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PGE_Response to 5/31/17 Nuclear Data Request

Additional submitted attachment is included below.

Pacific Gas and Electric Company

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July 12, 2017 **VIA ELECTRONIC FILING**

California Energy Commission
Dockets Office MS-4
Re: Docket No. 17-IEPR-01
1516 Ninth Street
Sacramento, CA 95814-5512

Re: Pacific Gas and Electric Company -- Response to 2017 Integrated Energy Policy Report Nuclear Data Request

I. INTRODUCTION

In accordance with the instructions provided in the May 31, 2017 *California Energy Commission (CEC) Request for Data Related to California's Nuclear Power Plants (Request)*, Pacific Gas and Electric Company (PG&E) hereby provides its responses to the questions listed in Attachment A to that Request. PG&E's responses focus on Diablo Canyon Power Plant (DCPP), as specified in the Request.

PG&E first provides the question as shown in Attachment A, and then provides its response. Where a question contains multiple parts, PG&E may have broken the question into multiple parts and responded to each part separately.

II. RESPONSES TO QUESTIONS FROM MAY 31, 2017 REQUEST, ATTACHMENT A

Question 1a:

Please provide a progress report on the transfer of spent fuel from pools into dry casks (in compliance with NRC spent fuel cask and pool storage requirements).

Question 1a Response:

There are a total of 1,712 used fuel assemblies stored in the spent fuel pools. There are 49 casks loaded in dry storage with a total of 1,568 assemblies. In compliance with NRC spent fuel cask and pool storage requirements, the current, budgeted plan is to load 9 additional casks (288 total

fuel assemblies) in 2018 and eight casks (256 total fuel assemblies) in each of the years 2020, and 2022.

Question 1b:

Please include details on the 2016 transfer campaign: UF06, moving 12 casks during 8/8/2016 to 11/6/2016 operating window.

Question 1b Response:

The last used fuel offload campaign, UFO6, was conducted 8/8/2016 to 11/12/2016, and successfully loaded 12 casks. The 12 casks contain 384 spent fuel assemblies; each cask used at DCPP holds 32 fuel assemblies.

Question 2:

Please provide updated tables on the status of spent nuclear fuel and current onsite storage capacity and a table summarizing the current spent fuel conditions including surface radiation levels and temperature. Tables on the current independent spent fuel storage installation (ISFSI) should contain information on capacity, planned expansions and timetables, existing and planned loading configurations, and surface conditions of the current ISFSI multi-purpose canisters.

Question 2 Response:

Updates to Table 14: On-Site Spent Fuel Capacity (number of assemblies) from the AB 1632 Assessment of California's Operating Nuclear Plants: Final Report, October 2008 (CEC-100-2008-005-F, page 217).

	Diablo Canyon	
	Assemblies	**MTU**
ISFSI Capacity	4,416	2,100 (lic.)
Planned Expansions	0	0
Total Planned ISFSI Capacity	4,416	2,100
Spent Fuel Pool Current Capacity (1,324/pool)	2648 (lic.)	N/A
Total On-site Storage Capacity	7064	N/A
Assemblies Generated during Current Licensing period	4,382 est.	1,887 est.
Spent Fuel Pool Original Design Capacity (before re-racking) (270/pool)	540	N/A

Acronyms:

est. = estimated
lic. = licensed
MTU = Metric Tons of Uranium
N/A = Not Applicable

There are no planned changes to loading configurations at this time. All casks to be loaded will use the same vertically-oriented, 32 assembly, multi-purpose canister in a seismically-anchored, steel and concrete shielding overpack known as the Holtec HI-STORM 100SA dry cask storage system. A description of the Holtec HI-STORM 100 system can be found at the referenced website.[1]

There is no table for spent fuel conditions including surface radiation levels and temperature as this data is not available.

As discussed in response to Question 4b, PG&E voluntarily participated with EPRI to perform a surface condition inspection in 2014 for 2 multi-purpose canisters. The surface conditions for these two canisters are noted in the report.

Question 3:

Please provide an updated evaluation of the potential long-term impacts and projected costs of spent fuel storage in pools versus dry cask storage of higher burn-up fuels in densely packed pools, and the potential degradation of fuels and package integrity during long-term wet and dry storage and transportation offsite.

Question 3 Response:

The annual cost difference of wet spent fuel storage versus dry cask spent fuel storage is $65.6 million (in 2014 $s), as presented in PG&E's Prepared Testimony for the 2015 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP), Table 2-8. Table 2-8 is provided as Attachment 1 to this response. This cost comparison is valid when spent fuel is located in both wet spent fuel storage and dry cask spent fuel storage. It should be noted that the annual dry cask storage costs in Table 2-8 would increase once all spent fuel is in dry cask storage due to other common site costs such as permitting, insurance, and property taxes being charged to dry storage.

The U.S. Nuclear Regulatory Commission (NRC) has evaluated the potential degradation of fuel assemblies and fuel storage structures, systems, and components during long-term wet storage in NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Revision 2, dated December 2010, Chapter VII, Sections A2 and A3 (Attachment 2 to this response). The potential degradation of fuel assemblies and package integrity during dry storage has been evaluated by the NRC in the draft report for comment "Managing Aging Processes in Storage (MAPS) Report," August 2016, Tables 4.3-1 – 4.3-5 (Attachment 3 to this response).

The NRC has evaluated and identified the requirements for fuel assemblies and packaging during transportation offsite in NUREG-1617, "Standard Review Plan for Transportation Packages for

[1] See: https://holtecinternational.com/productsandservices/wasteandfuelmanagement/dry-cask-and-storage-transport/hi-storm/hi-storm-100/

Spent Nuclear Fuel," and 10 CFR Part 71. PG&E is not aware of any industry operating experience regarding potential degradation of fuel and the package integrity during transportation offsite.

Question 4a:

Please provide information on the developments of facility specific aging cask management programs onsite and within the nuclear engineering community, and any related technological considerations.

Question 4a Response:

The Diablo Canyon ISFSI Final Safety Analysis Report discusses maintenance of the cask systems during the licensed 20-year operating period. The following is a summary of maintenance activities that are performed to ensure the structures, systems, and components are adequately maintained. Only minimal maintenance is required over the cask system's lifetime, and this maintenance primarily results from cask handling and weathering effects in storage. Typical of such maintenance is the reapplication of corrosion inhibiting materials on accessible external surfaces. Visual inspection of the overpack inlet and outlet air duct perforated plates (screens) is required by the Diablo Canyon ISFSI Technical Specifications to ensure that they are free from obstruction, including clearing of debris, if necessary. The gamma and neutron shielding materials in the overpack, transfer cask, and Multi-Purpose Canister degrade negligibly over time or as a result of usage. Radiation monitoring of the ISFSI provides ongoing evidence and confirmation of shielding integrity and performance. If the monitoring program indicates increased radiation doses, additional surveys of the overpacks would be performed to determine the cause of the increased dose rates.

Consistent with the industry, to address potential aging of components after 20 years of storage, facility-specific aging management programs are required to be developed using the following NRC guidance documents:

- NUREG-1927, "Standard Review Plan for Renewal of Specific Licenses and Certificates of Compliance for Dry Storage of Spent Nuclear Fuel," Revision 1, June 2016, NRC (Attachment 4 to this response)

- Draft Report for Comment "Managing Aging Processes in Storage (MAPS) Report," August 2016. NUREG-TBD. NRC (Attachment 3 to this response)

In addition, PG&E actively participates with industry in EPRI's Extended Storage Collaboration Program (ESCP) in order to study the long-term performance of participant's used fuel storage systems to develop the technical basis in support of extended storage through sharing of knowledge and research activities among ESCP participants.

Question 4b:

Also, please provide any DCPP MPC inspection reports (EPRI 2016 Inspection Report).

Question 4b Response:

The requested DCPP MPC inspection report is publically available as EPRI Technical Report 3002002822, "Diablo Canyon Stainless Steel Dry Storage Canister Inspection," dated August 2016, and is included as Attachment 5 to this response.[2]

Question 5:

Please provide a status update on currently mounted HI-STORM casks and their transport readiness under current NRC license requirements.

Question 5 Response:

The currently mounted HI-STORM casks are licensed for storage only. In January 2016, Holtec International applied to the NRC to amend their HI-STAR 100 Transportation Certificate, 71-9261, to include the Diablo Canyon MPC-32 canister. There have been responses to two sets of requests for additional information (RAIs) submitted by Holtec in August 2016 and most recently in March 2017. The license amendment request continues to be under review by NRC.

Question 6:

Alternative spent fuel management schemes to expeditiously transfer spent nuclear fuel assemblies from the wet spent fuel pool to dry casks in the ISFSI. PG&E alternate plans, if any, to isolate the spent fuel pool to eliminate the need for using Pacific Ocean seawater for cooling the spent fuel pool system.

Question 6 Response:

On August 11, 2016, PG&E filed Application (A.) 16-08-006 with the CPUC to obtain approval of a "Joint Proposal" (Joint Proposal). The Joint Proposal was prepared in concert with a broad coalition of community partners. In part, the Joint Proposal committed PG&E to developing a plan for "expedited post-shutdown transfer of spent fuel to dry casks storage as is technically feasible using the transfer schedules implemented at the San Onofre Nuclear Generating Station as a benchmark for comparison." In addition, per the 2015 NDCTP Decision (D.) 17-05-020, dated May 25, 2017, "PG&E is directed to provide testimony concerning expedited dry cask loading both pre-and post-shut down for DCPP. PG&E is to provide any updated information concerning expediting the 7-year timeframe for transfer of SNF [spent nuclear fuel] from wet to dry storage directed in this decision." This expedited fuel study will be incorporated into the site-specific decommissioning study that will be submitted to the CPUC with the 2018 NDCTP.

[2] The report is available electronically at:
https://publicdownload.epri.com/PublicDownload.svc/product=000000003002002822/type=Product

PG&E is in the process of developing the 2018 NDCTP site-specific decommissioning cost estimate. The site-specific cost estimate may include alternate plans to isolate the spent fuel pool to eliminate the need for using Pacific Ocean seawater for cooling the spent fuel pool system.

III. CONCLUSION

PG&E appreciates the opportunity to provide this information to the CEC. Please contact me if you have any questions or wish to discuss matters further.

Sincerely,

/s/

Valerie J. Winn

cc: Justin Cochran (by email - Justin.cochran@energy.ca.gov)