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Douglas R. Bauder
Site Vice President & Station Manager
San Onofre Nuclear Generating Station

10CFR 50.54(f)

November 26, 2012

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: **Docket Nos. 50-361 and 50-362**
Southern California Edison's Flooding Walkdown 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.

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.

2) NRC Letter, Endorsement of Nuclear Energy Institute (NEI) 12-07, "Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features", dated May 31, 2012.

Dear Sir or Madam:

On March 12, 2012, the NRC issued Reference 1 to all power reactor licensees and holders of construction permits in active or deferred status. Enclosure 4 of Reference 1 contains specific Requested Actions, Requested Information, and Required Responses associated with Recommendation 2.3 for Flooding Walkdowns. Specifically, Enclosure 4 of Reference 1 states that within 180 days of the NRC's endorsement of the walkdown process, each addressee will submit its final response, including a list of any areas that are unable to be inspected due to inaccessibility and a schedule for when the walkdown will be completed.

Enclosure 2 to this letter contains Southern California Edison's flooding walkdown response for San Onofre Nuclear Generating Station (SONGS) Units 2 and 3, consistent with the NRC-endorsed guidance (Reference 2).

This letter contains regulatory commitments. The specific regulatory commitments and the scheduled due date for completion are identified in Enclosure 1 of this letter.

Should you have any questions concerning the content of this letter, please contact Licensing Manager, Linda Conklin, at (949) 368-9443.

P.O. Box 128
San Clemente, CA 92672
(949) 368-9275 PAX 89275
Fax: (949) 368-9881
Doug.Bauder@sce.com

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

Executed on 11/26/2012

By: [signature]

Douglas R. Bauder
Site Vice President and Station Manager

cc w/ encl:
- Director, Office of Nuclear Reactor Regulation
- E. E. Collins, Regional Administrator, NRC Region IV
- G. G. Warnick, NRC Senior Resident Inspector, San Onofre Units 2 and 3
- R. Hall, NRC Project Manager, San Onofre Units 2 and 3
- B. Benney, NRC Project Manager, San Onofre Units 2 and 3

Enclosure 1:
List of Commitments and Schedule for Implementation of Flooding Walkdown Results

This table identifies actions discussed in this letter for which Southern California Edison commits to perform. Any other actions discussed in this submittal are described for the NRC's information and are not commitments.

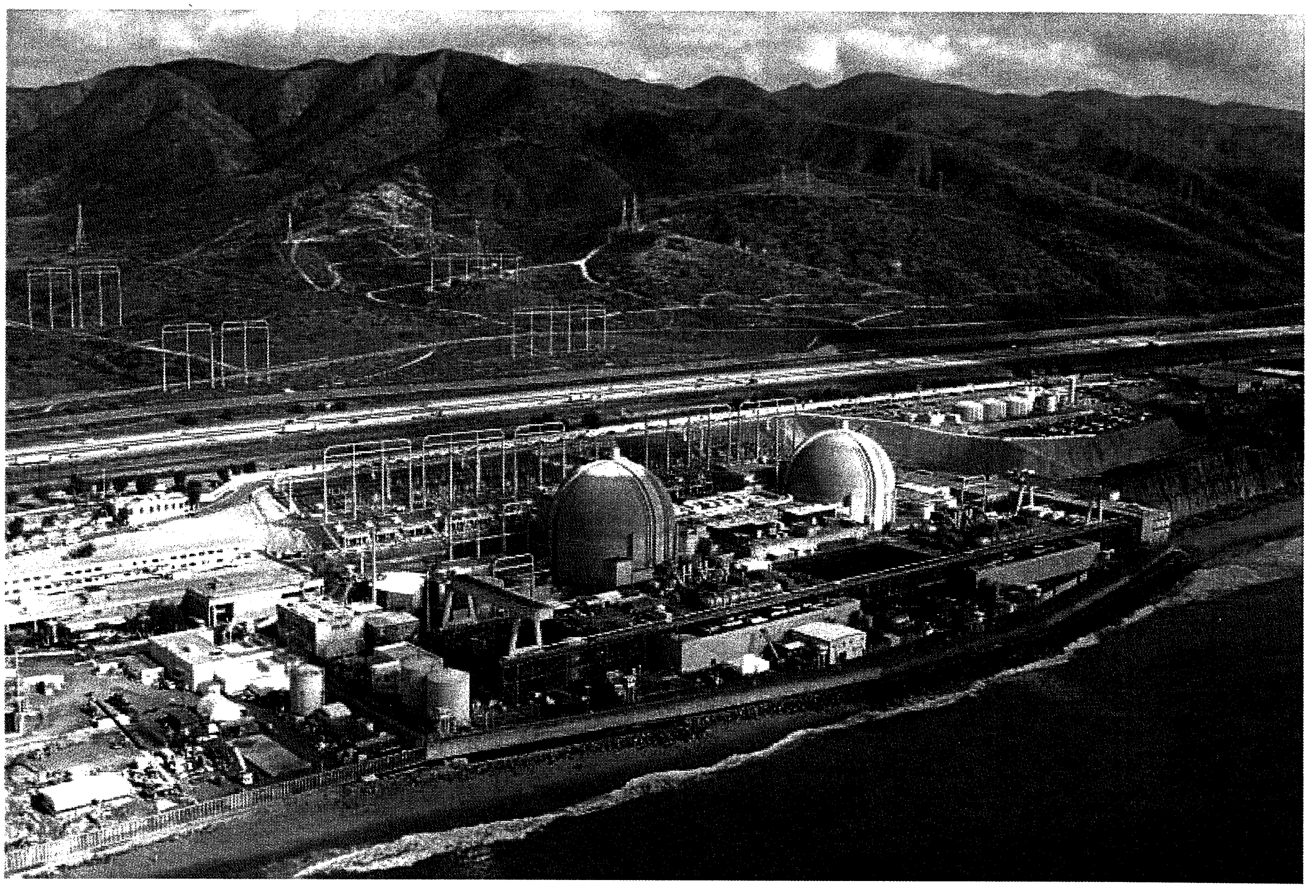
Commitment	Action Type		Scheduled Due Date
	One-Time	Sustainable	
Complete inspection of all restricted access features as identified in the SONGS Flood Walkdown Report	X		07/01/2013
Resolve deficiencies as identified in the SONGS Flood Walkdown Report	X		07/01/2013

Enclosure 2:
San Onofre Nuclear Generating Station
Flood Walkdown Report

San Onofre Nuclear Generating Station

Flood Walkdown Report

Fukushima Near-Term Task Force – Section 2.3, Flooding Walkdowns



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Pepared By:

Southern California Edison and CH2MHILL

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Introduction

In response to the nuclear fuel damage at Fukushima Dai-Ichi power facility resulting from an earthquake and subsequent tsunami, the United States Nuclear Regulatory Commission (NRC) requested information pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 50.54 (f). As part of this request, Southern California Edison's San Onofre Nuclear Generating Station (SONGS) was required to perform flood feature walkdowns to field-verify that plant features credited in the current licensing basis (CLB) for protection and mitigation from external flood events are available, functional, and properly maintained [1].

Purpose

This document provides a summary of the field assessment of external flood-protection and mitigation capabilities in accordance with NRC Recommendation 2.3 of SECY 11-0137 [2] and Enclosure 4 of the March 12, 2012, *Request for Information Pursuant to Title 10 CFR 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* (50.54 (f) letter [3]).

The SONGS flood protection walkdown was designed to verify that permanent and/or temporary structures, systems, components (SSCs), and procedures needed during a flood event are acceptable and capable of performing their design function as credited in the CLB. The walkdown also served as a means to verify visually that plant modifications implemented since original construction, such as security barrier installations, do not adversely affect plant flooding protection [1].

Requested Content

As specified in the NRC-endorsed Nuclear Energy Institute (NEI) 12-07 [Rev.0] *Guidelines for Performing Verification Walkdowns of Plant Flood Protection Features* (NEI 12-07 [1]), Appendix D provides additional information on the specific information requests in Enclosure 4 of the NRC's March 12, 2012, 50.54(f) letter. Eight sections were identified as requiring response; these can be found below in Sections A through H.

Section A: Design Basis Flood Hazard Level(s)

Requested Information

Describe the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress.

SONGS Response

The SONGS site is located on the southern California coast of the United States on the Pacific Ocean and is situated on a coastal plain at the base of the western foothills of the Santa Margarita Mountain Range. There are no perennial streams in the general vicinity of the plant site. The power block finish grade elevation is +30.0 feet mean lower low water (mllw), which is based on the plant's benchmark 1977 reference elevation [4].

The mean annual temperature in the coastal plain region is 61°F, with a mean minimum temperature of 42°F in January. Annual rainfall ranges from 10 to 16 inches, with 90 percent of the annual total occurring during the months of November through April [4].

Descriptions of the design basis flood hazard level(s) for all flood-causing mechanisms, including groundwater ingress, are detailed in the *San Onofre 2 & 3 Updated Final Safety Analysis Report* (UFSAR) [4], Section 2.4. Additional information from other CLB documents is referenced as needed.

The following subsections provide the information requested by the NRC for each flood-causing mechanism as detailed in the current licensing basis documents. In a separate activity, SONGS is performing an external flood hazard reevaluation as part of a response to SECY 11-0137 Item 2.1 of the 50.54(f) letter request for information, which will evaluate the current licensing basis.

Local Intense Precipitation (Design Basis Flood Hazard). The 6-hour, 1-square-mile probable maximum precipitation (PMP) event causes the highest flood level on the SONGS site and is therefore used as the design basis flood event [4]. The volume of the PMP was 7 inches in 1 hour and 12.25 inches in 6 hours.

Maximum Postulated PMP Flood Elevation. The maximum postulated PMP flood elevation is +31.0 feet mllw in the SONGS Unit 2 and Unit 3 Power Block [4].

Key Assumptions. All catch basins for the subsurface drainage system, roof drains, and exposed floor drains are assumed plugged for the purpose of determining water surface elevations arising during the thunderstorm PMP event [4].

Methodology Used to Develop the Design Basis Flooding Hazard. U.S. Weather Bureau Hydrometeorological Report (HMR) 36 [5] was used to calculate the orographic and conveyance components of the frontal PMP. Evaluation of the PMP was also determined for the SONGS site based on the methods of the U.S. Weather Bureau. The distribution of precipitation in the 6-hour thunderstorm was calculated; arrangement of the incremental values into the critical PMP storm was based on procedures used by the U.S. Army Corps of Engineers. The drainage area tributary to the SONGS Unit 2 and Unit 3 power block was divided into subbasins. The U.S. Soil Conservation Service soil-complex method was used to construct the hydrograph resulting from the PMP. Runoff curves for the given soil types were selected on the basis of Antecedent Moisture Condition III. Due to the relatively short times of concentration and corresponding very short lag times of the subbasins, the assumption was made that all precipitation excess within any period became runoff during that period. Precipitation intensities for durations less than 15 minutes were interpolated from the thunderstorm PMP data [4].

Differences or Contradictions in Flood Hazard Levels. No differences or contradictions in the flood hazard levels were identified in design or licensing documentation.

Probable Maximum Flood (PMF) on Streams and Rivers. An analysis of the 43-square-mile San Onofre Creek Basin (north of the site) and the 0.86-square-mile Foothill Drainage Basin (east of the site) was conducted to determine the PMF and subsequent contribution to flooding at the SONGS site. Recommendations of NRC Regulatory Guide 1.59 were used in conducting the PMF analysis [4].

Maximum Postulated PMF Flood Elevation.
San Onofre Creek Basin – The PMF peak discharge of 71,000 cubic feet per second (ft^3/s) was used in determining the maximum flood stage in San Onofre Creek. The results of the analysis demonstrated that the flow would be contained within the limits of the floodplain of San Onofre Creek and would not present any risk of flooding at the site [4].

Foothill Drainage Basin – PMP-induced runoff is diverted to the San Onofre Creek by a diversion structure. The diversion structure consists of an earth-filled berm with an excavated channel designed to intercept and convey the peak discharge associated with the PMF. The results of the analysis showed that the flow would be contained within the limits of the diversion structure and would not present any risk of flooding at the site. [4].

Key Assumptions. During the PMF analysis, the soil was considered saturated. A Snyder peaking coefficient of 0.7 was used for unit hydrograph computations. The Muskingum storage coefficient K for each reach was taken as 50 percent of the basin's lag time. The routing coefficient X was assumed as 0.3 [4].

Methodology Used to Develop the Design Basis Flooding Hazard. The San Onofre area is susceptible to frontal storms, usually occurring during the months of October through April, and local thunderstorms, which are predominant during summer and early fall. The PMP values associated with both types of storms were compared to determine the critical event. HMR 36 was used to calculate the frontal storm PMP and the National Weather Service Report was used in determining the thunderstorm PMP. It was concluded the 6-hour, 1-square-mile thunderstorm PMP (12.25 inches) was the more critical and consequently was used as the design basis event [4].

San Onofre Creek Basin: The San Onofre Creek Basin was subdivided and hydrologic parameters for each subbasin were calculated. The subbasin lag times were calculated on the basis of a figure published by the U.S. Army Corps of Engineers. This basin lag curve was derived as a result of a study of various drainage basins in southern California conducted by the U.S. Army Corps of Engineers. For purposes of conservatism, a 10 percent reduction of all calculated lag times was performed prior to their use in calculations.

Using the U.S. Army Corps of Engineers HEC-1 computer program, the PMF hydrograph for each subbasin was derived. A Snyder peaking coefficient of 0.7 was used for unit hydrograph computations in the program for each subbasin. This value was determined as a result of the analysis of the major storms of January and February 1969, as referenced in San Onofre 2 & 3 UFSAR Section 2.4.3.2 [4]. As noted, the analysis was performed for the Santa Margarita River Basin, where records permitted a valid reconstruction of the basin runoff hydrograph. After determining the PMF hydrograph for each individual subbasin, the hydrographs were routed and combined to obtain a PMF hydrograph at the mouth of San Onofre Creek.

Flood routing was conducted using the Muskingum Method. The Muskingum storage coefficient K for each reach was taken as 50 percent of the basin's lag time. The coefficient value was determined by assuming low-flow and high-flow conditions in subbasin A5 and calculating the corresponding velocities and average flow velocity. The average velocity was combined with the reach length to yield the travel time through the reach. From this relationship, a proportionality constant was calculated (i.e., 0.5) and then used in calculating K for the remaining subbasins. The routing coefficient X was assumed as 0.3, which is used for mountainous regions [4].

Foothill Drainage Basin: The analysis of the Foothill Drainage Basin was conducted in a manner similar to that of San Onofre Creek Basin described above. The drainage area was subdivided and subbasin hydrologic parameters were defined.

The HEC-1 computer program was used to develop the unit hydrograph and resultant PMF hydrograph for each subbasin. As explained in San Onofre 2 & 3 UFSAR Section 2.4.3.3.1 [4], a Snyder peaking coefficient value of 0.7 was used to derive the unit hydrographs. The PMF hydrographs obtained from each subbasin were routed to San Onofre Creek. Due to the relatively short distance between the outlets of subbasins B1 and B2, approximately 0.75 mile, and narrow range of lag times for the subbasins, it was decided to ignore lag and travel times and combine the individual subbasin PMF hydrographs directly, yielding a conservative PMF hydrograph at the outlet of subbasin B2 [4].

Differences or Contradictions in Flood Hazard Levels. No differences or contradictions in the flood hazard levels were identified in design or licensing documentation.

Potential Dam Failures. There are no existing dams located within the vicinity of the plant site whose seismically induced failure could result in adverse flooding at the site [4].

Probable Maximum Surge and Seiche Flooding.

Maximum Postulated Surge and Seiche Flood Elevation. The worst storm-generated wave of 54 feet would begin to be affected by the ocean floor at a distance offshore of approximately 11,000 feet and would be completely dissipated by the time it reached the beach in front of the San Onofre seawall. The maximum storm surge height has been determined to be +1.98 feet above the antecedent water level. It was concluded in the San Onofre 2 & 3 UFSAR that large surges will not develop in the vicinity of San Onofre. Seiche has been found to affect sea surface elevation by only 0.7 centimeter, which is considered negligible. [4].

Key Assumptions. The most conservative values were selected for the probable maximum surge and seiche flooding calculation and are detailed in the San Onofre 2 & 3 UFSAR, Section 2.4.5 [4].

Methodology Used to Develop the Design Basis Flooding Hazard.

1. *Probable Maximum Winds and Associated Meteorological Parameters* – Using the climatology of the northeast Pacific tropical cyclones and the structure of typical hurricanes, the track and the surface wind structure of the hypothetical maximum probable storm for the SONGS site were constructed.
2. *Surge and Seiche Water Levels* – Water levels antecedent to probable surge and seiche levels were established. Accepted conservative high tide levels and sea level anomalies for the San Onofre area were considered in establishing the antecedent water levels. The maximum surge water level hypothetically possible and applicable to the site would result from the hypothetical maximum probable storm. In developing the hypothetical maximum tropical storm, particular attention was given to the configuration of its radius of maximum winds, the storm's forward speed, and the storm's track. Detailed measurements and analyses of long-period waves (normal shelf seiching background levels) over the continental borderland were conducted near Oceanside, California, about 17 miles southeast of San Onofre, and used for determination of seiche water levels.
3. *Wave Action* – Severe deep-water storm waves determine the lowest and highest instantaneous water elevations in conjunction with long-period phenomena (e.g., tide and storm surge). As severe waves are infrequent, it was necessary to determine their characteristics by hindcasting. A careful selection of past storms based on reported wave damage and strong winds was conducted. Then, the deep-water significant wave characteristics for each storm were determined from weather maps. A wave height distribution function was used to determine the highest individual shallow-water wave height, H_{max}, in the storm from the hindcasted significant wave height and period time histories. Marine Advisors and Intersea Research examined a total of approximately 60 storms that occurred between 1900 and 1967 and that occurred near enough to San Onofre to be applied to this study. Twenty-five of the most severe storms were selected for hindcasting. The deep-water wave data were corrected for refraction and shoaling at the SONGS site, and also for island sheltering [4].

Differences or Contradictions in Flood Hazard Levels. No differences or contradictions in the flood hazard levels were identified in design or licensing documentation.

Probable Maximum Tsunami (PMT) Flooding. The potential flooding effects from both locally generated and distantly generated tsunamis were analyzed for the SONGS site. The locally generated tsunami was found to produce a greater wave runup than the distantly generated tsunami. Therefore, the locally generated tsunami results in the design basis for the SONGS site.

Maximum Postulated PMT Flood Elevation. The controlling tsunami occurring during simultaneous high tide and storm surge produces a maximum runup to elevation +15.6 feet mllw at the SONGS Unit 2 and Unit 3 seawall. When storm waves are superimposed, the predicted maximum runup is to elevation +27 feet mllw [4].

Key Assumptions. Mathematical modeling of the hypothetical tsunami was conducted assuming an earthquake with a 7-foot vertical displacement component of the sea floor 5 miles offshore from San Onofre as the generating mechanism. Normal faulting was postulated for the hypothesized offshore Zone of Deformation because the conversion of large strike-slip movements on the sea floor to a tsunami wave near San Onofre would be inefficient [4].

Methodology Used to Develop the Design Basis Flooding Hazard. Because of the moderating effect of southern California's offshore borderland on distant tsunami waves, local offshore fault zones are considered to be the most probable generators for large waves at San Onofre. The closest such zone to the

SONGS site is the hypothesized offshore Zone of Deformation, as discussed in San Onofre 2 & 3 UFSAR Section 2.5.2.4.5 [4]. The closest portion of this zone is approximately 5 miles southwest of the SONGS site.

To study the effect at San Onofre caused by sea floor displacements on the offshore Zone of Deformation, detailed specific analyses were completed by Dr. Basil W. Wilson [6].

Mathematical modeling of the hypothetical tsunami was conducted assuming an earthquake with a 7-foot vertical displacement component of the sea floor 5 miles offshore from San Onofre as the generating mechanism. This vertical displacement is much larger than would be expected to occur on the hypothesized offshore Zone of Deformation, which, because of its northwest trend, is characterized by predominantly strike-slip displacement.

Normal faulting was postulated for the hypothesized offshore Zone of Deformation because the conversion of large strike-slip movements on the sea floor to a tsunami wave near San Onofre would be inefficient. Further, there are no large topographic features oriented normal to the direction of strike-slip movement on the offshore Zone of Deformation [4].

Differences or Contradictions in Flood Hazard Levels. No differences or contradictions in the flood hazard levels were identified in design or licensing documentation.

<u>**Groundwater Ingress.**</u>

Maximum Groundwater Elevation. The average groundwater elevation beneath the site is +5 feet mllw. Fluctuations within the pumped regions of the San Onofre Creek Basin have had little impact on the level of groundwater at the SONGS site because of its proximity to the shoreline. Monitoring of groundwater levels at the SONGS site for a 10-year period between 1963 and 1974 showed the water table to vary from +2.7 feet to +5.7 feet mllw in the vicinity of the containment spheres [4].

Key Assumptions. As discussed in the San Onofre 2 & 3 UFSAR Section 3.4.1.1.1 [4], the foundation basemats and exterior walls of the structures that offer flood protection are designed to resist the upward and lateral pressures caused by the hydrostatic groundwater level design basis elevation of +5 feet mllw.

Differences or Contradictions in Flood Hazard Levels. No differences or contradictions in the flood hazard levels were identified in design or licensing documentation.

<u>**Flooding Hazards that Screened Out.**</u> The following flood mechanisms were not considered credible events and were screened out:

- **Ice-Induced Flooding**. The mild climate and general lack of freezing temperatures in this region make ice formation highly unlikely and it is, therefore, not considered credible.
- **Channel Migration and Diversion**. Upstream diversions associated with rivers, where low flow has an impact on dependable cooling water sources, is not a factor at the San Onofre site.
- **Dam Breach and Failures**. There are no upstream dams that could impact the San Onofre site.

Section B: Protection Mitigation Features Considered in the Licensing Basis

Requested Information

Describe protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety.

SONGS Response

The safety-related systems and components for which flood protection is provided are the same as those identified in paragraph C.I of Regulatory Guide 1.29. External flood protection of safety-related systems and components is provided for all postulated flood levels and conditions described in San Onofre 2 & 3 UFSAR Section 2.4 [4].

Descriptions of the protection and mitigation features that are considered in the licensing basis evaluation to protect against external ingress of water into SSCs important to safety are detailed in the San Onofre 2 & 3 UFSAR Sections 2.4 and 3.4 [4].

Flooding Licensing Basis. The PMF event is applicable to all modes of operation (e.g., full-power operations, reduced-power operations, startup, hot shutdown, cold shutdown, and refueling). The 6-hour, 1-square-mile PMP event would cause the highest flood level on the SONGS site and is therefore used as the design basis flood event. The maximum postulated flood level in the SONGS Unit 2 and Unit 3 power block is below elevation +31.0 feet mllw [4].

Flood Duration Assumed in the CLB. The duration of the design basis flood event is defined as 6 hours. The maximum postulated flood level is based on a 12.25-inch, 6-hour PMP event [4].

Flood-Protection Features that are Credited in the CLB.

Incorporated or Exterior Passive Flood-Protection Features.

1. Water control structures consist of the 42-inch- and 72-inch-diameter concrete culverts under Interstate 5. The culverts are maintained by the California State Department of Transportation. The capacity of these culverts is 180 and 520 ft^3/s, respectively.
2. The San Onofre Creek diversion structure located along the east side of Interstate 5 diverts runoff from the Foothill Drainage Basin to San Onofre Creek Basin. The capacity of the channel is 1,850 ft^3/s.
3. Two 4-foot by 4-foot box culverts at Highway 101 remain operational. The box culverts are sufficiently large and in an area that would not supply materials capable of restricting flow. Even if flow were restricted, the topography along Highway 101 is such that the resulting drainage flows would not impact the plant site.
4. The switchyard has an upper and lower bench. With the normal catch basins plugged, the ponded water on the upper bench would drain to the south access road (near SONGS Unit 3).
5. With the normal catch basins plugged, the upper site area would drain into the barranca associated with the south access road.
6. A diversion channel at the south entrance to the Unit 3 power block on the south side of the Service Building diverts runoff from the switchyard and upper site area over the seawall outside of the power block.
7. Swales are provided in the asphalt areas around the power block to convey the drainage to the seawall, where it will discharge to the ocean.
8. Penetrations in the auxiliary building control area at elevations 30 and 72 feet mllw are protected against ponding resulting from roof drainage by openings in the seismic gap, which allow the water to fall to elevation 7 feet in the turbine building area. The roof drainage contributing to the turbine building area is from the safety equipment building, the auxiliary building, and the turbine areas.
9. Tunnels and openings between buildings are sealed by waterstops.
10. Surface water will not enter the auxiliary building from the west because the bridge walkway over the intake structure has numerous parapet openings that allow drainage to flow into the cooling water intake structure.
11. A concrete berm on the west side of the bridge walkway prevents the control room complex from flooding due to a possible surge in the circulating water system.

12. Storm drainage in the North Industrial Area will not flow to SONGS Unit 2 and Unit 3 because of an elevation differential; the North Industrial Area is at an elevation of 20 feet and SONGS Unit 2 and Unit 3 are at an elevation of 30 feet. Although the North Industrial Area access road connects to the access road for the Unit 2 and Unit 3 switchyard, the North Industrial Area access road is graded to preclude drainage flows from entering the SONGS site.

13. Special structures designed to protect the site against wave action include the seawall and the screen well perimeter wall. The onshore intake structure is arranged so that all penetrations, except in the screen well, are sealed against leakage of rising or surging seawater.

14. The flood protection of all penetrations of safety-related structures that are below the maximum postulated flood level (+31.0 feet mllw) are tabulated in San Onofre 2 & 3 UFSAR Table 3.4-1 [4].

Incorporated or Exterior Active Flood-Protection Features.

1. *Watertight and Nonwatertight Doors* – The flood protection of all exterior openings of safety-related structures by watertight and nonwatertight doors that are below the maximum postulated flood level (+31.0 feet mllw) are tabulated in San Onofre 2 & 3 UFSAR Table 3.4-1 [4].

2. *Flood Sensors* – Safety-related areas have flood level alarms that indicate in the control room.

Weather Conditions or Flood Levels that Trigger Procedures and Associated Actions for Providing Flood Protection and Mitigation. The San Onofre *Abnormal Operating Instruction for Severe Weather* provides actions to minimize the effect of hurricanes, tornados, flooding, or tsunamis on the safe operation of SONGS Unit 2 and Unit 3. Weather conditions concerning external flooding that trigger this procedure include the following: flash flood watch or warning or a heavy rainfall in progress (rainfall is expected to exceed 3 inches in a 1-hour period or 6 inches in a 3-hour period), and tsunami warning. Notification sources are provided in the operating procedure. The associated actions for providing flood protection and mitigation are detailed in the attachments to the *Abnormal Operating Instruction for Severe Weather* for flash flood watch or warning and tsunami warning.

A San Onofre Alarm Response Instruction provides operating personnel with available options or possibilities for dealing with single or multiple alarm initiating events including external flooding of safety-related structures. The associated actions for providing flood protection and mitigation are detailed in the procedure.

Adverse Weather Conditions that were Assumed Concurrent with Flood-Protection Features and Associated Actions. Adverse weather conditions assumed concurrent with the associated actions for providing flood protection and mitigation include, but are not limited to, high winds and heavy rain with standing water. None of these adverse weather conditions will impede the execution of the San Onofre *Abnormal Operating Instruction, Severe Weather* or the San Onofre Alarm Response Instruction.

Section C: Warning Systems to Detect the Presence of Water

Requested Information

Describe any warning systems to detect the presence of water in rooms important to safety.

SONGS Response

Water Level Warning Systems Credited. The SONGS Unit 2 and Unit 3 are equipped with 92 mechanically actuated flood sensors located throughout safety-related areas, which provide the first indication of water intrusion from internal and external sources. Flood sensor alarms are indicated on control room status panels 2(3)ZL-9480-1 and 9481-2. A SONGS Alarm Response Instruction provides operating personnel with available options or possibilities for dealing with single or multiple alarm initiating events, including external flooding of safety-related structures.

Scope of Water Level Warning Systems Evaluation. As a result of a Title 10 CFR 50.56 Maintenance Rule evaluation and resulting corrective action for flood sensors (external to the flood feature walkdown program), a program was initiated to replace all 92 flood sensors within a 2-year period that started in March 2011. As a result of this replacement program, credit has been taken for flood sensors that have been replaced or are scheduled for replacement in lieu of a visual inspection as part of the flood feature walkdown. Seventy-nine flood sensors were replaced prior to the initiation of the walkdowns and the remaining 13 flood sensors are scheduled for replacement prior to the end of the 2012 calendar year. Each flood sensor maintenance plan was reviewed to ensure the flood sensors (1) have been or are scheduled to be replaced, (2) were last monitored or tested within periodicity, and (3) were scheduled for continued monitoring and testing within periodicity after replacement, and to ensure that (4) the scope of the surveillance was adequate to verify the ability of the feature to meet its CLB flood-protection requirement.

Section D: Effectiveness of Flood-Protection Features

Requested Information

Discuss the effectiveness of flood-protection systems and exterior, incorporated, and temporary flood barriers. Discuss how these systems and barriers were evaluated using the acceptance criteria developed as part of Requested Information Item 1.h.

SONGS Response

Purpose of the Walkdowns. The purpose of the flood feature walkdown was to verify the conformance of external flood features with the CLB.

In addition to the visual component of the flood feature walkdown, a review of the preventative maintenance and surveillance programs was performed. The purpose of the review was to validate that the credited features were contained in a program that would ensure their continued conformance with the CLB.

Development of the Walkdown Feature List. The CLB was used to determine what flood features were included in the flood feature walkdown program. Sections 2 and 3 of the San Onofre 2 & 3 UFSAR provided the basis for features to be included. Based on the 16 types of flood-protection features discussed in Section B of this report, the list was populated with a total of 729 features (727 physical features and 2 procedures).

Acceptance Criteria Development. SONGS adopted a general acceptance criterion from the guidance provided by NEI 12-07 Section 6 and Appendix A [1] for each type of flood feature listed in Section B. This approach is consistent with the Requested Information Item 1.h from Enclosure 4 of the 50.54 (f) letter [3].

The acceptance criteria for each flood feature were annotated in Part B1 of the walkdown record form, including any acceptance criteria from the CLB specific to a given flood-protection feature.

Evaluation of the Overall Effectiveness of the Plant's Flood-Protection Features.

> ***Procedures.*** A site procedure, Fukushima Event Response – Flood Protection Walkdown Scoping and Evaluation, was created to provide guidance for the scoping and evaluation process. It includes the flood feature walkdown process to ensure a uniform evaluation of the flood-protection features against the CLB. This procedure was developed based on the guidance provided in NEI 12-07 [1].
>
> ***Accessibility.*** The flood features that could be accessed were evaluated against the defined acceptance criteria documented on the flood feature walkdown record form. Those features that were restricted or inaccessible were entered into the corrective action program (CAP). Flood features classified as inaccessible are discussed in Section F of this report. Flood features with partial accessibility were evaluated against the acceptance criteria, as applicable, to determine if immediate response was warranted prior to the CAP rescheduled date.
>
> ***Effectiveness.*** A total of 729 flood-protection features (727 physical features and 2 procedures) were identified and evaluated at the SONGS site and documented on the flood feature walkdown record forms. The results of the flood feature walkdown program show that the flood-protection features are, with the exception of two identified deficiencies, effective in meeting their intended credited functions based upon

the defined acceptance criteria. In those cases where observations suggested that acceptance criteria were not met or were questionable, the potential issue was captured in the SONGS CAP to determine if it is a deficiency and what actions are to be taken.

Section F of this report provides a detailed discussion of the results from the flood feature walkdown program.

Other Existing Plant Equipment, Structures, and Procedures that Might Mitigate the Effects of an External Flood under a Variety of Plant Configurations. Catch basins for the subsurface drainage system, roof drains, and exposed floor drains are assumed plugged for the purpose of determining water surface elevations arising during the thunderstorm PMP event. Sump pumps and floor drains internal to safety-related buildings are not credited to remove water during a flooding event. These features were not included in the scope of the flood walkdown effort, but might be available to mitigate the effects of an external flood event.

Assessment of Maintenance and Monitoring Programs for Flood-Protection Features. A review of periodic maintenance (PM), surveillance, periodic monitoring, and functional testing requirements for each of the flood-protection features was performed. Results were documented on the NEI 12-07 walkdown record forms (Part B.2). The PM, surveillance, periodic monitoring, and/or functional testing was considered acceptable if it was (1) within the scope of a program or procedure, (2) was last maintained, monitored, or tested within periodicity, and (3) was scheduled for future maintenance, monitoring, and/or testing within periodicity; and (4) if the scope of the PM, surveillance, or test was adequate to verify the ability of the feature to meet its CLB flood-protection requirement.

Assessment of Maintenance Activities that Expose SSCs to Flood Hazards. Plant programs evaluate the impact of plant activities, including maintenance activities, on the ability of identified flood-protection features to perform their credited function. Compensatory measures required by site programs are implemented, when required, to ensure that the flood-protection function is maintained.

Section E: Implementation of the Walkdown Process

Requested Information

Present information related to the implementation of the walkdown process (e.g., details of selection of the walkdown team and procedures) using the documentation template discussed in Requested Information Item 1.j, including actions taken in response to the peer review.

SONGS Response

Walkdown Guidance and Exceptions.

Procedures. To ensure NEI 12-07 guidance was followed, a site-specific procedure, Fukushima Event Response – Flood Protection Walkdown Inspection Process, for guiding the inspection process was created to ensure compliance with the flood feature walkdown execution and documentation based on the criteria outlined in NEI 12-07 Sections 5.3, 7, and Appendix B [1].

Walkdown Packages, Pre-Job Brief, and Post-Job Brief. The flood feature walkdown packages were developed based upon the specific guidance provided in NEI 12-07 Section 5.2, Prepare Walkdown Packages [1], which included the following components: Pre-Job Brief, Walkdown Guidance and Acceptance Criteria, Walkdown Record Form, Design Drawings, General Arrangement Drawings, and Flood Protection Strategy Implementation Procedures.

Each pre-job brief contained the following: Industrial Safety, Radiological Safety, Dose Requirements, Acceptance Criteria, Plant Status, Industry Operating Experience, Procedure Compliance, Reporting Degraded Conditions, Positive Component Verification, Inspection Methodology, and Field Documentation Requirements.

At the completion of each day during the post-job brief, the walkdown team would discuss lessons learned for that day and the inspection plan for the next day's flood features.

Exceptions. No exceptions were taken to the endorsed guidance of NEI 12-07 [1].

Team Organization. The SONGS flood protection walkdown team was composed of qualified individuals of various technical disciplines, as shown in Exhibit E-1: SONGS Flood Feature Walkdown Team Composition. As suggested by NEI 12-07 Section 5.3 [1], multiple skill sets were available to participate in the evaluation of a given flood mitigation feature depending on the intended credited function. Each flood mitigation feature was evaluated by a minimum of two individuals from the team.

EXHIBIT E-1
SONGS Flood Feature Walkdown Team Composition

Walkdown Execution Team	Years of Experience	SONGS Oversight	Years of Experience
Senior Nuclear Consultant	40	Project Manager (Senior Electrical Engineer)	30
Nuclear Consultant	13	Task Technical Lead (Senior Civil Engineer)	15
Licensing and Hydrogeologist Consultant	15	Civil Engineer	25
Nuclear Consultant	6	Consulting Senior Mechanical Engineer	36
		Civil Engineer	10

Compliance with Section 5.3 of NEI 12-07. The flood feature walkdown team members represented five discipline areas, as shown in Exhibit E-1. The execution teams were paired to ensure that complementary skill sets were actively engaged in each feature evaluation (e.g., pairing licensing expertise with field/inspection experience).

The flood feature walkdown team was made familiar with the information required to respond to SECY 11-0137 Items 2.1 (Flood Hazard Evaluation) and 2.3 (Flood Walkdown) [2], as well as 50.54 (f) letter Enclosures 2 and 4 [3]. The flood feature walkdown team members (excluding craft support, health physics personnel, etc.) were also current in NEI-developed training provided through the NANTeL website (https://nantel.org). In addition to the NANTeL training, site-specific training was developed and delivered to further enhance the team's understanding of the importance of the flood feature walkdown program. All training records for flood feature walkdown team participants are documented in the SONGS training records database.

The site procedure developed to govern the inspection process included a qualifications matrix, which complies with Section 5.3 and Appendix C of NEI 12-07 [1].

Section F: Results of the Flood Feature Walkdown

Requested Information

Results of the walkdown including key findings and identified degraded, non-conforming, or unanalyzed conditions. Include a detailed description of the actions taken or planned to address these conditions using the guidance in Regulatory Issues Summary 2005-20, Rev 1, Revision to NRC Inspection Manual Part 9900 Technical Guidance, "Operability Conditions Adverse to Quality or Safety," including entering the condition in the corrective action program.

SONGS Response

Summary of Findings. The plant flood-protection features were found to be as described in the CLB (available, functional, and maintained), with just a few exceptions that are considered deficiencies. These deficiencies are described in the "Deficiencies" section below. The deficiencies notwithstanding, the flood-protection features in aggregate would perform their design function as credited in the CLB. Detailed observations, photographs, and qualitative dispositions were entered into the SONGS Recommendation 2.3 Flood Features Database for each feature and have been transmitted to central document management (CDM).

Twenty-five flood features were added to the CAP for material or design evaluation and were annotated in the walkdown record forms. Of the 25 items added to the CAP, 7 were evaluated for deficiency determination and 2 deficiencies were determined per the CAP (see "Deficiencies" section below for further discussion on the features identified as deficiencies).

Generic issues identified during the walkdowns and entered into the CAP, but not considered deficiencies, include the following:

- Penetration seals and flood features with incorrect or missing identification tags
- Material condition issues that do not challenge the ability of the feature to meet the CLB flood-protection requirement
- Features not listed in the San Onofre 2 & 3 UFSAR
- Errors in drawings or documents
- Operations procedure corrections and enhancements (as discussed below)
- Flood feature procedural monitoring enhancements (as discussed below)

Of the 727 physical flood features, 21 were determined to have restricted access and were entered into the CAP for future scheduling and disposition. Additionally, 10 flood features were determined to be inaccessible due to either a metallic bellow or steel plate structure obstructing the feature. SONGS engineering personnel performed an evaluation of each inaccessible feature and determined the features are capable of performing their credited CLB function (see "Features that are Inaccessible" section below for further discussion).

Of the 727 physical flood features, all were included in a preventative maintenance or surveillance program with the exception of 39 features. These 39 features were entered into the CAP for determination of the need to be included in a preventative maintenance or surveillance program. The lack of inclusion was determined by the CAP not to be a deficiency of the preventative maintenance or surveillance programs.

Flood sensors credited for detecting external and internal flooding were reviewed though the respective maintenance plans and the replacement program. The review consisted of (1) evaluating to ensure the flood sensor has been replaced or is scheduled for replacement per plant schedule, and (2) the flood sensor is scheduled for maintenance and testing on the required periodicity after the replacement date. No adverse findings were determined. Additional information concerning flood sensors is provided above in Section C: Warning Systems to Detect the Presence of Water.

Two site procedures are credited for response to external flood response and were evaluated using a reasonable simulation as described in the NEI 12-07 guidance [1]. The reasonable simulation consisted of a simulated severe storm reaching the criteria of entry requiring operator action to validate the plant configuration. Subsequently, a simulated significant rainfall was initiated resulting in flood sensor alarm response from simulated water ingress per the alarm response procedure. This resulted in operator response in three locations, two in SONGS Unit 3 and one in SONGS Unit 2. As a result of the procedure simulation, two non-safety-related items within the procedures were identified as needing to be addressed and several enhancements were suggested to lessen operator burden in identifying the referenced features. These items were entered into the CAP. None of the identified items or suggestions was determined by the CAP to be a deficiency to the procedures. The results of the reasonable simulation governing site preparation and response for the licensing basis flood event were adequate and could be completed within the warning time, as specified in the procedures.

Additionally, training for the procedures was determined to be adequate. The criteria for training adequacy were determined by (1) the successful performance of the severe storm simulation in which the procedures were implemented, and (2) review and validation of training records and periodicity. All training records are available in the SONGS training records system.

Description of Any Observations Reported in the CAP that Were Not Dispositioned. All flood feature walkdown observations entered into the CAP have been screened and associated actions have been assigned.

Deficiencies. As determined by the CAP, two features were determined to be deficiencies meeting the criteria of degraded, non-conforming, or unanalyzed. The two deficiencies are discussed below in the next subsection, providing condition, description of feature, functional location, discussion of the degraded or non-conforming condition, actions taken, and anticipated completion date for repairs. Although these features are defined as deficiencies, they pose limited risk to plant operations as they are passive external penetrations that protect against external water ingress and do not provide critical safety functions to ensure plant safety-related equipment can perform the intended functions.

Describe Actions that Were Taken or Are Planned to Address the Deficiencies. The following actions were take or are planned to address the deficiencies:

- Degraded Unit 3 Roof Drain Pipe (Functional Location S3.PENS.EGT011.502720303). Severe corrosion and wide cracks were identified on the cast-iron drain pipe servicing the roof of the Unit 3 Underground Electrical and Piping Galleries Structure. This condition represents a leakage path into the Unit 3 Underground Electrical Galleries Tunnel during a postulated PMP event. The drain at the roof has been plugged to prevent water from leaking into the underground tunnel through the failed drain pipe. An order has been generated to replace the degraded drain pipe. The anticipated completion date for the repair July 2013.
- Non-Conforming Unit 3 Underground Electrical Cable Tunnel Duct Bank Seal, Conduit 1 of 4 (Functional Location S3.PENS.UCT009.502520143). Water staining, corrosion, and missing fire-protection seal material were identified for an electrical conduit that is part of a duct bank penetrating the Unit 3 Underground Cable Tunnel. This condition represents a leakage path from an outside electrical manhole into the Underground Cable Tunnel through the unsealed conduit during a postulated external flooding event. The surface cover at the outside manhole cover is sealed, significantly restricting the amount of water that could travel into the underground tunnel through the conduit. As a result of the walkdown effort, a work order was generated to install the seal in the conduit. The seal was installed 10/24/2012 and the condition is no longer a deficiency.

Features Affected by Restricted Access. During the course of the SONGS Flood Feature Walkdown Program, 21 features were affected by restricted access.

Justification for Delay. The bulleted list below provides the various justifications for delay and required action to gain access.

- Fire retardant or metallic insulation obstructing visual inspection
  - Mitigation: schedule inspection in future with maintenance support to remove insulation
- Feature at an elevation requiring scaffold erection to allow for visual inspection
  - Mitigation: schedule inspection in future with maintenance support to erect scaffolding
- Feature obstructed by installed plant systems, structures, and/or components
  - Mitigation: schedule inspection in future with maintenance support for next scheduled preventative maintenance or surveillance

Schedule for Completion of Inspection. All restricted access inspections will be completed by July 2013.

Special Procedures Required for Inspection. No special procedures are required for inspection of the restricted-access features. The features require additional plant support that was not available due to normal plant operations.

Features that are Inaccessible. Ten features were determined to be inaccessible and are described below.

1. **Rubber Waterstops between the Containment Structure (Recirculating Rooms) and the Safety Equipment Building. Each SONGS Unit Contains One Waterstop at this Location.**

   Reason Inaccessible

   The waterstops are covered by metal bellows welded to the permanent structure. Inspection would require major disassembly.

   Functional Requirement

   Rubber waterstops prevent or limit water intrusion at the seismic gap so that safety-related equipment is not impacted by the flood level.

   Location

   Waterstops are located in the recirculation rooms (bottom elevation -12'9" mllw) in the seismic gap between structures. The room is accessed from the Containment Tendon Gallery.

   Basis for Reasonable Assurance that Feature is Available and Functional

   Potential water in-leakage at waterstops has been evaluated in an existing design calculation. The SONGS calculation for Plant Flood Analysis Review postulated the worst-case scenario by positioning a crack in the rubber waterstop at the lowest elevation, -12'9" mllw. The predicted leakage rate due to an external source is much less than flooding due to an internal component failure or actuation of the fire-protection sprinklers. A safety-related flood sensor is located in each recirculation room and alarms in the Control Room, with operator response specified in the Alarm Response Instruction. These flood detectors have recently been replaced and have periodic functional testing. Therefore, the flood effects are bounded and there is no adverse impact to safety-related equipment.

   Aggregate Effects

   There is no common failure mechanism for the rubber waterstops during the current licensing basis flood event (PMP). Flood sensors are located in each recirculation room, so operator response would limit flood effects and prevent impacts to safety-related equipment from groundwater ingress.

2. **Waterstops between the Auxiliary-Control Building (Chilled Water Tunnel) and the Safety Equipment Building. Shared Waterstop at North and South End of the Tunnel.**

   Reason Inaccessible

   The waterstops are covered by metal bellows welded to the permanent structure. Inspection would require major disassembly.

   Functional Requirement

   Rubber waterstops prevent or limit water intrusion at the seismic gap so that safety-related equipment is not impacted by the flood level.

   Location

   Waterstops are located in the Chilled Water Piping tunnel (bottom elevation -5'11" mllw) in the seismic gap between the Safety Equipment Building and the Auxiliary-Control Building.

   Basis for Reasonable Assurance that Feature is Available and Functional

Potential water in-leakage at waterstops has been evaluated in an existing design calculation. The SONGS calculation for Plant Flood Analysis Review postulated the worst-case scenario by positioning a crack in the rubber waterstop at the lowest level elevation, -12'9" mllw. The predicted leakage rate due to an external source is much less than flooding due to an internal component failure or actuation of the fire-protection sprinklers. A safety-related flood sensor is located in each chilled water piping tunnel and alarms in the Control Room, with operator response specified in the Alarm Response Instruction. These flood detectors have recently been replaced and have periodic functional testing. Therefore, the flood effects are bounded and there is no adverse impact to safety-related equipment.

Aggregate Effects

There is no common failure mechanism for the rubber waterstops during the current licensing basis flood event (PMP). Flood sensors are located in each chilled water tunnel, so operator response would limit flood effects and prevent impacts to safety-related equipment from groundwater ingress.

3. **Waterstops between the Auxiliary-Penetration Area and the Safety Equipment Building (Shutdown Heat Exchanger Piping Tunnel). Each SONGS Unit Contains One Waterstop at this Location.**

Reason Inaccessible

The waterstops are covered by metal bellows welded to the permanent structure. Inspection would require major disassembly.

Functional Requirement

Rubber waterstops prevent or limit water intrusion at the seismic gap so that safety-related equipment is not impacted by the flood level.

Location

Waterstops are located in the Shutdown Heat Exchanger Piping Tunnel (elevation 8'6" mllw) in the seismic gap between the Auxiliary-Penetration structure and Safety Equipment Building.

Basis for Reasonable Assurance that Feature is Available and Functional

Potential water in-leakage at waterstops has been evaluated in an existing design calculation. The SONGS calculation for Plant Flood Analysis Review postulated the worst-case scenario by positioning a crack in the rubber waterstop at the lowest level elevation, -12'9" mllw. The predicted leakage rate due to an external source is much less than flooding due to an internal component failure or actuation of the fire-protection sprinklers. A safety-related flood sensor is located in each tunnel and alarms in the Control Room, with operator response specified in the Alarm Response Instruction. These flood detectors have recently been replaced and have periodic functional testing. Therefore, the flood effects are bounded and there is no adverse impact to safety-related equipment.

Aggregate Effects

There is no common failure mechanism for the rubber waterstops during the current licensing basis flood event (PMP). Flood sensors are located in each shutdown heat exchanger piping tunnel, so operator response would limit flood effects and prevent impacts to safety-related equipment.

4. **Waterstops between the Auxiliary-Penetration Area and the Safety Equipment Building (Corridor 027). Each SONGS Unit Contains One Waterstop at this Location.**

Reason Inaccessible

The waterstops are covered by steel plates fastened to the permanent structure. Inspection would require major disassembly.

Functional Requirement

Rubber waterstops prevent or limit water intrusion at the seismic gap so that safety-related equipment is not impacted by the flood level.

Location

Waterstops are located in the seismic gap between the Auxiliary-Penetration Area and the Safety Equipment Building (bottom of the opening is elevation 8'0" mllw).

Basis for Reasonable Assurance that Feature is Available and Functional

The bottom of the waterstop is located above the site groundwater level. Potential water in-leakage at waterstops has been evaluated in an existing design calculation. The SONGS calculation for Plant Flood Analysis Review postulated the worst-case scenario by positioning a crack in the rubber waterstop at the lowest level elevation, -12'9" mllw. The predicted leakage rate due to an external source is much less than flooding due to an internal component failure or actuation of the fire-protection sprinklers. In-leakage at the waterstop at this location would be contained in the corridor due to a steel flood barrier at the west end of the corridor and watertight doors at the other openings. There is no adverse impact to safety-related equipment.

Aggregate Effects

Water in-leakage is contained in the corridor and there is no impact to safety-related equipment.

5. **Waterstops for the Piping Opening between the Auxiliary-Penetration Area and the Safety Equipment Building (FLOCs S2.PENS.SE00802620012 and S3.PENS.00802620033). Each SONGS Unit Contains One Waterstop at this Location.**

Reason Inaccessible

The waterstops are covered by steel plates fastened to the permanent structure. Inspection would require major disassembly.

Functional Requirement

Rubber waterstops prevent or limit water intrusion at the seismic gap so that safety-related equipment is not impacted by the flood level.

Location

Waterstops are located in the seismic gap between the Auxiliary-Penetration Area and the Safety Equipment Building (bottom of opening is elevation 19'6" mllw).

Basis for Reasonable Assurance that Feature is Available and Functional

The bottom of the waterstop is located above the site groundwater level. Potential water in-leakage at waterstops has been evaluated in an existing design calculation. The SONGS calculation for Plant Flood Analysis Review postulated the worst-case scenario by positioning a crack in the rubber waterstop at the lowest level elevation, -12'9" mllw. The predicted leakage rate due to an external source is much less than flooding due to an internal component failure or actuation of the fire-protection sprinklers. In-leakage at the waterstop would flow through floor access openings to elevation -5'6" mllw and be contained in the Component Cooling Water Piping Area. There is a safety-related flood sensor in this area that alarms in the Control Room, with operator response specified in the Alarm Response Instruction. These flood detectors have recently been replaced and have periodic functional testing. Therefore, the flood effects are bounded and there is no adverse impact to safety-related equipment.

Aggregate Effects

There is no common failure mechanism for the rubber waterstops during the current licensing basis flood event (PMP). Water in-leakage would collect in an area with flood sensors; operator response would limit flood effects and prevent impact to safety-related equipment.

Walkdown Record Forms. The walkdown record forms have been completed and detailed observations, photographs, and qualitative dispositions were entered into the SONGS Recommendation 2.3 Flood Features Database for each feature and have been transmitted to CDM.

Section G: Cliff-Edge Effects

Requested Information

Document any cliff-edge effects identified and the associated basis. Indicate those that were entered into the corrective action program. Also include a detailed description of the actions taken or planned to address these effects.

SONGS Response

Cliff Edge Effects and Physical Margins. As indicated in Section 3.12 of NEI 12-07 [1], the NRC is no longer expecting the Recommendation 2.3: Flooding Walkdowns of the 50.54(f) letter [3] to include an evaluation of cliff-edge effects. The available physical margin (APM) has been estimated and documented, as applicable, in the walkdown record forms. The guidance provided in NEI FAQ-006 was also followed. This information will be used in the flood hazard reevaluations performed in response to Item 2.1: Flooding in the 50.54(f) letter [3].

Section H: Other Planned and/or Newly Installed Flood-Protection Features or Measures

Requested Information

Describe any other planned or newly installed flood-protection systems or flood mitigation measures including flood barriers that further enhance the flood protection. Identify results and any subsequent actions taken in response to the peer review.

SONGS Response

Changes Determined to be Necessary. Flood-protection features with low APM have been entered into the CAP for further evaluation and consideration to increase margin.

Conclusion

The 727 identified plant flood-protection physical features, the majority of which were incorporated passive protection features, were found to be as described in the CLB (available, functional, and maintained) with a few exceptions as described in Section F: Deficiencies. The deficiencies notwithstanding, the flood-protection features in aggregate would perform their design function as credited in the CLB. A summary of the findings is below.

Additional flood-protection features were identified during the flood walkdown that protect against external ingress of water into SSCs important to safety but not included in the San Onofre 2 & 3 UFSAR [4]. These features were evaluated according to acceptance criteria developed for similar flood-protection features and were found to meet the acceptance criteria. These items were added to the CAP and will be evaluated for their need to be included in the San Onofre 2 & 3 UFSAR.

Deficiencies

Two observations were determined to be deficiencies (see Section F: Deficiencies). The two deficiencies were entered into the CAP. One of the deficiencies was subsequently corrected, and the corrective action for the other deficiency is anticipated to be complete by July 2013. These deficiencies are passive external penetrations that protect against external water ingress and are not required for plant safety-related equipment to function.

Restricted-Access Flood Features

Twenty-one flood features were deemed restricted-access and require future scheduling and disposition.

Restricted-access features have been entered into the CAP and added to the work week process to align plant support. All restricted-access features will be tracked by their respective maintenance orders and are currently scheduled for visual inspection by July 2013.

Inaccessible Flood Features

Ten flood features were deemed inaccessible and entered into the CAP for engineering evaluation. These features were evaluated by SONGS engineering personnel and determined to have reasonable assurance that they will perform to meet their intended CLB function. The SONGS calculation for Plant Flood Analysis Review postulated the worst-case scenario by positioning a crack in the rubber waterstop at the lowest level elevation, -12'9" mllw. The predicted leakage rate due to an external source is much less than flooding due to an internal component failure or actuation of the fire-protection sprinklers.

References

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4. San Onofre Nuclear Generating Station. 2009. *San Onofre Unit 2 & 3 Updated Final Safety Analysis Report* (UFSAR). April 2009.
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7. Nuclear Energy Institute (NEI). 1996. *Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants.* NUMARC 93-01 Rev.2. April 1996.