

SAFETY EVALUATION REPORT RELATED TO THE TERMINATION OF FACILITY
OPERATING LICENSE NO. DPR-7
PACIFIC GAS & ELECTRIC COMPANY
HUMBOLDT BAY POWER PLANT, UNIT 3
DOCKET NO. 50-133

1.0 BACKGROUND

Humboldt Bay Power Plant, Unit 3 (HBPP, Unit 3 or the facility), was a 65-Megawatt electric Boiling Water Reactor, which was last operated in 1976, and was permanently defueled in 1984.

The HBPP, Unit 3 is located about four miles true southwest of the city of Eureka, Humboldt County, California, and consists of approximately 113 acres of land. Pacific Gas and Electric Company (PG&E), the licensee, is operating Humboldt Bay Generating Station (HBGS), a new dual fueled (natural gas and diesel) power plant, on the Humboldt Bay site adjacent to the south side of the facility. The Humboldt Bay Independent Spent Fuel Storage Installation (ISFSI) is located on site approximately 600 feet northwest of the HBGS.

The HBPP, Unit 3 achieved initial criticality on February 16, 1963 and began commercial operation in August 1963. On July 2, 1976, HBPP, Unit 3 was shut down for annual refueling and to conduct seismic modifications. Seismic and geologic studies were in progress. In December 1980 updated economic analyses indicated that restarting Unit 2 would likely not be cost-effective. On July 30, 1984, PG&E submitted the HBPP, Unit 3 SAFSTOR (Safe Storage) Decommissioning Plan (SDP) application to amend the HBPP, Unit 3 Operating License to a Possession-Only License (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20093N573 (Pkg)). On July 16, 1985, the Nuclear Regulatory Commission (NRC) issued Amendment No. 19 to the HBPP, Unit 3 Operating License (ADAMS Legacy No. 507260040) to change the status to possess-but-not-operate, and the plant was placed into a SAFSTOR status.

In 1996, the NRC decommissioning rule, was finalized. This rule introduced the term Post Shutdown Activities Report (PSDAR). The rule applies to power reactor licensees who do not have an approved decommissioning plan on the effective date of the final rule. As detailed in the relevant Statements of Consideration (SOCs), licensees that already have an approved plan, such as PG&E for HBPP, Unit 3, could, at their option, follow the provisions of the rule. Consistent with the discussion in the decommissioning rule SOC, the SDP was initially considered to be a PSDAR because it contained information related to decommissioning activities and was approved before 1996. PG&E voluntarily submitted a PSDAR for HBPP, Unit 3 in February 1998 to provide a general overview of proposed decommissioning activities. PG&E subsequently revised the PSDAR, as necessary, in accordance with the requirements of 10 CFR 50.82. PG&E submitted the most recent revision of the PSDAR, Revision 4, in July 2013 (ADAMS Accession No. ML13213A160).

On November 17, 2005, the NRC issued Materials License No. SNM-2514 (a site-specific 10 CFR Part 72 License, Docket No. 72-27, Humboldt Bay ISFSI) authorizing PG&E to receive, possess, store, and transfer spent fuel and associated radioactive materials resulting from the operation of HBPP, Unit 3 into the Humboldt Bay ISFSI (ADAMS Accession No. ML053220239

Enclosure 1

(Pkg)). The ISFSI is a separately licensed facility located within boundaries of the 10 CFR Part 50 licensed site. The ISFSI is required to be eventually decommissioned. Decommissioning and termination requirements for Materials License No. SNM-2514 are provided in 10 CFR 72.54, Expiration and termination of licenses and decommissioning of sites and separate buildings or outdoor areas.

On June 16, 2008, the NRC approved a license amendment that eliminated the security plan requirements for the 10 CFR Part 50 licensed facility with all the spent nuclear fuel transferred to the ISFSI (ADAMS Accession No. ML081060393 (Pkg)). The licensee completed transferring all the spent fuel to the ISFSI on December 11, 2008 (ADAMS Accession No. ML083657367). PG&E began actively decommissioning HBPP, Unit 3, including decontamination and dismantlement, in June 2009. Greater-Than-Class-C (GTCC) waste was transferred to the HBPP ISFSI in 2013. HBPP, Unit 3 reactor, as well as plant structures associated with reactor operations, have since been removed.

On May 4, 2016, in response to PG&E's application dated May 3, 2013 (ADAMS Accession No. ML13130A008), as supplemented on February 14, 2014 (ADAMS Accession No. ML14045A329), March 31, 2014 (ADAMS Accession No. ML14093A050), April 2, 2014 (ADAMS Accession No. ML14204A150), August 13, 2014 (ADAMS Accession No. ML14246A164), and March 16, 2015 (ADAMS Accession No. ML15086A161), the Commission issued license Amendment No. 45 ((ADAMS Accession No. ML15090A444 (Pkg))). Among other things, this license amendment approved HBPP, Unit 3's license termination plan (LTP), incorporated it into HBPP, Unit 3's license, and specified limits to the changes the licensee could make without prior NRC approval.

Since the issuance of Amendment No. 45 and the approval of the HBPP, Unit 3 LTP, the NRC staff has reviewed final status survey reports (FSSRs) of several survey units associated with HBPP, Unit 3. During its review, the NRC staff noted that the licensee had not accounted for either all its radionuclides of concern (ROCs) or its insignificant radionuclides in a manner consistent with the LTP. When asked about these issues, the licensee responded with additional data. By letter dated February 8, 2021 (ADAMS at Accession No. ML21039A515), as supplemented on April 29, 2021 (ADAMS Accession No. ML21119A214), and May 20, 2021 (ADAMS Accession No. ML21140A395), PG&E also submitted a request to amend License No. DPR-7 for HBPP, Unit 3 to change how it assesses-insignificant/hard-to-detect (HTD) ROCs. The NRC approved the amended LTP by a license amendment, dated June 24, 2021 (ADAMS Accession No. ML21158A123 (Pkg)), as corrected on July 8, 2021 (ADAMS Accession No. ML21189A072 (Pkg)).

The licensee conducted decommissioning activities at HBPP, Unit 3 in accordance with an approved LTP from May 2016 to July 2021. In accordance with the approved LTP, the licensee conducted final status surveys (FSSs) to demonstrate that the facility and site meet the criteria for unrestricted release as presented in 10 CFR 20.1402. Details of the FSS results were submitted to the NRC in 11 separate FSSRs. Although the NRC staff identified some errors in FSSRs submitted prior to and after Amendment 47's effective date, the NRC staff noted that this did not have a detrimental impact for demonstrating compliance with the unrestricted release criteria. Details about the errors and how they should have been addressed, as well as how the NRC staff performed its own independent assessments and bounded the hypothetical doses for demonstrating compliance with the unrestricted release criteria, is documented in each FSSR Safety Evaluation Report (SER) (ADAMS Accession Nos. ML18155A300, ML18278A087, ML19319B063, ML20030A100, ML21214A101, ML21225A773, ML21225A776, and

ML21306A185). In accordance with 10 CFR 50.82(a)(9), the licensee submitted an application for termination of its Facility Operating License on October 21, 2021 (ADAMS No. ML21294A421). This SER documents the NRC's approval of PG&E's request for license termination.

2.0 EVALUATION

In accordance with 10 CFR 50.82(a)(11), the Commission shall terminate the license if it determines that: (i) the remaining dismantlement has been performed in accordance with the approved LTP, and (ii) the final radiation survey and associated documentation, including an assessment of dose contributions associated with parts released for use before approval of the LTP, demonstrate that the facility and site have met the criteria for decommissioning in 10 CFR Part 20, Subpart E.

In accordance with the approved LTP, PG&E performed the HBPP, Unit 3 site release for unrestricted use in two phases. The first phase (Phase I) consisted of a partial site release of an area south of King Salmon Avenue. In a letter dated November 9, 2016 (ADAMS Accession No. ML16326A004), PG&E submitted a request for the partial site release for the proposed release of the 30.4 acres, known as the Fisherman's Channel and encompassing FSS areas OOL 10-11 and OOL 10-12, from the HBPP, Unit 3 license. PG&E's submittal included a FSSR for the survey units within the area proposed to be released. Under contract to the NRC, the Oak Ridge Institute for Science and Education (ORISE), as managed Oak Ridge Associated Universities (ORAU), conducted a confirmatory radiological survey of the area to be released on September 30 through October 1, 2015. ORISE provided a report on that survey on October 24, 2016 (ADAMS Accession No. ML16300A275). The survey included gamma, alpha, and beta radiation surveys and soil sampling. The results of the ORISE gamma, alpha, and beta radiation surveys, combined with the ORISE laboratory analytical results of the soil samples, satisfied the NRC approved soil and surface activity derived concentration guideline levels (DCGLs) in PG&E's LTP. The NRC approved the partial site release on January 5, 2018 (ADAMS Accession No. ML17115A107).

In accordance with the approved LTP, Phase II Decommissioning activities will be complete when the FSSRs are approved by the NRC. As part of license termination approval, the NRC verifies that the site meets acceptance levels. PG&E completed Phase II Decommissioning and submitted a request to terminate the License No. DPR-7 on October 21, 2021 (ADAMS Accession No. ML21294A421) contingent on NRC's completion of its review of the few remaining FSSR submittals. The NRC staff completed its evaluation of the remaining FSSRs on November 2, 2021. The following is the NRC staff's evaluation of all the submittals demonstrating the site meets the decommissioning requirements for license termination of the License DPR-7.

2.1 Remaining Dismantlement Activities

In accordance with 10 CFR 50.82(a)(9)(ii)(B), Section 3 of the LTP provided a discussion of the remaining dismantlement activities necessary for license termination. These activities include site remediation and radiological FSSs. Additionally, Section 2.1.5.5 of the LTP lists the remaining structures, systems, and components to be dismantled or decontaminated after approval of the LTP and Section 4.3 provides a corresponding description of the remediation considerations for each of the remaining structures, systems, and components.

In the LTP, the licensee stated it planned to remediate the site, including structures, systems, and components that remain on site, to the criteria specified in 10 CFR Part 20, for unrestricted use. To meet these criteria, the licensee planned to use typical remediation methods, which include chemical decontamination, wiping, washing, vacuuming, scabbling, spalling, and abrasive blasting. For radiologically contaminated systems and components, the licensee planned to either: (1) remove them and send them to an offsite processing facility, or to a low-level radioactive waste facility, for disposal; or (2) decontaminate them onsite and ensure that any residual radioactivity remaining meets the release criteria for unrestricted use.

As stated in the LTP, Section 1.2, and as evaluated by the NRC staff through inspection and FSS review, all structures associated with Unit 3 will be removed, along with temporary decommissioning support trailers. At license termination, only the following structures will remain:

- * HBGS and associated structures
- * Administration Building
- * Administration Annex Building
- * Security Building
- * Count Room Building
- * Training Building
- * Waste Management Building
- * ISFSI and supporting structures

Most plant related structures have been removed from the site including the caisson. The Humboldt Bay caisson was a first of its kind structure to house a nuclear containment structure, pressure suppression chamber, and nuclear steam supply system below grade. The caisson's removal was completed in 2018.

As noted above, the licensee also had to complete FSSs. It detailed the results of those FSSs in FSSRs it submitted to the NRC staff. Refer to Table 2, PG&E Phase II Decommissioning FSSRs and Corresponding NRC FSSR Approvals, for a complete listing of these Phase II Decommissioning submittals and the NRC's approvals with ADAMS Accession Nos. and document dates. The NRC staff has reviewed the licensee's FSSRs for HBPP, Unit 3 and determined that the licensee has remediated the remaining structures, systems, and components consistent with Section 4.3 of the LTP. Therefore, the NRC staff concludes that the dismantlement and decontamination activities have been completed in accordance with the approved LTP.

2.2 Final Status Survey

The FSS is the radiation survey performed after an area has been fully characterized, remediation has been completed, and the licensee believes that the area is ready to be released for unrestricted use. The purpose of the FSS is to demonstrate that the area meets the radiological criteria for license termination. The NRC staff's evaluation of the FSS results for site areas that were previously released under partial site release or under Phase I Decommissioning are discussed in ADAMS Accession No. ML17115A107 (Pkg). Under contract to the NRC, ORISE conducted a confirmatory radiological survey of the area to be released on September 30 through October 1, 2015. A report on that survey was provided on October 24, 2016 (ADAMS Accession No. ML16300A275). The survey included gamma, alpha, and beta

radiation surveys and soil sampling. The results of the ORISE gamma, alpha, and beta radiation surveys, combined with the ORISE laboratory analytical results of the soil samples, satisfies the NRC approved soil and surface activity DCGLs described in PG&E's LTP.

Details of the Phase II Decommissioning FSS results were submitted to the NRC in 11 separate FSSRs. Refer to Table 2, PG&E Phase II Decommissioning FSSRs and Corresponding NRC FSSR Approvals, for a complete listing of these Phase II Decommissioning submittals and the NRC's approvals with ADAMS Accession Nos. and document dates.

The NRC conducted performance-based in-process inspections of the licensee's FSS program during the decommissioning process. The purpose of the inspections was to verify that the FSSs were being conducted in accordance with the commitments made by the licensee in the LTP, and to evaluate the quality of the FSSs by reviewing the FSS procedures, methodology, equipment, surveyor training and qualifications, document quality control, and survey data supporting the FSSRs. The NRC inspectors documented their findings in inspection reports. Table 1, NRC Inspection Reports for HBPP, Unit 3 Regarding FSSs, provides the ADAMS Accession No. and document date for the relevant inspection reports. In addition, the NRC conducted numerous independent confirmatory surveys to verify the FSS results obtained and reported by the licensee. Refer to Table 3, Reports on HBPP, Unit 3 Regarding Confirmatory Surveys for Phase II, below, for a complete listing of Phase II Decommissioning confirmatory surveys performed with date and ADAMS Accession Nos. Confirmatory surveys consisted of surface scans for beta and gamma radiation, direct measurements for total beta activity, and collection of smear samples for determining removable radioactivity levels.

Table 1. NRC Inspection Reports for HBPP, Unit 3 Regarding FSSs

| ADAMS Accession No. | Document Date | Title |
|------------------------|---------------|---|
| ML20336A192 | 12/01/2020 | Humboldt Bay Power Plant - NRC Inspection Report 05000133/2020-001 and 07200027/2020-001 |
| ML19262G962 | 09/27/2019 | Humboldt Bay Power Plant Inspection Report 050-00133/2019-002 |
| ML19135A315 | 05/21/2019 | Humboldt Bay Power Plant - Inspection Report 050-00133/2019-001 |
| ML18291A654 | 10/17/2018 | Pacific Gas and Electric Company; Humboldt Bay Power Plant Inspection Report 050-00133/2018-003 |
| ML18170A065 | 06/20/2018 | Humboldt Bay Power Plant - NRC Inspection Report 05000133/2018-002 And 07200027/2018-001 |
| ML18030B036 | 01/31/2018 | Humboldt Bay Power Plant - NRC Inspection Report 05000133/2018-001 |
| ML17285A546 | 10/19/2017 | Humboldt Bay Power Plant - Inspection Report 05000133/2017003 |
| ML17213A861 | 08/02/2017 | Humboldt Bay Power Plant - NRC Inspection Report 05000133/2017-002 |

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|-------------|------------|---|
| ML16062A280 | 03/03/2016 | Humboldt Bay Power Plant IR 050-00133/16-001 |
| ML15351A463 | 12/17/2015 | Humboldt Bay Power Plant - NRC Inspection Report 050-00133/15-010 |
| ML15063A124 | 03/03/2015 | IR 05000133/2015-007; 02/10-12/2015; Humboldt Bay Power Plant, Unit 3 |
| ML13266A405 | 09/20/2013 | IR 05000133-13-010; 08/19-22/2013; Humboldt Bay Power Plant, Unit 3 NRC Inspection Report |
| ML12073A424 | 03/13/2012 | IR 05000133-12-007, February 13-17, 2012, Pacific Gas and Electric Company |
| ML11294A516 | 10/21/2011 | EA-11-211, IR 05000133-11-007, 07200027-11-001, on 8/1-4/2011, Humboldt Bay Power Plant, NRC Inspection Report |
| ML12104A064 | 04/13/2012 | IR 05000133-12-008; Pacific Gas and Electric Company; 03/21-25-/2012; Humboldt Bay Power Plant, Unit 3, NRC Inspection Report |
| ML12180A601 | 06/28/2012 | IR 05000133-12-009, June 11-14, 2012, Pacific Gas and Electric Company |
| ML15351A464 | 12/17/2015 | Humboldt Bay Power Plant - NRC Inspection Report 050-00133/15-010. |

The NRC staff's review and acceptance of the all the FSSRs is documented in correspondence with the licensee and in Table 2, PG&E Phase II Decommissioning FSSRs and Corresponding NRC FSSR Approvals.

Table 2. PG&E Phase II Decommissioning FSSRs and Corresponding NRC FSSR Approvals

| FSS Report # | LTP Table 5-2, page 5-17 and 5-18, Survey Area Designator | PG&E Submittal | NRC Response |
|---------------------|--|---|--|
| 1 | OOL10 & 11 | PG&E Letter HBL-17-001, Final Status Survey Report for New Generation Footprint Area, dated March 9, 2017 (ADAMS Accession No. ML17068A100) | Letter to E.D. Halpin, Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports NGFA-EST and NGFA-WST, dated June 11, 2018 (ADAMS Accession No. ML18155A300) |

Table 2. PG&E Phase II Decommissioning FSSRs and Corresponding NRC FSSR Approvals

| FSS Report # | LTP Table 5-2, page 5-17 and 5-18, Survey Area Designator | PG&E Submittal | NRC Response |
|---------------------|--|---|---|
| 2 | OOL10-04 | PG&E Letter HBL-18-008, Final Status Survey Report for Mobile Emergency Power Plant Station Area (Survey Unit OOL10-04), dated July 19, 2018 (ADAMS Accession No. ML18200A248) | Letter to Halpin, Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports OOL10-04 and ISF01-01, dated October 11, 2018 (ADAMS Accession No. ML18278A087) |
| 3 | ISF01-01 | PG&E Letter HBL-18-009, Humboldt Bay Power Plant, Unit 3 - Final Status Survey Report for Independent Spent Fuel Storage Installation Area (Survey Unit ISF01-01), dated July 19, 2018 (ADAMS Accession No. ML18269A133) | Letter to Halpin, Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports OOL10-04 and ISF01-01, dated October 11, 2018 (ADAMS Accession No. ML18278A087) |
| 4 | RLY01-01&02 & Mobile Energy Power Plant (MEPPS) 01-01&02 | PG&E Letter HBL-19-011, Final Status Survey Report for the Relay Building (Survey Units RLY01-01 and RLY01-02) and the MEPPS Island Building (Survey Units MEPPS01-01 and MEPPS01-02), dated May 22, 2019 (ADAMS Accession No. ML19143A046) | Letter to Halpin, Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports for the Relay Building and the MEPPS Island Building, dated December 4, 2019 (ADAMS Accession No. ML19319A566) |
| 5 | OOL10-05 OOL10-06 OOL10-14 OOL10-15 OOL10-19 OOL10-23 | PG&E Letter HBL-19-014, Final Status Survey Report for Six Survey Areas Within Survey Unit OOL10, dated October 17, 2019 (ADAMS Accession Nos. ML19291A014 and ML19290H613) | Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports for Six Survey Areas Within Survey Unit OOL10, dated February 12, 2020 (ADAMS Accession No. ML20030A099) |
| 6 | NOL01-09 | PG&E Letter HBL-20-007, Final Status Survey Report for the Humboldt Bay Power Plant Reactor Caisson Survey Units, dated April 1, 2020 (ADAMS Accession No. ML20092M643) | Letter to J. Welsch, PG&E, from A. Snyder, NRC, Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports, dated August 3, 2021 (ADAMS Accession No. ML21214A100) |
| 7 | OOL09-01 OOL09-02 | PG&E Letter HBL-20-010, Final Status Survey Report for the | Humboldt Bay Power Plant, Unit 3 - Approval of Final |

Table 2. PG&E Phase II Decommissioning FSSRs and Corresponding NRC FSSR Approvals

| FSS Report # | LTP Table 5-2, page 5-17 and 5-18, Survey Area Designator | PG&E Submittal | NRC Response |
|---------------------|--|---|--|
| | OOL09-03 OOL09-04 OOL09-05 OOL09-06 OOL09-07 OOL09-08 OOL09-09 OOL09-10 | Humboldt Bay Power Plant Trailer City Area, dated May 21, 2020 (ADAMS Accession No. ML20142A287) | Status Survey Reports for Trailer City Survey Units, dated August 24, 2021 (ADAMS Accession No. ML21225A772) |
| 8 | OFA01-01 SEC01-01 SEC01-03 OOL02-02 CRB01-01 CRB01-02 CRB01-03 WMF01-01 WMF01-02 WMF01-03 WMF01-04 WMF01-05 WMF01-06 | PG&E Letter HBL-20-013, Final Status Survey Report for the Humboldt Bay Power Plant (Office Annex, Security Building, Intake Structure, Count Room Building, and Waste Management Facility), dated September 24, 2020 (ADAMS Accession No. ML20268B244) | Letter to J. Welsch, PG&E, from A. Snyder, NRC - HBPP, Unit 3 - Approval of Final Status Survey Reports for Multiple Survey Units, dated August 25, 2021 (ADAMS Accession No. ML21225A775) |

Table 2. PG&E Phase II Decommissioning FSSRs and Corresponding NRC FSSR Approvals

| FSS Report # | LTP Table 5-2, page 5-17 and 5-18, Survey Area Designator | PG&E Submittal | NRC Response |
|---------------------|--|---|--|
| 9 | OOL03-01 OOL03-02 OOL04-01 OOL08-01 OOL08-02 OOL08-03 OOL10-18 OOL10-25 OOL02-02 OOL08-04 OOL08-05 OOL08-06 OOL02-01 OOL06-01 OOL11-01 OOL01-01 OOL01-02 OOL01-03 OOL07-01 OOL07-02 OOL07-03 OOL07-04 OOL05-01 | PG&E Letter HBL-21-010, Final Status Survey Reports for the Humboldt Bay Power Plant (Intake structure final grade, Open land area north of Units 1 and 2 encompassing the north yard and embankment to the west of the reactor building, A narrow strip of open land area traveling from Unit 3 to the discharge canal, Open land area bordering the western side of the Class 1 Survey Area NOL01, and A major portion of the open land area), dated June 8, 2021 (ADAMS Accession No. ML21160A224) | Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports for Remaining Facility Survey Units, dated November 2, 2021 (ADAMS Accession No. ML21299A235) |
| 10 | OOL10-01 OOL10-13 OOL10-17 OOL10-20 OOL10-22 OOL10-24 OOL10-26 | PG&E Letter HBL-21-011, Final Status Survey Report for the Humboldt Bay Power Plant (Remainder of Land Area), dated July 13, 2021 (ADAMS Accession No. ML21194A441) | Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports for Remaining Facility Survey Units, dated November 2, 2021 (ADAMS Accession No. ML21299A235) |
| 11 | NOL01-01 NOL01-02 NOL01-03 NOL01-04 NOL01-05 NOL01-06 NOL01-07 NOL01-08 | PG&E Letter HBL-21-014, Final Status Survey Report for the Humboldt Bay Power Plant (Remainder of Survey Units), dated August 9, 2021(ADAMS Accession No. ML21221A135) | Humboldt Bay Power Plant, Unit 3 - Approval of Final Status Survey Reports for Remaining Facility Survey Units, dated November 2, 2021 (ADAMS Accession No. ML21299A235) |

As described in Section 1.5.4 of the LTP, the licensee committed to follow Section 5 of the LTP, FSS Plan, for completing the remaining cleanup activities. The approved LTP is part of the license and becomes a license requirement. Section 5 of the LTP describes the FSS Plan that encompasses the radiological assessment of all affected structures, systems, and land areas for the purpose of quantifying the concentrations of any residual activity that exists following all decontamination activities.

As noted previously, the NRC staff's evaluation of the FSS results for site areas that were previously released under partial site release (i.e., under Phase I Decommissioning) are discussed in ADAMS Accession No. ML17115A107 (Pkg). Under contract with the NRC, ORISE conducted a confirmatory radiological survey of the area to be released on September 30 through October 1, 2015. A report on that survey was provided on October 24, 2016 (ADAMS Accession No. ML16300A275). The survey included gamma, alpha, and beta radiation surveys and soil sampling. The results of the ORISE gamma, alpha, and beta radiation surveys, combined with the ORISE laboratory analytical results of the soil samples, satisfies the NRC approved soil and surface activity DCGLs described in PG&E's LTP.

Based on cleanup activities carried out by the licensee; the NRC staff's review of PG&E's FSSRs; and the results of ORISE confirmatory surveys, conducted under contract with the NRC, the NRC approved the unrestricted use of the Phase I release area under the License No. DPR-7 because the licensee has met the criteria of 10 CFR 20.1402 (ADAMS Accession No. ML17115A107).

At the request of the NRC, ORISE, managed by ORAU, conducted confirmatory survey activities at the facility for Phase II Decommissioning. Reports detailing these confirmatory survey activities are listed in Table 3, Reports on HBPP, Unit 3 Regarding Confirmatory Surveys for Phase II Decommissioning.

Table 3, Reports on HBPP, Unit 3 Regarding Confirmatory Surveys for Phase II Decommissioning

| ADAMS Accession No. | Document Date | Title |
|---------------------|---------------|--|
| ML20021A128 | 01/17/2020 | Letter from Erika Bailey, ORISE, to John Hickman, NRC, forwarding Independent Confirmatory Survey Summary and Results for Remaining Land Areas and Select Buildings - the Humboldt Bay Power Plant, Eureka, CA |
| ML18100A014 | 04/04/2018 | Humboldt Bay Power Plant, Submittal of Independent Confirmatory Survey Summary and Results for Survey Units OOL10-14 and NOL01-09 |
| ML16300A275 | 10/24/2016 | Final Report - Independent Confirmatory Survey Summary and Results for Survey Units NOL01-03, NOL01-08, OOL10-12, and TRL 50 at the Humboldt Bay Power Plant, Eureka, California (Partial Site Release) |
| ML18029A019 | 08/03/2016 | Letter dated August 3, 2017, from Nick Altic, ORAU, to John Hickman, NRC, Regarding Project Specific Plan for |

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| | | the Confirmatory Survey Activities at the Humboldt Bay Power Plant |
| ML16250A433 | 10/28/2015 | Forward Final Report on Independent Confirmatory Survey Summary and Results for the Discharge Canal and Annex Building 6 at the Humboldt Bay Power Plant, Eureka, California |
| ML16250A432 | 04/09/2012 | Humboldt Bay Power Plant - Final Report - Confirmatory Survey of the Fuel Oil Tank Area |
| ML11209B538 | 04/20/2011 | Confirmatory Survey Results for Portions of the Material and Equipment from Units 1 and 2 at the HBPP. 2029-SR-01-0 |

Under 10 CFR 50.82(a)(11) the NRC terminates the relevant license when it determines: (1) dismantlement has been performed in accordance with the approved LTP; and (2) the final radiation survey and associated documentation, including an assessment of dose contributions associated with parts released for use before approval of the license termination plan, demonstrate that the facility and site have met the criteria for decommissioning in 10 CFR Part 20, Subpart E. Under 10 CFR 20.1402, found in Subpart E, a site will be considered acceptable for unrestricted use if: (1) the residual radioactivity that is distinguishable from background radiation results in a total effective dose equivalent (TEDE) to an average member of the critical group that does not exceed 25 mrem per year; and (2) the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). The NRC staff used the approach discussed under, "For PSR (Partial Site Release) and previous PSR interactions" in Appendix K, Section K.1.5, in the NUREG-1757, Vol 2, Rev.1, "Consolidated Decommissioning Guidance, Characterization, Survey, and Determination of Radiological Criteria" (ADAMS Accession No. ML063000252) to conduct its review.

As noted above, the NRC staff has previously approved a partial site release for HBPP, Unit 3. As discussed in Appendix K, when a license first pursues partial site release, NRC staff takes into consideration any previous Partial Site Releases when it considers final license termination. The entire site should meet the Subpart E dose limit.

The licensee decommissioned the site using the *Multi-Agency Radiation Site Survey and Investigation Manual* approach, meaning the licensee demonstrated compliance on a survey unit by survey unit basis. Under this method, the size of the survey units and the rigor of the surveys performed are determined based on the expected level of residual radioactivity in areas across the site as well as spatial and topographical considerations. The NRC staff evaluation of the submittals listed in Table 2 above (Phase II Decommissioning submittals) determined that future site inhabitants across all survey units would experience an average hypothetical future dose of less than 6 mrem/y. The maximum occurred for the Caisson survey unit (NOL01-09) which had a hypothetical future dose of less than 10 mrem/y. Based on cleanup activities carried out by the licensee for Phase II Decommissioning; the NRC staff's review of PG&E's Phase II Decommissioning FSSRs; and the results of ORISE confirmatory surveys for Phase II Decommissioning, conducted under contract with the NRC, the NRC staff concludes that the licensee has met the criteria of 10 CFR 20.1402 for Phase II Decommissioning activities.

The NRC considered the final dose from for the entire site, except the ISFSI which will remain under Materials License No. SNM-2514. In this case, the site is defined as the entire site, including the portion released under Phase I Decommissioning and the remainder of the site

addressed under Phase II Decommissioning and does not including the ISFSI. No conditions were identified in the license related to partial site release. In applying the sum of the fraction approach, described in detail in NUREG-1757, Vol 2, Rev.1 (ADAMS Accession No. ML063000252), the actual cleanup values demonstrated that the potential dose from all residual radioactivity at the site (from Phase I and Phase II Decommissioning) from all media is less than 25 millirem per year. Thus, the NRC staff concludes that the entire site, excluding the ISFSI which will remain under Materials License No. SNM-2514, is below the NRC release criteria for unrestricted use of less than 25 mrem/year.

According to the guidance in NUREG-1757, Vol. 2, Rev. 1, "Consolidated Decommissioning Guidance Characterization, Survey, and Determination of Radiological Criteria" (ADAMS Accession No. ML063000252), the removal soil and buildings to be below 25 mrem will be ALARA. The licensee removed soil and buildings to below 25 mrem, thus, following the guidance.

Therefore, based on the above discussion, the NRC staff concludes that the entire HBPP, Unit 3, site, excluding the ISFSI, meets the requirements of 10 CFR 20.1402, and is considered acceptable for unrestricted use because the residual radioactivity that is distinguishable from the background radiation results in a total TEDE to an average member of the critical group that does not exceed 25 mrem/y, and the residual radioactivity has been reduced to levels that are ALARA.

2.3 Other Documents Required for License Termination

In addition to the license termination requirements of 10 CFR Part 50, Parts 30, 40, and 70 also have requirements for forwarding of specific records to NRC prior to license termination. Table 4, Record Forwarding Requirements, summarizes these requirements.

Table 4. Record Forwarding Requirements

| | |
|-----------------|---|
| 10 CFR 30.51(d) | Prior to license termination, each licensee authorized to possess radioactive material with a half-life greater than 120 days, in an unsealed form, shall forward the following records to the appropriate NRC Regional Office: (1) Records of disposal of licensed material made under 10 CFR 20.2002 (including burials authorized before January 28, 1981), 20.2003, 20.2004, 20.2005; and (2) Records required by 10 CFR 20.2103(b)(4). |
| 10 CFR 30.51(f) | Prior to license termination, each licensee shall forward the records required by 10 CFR 30.35(g) to the appropriate NRC Regional Office. |
| 10 CFR 40.61(d) | Prior to license termination, each licensee authorized to possess source material, in an unsealed form, shall forward the following records to the appropriate NRC Regional Office: (1) Records of disposal of licensed material made under 10 CFR 20.2002 (including burials authorized before January 28, 1981), 20.2003, 20.2004, 20.2005; and (2) Records required by 10 CFR 20.2103(b)(4). |
| 10 CFR 40.61(f) | Prior to license termination, each licensee shall forward the records required by 10 CFR 40.36(f) to the appropriate NRC Regional Office. |
| 10 CFR 70.51(a) | Before license termination, licensees shall forward the following records to the appropriate NRC Regional Office: (1) Records of disposal of licensed material made under 10 CFR 20.2002 (including burials authorized before January 28, 1981), 20.2003, 20.2004, 20.2005; and (2) Records required by 10 CFR 20.2103(b)(4); and (3) Records required by 10 CFR 70.25(g). |

PG&E addressed each of these requirements in a letter to NRC dated August 5, 2021 (ADAMS Accession No. ML21217A289), as described below.

PG&E addressed the record provision requirements of 10 CFR 30.51(d)(1), 10 CFR 40.61(d)(1), and 10 CFR 70.51(a)(1) by stating:

HBPP, Unit 3 has disposed of licensed material under 10 CFR 20.2002. PG&E has applied for and received NRC approval for disposal of waste in accordance with 10 CFR 20.2002. In addition, the applications required NRC approval of exemption requests in accordance with 10 CFR 30.11.

HBPP, Unit 3 has not disposed of any licensed material under 10 CFR 20.2003, 20.2004, or 20.2005. Therefore, records of such disposals do not exist because these types of disposals were never made at the HBPP, Unit 3 facility.

Based on the information above and prior submittals to the NRC, [PG&E] considers the record forwarding requirements in 10 CFR 30.51(d)(1), 10 CFR 40.61(d)(1), and 10 CFR 70.51(a)(1) to be met in support of HBPP license termination.”

PG&E addressed the requirements of 10 CFR 30.51(d)(2), 10 CFR 40.61(d)(2), and 10 CFR 70.51(a)(2), which require submittal of records required by 10 CFR 20.2103(b)(4), collectively because the requirements are identical. Paragraph 20.2103(b)(4) addresses records associated with the release of radioactive effluents to the environment. PG&E states that:

“As required by 10 CFR 50.36 a(a)(2), the HBPP Technical Specifications, and the Humboldt Bay Quality Assurance Plan, PG&E has submitted an Annual Radioactive Effluent Release Report (ARERR) to the NRC throughout the duration of the HBPP 10 CFR Part 50 license. The ARERR provides a summary of gaseous and liquid radioactive effluents released from HBPP to the environment during the period of January 1 through December 31 for a given calendar year. The ARERR also provides the results of measurements and calculations used to evaluate the radiation dose for a hypothetical individual at or beyond the applicable site boundary.”

PG&E submitted the Radioactive Effluent Release Reports on an annual basis. By letter dated July 28, 2021, PG&E also submitted the “Humboldt Bay Power Plant, Unit 3 - Errata for Humboldt Bay Power Plant 2020 Annual Radioactive Effluent Release Report” (ADAMS Accession No. ML21209B008). In its letter, the licensee states that

“Subsequent to the submittal, PG&E received final burial information from a waste processor for calendar year 2020. The Enclosure to this letter provides an updated version of Table 5, Solid Waste and Irradiated Fuel Shipments, of Reference 1. The table has been updated to reflect this additional final disposition data from the processor for 2020.”

PG&E states in its August 6, 2021, letter that for calendar year 2021, there were no radioactive shipments and no gaseous or liquid effluent releases. With the July 28, 2021, and all the previous ARERRs, as noted above, the NRC staff conclude that the decommissioning record associated with the release of effluents to the environment is complete.

With these submittals, PG&E contends that it has met the requirements of 10 CFR 30.51(d)(2), 10 CFR 40.61(d)(2), and 10 CFR 70.51(a)(2).

Due to the similarity of the requirements, PG&E also addressed the requirements of 10 CFR 30.51(f), 10 CFR 40.61(f), and 10 CFR 70.51(a)(3), collectively. These regulations require the licensee to forward information important to decommissioning as required by paragraphs (1), (2), (3), and (4) of 10 CFR 30.35(g), 10 CFR 40.36(f), and 10 CFR 70.25(g), respectively. PG&E states that it has met these requirements through the submittal of: (1) Humboldt Bay Power Plant, Unit 3 LTP, revisions and information incorporated therein; (2) Humboldt Bay Power Plant, Unit 3 Site Historical Site Assessments, Characterization reports, and groundwater sampling campaigns of which the results were summarized in the LTP; (3) Humboldt Bay Power Plant, Unit 3 FSSRs, and (4) other information provided in the August 5, 2021 submittal. Further PG&E stated in its August 6, 2021 submittal that:

“Immediately prior to and during active decommissioning, no plant related radioactivity was detected in onsite monitoring wells. At the completion of site remediation and during site restoration, all onsite monitoring wells were closed in accordance with Humboldt County requirements.”

Based on the above information, the NRC concludes that PG&E has met the requirements of 10 CFR Parts 30, 40, and 70 for forwarding of specific records to NRC prior to license termination.

3.0 STATE CONSULTATION

This SER was prepared by the NRC staff without input from the State of California. However, the State is on the Humboldt Bay, Unit 3 Listserv for all correspondence between NRC and PG&E and thus has been informed of NRC's intention to terminate the HBPP, Unit 3 license. Further, on October 20, 2021, the NRC staff notified the State of California for awareness that the NRC was getting ready to terminate the Humboldt Bay, Unit 3 license and estimated that the goal was to terminate the license no later than December 15, 2021 (ADAMS Accession No. ML21293A242).

4.0 ENVIRONMENTAL CONSIDERATIONS

Pursuant to 10 CFR 51.21, 51.32, and 51.35, an environmental assessment (EA) and finding of no significant impact (FONSI) was published in the *Federal Register* on May 3, 2016 (81 FR 26589) for approval of the LTP. The EA described the potential environmental effects (both radiological and non-radiological) from the decision to approve the LTP and release the NRC license for unrestricted use (pursuant to 10 CFR 20.1402) along with termination of the license. The licensee's decommissioning activities since approval of the LTP did not require additional EA evaluations because the licensee followed the approved LTP. Further, in issuing LTP in June 2021, the NRC staff concluded the action related to changes in recordkeeping, reporting, or administrative procedures or requirements. Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(10). Pursuant to 10 CFR 51.22(b), no environmental impact statement or EA did not need to be prepared in connection with the issuance of the amendment. This NRC action, termination of the HBPP, Unit 3 license, was also considered in the EA and FONSI published in the *Federal Register* in May 2016. Accordingly, the May 3, 2016, EA and FONSI (ADAMS Accession No. ML16106A054) provides the environmental analysis for termination of the HBPP, Unit 3 license.

5.0 EVALUATION OF THE NEED FOR NRC/EPA LEVEL 2 CONSULTATION

5.1 Background

The NRC and U.S. Environmental Protection Agency (EPA) entered into a Memorandum of Understanding (MOU) for "Consultation and Finality on Decommissioning and Decontamination of Contaminated Sites" on October 9, 2002 (ADAMS Accession No. ML022830208). The MOU provides that, unless an NRC-licensed site exceeds any of three trigger criteria contained in the MOU, the EPA agrees to a policy of deferral to the NRC for decision making on decommissioning, without the need for consultation.

For sites that trigger the criteria in the MOU, the NRC will consult with the EPA at two points in the decommissioning process: (1) prior to NRC approval of the licensee's LTP or Decommissioning Plan, which the NRC terms Level 1 consultation; and (2) following completion of the FSS, which the NRC terms Level 2 consultation.

5.2 Evaluation

The license termination will be completed in accordance with the NRC approved HBPP, Unit 3 LTP which requires the evaluation of the FSSRs, among other things, as part of the license termination process. Based on the NRC staff's approval of the FSSRs, the NRC staff preliminarily concludes, pending completion of the license termination request, that the FSSRs support PG&E's termination request. More specifically, the NRC staff has preliminarily determined that each FSSR demonstrates that each of the HBPP, Unit 3, survey units is acceptable to release for unrestricted use in accordance with, "Radiological Criteria for License Termination," of Part 20, "Standards for Protection Against Radiation," to Title 10 of the *Code of Federal Regulations* (10 CFR), Subpart E for unrestricted release.

The above-mentioned NRC-EPA MOU provides that, unless an NRC-licensed site exceeds any of three trigger criteria, the EPA agrees to a policy of deferral to NRC decision making on decommissioning, without the need for consultation. For sites that trigger the criteria in the MOU, the NRC will consult with the EPA at two points in the decommissioning process:

- (1) prior to NRC approval of the LTP or Decommissioning Plan, which the NRC terms Level 1 consultation; and
- (2) following completion of the FSS, which the NRC terms Level 2 consultation.

In 2014, consistent with the MOU, the NRC staff evaluated the LTP application to determine whether a Level 1 consultation was required.¹ The NRC consulted with the EPA on July 7, 2014 (ADAMS Accession No. ML14128A228) because the site met one of the Level 1 consultation trigger criteria. Under the MOU, the agencies (NRC and EPA) will consult with each other pursuant to the provisions of the MOU with respect to those sites presenting the circumstances described in Sections V.C.2 and V.C.3 of the MOU. More specifically, the licensee proposed DCGLs² for twenty-two radionuclides for HBPP, Unit 3. When reviewing the HBPP, Unit 3 LTP application, the NRC staff identified that the proposed DCGLs for four of the site radionuclides of concern (europium [Eu]-152, Eu-154, hydrogen-3, and niobium-94) exceeded the soil concentration levels in Table 1³ of the MOU for the land use scenarios. This means that there

1 The NRC reviewed and approved the PG&E LTP in 2016 (ADAMS Accession No. ML15090A339), as amended in June 2021 (ADAMS Accession No. ML21158A123 [Pkg.]), and as corrected on July 8, 2021 (ADAMS Accession No. ML21189A072 [Pkg]). The LTP amendment and the subsequent correction to the licensing amendment, did not require review of the MOU because the changes were not associated with the determination of derived concentration guideline levels or the comparison to Table 1 values.

2 A DCGL is the "derived concentration guideline level" for residual radioactivity in soil that corresponds to the dose based regulatory release criteria (normally, 25 mrem/y for unrestricted release per 10 CFR 20.1402). DCGLs are determined by performing a pathways analysis to estimate the potential dose for a future site occupant out to 1,000 years post license termination. A DCGL is developed for each significant radionuclide of concern that is likely to be present as residual radioactivity at a site and, if there are more than one, a sum-of-fractions (SOF) is calculated to ascertain whether the concentrations measured in soil meet the DCGLs. Typically, the average concentrations of radionuclides of concern, as measured by sampling, are divided by the respective DCGL, and summed. So long as the SOF is less than unity, the DCGLs are considered to be met (a SOF of 1 usually corresponds to the dose basis used to derive the DCGLs). The SOF is sometimes known as the "unity rule" (see footnote 4).

3 Per the MOU, Table 1: "Except for radium-226, thorium-232, or total uranium, concentrations should be aggregated using a SOF approach to determine site specific consultation trigger concentrations. This table is based on single contaminant concentrations for residential and commercial/industrial land use

would be a possibility of the average residual radioactivity complying with the site derived DCGLs for NRC regulatory compliance purposes yet exceeding the Table 1 values⁴ such that the site met one of the consultation triggers. The NRC stated in its consultation letter that, following the completion of NRC's review of the HBPP, Unit 3 FSSRs:

"If the FSS measurements show that the remaining radionuclide concentrations are below the values set forth in Table 1 of the MOU, then the NRC will proceed to terminate the HBPP, Unit 3 license and the site will be released for unrestricted use. The NRC will inform the EPA of such findings. If the FSS measurements show that any of the remaining radionuclide concentrations are above the values set forth in Table 1 of the MOU, then the NRC will engage in Level 2 consultation with the EPA to identify and resolve any remaining issues."

Regarding groundwater, in the NRC's Level 1 consultation with EPA, the NRC staff did not request EPA consultation on groundwater because: "there [was] no waterborne pathway as the groundwater is saline and is not used now, nor likely to be used in the future, for either direct consumption or for agricultural purposes. Therefore, the NRC is not requesting a consultation on groundwater."

Following completion of the review and approval of the FSSRs, the NRC staff evaluated the FSS measurements to determine whether they would trigger the need for a Level 2 consultation. Based on this evaluation, the NRC staff concluded that a Level 2 consultation is not needed because the average concentration (calculated from final status survey data) of each radionuclide of concern within each survey unit in all FSSRs, is below the values set forth in Table 1 of the MOU and, when applying the sum-of-fractions (SOF) approach, described above (in footnote 3), the SOF is significantly below unity for every survey unit. Therefore, the site did not meet the trigger that necessitates Level 2 consultation. It also did not meet the other triggers in the MOU.

That said, the NRC staff informed EPA in its letter dated November 17, 2021 (ADAMS Accession No. ML21299A253), as part of the NRC staff's conclusion that a Level 2 consultation was not needed, that there were a few small areas of elevated residual radioactivity left on the site, one of which is further described because it is an anomaly from what is typically considered in regulatory guidance. Specifically, the licensee had four dewatering wells to allow excavation of the caisson structure and commodities. The pump in one well in the excavation failed such that the well became a point for groundwater recharge although the remaining wells continued

when using generally accepted exposure parameters. Table users should select the appropriate column based on the site's reasonably anticipated land use."

⁴ The term "unity" is in reference to the unity rule (mixture rule) as defined in NUREG-1575, Rev. 1. EPA 402-R-97-016, Rev. 1., DOE/EH-0624, Rev. 1. Multi-Agency Radiation Survey and Site Investigation Manual, August 2000. A rule applied when more than one radionuclide is present at a concentration that is distinguishable from background and where a single concentration comparison does not apply. In this case, the mixture of radionuclides is compared against default concentrations (DCGLs for NRC dose demonstration purposes and Table 1 values for by applying the unity rule. This is accomplished by determining: 1) the ratio between the concentration of each radionuclide in the mixture, and 2) the concentration for that radionuclide in an appropriate listing of default values. The sum of the ratios for all radionuclides in the mixture should not exceed 1 or unity. The SOF that is used for NRC's FSSR reviews is different than the SOF for the MOU (the concept is generally the same, but the details of the MOU equation are distinct as noted in footnote 3).

operating for dewatering purposes. Solids/silt accumulated in the well, and its surrounding gravel pack, at approximately 100 feet below final site grade. Although, two individual samples of the accumulated material in the well exceeded the concentrations in Table 1 of the MOU, the site survey unit averages did not exceed the concentrations in Table 1 of the MOU. While the material in the well was subsequently purged and disposed of as waste, and the well closed, residual material in the surrounding gravel pack remains. This situation was evaluated by the licensee to determine a hypothetical dose contribution to future site occupants. The NRC staff reviewed the licensee's evaluation and found it conservatively addressed the potential dose contribution from the material as documented in a SER (see ADAMS Accession No. ML21214A101). Given the material's inaccessibility because of its depth below final grade, as documented in the SER referenced in the previous sentence, the NRC staff determined it was very unlikely it could convey significant dose to future site occupants.

The licensee states in its request for license termination that no HBPP related radionuclide contamination was detected in groundwater during active decommissioning at HBPP. The NRC staff concluded that a Level 2 consultation is not required for groundwater for the same reasons given in its Level 1 consultation. To provide additional support to its conclusion, the NRC staff also performed further evaluation using the typical minimum detectable concentrations (MDCs) of the licensee's laboratory analysis. Specifically, the NRC staff used these MDCs to perform an independent dose assessment for potential ingestion of groundwater that determined the dose through the groundwater pathway is bounded at 1 mrem/yr TEDE. The NRC staff considers the bounding estimate to be conservative due to groundwater at the site not being considered a potable water source.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (i) the remaining dismantlement has been performed in accordance with the approved LTP, (ii) the FSSs and associated documentation, including an assessment of dose contributions associated with parts released for use before approval of the LTP, demonstrate that the entire site, with the exception of the ISFSI which will remain under the Materials License No. SNM-2514, have met the criteria for decommissioning in 10 CFR part 20, Subpart E, and (iii) PG&E has met the 10 CFR Parts 30, 40, and 70 requirements for forwarding of specific records to NRC prior to license termination. The NRC agrees that PG&E satisfied the requirements for termination of the HBPP, Unit 3, excluding the ISFSI, as stated in 10 CFR 50.82(a)(11).

Principal Contributors: A. Snyder, Senior Project Manager, DUWP/RDB
 G. Chapman, Health Physicist, CHP, DUWP/RDB
 K. Pinkston, Risk Analyst, PhD, DUWP/RTAB

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