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PG&E Letter DCL-17-064

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
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10 CFR 50.54(f)

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
Diablo Canyon Power Plant Focused Evaluation Report for External Flooding

References:

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012 (ADAMS Accession No. ML 12053A340)

2. PG&E Letter to NRC, DCL-15-034, "Final Response to Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 Flooding," March 11, 2015

3. PG&E Letter to NRC, DCL-16-016, "Updated Response to Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 Flooding," February 8, 2016

4. NRC Letter, "Diablo Canyon Power Plant, Unit Nos. 1 and 2 – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request - Flood-Causing Mechanism Reevaluation (CAC Nos. MF6039 and MF6040)," March 30, 2016 (ADAMS Accession No. ML 16083A551)

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

Dear Commissioners and Staff:

The enclosure to this letter provides the Focused Evaluation (FE) Report for External Flooding for Diablo Canyon Power Plant, Units 1 and 2.

On March 12, 2012, the NRC issued Reference 1 to request information associated with Near-Term Task Force Recommendation 2.1 for Flooding. One of the requests for information in Reference 1 directed licensees to submit a Flood Hazard Reevaluation Report (FHRR). Pacific Gas and Electric Company (PG&E) submitted the FHRR in Reference 2 and updated it in Reference 3. Based on the updated FHRR, the NRC issued the interim staff response (Reference 4), which concluded that the FHRR was suitable input for other assessments associated with Near-Term Task Force Recommendation 2.1, "Flooding." The FHRR served as input into the FE, as specified in Reference 5.

This submittal of the FE completes the actions related to External Flooding required by Reference 1.

PG&E makes no new or revised regulatory commitments (as defined by NEI 99-04) in this report.

If you have any questions or require additional information, please contact Mr. Scott Maze at 805-542-9730.

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

Executed on July 19, 2017.

Sincerely,

Jon A. Franke
Vice President, Generation Technical Services

mem6/4539/50465592-19
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Diablo Canyon Power Plant Units 1 and 2

Focused Evaluation Report for External Flooding

In Response to 50.54(f) Information Request Regarding Near-Term Task Force Recommendation 2.1

Revision 0

	Prepared by:	Reviewed by:	Approved by:
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Date	6/26/17	6/26/17	6/29/17

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1 Executive Summary

The Diablo Canyon Power Plant (DCPP) site has reevaluated its flooding hazard in accordance with the NRC's March 12, 2012, 10 CFR 50.54(f) request for information (RFI) (Reference 1). The RFI was issued as part of implementing lessons learned from the Fukushima Dai-ichi accident; specifically, to address Recommendation 2.1 of the NRC's Near-Term Task Force (NTTF) report. DCPPs information was submitted to the NRC in Revision 1 of the Flood Hazards Reevaluation Report (FHRR) on February 8, 2016 (Reference 2). The NRC's response letter, "Diablo Canyon Power Plant, Unit Nos. 1 and 2 – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation" dated March 30, 2016 (Reference 3) documents the Mitigating Strategies Flood Hazard Information (MSFHI). There is one mechanism, Local Intense Precipitation (LIP) that was found to exceed the design basis flood level at the DCPP site and is included in this Focused Evaluation (FE).

In support of the Mitigating Strategies Assessment (MSA, Reference 4), a more detailed LIP analysis was performed, "Study Calculation: Diablo Canyon Power Plant Local Intense Precipitation Analysis 2D Modeling", (Reference 5). To determine flow path and volume of water entering plant structures and potential impact on structures, systems and components, an additional flooding analysis internal to buildings was conducted, "Study Calculation: Diablo Canyon Local Intense Precipitation (LIP) Effect on Building Internals" (Reference 6). These calculations determined that the water levels from a LIP event are bounded by the Current License Basis. Associated effects (AE) and flood event duration (FED) parameters were assessed and submitted as a part of the MSA. The FE concludes that all vulnerabilities due to the LIP mechanism are addressed by permanent flooding protection, and available physical margin was demonstrated to be adequate to protect Structures, Systems, and Components (SSCs) needed to maintain Key Safety Functions (KSFs). This FE followed Path 2 of Nuclear Energy Institute (NEI) 16-05, Rev. 1 (Reference 7) and utilized Appendix B for guidance on evaluating the site protection features. This submittal completes the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter.

2 Background

On March 12, 2012, the NRC issued Reference 1 to request information associated with (among others) the NTTF Recommendation 2.1 for Flooding. One of the Required Responses specified in Reference 1 directed licensees to submit a FHRR to reevaluate the flood hazards for their sites using present-day methods and guidance used for early site permits and combined operating licenses. By letter dated March 11, 2015, Pacific Gas and Electric Company (PG&E) provided the FHRR Revision 0 for the DCPP, Units 1 and 2 (Reference 8). By letter dated February 8, 2016, PG&E submitted a revised FHRR, Revision 1, which contained a new LIP and associated site drainage analysis (Reference 2). A description of interim actions implemented to address the potential effects of the unbounded flooding mechanism was required by the original 10 CFR 50.54(f) request, and these measures were described in both the original and revised FHRR submittals (References 8 and 2). These actions consist of a warning time notification process and a procedure to deploy sandbags at all affected doors when heavy rainfall is forecast, and were inspected by the NRC as part of the TI-190 inspections. Based on Reference 2, on March 30, 2016, the NRC issued an interim staff response letter (Reference 3) to PG&E, also known as the "MSFHI Letter." Appendix G of NEI 12-06 (Reference 9) defines the reevaluated flood hazard information as the mitigating strategies flood hazard information (MSFHI). Reference 3 transmitted a summary of NRC staff's assessment of the re-evaluated flood-causing mechanisms described in the DCPP FHRR, Revision 1 (Reference 2), and documented the NRC staff's conclusion that the reevaluated flood hazards information for DCPP was suitable for assessments associated with Near-Term Task Force Recommendation 2.1 "Flooding". In accordance with Reference 10, the NRC considers the reevaluated flood hazard to be "beyond the current design/licensing basis of operating plants".

Following the Commission's directive to NRC staff in Reference 11, the NRC issued a letter to industry (Reference 12) indicating that new guidance is being prepared to replace instructions in Reference 13 and provide for a "graded approach to flooding reevaluations" and "more focused evaluations of local intense precipitation and available physical margin in lieu of proceeding to an integrated assessment." NEI prepared the new "External Flooding Assessment Guidelines" in NEI 16-05, Revision 1 (Reference 7), which was endorsed by the NRC in Reference 14. NEI 16-05 indicates that each flood-causing mechanism not bounded by the design basis flood (using only stillwater and/or wind-wave runup level) should follow one of the following five assessment paths:

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

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

3 References

1. NRC Letter, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012.

2. PG&E Letter to NRC, "Updated Response to Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1, Flooding," dated February 8, 2016.

3. NRC Letter, "Diablo Canyon Power Plant, Unit Nos. 1 and 2 – Interim Staff Response to Reevaluated Flood Hazards Submitted in Response to 10 CFR 50.54(f) Information Request – Flood-Causing Mechanism Reevaluation," dated March 30, 2016.

4. PG&E Letter to NRC, "Submittal of the Diablo Canyon Power Plant Mitigating Strategies Assessment for Flooding Report", dated April 6, 2017.

5. PG&E Calculation No.: 9000042281-000-00 (Revision 0), "Study Calculation: Diablo Canyon Power Plant Local Intense Precipitation Analysis 2D Modeling," dated March 22, 2017.

6. PG&E Calculation No.: 9000042232-001-00 (Revision 1), "Study Calculation: Diablo Canyon Local Intense Precipitation (LIP) Effect on Building Internals," dated June 14, 2017.

7. NEI, Report NEI 16-05 (Revision 1), External Flooding Assessment Guidelines, dated June 2016.

8. PG&E Letter to NRC, "Final Response to Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1, Flooding," dated March 11, 2015.

9. NEI, Report NEI 12-06 (Revision 2), "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," dated December 2015.

10. NRC Letter, "Supplemental Information Related to Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Flooding Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 1, 2013.

11. NRC Staff Requirements Memorandum to COMSECY-14-0037, "Integration of Mitigating Strategies for Beyond Design-Basis External Events and the Reevaluation of Flooding Hazards," dated March 30, 2015.

12. NRC Letter, "Coordination of Requests for Information Regarding Flooding Hazard Reevaluations and Mitigating Strategies for Beyond-Design-Basis External Events," dated September 1, 2015.

13. NRC Letter, "Trigger Conditions for Performing an Integrated Assessment and Due Date for Response," dated December 3, 2012.

14. NRC Staff Guidance, JLD-ISG-2016-01, Guidance for Activities Related to Near-Term Task Force Recommendation 2.1, Flood Hazard Reevaluation; Focused Evaluation and Integrated Assessment, Revision 0, dated July 11, 2016.

15. PG&E Drawing 522316, "Diablo Canyon Power Plant Hi-Resolution Topography Survey Power Block Area," Sheet 1, Revision 1, February 19, 2014.

4 List of Abbreviations and Acronyms

- AFW – Auxiliary Feed Water
- APM – Available Physical Margin
- BDB – Beyond Design Basis
- DCPP – Diablo Canyon Power Plant
- FE – Focused Evaluation
- FED – Flood Event Duration
- FHRR – Flood Hazard Reevaluation Report
- FIAP – Flooding Impact Assessment Process
- FLEX – Diverse and flexible coping strategies covered by NRC order EA-12-049
- KSF – Key Safety Function as described in NEI 12-06
- LIP – Local Intense Precipitation
- MSA – Mitigating Strategies Assessment
- MSFHI – Mitigating Strategies Flood Hazard Information
- NAVD88 - North American Vertical Datum of 1988
- NEI – Nuclear Energy Institute
- NRC – Nuclear Regulatory Commission
- NTTF – Near-Term Task Force
- PG&E – Pacific Gas and Electric Company
- PMF – Probable Maximum Flood
- POI – Point of Interest
- RFI – Request for Information
- SSCs - Structures, systems and components
- UFSAR - Updated Final Safety Analysis Report
- WSE – Water Surface Elevation

5 FLOOD HAZARD PARAMETERS FOR UNBOUNDED MECHANISMS

The NRC completed an Interim Staff Response to Reevaluated Flood Hazards (Reference 3) related to Diablo Canyon's revised Flood Hazard Reevaluation Report (Reference 2). In Reference 3, the NRC states that "the NRC staff has concluded that the licensee's reevaluated flood hazard information is suitable input for other assessments associated with Near-Term Task Force Recommendation 2.1 'Flooding.'" The enclosure to Reference 3 includes a summary of the current design basis and reevaluated flood hazard parameters. In Table 1 of the enclosure to Reference 3, the NRC lists the following flood-causing mechanisms for the design basis flood:

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

In Table 2 of the enclosure to Reference 3, the NRC lists flood hazard information (specifically stillwater elevation and wind-wave runup elevation) for the following flood-causing mechanism that is not bounded by the design basis hazard flood level:

- Local Intense Precipitation (LIP)

LIP, the only unbounded flood mechanism for Diablo Canyon, is described in detail in Reference 2, the FHRR submittal. NEI 16-05 (Reference 7) states that Path 2 should be followed for the LIP mechanism if licensees rely solely on protection features to maintain the Key Safety Functions (see Flooding Impact Assessment Process (FIAP) Evaluation Path Determination Criteria Table, Section 6.3.3 of NEI 16-05). This FE therefore follows the Path 2 guidance. Note that elevation data in this document is based on the North American Vertical Datum of 1988 (NAVD88).

As part of DCPP's effort to support the Mitigating Strategies Assessment (MSA, Reference 4), additional detailed modeling based on the LIP event was conducted. As a result, a new calculation was issued, " Study Calculation: Diablo Canyon Power Plant Local Intense Precipitation Analysis 2D Modeling" (Reference 5), which included a more detailed LIP evaluation of water depth and potential entry points to safety-related structures including the rooftop of the auxiliary building, and determined new water depths above door thresholds and duration of inundation.

As documented in the Reference 5 calculation, flood heights from a LIP event vary at different DCPP locations due to the site-specific terrain and watershed pathways. Based on the results of Reference 5, the maximum water depth above the door thresholds in the power block area and surrounding structures varied between 0 feet and 1.01 feet. The duration of time-dependent water depths varied between 0.00 hours and 8.80 hours. Table 1 below, from Reference 5, provides the detailed parameters for the LIP event.

Table 1 – Reevaluated Flood Hazards for LIP External Flood Mechanism (Source: Reference 5)

Door/Unit No	Stillwater Elevation and Reevaluated Hazard Elevation (Feet NAVD88 datum)[3]	Maximum Water Depth Above Door Threshold (Feet) [1]	Flood Duration (Hours)
A1.1	87.48	-0.01	0
A1.2	86.77	-0.03	0
A2.1	86.64	0.14	1.90
BU101	86.58	0.08	0.45
BU102	86.66	0.16	0.95
BU103	86.63	0.13	0.45
A3.1	86.69	0.19	1.35
A3.2	86.70	0.20	1.55
A3.3	86.62	0.12	0.25
BU104	86.66	0.16	0.95
101-1	86.98	0.18	0.80
102-1	86.97	0.17	0.55
119-1	87.01	0.21	0.85
122-1	87.22	0.42	4.90
C1.1	86.91	0.11	0.95
129	86.90	0.10	0.95
130	86.89	0.09	0.60
C1.2	86.84	0.04	0.20
BU101-2	86.68	-0.02	0.00
BU102-2	86.65	0.00	0.00
BU103-2	86.43	-0.07	0.00
BU104-2	86.43	-0.07	0.00
BU108-2	86.62	0.12	0.95
BU105-2	86.60	0.10	0.50
BU106-2	86.90	0.20	2.85
B2.1	86.93	0.13	0.95
B1.1	86.87	0.07	0.25
B1.2	86.91	0.11	0.65
101-2	87.08	0.28	0.85
102-2	87.08	0.28	1.35
119-2	87.10	0.30	1.35

Door/Unit No	Stillwater Elevation and Reevaluated Hazard Elevation (Feet NAVD88 datum)[3]	Maximum Water Depth Above Door Threshold (Feet) [1]	Flood Duration (Hours)
122-2	87.10	0.30	1.35
192-1	87.21	0.41	6.20
191-1	87.04	0.24	2.70
194-1	87.02	0.22	0.75
192-2	87.19	0.39	8.80
191-2	87.11	0.31	2.40
194-2	87.10	0.30	0.80
363-1	116.87	0.07	0.45
361-1	117.14	0.34	1.90
360-1	117.14	0.34	4.10
355-1	117.19	0.39	5.45
354-1	117.19	0.39	6.30
360-2	117.20	0.40	8.55
361-2	117.20	0.40	8.55
363-2	116.83	0.03	0.20
520	140.51	-0.07	0.00
521	140.51	0.13	0.60
525	140.51	0.46	2.10
528	140.51	-0.07	0.00
530	140.21	-0.29	0.00
540	140.20	0.03	0.05
541	140.21	0.04	0.05
565	140.20	0.20	4.25
575	141.01	1.01	7.20
587	140.52	0.52	4.40
588	141.01	0.84	2.00
589	141.01	1.01	6.35
609	163.46	-0.54	0.00
610	163.46	-0.54	0.00
523-2	140.96	0.79	1.95
524-2	140.51	-0.07	0.00
529-2	140.51	-0.07	0.00
530-2	140.21	-0.29	0.00
540-2	140.19	0.02	0.05
541-2	140.18	0.01 [0.00][2]	0.00
565-2	140.18	0.18	4.20
575-2	140.97	0.97	6.25
584-2	140.62	0.62	4.25

Door/Unit No	Stillwater Elevation and Reevaluated Hazard Elevation (Feet NAVD88 datum)[3]	Maximum Water Depth Above Door Threshold (Feet)[1]	Flood Duration (Hours)
585-2	140.96	0.79	1.95
586-2	140.96	0.96	6.35
608-2	163.46	-0.54	0.00
611-2	163.47	-0.53	0.00
612-2	163.47	-0.53	0.00
LCRN	140.51	0.01 [0.00][2]	0.00
LCRS	140.52	0.02 [0.00][2]	0.00

Notes:

1. Maximum water depth above door threshold is calculated based on the difference between maximum stillwater elevation and door threshold elevation. A negative value indicates maximum stillwater elevation is below door threshold.
2. Inconsequential exceedance depth and duration result in no flooding time.
3. The values in this column are reported in the Reference 5 calculation in a local PG&E elevation datum. In order to convert these to NAVD88 elevation datum, 0.687 feet was added to the PG&E datum values (reference PG&E Drawing 522316, Sheet 1, Revision 1 (Reference 15)).

6 OVERALL SITE FLOODING RESPONSE

6.1 DESCRIPTION OF OVERALL SITE FLOODING RESPONSE

As described in the FHRR, Revision 1 (Reference 2), the Beyond Design Basis (BDB) LIP flooding scenario results in flood waters above site grade which causes ponding at several doors in the power block area (Reference 5). For the areas identified in the FHRR that experienced inundation due to LIP, this FE evaluates the impact on Structures, Systems, and Components (SSCs) needed to maintain KSFs at DCPP, termed Key SSCs in this evaluation.

The Key SSCs potentially impacted by flood waters from the postulated LIP are located in the auxiliary building and the turbine building. Therefore, plant walkdowns and additional detailed modeling based on the LIP event were conducted, resulting in issuance of two study calculations, References 5 and 6. Using the time series of water surface elevations (WSE) at Points of Interest (POIs) where inundation occurred, flood water depths, volumes, and pathways into the auxiliary building and the turbine building were identified in "Study Calculation: Diablo Canyon Local Intense Precipitation (LIP) Effect on Building Internals" (Reference 6).

The internal flooding model utilized in Reference 6 was conducted assuming no deployment of sandbags prior to the LIP event (i.e., the interim actions described in the FHRR, Revision 1 (Reference 2) were not implemented). Gaps under various doors were physically measured, taken from plant drawings, or conservatively estimated. As a conservative assumption, building internal floor drains were generally considered nonfunctional; however for purposes of calculating water levels on the exterior of the structures at the POI's, the exterior drainage system between the Unit 1 and Unit 2 containment structures, fuel handling building and the auxiliary building were considered functional for draining water to the surrounding ground surface elevation by means of several existing piped conveyance systems. These drains are included in a Preventative Maintenance program. Similarly, drains in the adjacent outage access control areas are modeled to convey water externally through the existing drain system. These drains are currently not in a Preventative Maintenance program; however, the addition of these drains to the Preventative Maintenance program is being tracked by Notification 50926905, which is expected to be complete by August 30, 2017.

Based on the internal flooding model shown in Reference 6, Attachment 1, grated openings and staircases provide outlets for water to leave an area. It was also assumed that once water entered a stairwell or grated opening inside the buildings, water would continue to flow uninterrupted to the lowest point in the stairway or series of grate openings. Water volumes that reached the grated openings and/or the stairwells for the fuel handling and auxiliary building POIs were assumed to be conveyed to the bottom of the auxiliary building, located at plant elevation 55 feet. Water volumes entering the turbine building were assumed to collect at low points in the turbine building proximate to the POI. The simulations were carried out utilizing the "End Loaded" and "Front Loaded" LIP temporal rainfall distributions with a duration of 6 hours and a total precipitation depth of 5.9 inches. These two distributions bound all other LIP temporal distributions (i.e. the front third, center, and end third loaded distributions) with the maximum effects in terms of depth and duration of flooding. The maximum external and internal water depths at each POI were computed along with the total volume conveyed down to the lower levels of the building. The relevant results are summarized in Tables 2, 3 and 4.

As evaluated in Reference 6, the progression of inundation inside the affected buildings results in a maximum total volume of 338,566 gallons of water being conveyed to the auxiliary building sump and Pipe Tunnels and 25,475 gallons to the lower levels of the turbine building (see Tables 2 and 3 respectively). The DCPP Updated Final Safety Analysis Report (UFSAR), Section 9.2.3.3.7(2) - Internal Flooding Protection, states that, "[a] volume of 345,000 gallons in the auxiliary building pipe tunnel for sump overflow storage is available to receive water flooding," so the current design basis flooding volume for the auxiliary building pipe tunnel bounds the volume of water resulting from a BDB LIP flooding event. Furthermore, due to DCPP site arrangement, the LIP event results in surface runoff that rapidly dissipates following the LIP event.

UFSAR, Section 10.4.5.3.1 discusses "the effects of flooding on PG&E Design Class I essential safe shutdown equipment located in the turbine building" due to "the failure of circulating water system piping". This section of the UFSAR also states, "A flooding analysis was performed based on the failure of an operator to properly secure a condenser waterbox manway cover. In order to obtain a conservative flooding rate for this scenario, waterbox manhole cover failure was assumed to be coincident with an operating error in which both circulating water pumps were running and both discharge gates were closed to the stops. In this event, approximately 43,000 gpm or 5,700 cfm of water could be expected to flow from a lower inlet waterbox manhole (the manholes with the greatest incident head of water). This flow would fill the sump and equipment pit storage areas below elevation 85 feet in 15 minutes, if the building drains are assumed to be functioning, and in 10 minutes, if the drains are not functioning." Conservatively assuming that the drains are plugged and not functioning, this equates to a storage capacity of 430,000 gallons in the turbine building (43,000 gpm for 10 minutes), which bounds the postulated water volume of 25,475 gallons from BDB LIP event. Therefore, there is no adverse impact to any Key SSCs in the turbine building.

Table 2 – Volumes Estimated to Enter Auxiliary Building Sump and Pipe Tunnel at Elevation 55'
(Source: Reference 6)

POI	Door	Building	Level (Feet)	Total Volume (Gallons)	
				Front Loaded	End Loaded
41	360-1	Fuel Handling	115	14,874	15,951
43	354	Fuel Handling	115	90,793	99,686
44	360-2	Fuel Handling	115	93,463	74,418
48	521	Control Room	140	1,659	1,712
49	525	Fuel Handling	140	137,777	145,430
Total				**338,566**	**337,197**

Table 3 – Volumes Estimated to Enter Turbine Building (Source: Reference 6)

POI	Door	Building	Level (Feet)	Total Volume (Gallons)	
				Front Loaded	End Loaded
11	101-1	Turbine	85	702	1,804
29/30	101-2/119-2	Turbine	85	1,668	3,494
56	588	Turbine	140	11,332	8,279
66	585-2	Turbine	140	11,773	8,606
Total				**25,475**	**22,183**

As indicated in Table 4, water depth inside all doors except in 5 locations (9 POIs), is less than 1 inch. A 1-inch depth directly inside the door is considered minimal, since the water in these areas will dissipate quickly through open gratings and stairwells and not adversely affect the operation of any Key SSCs.

The five locations with greater than 1 inch of flooding are:

- Unit 2 turbine building 85’, Doors 101-2 and 119-2
- Unit 1 fuel handling building 115’, Doors 360-1 and 361-1
- Unit 2 fuel handling building 115’, Doors 360-2 and 361-2
- Unit 1 outage access control facility, Doors 587 and 588
- Unit 2 outage access control facility, Door 585-2.

The inundation near doors 101-2 and 119-2 is in the 12 kV Switchgear Area of the 85' elevation of the Unit 2 turbine building and there are no Key SSCs in this area. The outlet from this area is down a stairwell, which conveys approximately 3,500 gallons of water (see Table 3) to a lower level at 76' elevation. There are no Key SSCs in this lower level, and there is adequate storage volume to retain the water. (Reference 6). Consequently, there are no adverse impacts to any Key SSCs in this area.

The flooding near doors 360-1/361-1 and 360-2/361-2 is in the spent fuel pool/cask decontamination areas of the 115' elevation of the Unit 1 and 2 auxiliary building. There are no Key SSCs located in these areas that would be impacted by this depth of water; however, there is a floor opening on the 115’ elevation floor leading to the auxiliary feed water (AFW) pump rooms in each unit. The AFW pumps provide a Key Safety Function, and are located on the 100’ elevation; however, these areas will not be impacted since the openings on the 115' elevation are surrounded by 6-inch concrete curbs. In this vicinity, the maximum water depth inside U-1 doors 360-1/361-1 and U-2 doors 360-2/361-2 is 3.9 inches and 5.1 inches, respectively. The curbs around the floor openings to the AFW pump rooms preclude water ingress to the areas and these Key SSCs are not impacted (Reference 6).

The inundation near doors 587/588 and 585-2 is in the 140’ outage access control facilities for Units 1 and 2 respectively. No Key SSCs are located in these areas. The outlet from these areas is through doors 535 or 535-2 into the turbine building, and there is minimal water depth beyond these doors.

Therefore, based on the internal flooding analysis and existing permanent passive plant features, Key SSCs are not affected, and the interim actions implemented as described in the FHRR, Revision 1 (Reference 2), are not required to respond to LIP flooding.

Table 4 –Computed Maximum Water Depths inside Doors at POIs (Source: Reference 6)

POI	Door ID	Building	Level (Feet)	Maximum water depth behind door (Inches)
11	101-1	Turbine	85	0.6
12	102-1	Turbine	85	negligible
13	119-1	Turbine	85	0.6
14	122-1	Turbine	85	0.2
29	101-2	Turbine	85	1.3
30	102-2	Turbine	85	0.1
31	119-2	Turbine	85	1.3
32	122-2	Turbine	85	0.1
40	361-1	Fuel Handling	115	3.9
41	360-1	Fuel Handling	115	3.9
42	355-1	Fuel Handling	115	0.5
43	354-1	Fuel Handling	115	0.5
44	360-2	Fuel Handling	115	5.1
45	361-2	Fuel Handling	115	5.1
48	521	Control Room	140	0.5
49	525	Fuel Handling	140	0.8
50	528	Fuel Handling	140	0.8
51	530	Fuel Handling	140	negligible
52	540	Ventilation Building	140	0.3
53	541	Ventilation Building	140	0.3
56	587	Outage Access	140	1.9
57	588	Outage Access	140	1.9
60	610	Control Room Roof	150	negligible
61	523-2	Control Room	140	negligible
62	524-2	Fuel Handling	140	negligible
63	529-2	Fuel Handling	140	0.8
64	530-2	Fuel Handling	140	negligible
66	541-2	Ventilation Building	140	negligible
70	585-2	Outage Access	140	1.9
75	LCRN	Louvers Control Room North	140	negligible

6.2 SUMMARY OF PLANT MODIFICATIONS AND CHANGES

There are no remaining actions required to be completed, including plant modifications, procedural changes, or other procurement activities.

7 FLOOD IMPACT ASSESSMENT: LOCAL INTENSE PRECIPITATION (LIP, PATH 2 ASSESSMENT)

7.1 Description of Flood Impact

Section 5 of this FE describes the flood hazard parameters for DCPP's unbounded flood mechanism, LIP. The site flooding response evaluated in Section 6 of this enclosure describes the internal flooding analysis and existing permanent passive plant features that will provide adequate protection of Key SSCs from LIP flood water.

7.2 Adequate Available Physical Margin (APM) Justification and Reliability of Flood Protection

This section provides APM values and reliability information for the plant features that are to be credited for preventing unacceptable ingress of flood water from the postulated LIP into the auxiliary building and the turbine building. The APM analysis is based on the maximum height of water in the vicinity of the specific plant feature at any time during the LIP event.

Both the LIP and internal flooding analyses (References 5 and 6 respectively) assumed that all drainage system components are non-functional or completely blocked during the LIP event, with the exception of the drains discussed in section 6.1. There are no active flood protection features.

Site topography and man-made fill areas are Type 1 features (as defined in NEI 16-05 these are features engineered in the design basis as having a flood protection function), that were designed and constructed to mitigate (or minimize) the effects of a Probable Maximum Flood (PMF) and ponding effects of a LIP. These passive features, documented in the FHRR, Revision 1 (Reference 2), were reviewed against the criteria of NEI 16-05 Revision 1, Appendix B and confirmed to meet the criteria of reliability.

On the 115' level of the auxiliary building, 6-inch tall curbs around the floor openings above the Unit 1 and Unit 2 AFW pump rooms preclude water ingress into these areas. At the location of these curbs, the maximum water depth from the BDB LIP event is 3.9 inches and 5.1 inches for Units 1 and 2 respectively (Reference 6). This results in a worst case APM of 0.9 inches. While this APM could be considered small, NEI 16-05, Appendix B states that negligible or zero APM can be justified as acceptable if the use of conservative inputs, assumptions, and/or methods in the flood hazard reevaluation can be established. The following conservative inputs and assumptions were made in the DCPP analysis:

- Infiltration was conservatively not utilized in the model,
- Runoff losses were ignored, resulting in maximizing runoff,
- All outdoor external drainage system components were assumed non-functional or completely blocked during the LIP event (with the exception of the auxiliary

building exterior drains previously discussed), which results in overland flow over the entire plant site without any flow diverted through the drainage system(s),
- Building internal floor drains were considered nonfunctional (with the exception of the drains inside the outage access control facility previously discussed).

For these reasons the APM values are considered acceptable.

There is adequate freeboard on the 6" curb to prevent overtopping. The hydrostatic forces from the LIP flood waters (maximum 5.1 inches) are minimal. There would be no hydrodynamic loading from wave effects and debris. Therefore, the existing 6 inch concrete berms will perform their functions throughout the duration of the flood event and their reliability is assured.

7.3 Adequate Overall Site Response

No manual actions are required for this flood mechanism at Diablo Canyon Power Plant.

8 CONCLUSION

As stated in the FHRR, Revision 1 (Reference 2), the reevaluated LIP was not bounded by the current analysis of the plant as documented in the UFSAR. This was the only flooding mechanism that was not bounded. This places Diablo Canyon Power Plant in Path 2 to address this unbounded flooding mechanism. The preceding FE has identified LIP floodwater ingress pathways to the auxiliary building and turbine buildings based on "Study Calculation: Diablo Canyon Local Intense Precipitation (LIP) Effect on Building Internals" (Reference 6). In accordance with NRC guidance, this evaluation has determined that existing plant flood protection features will adequately protect all SSCs that are needed to maintain Key Safety Functions following the LIP event. No manual actions are required to ensure the plant's safe shutdown equipment will be capable of performing their Key Safety Functions throughout a LIP event. Based on NEI 16-05, Revision 1 (Reference 7), the site's passive permanent flood protection features were determined to be reliable, which include the site topography and man-made fill areas that mitigated the effects of LIP in and around the power block, and flood protection features in the auxiliary building. There are no active flooding protection features or required site response. All vulnerabilities due to the LIP mechanism were determined to be addressed by passive plant design features, and available physical margin was determined by this evaluation to be acceptable to protect Key SSCs. This evaluation verified the reliability of the flood protection features. This submittal completes the actions related to External Flooding required by the March 12, 2012 10 CFR 50.54(f) letter.