, Fukushima Project	Michael Powell	APS
Shift Manager, Operations	Randall Eimar	APS
Sr Engineer, Design Civil	Warren Jones	APS
Sr Consulting Engineer, Design Mechanical Administration	Hamid Mortazavi	APS
Director, Design Engineering Administration	Ken House	APS
Sr Engineer, Contractor	John Conly	APS / Certrec
Sr Consulting Engineer, Design Mechanical Administration	Winston Borrero	APS
Director, Nuclear Regulatory Affairs	George Andrews	APS
Sr Engineer, Licensing	Carl Stephenson	APS
Section Leader, Nuclear Regulatory Affairs	Mike Dilorenzo	APS
Engineer III, Design Civil	Will Nau	APS
Dept Leader, Design Mechanical Administration	Rex Meeden	APS
Sr Engineer, Licensing	Paul Hom	APS

DOCUMENTS AUDITED:

Attachment 1 of this report details the documents that were reviewed by the NRC staff, in part or in whole, as part of this audit. The documents were located in an electronic reading room (ERR) during staff review. The documents, or portions thereof, that were used by the NRC staff as part of the technical analysis and/or as reference in the completion of the staff assessment, will be submitted by the licensee and docketed for completeness of information, as necessary. These documents are identified in Table 1.

AUDIT ACTIVITIES:

In general, the audit activities consisted mainly of the following actions:

- Review background information on site topography and geographical characteristics of the watershed.
- Review site physical features and plant layout.
- Understand the selection of important assumptions and parameters that would be the basis for evaluating the individual flood causing mechanisms described in the 50.54(f) letter.
- Review model input/output files to computer analyses, such as the Hydrologic Engineering Center (HEC) River Analysis System (RAS) and HEC- Hydrologic Modeling System (HMS) to have an understanding of how modeling assumptions were programmed and executed.

Attachment 2 of this report contains Table 1, "Technical Topic of Discussion," which provides more detail and summarizes specific technical topics (and resolution) of important items that were discussed and clarified during the audit. The items discussed in Table 1 may be referenced/mentioned in the staff assessment in more detail.

EXIT MEETING/BRIEFING:

On August 26, 2015, the NRC staff closed out the discussion of the technical topics described above.

1. Attachment 1- List of References Reviewed by the NRC staff
2. Attachment 2- Information Needs Discussed During Audit

**ATTACHMENT 1
LIST OF REFERENCES REVIEWED BY NRC STAFF**

Calculation (Calc) Package 13-5002 F-02
ERR file "Palo Verde FHRR Audit follow-up to NRC Conference Call on 8-20-2015.pdf"
FLO-2D Grid Cell Numbers Response
Files "CN396-A00005.R000 (F-02 Effects of LIP)" Parts 1 and 2.
AeroTech (2013a) CN396-A00024.
Letter 484-08610.
Confirmatory manual survey topographic elevation(s) "Unit 1 Elevations for LIP," "Unit 2 Elevations for LIP," "Unit 3 Elevations for LIP," "Unit 1 – 2 – 3 Topo – Confirmatory Manual Survey Data," and "Manual Survey Key for Elevations."
APS Study 13-MS-A135
CN396-A00023.R000-Refined LIP-based models of the PVNGS Units, developed by URS Corporation.
ERR file "Palo Verde FHRR Audit follow up to NRC Conference Call on 8-20-2015.pdf"

**ATTACHMENT 2
TECHNICAL TOPICS OF DISCUSSION-PALO VERDE FHRR AUDIT**

Table 1: Technical Topics of Discussion

Info Need No.	Information Need Description	Post Audit Status
1	<p><u>Local Intense Precipitation – Estimated Probable Maximum Flood Elevations</u> Evaluation of the effects of flooding of local intense precipitation (LIP) on water surface elevations at the Palo Verde Nuclear Generating Station (PVNGS) site is requested in the 50.54 letter. In the PVNGS Flood Hazard Reevaluation Report (FHRR), the licensee described a LIP analysis in Section 3.2.1 that relied on two-dimensional flow modeling, using FLO-2D, to estimate flood water surface elevations and maximum flood depths at a set of powerblock door/hatch locations. Flood depth resulting from this modeling (Case 4) were graphically depicted in Figure 3-3 of the FHRR. Comparison of the reevaluated flood depths and the current licensing basis were provided in Table 4-3 of the FHRR. In Section 3.2.1.5 of its FHRR, the licensee noted that Case 4 produced a result for which there was a localized (transient) accumulation of LIP-related flood water adjacent to certain power block structures leading to water ingress into those structures. In Section 3.2.1.6 of its FHRR, the licensee acknowledged that it had conducted a room-by-room analysis of the impact of the water ingress on structures, systems and components and concluded that internal flooding would not impact safe shutdown equipment.</p>	<p>In response to this information need the licensee provided the following responses:</p> <p>a. Related to how the water depths on-site were derived, the licensee stated that the transient water accumulation depths of 0.19 to 0.63 feet (ft), presented in FHRR Table 4-3, were based on the results provided in licensee’s ERR Calculation (Calc) Package 13-5002 F-02, Tables 7-1 to 7-3, Case 4. The licensee stated that these depths are conservative estimates of the maximum range of transient water accumulation depth during the LIP flood event, where the design-basis LIP elevation would be exceeded and migration of water into structures at the identified pathways is expected. The licensee stated that the flood depths reported in the FHRR excluded pathways 31 (a low grade area in the North Yard) and 55 (an isolated open space, the Tendon Shaft) for all units. The licensee also stated that pathways 18 thru 25 were excluded for Unit 2 due to discrepancies in the modeling and specific runoff conditions (the area was not susceptible to ponding).</p> <p>For the three PVNGS reactor units, the licensee reported in ERR file “Palo Verde FHRR Audit follow-up to NRC Conference Call on 8-20-2015.pdf” the following maximum transient flood elevations (ft NGVD29):</p> <ul style="list-style-type: none"> • Unit 1: 957.73 • Unit 2: 954.80

Info Need No.	Information Need Description	Post Audit Status
	<p><u>Request:</u> In connection with the 50.54 request, it was expected that the FHRR would include a description of the specific location(s) where the estimated flooding might occur as the result of a LIP event and specific flood depths or water surface elevations at these location(s). In the absence of that information, the licensee is requested to provide the following information about the values of Reevaluated Water Level for Maximum Transient Water Accumulation Depths at Safety-Related Structures for the LIP presented in FHRR Table 4-3:</p> <ol style="list-style-type: none"> Describe how the water depths provided in FHRR Table 4-3 were derived. In particular how are the values presented in FHRR Table 4-3 related to the maximum flood depths presented in the ERR in Calc Package F-02 Tables 7-1 to 7-3 Identify the locations of the “localized sections near the powerblock” at which water depths are reported in FHRR Table 4-3 to be 1.0 to 1.75 ft below plant grade. Provide a table of FLO-2D model grid cell numbers corresponding to the 165 Door/Hatch locations listed in Tables 7-1 to 7-3 of ERR Calc Package F-02. In reference to Calc Package F-02, the document is purported to be 272 pages long. However, there are only 99 pages present in the version found in the ERR. The licensee is requested to provide missing pages 100-272 of Calc Package F-02. 	<ul style="list-style-type: none"> • Unit 3: 952.28 <p>The licensee also reported that a room-by-room flood analysis indicated that no safety-related structures are affected by the transient LIP-based flooding scenario.</p> <ol style="list-style-type: none"> The licensee stated that the “localized sections near the powerblock”, referred to in FHRR Table 4-3, were areas with flooding durations greater than about 4.25 hours (hrs). During the August 20, 2015, audit, the licensee produced a figure, designated “Figure E”, which illustrated the spatial variation in the duration of the LIP flooding and the locations of long-term ponding. With reference to Figure E, the licensee stated that the <u>transient</u> flood depths reported in FHRR Table 4-3 (discussed in a. above) were from areas with flooding durations less than about 3 hrs. In response to the information need request related to the 165 Door/Hatch locations, the licensee provided in the ERR a list of pathway numbers for each unit and the corresponding FLO-2D model grid cell numbers as “FLO-2D Grid Cell Numbers Response.” In response to the information need request concerning Calc Package F-02, the licensee placed in the ERR a complete version of Calculation No. 13-5002 F-02 that included the identified missing pages, as files “CN396-A00005.R000 (F-02 Effects of LIP)” Parts 1 and 2. <p>The NRC staff had additional questions regarding the maximum transient flood elevations provided in the response by the licensee. These are described in info need #4 and request confirmation of the pathways excluded by the licensee when reporting maximum</p>

Info Need No.	Information Need Description	Post Audit Status
		<p>(transient) flood depths and elevations. The NRC staff requested that the figure designated as "Figure E" be placed on the docket to support the development of the PVNGS staff assessment.</p> <p>The NRC staff concluded that the information provided by the licensee in response to this information need request was sufficient.</p>
<p>2</p>	<p><u>Local Intense Precipitation – Topographic Data</u> Evaluation of the effects of flooding of LIP on water surface elevations at the PVNGS site is requested in the 50.54 letter. In its FHRR, flood depths reported by the licensee in PVNGS Calc Package F-02, Tables 7-1 to 7-3 were significantly higher (about 0.8 ft higher) around certain portions of Unit 2 than around the corresponding areas of Units 1 and 3. The licensee identified "sustained ponding" in several areas of the model, including areas adjacent to Unit 2, and attributed this ponding to inaccuracies in the site topographic data, citing AeroTech (2013a) (Calc Package F-02, page 75 of 271). The licensee stated that the accuracy tolerance reported for the topographic data was +/-0.237 ft. The licensee also stated, based on a manual survey of the powerblock site (PVNGS, 2013b), that such ponding "is not possible" and dismissed the simulated results as an artifact of the topographic data. In the internal flooding calculations, the licensee noted that it did not use the flooding depths at Unit 2, but applied the flood depths at Units 1 and 3 instead (Calc Package F-02, page 75 of 271).</p>	<p>The licensee provided the following information in response to the staff's information need.</p> <ul style="list-style-type: none"> a. AeroTech (2013a) was provided via the ERR with the file name CN396-A00024. b. PVNGS (2013b) was provided via the ERR through Letter 484-08610. In addition, confirmatory manual survey topographic elevation data were provided via the ERR as "Unit 1 Elevations for LIP," "Unit 2 Elevations for LIP," "Unit 3 Elevations for LIP," "Unit 1 – 2 – 3 Topo – Confirmatory Manual Survey Data," and "Manual Survey Key for Elevations." c. In reference to staff questions concerning the estimated errors associated with the topographic data obtained from the manual survey, citing from the Certificate of Calibration, Specifications/ Accuracy (designated "LIMITED USE"), the licensee reported that the manual survey accuracy was calculated to ± 30 arc seconds (± 0.001 inches). By comparison, the licensee noted that the accuracy of the flyover aerial survey data was ± 0.237 ft. d. In reference to staff questions concerning the identification of differences (if any) between the topographic data from AeroTech

Info Need No.	Information Need Description	Post Audit Status
	<p><u>Request:</u> In connection with the 50.54 request, the licensee is requested to provide the following information:</p> <ul style="list-style-type: none"> a. the site topographic data from AeroTech 2013a, which was the basis for the FLO-2D LIP model; b. the site topographic data from the manual survey, PVNGS 2013b; c. estimated errors for topographic data from the manual survey; d. identification of differences in the topographic data from AeroTech (2013a) and PVNGS (2013b); e. a description of the analysis used to conclude that the simulated sustained ponding is not possible; f. justification for using known inaccurate topographic data in the FLO-2D simulations used as the basis for the FHRR; g. Copies in the ERR of AeroTech (2013a) and PVNGS (2013b). 	<p>(2013a) and PVNGS (2013b) references, the licensee identified two areas for which there were differences. They were the area between the Diesel Generator and Operations Support Buildings (identified by the licensee as potential flooding pathways 8 to 12) and the breezeway between the Auxiliary and the Turbine Buildings (identified by the licensee as potential flooding pathways 18 to 26 and 32). The licensee also deferred additional discussion of this topic in its responses to another staff information request, as described below.</p> <ul style="list-style-type: none"> e. In response to staff questions during the audit regarding the description of the analysis used by the licensee to conclude that the sustained ponding is not possible based on the FLO-2D modeling simulations, the licensee responded that its decision was based on both plant walkdowns, past observation of surface drainage during rain events, and the results of manual (topographic) surveys at certain locations within the powerblock. The specific area corresponds to a common passageway adjacent to both the Diesel Generator and Operations Support buildings at Units 2 and 3 (designated as Pathways 8, 9 and 10). The licensee noted that the area is both described and evaluated in Calc Package F-02. A licensee-provided photograph, designated as "Figure C", illustrated what one area of the pathway under discussion looks like in plan map view. The licensee stated that the FLO-2D model grid cell elevations in this area were corrected using the manual survey data. The licensee showed the model results ("Figure A" and "Figure B" in the licensee's response) for Pathway 9 at the Unit 2 location before and after the correction. e. In reference to the NRC staff's request for the licensee to provide a justification or explanation for its decision to use known

Info Need No.	Information Need Description	Post Audit Status
		<p>inaccurate topographic data in the FLO-2D simulations that were later used as the basis for the FHRR LIP estimates, the licensee noted that it was not known until much later in the project that a portion of the model in the congested areas of the powerblock was susceptible to so-called "shadowing effects" from the buildings, leading to lower topographical resolution in the aerial survey. To address the resolution issue, the licensee reported that it conducted manual (field) surveys to improve the topographic data for the model for the three units when the results of the hydrographs revealed large discrepancies between the units.</p> <p>The licensee noted that most data resolution discrepancies were resolved except for a few areas/locations within the Unit 2 breezeway. Based on the plant walkdown, the manual survey results, and past observations of surface drainage during rain events, the licensee concluded that the breezeway area in question was determined to not be susceptible to sustained ponding during a LIP event. Because the as-built designs of the three power reactor units are substantially the same (identical), the licensee reasoned, using engineering judgment, that these similarities between the three units allowed the use of the other two unit's (Units 1 and 3) results to examine the areas of large discrepancies at Unit 2.</p> <p>In support of its decision, the licensee relied on a contractor study (APS Study 13-MS-A135) that consisted of a room by room analysis that utilized a bounding flood depth value for all three units, considering grade and curb features, where several of the pathways used the larger Unit 2 flood depth value and in some pathways, a corrected flood value between the three units was used, resulting in no effect to equipment necessary for achieving a safe shut down condition/state.</p>

Info Need No.	Information Need Description	Post Audit Status
		<p>Lastly, the licensee noted that more refined LIP-based models of the PVNGS Units, subsequently developed by URS Corporation and documented in CN396-A00023.R000, utilizing all of the manual surveys taken, showed significantly smaller values of peak flood depths and duration, resulting in additional margin in the evaluations performed in APS Study 13-MS-A135 (the licensee referred the staff to the FHRR margin discussion at p. 29).</p> <p>Based on the licensee's initial explanation, as well as discussion in connection with Information Item 2, the staff asked the licensee to provide additional explanation of its reasoning for the acceptability of applying "engineering judgment" to use flood modeling results from Units 1 and 3 and apply those to flooding simulations for Unit 2. In response to a staff request, the licensee prepared a supplemental description of its reasoning concerning the use of the Units 1 and 3 analog data at Unit 2, and provided to staff the flood depths used in the room-by-room analysis of the effects of water ingress to safety structures during the LIP event. In summary, the licensee explained that the designs of the three units at the PVNGS are substantially the same. Accordingly the licensee reasoned that all three units would have the same response to a LIP event. The staff reviewed the licensee's explanation of its engineering reasoning and found it acceptable.</p> <p>The NRC staff concluded that the information provided by the licensee in response to this information need request was sufficient.</p>
3	<p><u>All Flood Causing Mechanisms – Comparison of Reevaluated Flood Hazard with Current Design Basis</u> The FHRR for the PVNGS site provides comparisons of the reevaluated flood hazards with the current licensing</p>	<p>In response to this information need the licensee noted that the CLB and the CDB had been used interchangeably in the PVNGS FHRR as they were viewed to be synonymous. In response, the staff noted</p>

Info Need No.	Information Need Description	Post Audit Status
	<p>basis (CLB) for all flood-causing mechanisms described in Section 3.0. Table 4-3 of the FHRR is a summary of this comparison. However, the 50.54(f) letter requested a comparison of the reevaluated flood hazard with the “current design basis” (CDB), not the CLB. It would also appear that the term CLB is used repeatedly throughout the FHRR text when the licensee was intending to refer to the CDB.</p> <p>The licensee is requested to provide clarification regarding the inconsistencies identified in the FHRR text and table(s) with regard to the comparison of the reevaluated flood hazard to the CDB and submit a revised hazard comparison consistent with the instructions provided in the 50.54(f) letter.</p>	<p>that the terms have distinct regulatory meanings but that the issue was resolved.</p> <p>The NRC staff concluded that the information provided by the licensee in response to this information need request was sufficient.</p>
4	<p><u>ERR Files and LIP Reevaluated Elevations</u> Following the recent PVNGS audit, the staff had a question concerning new information placed in the ERR by the licensee in response to a subsequent staff query. The licensee’s assistance is requested in clearing-up the confusion concerning the new information in the ERR.</p> <p>ERR file “Palo Verde FHRR Audit follow up to NRC email from 8-26-2015.pdf” indicates that the flood depths of 0.19 to 0.63 ft reported in FHRR Table 4-3 were based on pathways 1 thru 30 and 32 thru 54 (i.e., pathways 31 and 55 were excluded for all three units) with the exception of Unit 2, for which pathways 18 thru 25 were also excluded. Tables 7-1 to 7-3 (Case 4) in Calc</p>	<p>This information need was transmitted to the licensee via an email from the NRC staff on September 16, 2015, as a follow-up to information need No. 1, above. The licensee provided a response via email to the staff on September 17, 2015.</p> <p>In its response, the licensee stated that the flood depths reported in FHRR Table 4-3 were based on pathways 1 thru 30 and 32 thru 54 (i.e., pathways 31 and 55 were excluded for all three units) with the exception of Unit 2, for which pathways 18 thru 25 were also excluded.</p> <p>With reference to the maximum water surface elevations at each of the units, the licensee described the basis for the differences in the elevations provided in ERR file “Palo Verde FHRR Audit follow up to NRC Conference Call on 8-20-2015.pdf” and the maximum elevations in Calc Package F-02, Tables 7-1 to 7-3 for Case 4. The licensee also stated in its response that the maximum Case 4 elevations in</p>

Info Need No.	Information Need Description	Post Audit Status
	<p>Package F-02 are identified as the source of the flood depth values.</p> <p>ERR file "Palo Verde FHRR Audit follow up to NRC Conference Call on 8-20-2015.pdf" provides the maximum water surface elevation at each unit and identifies Tables 7-1 to 7-3 (Case 4) in Calc Package F-02 as the source for these values. However, this document does not indicate which pathways were excluded in determining the maximum water surface elevations. For example, it appears to the staff that the pathways 26 and 32 at Units 2 and 3 were excluded in determining the maximum water surface elevations.</p> <p>It is requested that the licensee confirm the pathways that were excluded for each unit when reporting (a) flood depths in FHRR Table 4-3, and (b) maximum water surface elevations in ERR file "Palo Verde FHRR Audit follow up to NRC Conference Call on 8-20-2015.pdf". Identify and justify any differences in the excluded pathways for flood depth and water surface elevation.</p>	<p>Tables 7-1 to 7-3 are acceptable replacements for the maximum elevations provided in ERR file "Palo Verde FHRR Audit follow up to NRC Conference Call on 8-20-2015.pdf".</p> <p>Based on this information, the staff concluded that, for the three PVNGS reactor units, the following maximum transient flood elevations (ft NGVD29), taken from results presented in ERR Calc Package 13-5002 F-02, Tables 7-1 to 7-3, Case 4, are appropriate:</p> <p>Unit 1: 957.73 Unit 2: 955.04 Unit 3: 952.37</p> <p>The NRC staff concluded that the information provided by the licensee in response to this information need request was sufficient.</p>

Additional Interactions with the licensee to capture in the audit summary outside of the table

We had a clarification call on August 26, 2015. On August 25, 2015, the staff sent an email to the licensee requesting a call to discuss FHRR Table 4-3. Specifically the staff requested the following clarification:

"Specifically, the table provides a range of flood depth values for LIP, however, the NRC is in the process of completing the interim hazard letters which provides maximum flood elevations at the site. Therefore, the staff wants to discuss and make sure it understands, the correlation (for LIP) regarding the depth values vs. site elevations needed for the Tables."

On August 26, 2015, the staff held a teleconference call with the licensee to get clarification on the values presented in its FHRR for LIP. It was unclear if the values in the FHRR for the reevaluated LIP hazard in the FHRR were depths or elevations. The 50.54(f) letter requested that licensees prepare and submit to the NRC reevaluated elevations for flooding hazards, unless they can be justifiably screened. During the call the licensee clarified the values in the FHRR were in fact depths and committed to providing the elevations for use in the interim staff response letter in the ERR. The requested elevation information for each unit was placed in the ERR:

Unit 1: 957.73

Unit 2: 955.04

Unit 3: 952.37

We also had the following clarifications via email.

In the course of reviewing the documentation uploaded to the ERR as a result of the August 20, 2015, audit and the August 26, 2015, teleconference, the staff noticed that the documents titled "Palo Verde FHRR Audit, follow up to NRC Conference Call on 8-20-2015" and "Palo Verde FHRR Audit, follow-up to NRC email from 8-25-2015" appeared to contain the same information. In addition, the NRC staff noticed that the FHRR did not contain the CDB for the Hassayampa River, which was needed in a referenceable document for the interim staff response letter. On September 9, 2015, the NRC staff sent an email requesting the following clarifications.

1. A verification/confirmation regarding the last two ERR docs uploaded correspond to the requests for which they were created since they appear to be duplicate items. For background, the two documents relate to:
 - a. the engineering judgement/technical basis for Unit 2 elevations as derived from Unit 1 and Unit 3 in-situ survey performed to determine elevations
 - b. the correlation (for LIP) regarding the depth values vs. site elevations needed for the NRC [Mitigating Strategies Flood Hazard Information] MSFHI Tables. The staff is looking for the Max elevations for each unit including information about the flow paths that were excluded (which I believe are solely on the breezeway).

2. A verification/confirmation about the CDB hazard elevation for the Hassayampa River to verify if this value was intentionally omitted from the FHRR for security/ safety-related reasons. All other elevations for washes/Rivers were included in the FHRR Section 2.2.2 and/or Table 2-2. If the value can be made public, then the NRC will proceed with the development/issuance of the MSFHI letter in a public forum. If the value is to remain from public domain, then the staff wants to understand the reason and proceed with a redacted table for Palo Verde, if applicable.

The licensee responded on September 9, 2015, by providing which document was to correspond to which topic outlined in the clarification email and corrected the ERR by uploading the correct version of Palo Verde FHRR Audit, follow up to NRC Conference

Call on 8-20-2015" for the staff to review. The also indicated that the design-basis for the Hassayampa River was not security-related information and provided the staff with the design-basis value. The licensee's response was placed on the docket under ADAMS Accession No. ML15266A226.

R. Edington

-2-

If you have any questions, please contact me at (301) 415-3809 or by e-mail at Juan.Uribe@nrc.gov.

Sincerely,

/RA/

Juan Uribe, Project Manager
Hazards Management Branch
Japan Lessons-Learned Division
Office of Nuclear Reactor Regulation

Docket Nos. 50-528, 50-529 and 50-530

Enclosure:
Audit Report

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ARivera-Varona, NRO	KErwin, NRO	ACampbell, NRO
MWillingham, NRO	MLee, NRO	BHarvey, NRO
MShams, NRR		

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NAME	JUribe	SLent	ARiveraVarona	MShams	JUribe
DATE	05/17/2016	05/17/2016	05/18/2016	05/18/2016	05/18/2016

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