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ATTACHMENT A

DIABLO CANYON INDEPENDENT SAFETY COMMITTEE REPORT

Report on

Fact-Finding Meeting with DCPP
on March 14, 15 and 27, 2023
by

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and
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1.0 SUMMARY

The results of the DCISC Fact-finding meeting held on March 14, 15 and 27, 2023, at the Diablo Canyon Power Plant (DCPP) in Avila Beach, CA are presented. The subjects addressed and summarized in Section 3 are as follows:

1. Meet with DCPP Officer, Site Vice-President Adam Peck
2. September 14, 2022 Emergency Exercise Critique
3. Equipment Long Range Plan Reviews (PMO++)
4. Meet with Nuclear Regulato1y Commission (NRC) Senior Resident Inspector
5. Radiation Monitoting and Eagle-21 Systems
6. Switchyard DC Control Power
7. Aging Management Plans for Extended Operations
8. Seismic Safety Issues
9. Review of the 2010 Enercon Services Report Regarding Seismic Vulnerabilities
10. Review of Proposed Changes to NRC Regulation 10 CFR 50.59
11. Maintenance Department Update
12. Observe DCPP Management Review Meeting (Remote)

2.0 INTRODUCTION

This Fact-Finding meeting with DCPP was made to evaluate specific safety matters for the DCISC. The objective of the evaluation was to determine if Pacific Gas and Electric's (PG&E's) perfonnance is appropriate and whether any areas revealed observations, which are impo1iant enough to wanant fmiher review, follow-up, or presentation at a public meeting. These safety matters include follow-up and/or continuing review effmis by the Committee, as well as those identified as a result of reviews of various safety-related documents.

Section 4-Conclusions highlights the conclusions of the Fact-Finding Team based on items reported in Section 3-Discussion. These highlights also include the team's suggested follow-up items for the DCISC, such as scheduling future Fact-Finding Meetings on the topic, presentations

at future public meetings, and requests for future updates or information from DCPP on specific areas of interest, etc.

Section 5-Recommendations presents specific recommendations to PG&E proposed by the Fact-Finding Team. These recommendations will be considered by the DCISC. After review and approval by the DCISC, the Fact-Finding Repo11, including its recommendations, will be provided to PG&E. The Fact-Finding Repo11 will also appear in the DCISC Annual Repo11.

3.0 DISCUSSION

3.1 Meet with DCPP Site Vice-President Adam Peck

The DCISC Fact-finding Team (FFT) met with DCPP Site Vice-President, Adam Peck, for a high-level update on DCPP Extended operations and PMO++, the DCPP initiative to review and decide on maintenance and projects needed for extended operations. (The FFT also reviewed PMO++ in more detail later in this Fact-finding Meeting. See section 3.3 below.) The DCISC last met with a DCPP officer in Januaiy 2023 (Reference 6.1), when it concluded the following:

> *The regular meetings between DCISC and DCPP Officers and Directors continue to be beneficial for both organizations.*

Conclusion: The regulai- meetings between DCISC and DCPP Officers and Directors continue to be beneficial for both organizations.

Recommendations: None

3.2 September 14, 2022 Emergency Exercise Critique

The DCISC FFT met with Cameron Christian, DCPP Emergency Preparedness Coordinator, to review the critique of the September 14, 2022 Evaluated Emergency Exercise. The last DCISC review ofDCPP Emergency Planning was at the September 14-15, 2022 Fact-finding Meeting (Reference 6.2) when it observed the September 14, 2022 emergency exercise and concluded the following:

> *The DCPP September 14, 2022 Evaluated Emergency Exercise appeared to have been planned and implemented effectively. The scenario was challenging, and emergency personnel handled it properly. Each emergency location activated on time and set up properly. Emergency Action Levels and Protective Action Recommendations were declared correctly.*

The pmpose of this exercise was to develop and maintain the Emergency Response Organization's (ERO's) key skills to protect public health and safety in the unlikely event of a radiological emergency. This Emergency Plan Exercise was designed to evaluate the proficiency of DCPP personnel in implementing the principal Emergency Plan functions in response to a radiological emergency. The Technical Suppmt Center, Operational Support Center, Emergency Operations

Facility, Unified Dose Assessment Center (UDAC), Joint Information Center, and Offsite Emergency Laboratmy participated. The plant simulator acted as the Control Room and drove indications in DCPP's Emergency Response Facilities.

The NRC, Sheriffs Watch Commander, County Emergency Operations Center, and the State of California Office of Emergency Services Warning Center participated along with offsite agencies within the DCPP Emergency Planning Zone as described in the County's extent of play agreement with the Federal Emergency Management Agency (FEMA).

The exercise had as its objective evaluating the following activities:

- Communications between onsite and offsite Emergency Response Facilities
- Coordination with offsite response organizations
- Dissemination of info1mation to the public via media channels
- Operational and engineering assessment of accident sequences
- Engineering assessment, repair plan development, and repair of critical equipment under emergency conditions
- Mitigative action implementation through the simulated repair of equipment
- Protection of workers (radiological or physical) during emergency response

The scenario (described fully in the September 14-15, 2022 Fact-finding Report, Reference 6.2) included a loss of all three fission product baniers followed by a simulated radioactive release to the atmosphere. The release exceeded the Environmental Protection Agency Protective Action Guidelines (PAGs) at the site boundary and required ERO decision makers to develop Protective Action Recommendations (PARs) to include recommendations for evacuation of the public. The scenario also included the loss of all Residual Heat Removal (RHR) pumps. The ERO needed to repair a differential relay on Bus G to make an RHR pump available to operations. Repair of the RHR pump allowed the operating crew to cool the plant down to less than 200 degrees Fahrenheit, which mitigated the containment loss and stopped the radiological release.

The critique repo1ted that the overall drill was satisfactmy but identified the following three weaknesses (gaps to excellence):

1. Objective B.1.1: On-shift personnel take appropriate actions to mitigate the emergency condition based on Emergency Operating Procedures (EOPs) and abnmmal response procedures. Gap: The crew misread a step in the EOP, delaying cooldown of the ruptured and faulted steam generator resulting in a higher offsite dose consequence due to a loss of steam generator level. The crew established feed flow to a ruptured and faulted steam generator for about a minute before recognizing their mistake. Gap: Shift Manager did not direct/ensure an initial public address system announcement was made following declaration of an Alert.

The Operations crew was coached and remediated during the critique by an Operations instructor with a review of the conect procedure flow path. Members of the crew ran a similar event sequence later in the same week to demonstr·ate they could conectly execute the procedure flow path. A notification was written to capture the weakness in the Conective

Action Program (CAP). Lessons learned from the event were also shared with the other crews during their training sessions.

2. Objective 1.2.2: Demonstrate the ability of UDAC to perform dose assessment. Dose assessment evaluations are performed within 15 minutes of the availability of indications impacting offsite dose (e.g., core state, release path, release status and meteorological conditions, te1m, and release duration) and are checked for accuracy and updated as applicable to refine the projections. Gaps:

   - The dose assessor inconectly determined that a condition was met. However, it was not met due to the 10% atmospheric steam dump on the ruptured steam generator being open and the main steam isolation valve being closed. This resulted in the dose assessor erasing the main steam flow value for the ruptured steam generator. This caused the dose assessment software to have inadequate inputs to perform a conect calculation and resulted in an enor message. Troubleshooting was initially unsuccessful, which significantly delayed dose assessment. The first dose assessment was not available until approximately 90 minutes after the first indications of a release to the environment. The dose assessor and dose assessment coordinator eventually performed a manual dose assessment.

   - The dose assessor inconectly selected n01mal steam generator level despite being told level was 0% narrnw range. This enor was not found by the dose assessment coordinator during the validation portion of the dose assessment.

   The dose assessor and dose assessment coordinator were coached and remediated during the critique. A performance analysis was done, anda notification was written in the CAP to capture the weakness.

3. Objective: Field Monitoring Teams (FMTs) are briefed, and personal protective measures (including turn back dose and dose rates) are identified. Gap: The FMT Communicator used gap values for the duration of the potential consequence during an actual emergency: this meant that the turnback value which was derived on Total Effective Dose Equivalent would have been non-conservative resulting in the team hitting their turnback value later than they should have.

   The FMT Communicator and Coordinator were coached and remediated during the critique process. A performance analysis was done, and a notification was written in the CAP to capture the weakness.

The NRC's 4th quarter Integrated Inspection Report addressed the exercise but had no findings or concerns.

Conclusion: DCPP's September 14, 2022 emergency exercise critique determined that the exercise was satisfactory overall, meeting all major objectives. The critique was comprehensive and thorough, including many lessons-learned for improved future performance. Three gaps to excellence were identified and corrected.

Recommendations: **None**

3.3 Equipment Long Range Plan Reviews (PMO++)

The DCISC FFT met with Allen Wilson, Director of Projects, and Michael Jackson, Manager of Project Se1vices and License Renewal, for an update on Equipment Long Range Plan Reviews under PMO++. The DCISC last reviewed PMO++ in December 2022 (Reference 6.3), concluding the following:

> *It appears that DCPP is appropriately beginning initiatives to review capital projects and review plant maintenance to support extended operation through 2030.*

DCPP's cun-ent effo1ts to review the long rang maintenance and project plans for station equipment is named "PMO++" (based on DCPP's 2016 Preventive Maintenance Optimization initiative). The objective for this initiative, according to DCPP, was the following:

> *In preparation for License Renewal and Extended Operations, we are taking a holistic look at equipment/system's overall health to determine and prioritize outstanding work scope based on Maintenance Plans (MP) in grace or Preventive Maintenance Change Requests (PMCR) that were approved with rationale stating end of license is 2024/2025, Corrective Maintenance (CM) Orders that have been pushed to beyond 2025, Open SAPNs {SAP Notification) I cognitive trending done by plant personnel, License Renewal (LR) activities, and any other inputs such as Life Cycle Maintenance (LCM) studies, industry peers, Operating Experience (OE).*

Also, the purpose was as follows:

1. *To validate that the Maintenance being performed is effective and is maintaining or improving safety, equipment reliability or efficiency and identify any gaps we may have in our maintenance/surveillance strategies.*
2. *To identify Maintenance gaps and/or Projects that should be evaluated to improve safety, equipment reliability, efficiency, or support license requirements.*

The project began on Monday December 12, 2022 with initial reviews completed by the end of Janua1y 2023. A cross-functional team was in place to review a comprehensive list of documents including the following:

- Con-ective Maintenance
- Preventive Maintenance
- Surveillances
- License Renewal/Aging Management Programs
- Repair Pa1ts Equivalents
- Modifications and Designs

- Critical Spares
- End of Life Grace Periods (pre-determined, pre-approved schedule extensions)
- Cognitive Trending via SAPNs (Conective Action Notifications) and Interviews

Examples of outcomes would include CAP Notifications for Preventive Maintenance changes, identifying turnkey projects, or determining additional options needing investigating.

This intensive, comprehensive review is an imp01iant input into the DCISC charge in California Senate Bill 846 to determine any "issues of defened maintenance." This item is being included in fact-finding meetings in early 2023 to suppori a final proposed conclusion for the DCISC June 28-29, 2023 Public Meeting.

DCPP has over 12,000 Preventive Maintenance (PM) activities. Approximately 88 PM Change Requests (representing 200 individual PM activities) were processed as a result of the reviews. These PM activities, which were modified in preparation for the 2025 shutdown, typically by changing the interval between maintenances, were returned to their original frequencies. An example of this is the Condensate Booster Pump motor rewinds. Similar decisions were made for Corrective Maintenance items, such as the Turbine-Driven Auxiliary Feedwater Pump exhaust COITOSlOn.

Approximately 560 potential projects and plant concerns were reviewed for possible action to support the five-year operations extension. Approximately 200 were reinstated to be prioritized for implementation for the extended plant life. One of those potential projects, the update to Eagle 21 involving the Reactor Protection System, had been terminated when the plan was to end power operations in 2025. For Eagle 21, it was decided to retain the original system now that the supplier, Westinghouse, had begun producing replacement pa1ts along with a service contract and because the proposed replacement system was a "first of a kind," introducing the risk of possible early failure or "infant mortality" due to limited or no operating experience. An example of a system to be replaced with an upgraded one is the Digital (Control) Rod Position Indicator, which has good operating experience in other plants.

The review will conclude with one master list of projects to be entered into the CAP for tracking. The draft list is being reviewed for "relative risk ranking" with the highest priority projects being those needing implementation in Refueling Outage 1R24 in Fall 2023. The master list will be reviewed and approved in a series of three Project Working Group review meetings and then to the Plant Health Prioritization Committee for final approval by the end of April 2023.

The DCISC plans to review this progress in its April 19-20 and May 28-29, 2023 Fact-fmding Meetings with its final conclusions in the May Fact-finding Meeting Report to be approved at the DCISC June 28-29, 2023 Public Meeting. This will fulfill the following CA Senate Bill 846 requirement:

> *"The comnnsswn shall review the reports and recommendations of the Independent Safety Committee for Diablo Canyon described in Section 712.1. If the Independent Safety Committee for Diablo Canyon's reports or recommendations cause the commission to determine, in its discretion, that the costs of any upgrades*

necessary to address seismic safety or issues of deferred maintenance that may have arisen due to the expectation of the plant closing sooner are too high …"

Conclusions: The plant's PMO++ initiative to evaluate capital projects and plant maintenance activities to suppo1·t extended operation through 2030 is proceeding satisfactorily. The initiative review is expected to be completed in time for the DCISC to complete its review and to develop conclusions at its June 28-29, 2023 Public Meeting, satisfying the California Senate Bill 846 requirement.

Recommendations: None

3.4 Meet with NRC Senior Resident Inspector

The DCISC FFT met with Mahdi Hayes, NRC Senior Resident Inspector, and Jennifer Mezaros, NRC inspector on rotational assignment to DCPP, for an update. The DCISC last met with the NRC in its Janua1y 2023 Fact-finding Meeting (Reference 6.4), concluding the following:

The meeting with the NRCSenior Resident Inspector was beneficial, and the DCISC should continue the meetings.

The pruticipants discussed the following items:

- Refueling Outage 1R24 to occur in Fall 2023.
- NRC inspection teams to inspect DCPP's Aging Management Program and PMO++ results.
- An NRC non-cited violation for an incipient fire protection testing problem repo1ted by an employee to NRC as an allegation. (The DCISC will review this item at its April 14-15, 2023 Fact-finding Meeting.)

Conclusions: The meeting with the NRC Senior Resident Inspector was beneficial, and the DCISC should continue the meetings.

Recommendations: None

3.5 Radiation Monitoling and Eagle 21 Systems

The DCISC FFT met with Kevin O'Neill, Tactical Engineer for Radiation Monitors; Klis Jentzsch, Eagle 21 Subject Matter Expe1t; and Mike Sullivan, Strategic Engineer for Radiation Monitors, for an update on these two systems in the context of DCPP extended operations. The DCISC last reviewed the Radiation Monitoring System (RMS) in July 2022 (Reference 6.5) and Eagle 21 in December 2013 (Reference 6.6), concluding the following:

DCPP's Radiation Monitoring System was in acceptable health overall but needed further actions to address several portions of the system that were in Maintenance Rule category (a)(J) due to a high rate of functional failures. The DCISC should

review the status of the Radiation Monitoring System again in early 2023 after a new Excellence Plan for the system is expected to be approved and initiated.

DCPP is proceeding with the replacement of its Eagle 21, Plant Process Protection System (PPS). Its design is under review by NRC, which approval is expected by the end of 2014. Installation is planned for Refueling Outages 1R21 and 2R21 (2019). The replacement appears prudent for improved reliability, maintenance, and nuclear safety.

Radiation Monitoring System

The cunent RMS is perfo1ming satisfactorily with a few exceptions. DCPP is analyzing the system to decide on sh01t-te1m improvements versus long-te1m wholesale changeout. The fo1mer is faster and easier using known components, whereas the latter is complex with "first-of-a-kind" risk of new equipment. They plan to have a life cycle management study pe1fo1med by a consultant to help make the choice. The DCISC should review this study and final decision when available.

Eagle 21

Eagle 21 is part of the original Westinghouse Nuclear Steam Supply System (NSSS), which includes the Reactor Coolant System (RCS). Eagle 21 was updated in the mid-l 990s and had been under consideration for possible replacement with a digital version. The system consists of four separate protection sets, which provide trip and actuation signals to the Solid-State Protection System (SSPS) for use by the Reactor Trip System (RTS) and Engineered Safety Features Actuation System (ESFAS).

Section 3.3 above describes the cunent thinking for Eagle 21:"One of those potential projects, the update to Eagle 21 involving the Reactor Protection System, had been terminated when the plan was to end power operations in 2025. For Eagle 21, it was decided to retain the original system now that the supplier, Westinghouse, had begun producing needed replacement pa1ts along with a service contract and because the new system was a "first of a kind," introducing the risk of possible early failure or "infant m01tality" due to limited or no operating experience."

Conclusions: DCPP's Radiation Monitoring System, which is performing satisfactorily, is under consideration for short-term improvement or long-term full replacement for extended operations from 2025 to 2030 and possibly beyond. A life cycle management study is being considered. The DCISC should continue to follow DCPP's review and decision.

Eagle 21, the original Reactor Protection System, is performing satisfactorily and has the benefit of a recent decision by the manufacturer to produce and supply needed replacement parts with a seI"Vice contract to industry. Thus, DCPP plans to maintain its current Eagle 21 system for the five-year extended operations. This appeared satisfactory to the DCISC Fact-finding Team.

Recommendations: None

3.6 DC Control Power for the 230kV and 500kV Switchyards

The DCISC FFT met with Do Vo, Transmission System Engineer, and Joe Gmyance, Electrical Engineering Supe1visor, for a review of Direct CmTent (DC) Switchyard Control Power. The DCISC last reviewed the Transmission System in December 2022 (Reference 6.7), when it concluded the following:

> *The 230kV and 500kV Transmission Systems are both rated in Green health, which is good. Minor on-going problems are beingaddressed using the Corrective Action Program. DCPP plans to move its spare transformers up the hill near the Independent Spent Fuel Storage Installation to get them out of the salt spray environment. Reviews of maintenance and equ;pment upgrades are under way for license extension.*

DC control power for breaker control and communication equipment for both 230kV and 500kV switchyards is provided from the plant vital buses with batteries and batte1y chargers for backup. Batteries are subject to weekly and quaiterly inspections for such parameters as batte1y float voltage, pilot cell voltage, specific gravity, electrolyte levels, chai·ger output, and unintentional grounds as well as three-to-five-year batte1y discharge tests. Batteries are replaced as detennined by inspection or testing results. The overall health of the switchyai·d DC Control System was rated "Acceptable."

Conclusions: The DCPP 230kV and S00kV Switchyard DC Control Power System was considered as "Acceptable" by PG&E as determined by its operating reliability and periodic inspections and tests.

Recommendations: None.

3.7 Aging Management Plans for License Renewal

The DCISC FFT met with Brandy Lopez, License Renewal Strategic Initiative Principal; Elie Bracken, Manager of Decommissioning Projects; and Michelle Olsofski, License Renewal Engineer, for an update on DCPP Aging Management Plans (AMPs) for License Renewal. The DCISC last reviewed DCPP aging management in August 2009 (Reference 6.8), when it concluded the following:

> *DCPP's Equ;pment Reliability (ER) Program (including aging management) is well-designed and implemented. A major Single Point Vulnerability (SPV) evaluation has been completed and the results are being implemented which should help reduce threats to plant pe,formance. An industry assessment of DCPP ER made recommendations in the area of long-term planning and streamlining the budget and schedule approval process.*

Ms. Lopez reported that DCPP has a 40-person project team reviewing the changes in NRC's regulations and guides for license renewal since DCPP filed its original application for license renewal in 2008. Members of the team were developing AMPs for systems and equipment as required for the License Renewal Application that DCPP expected to file by the end of 2023. Some existing AMPs were being updated for license renewal, such as the one for NFPA-805, Fire Protection. New AMPs were being initiated per NRC regulations, such as Cathodic Protection of Auxilia1y Saltwater discharge piping.

Conclusions: DCPP appeared to be proceeding appropriately in upgrading and adding new Aging Management Plans for systems and equipment for its NRC License Renewal application to be submitted in late 2023.

Recommendations: None.

3.8 Seismic Safety Issues

The DCISC FFT met in person with Albeit Kottke, Geotechnical Ea1thquake Engineer; Nathan Barber, Supe1visor, Risk and Regulato1y Initiatives; Bill Horstman, Principal Civil Engineer; Nozar Jahangir, Manager, Seismic Engineering; Rasool Baradaran, Probabilistic Risk Assessment (PRA) Supe1visor; and Scott Hildebrand, Supe1visor, Nuclear Project Se1vices for License Renewal Coordination/Implementation. Joining the meeting remotely were Jeff Bachhuber, Director, Geosciences; Chtis Madugo, Geosciences Consultant; and Robe1t Fiori, Main Turbine Strategic Engineer. The subjects of the meeting were several technical topics related to the seismic safety of the power plant. The DCISC last reviewed seismic safety during its Fact-Finding meetings in November 2022 (Reference 6.9) and Janua1y 2023 (Reference 6.10) the conclusions of which were incorporated into the discussions below.

1. The DCISC's Review of Seismic Safety Under Senate Bill 846

The FFT began the meeting with a discussion of the mandate in recent California legislation, Senate Bill 846 (SB846, enacted in September 2022), which directed the DCISC to review and evaluate seismic safety in the context of inquiling as to whether important seismic-safety upgrades would be needed to suppo1t safe operation if the plant's operating period were to be extended beyond the cmTent NRC licenses that end in 2024 (Unit 1) and 2025 (Unit 2).

As background, as part of its work to obtain the needed information for the seismic-safety evaluation, the DCISC held the above-cited review meeting on November 9, 2022, during which the FFT met with most of the same PG&E staff who were participating in this meeting. The outcome of that November meeting was a report that the DCISC approved during its Febmaiy 2023 Public Meeting (Reference 6.11). The p1incipal DCISC conclusions and recommendations from that repo1t were discussed with the PG&E staff during this meeting. The basic thtust of those conclusions, smnmarized during this March 2023 meeting, was that the DCISC believes that seismic safety is adequate now, and also believes (based on cmTently available info1mation) that it would not be necessa1y to perfo1m any significant seismic-safety upgrades to support DCPP operation during the proposed five-year operations-extension pe1iod.

The conclusions of the DCISC's November 2022 repmt were briefly reviewed and discussed. The FFT confirmed with PG&E that PG&E had no technical concerns or corrections to suggest for the DCISC's report. In addition to the technical topics covered, one major procedural point raised was that the DCISC has been asked by the California Public Utilities Commission (CPUC) to provide a report by the end of June 2023, covering its conclusions andrecommendations on the cited topics. To meet that deadline, the FFT explained that the DCISC cunently plans to write a draft of that report internally by mid-June and then to present and discuss it, obtain public comment on it, and then approve it during its next DCISC Public Meeting, scheduled for June 28-29, 2023, just prior to the deadline.

However, it was pointed out by both the FFT and the PG&E staff that some important seismic-safety information is not expected to be completed before the June 30 deadline, as discussed below. Therefore, the FFT concluded that the June 30 DCISC position on seismic safety for the CPUC will necessarily need to explain that the DCISC's conclusions must remain preliminary until the expected new information after June 30 will have been reviewed.

2. Expected New Seismic Safety Information

The FFT and the PG&E staff discussed the expected new information, and its likely schedule as follows:

- The SB 846 legislation requires PG&E to undertake an updated seismic assessment. The FFT learned that PG&E expects to complete that assessment in the fomth quarter of 2023.

- The State of California's Independent Peer Review Panel for seismic safety (IPRP) will be meeting on May 5, 2023 and is expected to review the cunent understanding of at least the seismic-hazard and seismic-ground-motion aspects of DCPP seismic safety and perhaps some of the seismic-engineering aspects, too. The IPRP also plans to review the DCISC November 2022 report and could provide its own insights or comments about that repmt. If the IPRP subsequently produces a report with any findings and recommendations, those would also need to be accounted for by the DCISC is its own reviews. If the IPRP inforn1ation would be available before the DCISC's June 30 deadline for its CPUC submittal, the DCISC would attempt to include the IPRP information in its CPUC submittal.

- Using mate1ial from its previous application, PG&E is prepa1ing a new application to the NRC for the extension of its operating licenses, and the cunent plan is to submit that application by the end of calendar 2023. That application will cover seismic safety among many other technical topics, and the DCISC in tum will necessarily need to review that application after its submission.

- Mr. Baradaran and Mr. Barber reported that their regular periodic update of the plant's full PRA (Probabilistic Risk Assessment), which has been under

development for a couple of years, is expected to be completed in the next few months and will include an update for the Seismic PRA (SPRA). Modifications to the previous version, produced in 2017 (Reference 6.12), are needed to account for configuration changes, changes in the underlying data, and changes in some of the models of accident sequences. Mr. Barber repo1ted that in his view these changes will not be imp01tant enough to alter the fundamental insights from the SPRA, but of course the DCISC will want to review the new SPRA independently.

For all of the above reasons, the DCISC's required submittal to the CPUC on seismic safety, due on June 30, will of necessity need to be only a prelimina1y review, subject to reevaluation if new technical info1mation becomes available.

3. Senate Bill 846 Requirements Regarding an Updated Seismic Assessment

PG&E provided some detail about its plans to perform the updated seismic assessment required to be completed by SB 846. This detail was in addition to the info1mation that had been provided to the DCISC during its Januruy 2023 meeting. Specifically, PG&E is in the process of identifying the expe1ts who would comprise the study group to perfo1m this assessment. The PG&E staff said that they are also giving careful thought as to whether they need to do an elaborate and complex update to the 2015 Probabilistic Seismic Hazru·d Analysis (PSHA) (Reference 6.13), or whether a less detailed review might be sufficient. They are also considering whether they need a Senior Seismic Hazard Analysis Committee (SSHAC)-type process (Reference 6.13 and Reference 6.14) or can do the evaluation with a less f01mal and less elaborate methodology, and if so whether a SSHAC Level 1 review would be sufficient.

(The acronym "SSHAC" refers to a PSHA analysis methodology (Reference 6.13, Reference 6.14) developed by an expert panel, the "Senior Seismic Hazard Analysis Committee," in the 1990s that has become one standard methodological approach, endorsed by the NRC, for performing PSHA analysis. SSHAC-type analyses can be done at 4 different "levels", 1 to 4. The 2015 DCPP PSHA study (Reference 6.15) was a SSHAC-level-3 analysis.)

The PG&E staff explained that theywill be doing a sho1t-te1m seismic-hazru·d and seismic-ground-motion evaluation between now and July 2023, for use to suppo1t the license renewal application. Based on that sho1t-te1m study, which will be largely a study that asks the question, "is anything new that is impo1tant?", they will then consider whether a SSHAC-type project should be unde1taken. If a SSHAC-type project is required, it would be a year-long project. They indicated that both the timeline and the level of effort are under consideration, based in prut on how much difference it might make to the various seismic-hazard insights. One consideration, besides the timeline, is whether or not a fully quantitative new PSHA evaluation is required at this time. The DCISC will need to follow this decision process to assure that the DCISC is apprised of and can do its own review of any new seismic safety insights.

PG&E's Long Te1m Seismic Program (LTSP), which is a multi-decade long program to advance the understanding of seismic safety at Diablo Canyon and an NRC license condition, was discussed briefly. It was repo1ted that the most recent insights from the LTSP will be incorporated into the SB 846-mandated seismic evaluation, and that the LTSP will continue with its long-established

program of site and regional seismic data collection and analysis throughout any operations extension period. The FFT also inquired with PG&E if infmmation gathered from the recent major earthquake in Turkey would be incorporated into the LTSP, and PG&E personnel responded that infmmation gained from that earthquake would be included in the LTSP as has been the case with other major eaithquakes in the recent past.

4. FLEX Capabilities Modeled in the Probabilistic Risk Assessment

(FLEX is not an acronym but is the name for a composite of mostly portable, manually employed equipment (stored on site in a seismically robust building or in a secure outdoor area) and pre-installed plant connections to provide cooling water to the Reactor, Steam Generators, and Spent Fuel Pools in the case of beyond-design-basis events.)

Mr. Barber and Mr. Baradaran reported that in the PRA update now unde1way, the systems model will be incorporating more FLEX capability than had been included in the previous PRA model. However, Mr. Bai·ber repmted that although the analysis is still in a preliminary stage, he believes that any reductions in seismic risk arising due to the existence of the FLEX capabilities ai·e likely to be small, in pait because at the ve1y large ea1thquake motions where most of the seismic risk occurs, the ability to deploy the FLEX equipment in a timely way may be compromised. The PRA analysis suppo1ting this tentative conclusion is difficult to perfo1m and its implications ai·e impo1tant; therefore, the DCISC will want to review that analysis when it has been finalized.

Conclusions: DCPP's wide-ranging and longstanding p1·ogram for achieving and maintaining seismic safety is robust and has adequate resources. Important new analyses were being developed at the time of this meeting and were expected to be available over the next several months, i.e., second quarter 2023. To suppo1·t the DCISC's legislative mandate under SB 846 to perform a seismic-safety evaluation, the DCISC currently has sufficient information to complete the evaluation. The DCISC will also need to review the new reports and evaluations as they become available, including the contribution of FLEX capabilities to further reduce seismic risk. At this time, the DCISC concludes that there are no concerns with the adequacy of seismic safety at DCPP.

Recommendations: None

3.9 Review of the 2010 Enercon Se1vices Repmt Regarding Seismic Vulnerabilities

The DCISC FFT continued the meeting discussed above in person with Albert Kottke, Geotechnical Eaiihquake Engineer; Nathan Barber, Supe1visor, Risk and Regulatory Initiatives; Bill Horstman, Principal Civil Engineer; Nozar Jahangir, Manager, Seismic Engineering; Rasool Baradaran, Probabilistic Risk Assessment (PRA) Supe1visor; and Scott Hildebrand, Supervisor, Nucleai·Project Se1vices for License Renewal Coordination/Implementation. Joining the meeting remotely were Jeff Bachhuber, Director, Geosciences; and Chris Madugo, Geosciences Consultant; and Robe1i Fiori, Main Turbine Strategic Engineer. The subject of this po1tion of the meeting was a review of a study entitled "Seismic Assessment ofDiablo Canyon Power Plant Non-

Safety Related Strnctures, Systems and Components," completed by Enercon Services in 2010 (Reference 6.16). This was the DCISC's first review of this topic.

The DCISC's review was motivated by a coI11I11ent from a member of the public at the DCISC's Febrnary 2023 Public Meeting, followed up by conespondence on the same issue from the public and by a recent article in the local press about the same topic. The FFT obtained a copy of the Enercon repo1t, which had been pe1fo1med in 2010 as a part of responses to direction under California Assembly Bill 1632, to address the potential vulnerability of power plant buildings (six buildings in pa1ticular) and strnctures at DCPP due to a seismic event. The repo1t focused upon identifying the non-safety related strnctures, systems, and components (SSCs) of the plant which were most vulnerable to damage from earthquakes and assessing their seismic capabilities. This included seismic-initiated off-n01mal scenarios that would not lead to nuclear safety concerns but might lead to other imp01tant damage to the power plant that could prevent it from operating to make electricity.

The DCISC's purposes in performing this review were 1) to determine whether there were new insights in the Enercon repo1t into the seismic safety of strnctures or equipment impo1tant to safety and 2) to evaluate specific concerns raised by the public as a part of the DCISC's responsibilities for public outreach under its charter. The DCISC charter describes its scope as reviewing "operational safety." The DCISC interprets this to mean to review the plant's "nuclear· safety," which is concerned specifically with safety against core damage, radiological releases (on site or off site), radiation exposures to the plant's workers, radiological damage to the envirollll1ent and to offsite property, etc. Hence an inquiry about the non-nuclear-safety related SSCs mentioned above is largely out of scope for the DCISC except insofar as some seismic scenarios might injure or othe1wise compromise the ability of plant personnel, located in non-safety buildings, to perform safety duties after such an earthquake. However, members of the public had raised concerns to the DCISC that such damage could force the plant off-line for a long period, which would compromise the DCPP's mission to support the California electrical grid.

The issue raised by the public and addressed during this FF meeting concerns off-no1mal scenar·ios initiated by ea11hquakes too small to result in a compromise to nuclear safety. Such scena1ios might neve1theless damage equipment and strnctures that would require the plant to shut down for a long time to repair the damage and could also cause injuries to on-site plant personnel, which could compromise effective post-earthquake plant response.

The PG&E staff expe1ts explained some of the technical underpinnings of the Enercon rep011: how the various on-site buildings had been designed to the seismic building code of the time; how the extra margin above the code is understood; what was the code's end-point (generally life safety, not an ability to function afterward); and how the Enercon report's quantifications of the likelihood of building failure should be interpreted.

One of the Enercon report's takeaway messages is that for earthquakes smaller than an earthquake that would compromise DCPP's nuclear safety, the likelihood of a seismic failure of any of the various buildings analyzed is in the range of ar·ound 0.001 per year (occmTing on average once in 1,000 year·s). [In this context, "failure" (defined by Enercon) means that the loss of function would last longer than 120 days. Failure could also cause injuries to on-site plant personnel, as noted

above.] The analysis supporting the above likelihood was discussed in the meeting, and it appeared to be technically sound to the FFT. However, the word "failure" in Enercon's context means damage to the building that would prevent it from serving its function for 120 days until repairs were made. Near-term functional reoccupation is an economic question, that impacts whether temporary trailers and other structures would be needed while building repairs were performed. For any of the buildings analyzed, the likelihood of damage that would place the safety of the building's occupants at risk is even lower than the approximate number quoted just above. Whether that likelihood is an acceptable value is something that the DCISC FF team believes is an issue of public policy beyond the DCISC's remit under its charter.

The recent press a1ticle stated that six DCPP buildings were designed as earthquake-vulnerable "soft story" buildings. *("Soft story" buildings have a first story that is elevated on columns generally to facilitate underbuilding parking. The columns are not seismically braced, and the design is not seismically robust.)*

The FFT inquired about this design of the buildings at DCPP, and the staff explained to the FFT how the comparison of the building's structures to "soft story" buildings in the context of earthquake vulnerabilities was not technically appropriate. The staff pointed out that while the "soft story" design is a prominent feature of many California buildings that makes them more vulnerable than is acceptable, and while ductility is a major consideration in designing and evaluating any building's seismic capacity, the soft-story description as found in the Enercon report was not an accurate description of the design of the buildings evaluated in that report. Fmther, the PG&E experts explained how the ductility properties of the cited buildings were not a safety concern, including to the building occupants. Indeed, the Appendix to the Enercon Report concluded that all six of the buildings evaluated would have str-ong seismic performance. The FFT also noted that these buildings are not safety-related and do not contain safety-related or any other plant operating components. They are "administr-ative" type buildings. They house plant personnel which are mostly not those required to immediately respond to plant events. Those personnel necessary to respond to plant events would be plant operators who are located in the Contr-ol Room and typically work in safety-related buildings designed to much stricter NRC regulations. Additionally, most key emergency response personnel work rotating shift schedules, which would typically place at least 75% of those groups off site at any particular· time.

The FFT also inquired about one specific finding of the 2010 Enercon report regarding a conclusion that the plant's main turbine thrust bearings would be vulnerable to seismic damage at earthquake levels much below levels that would compromise the plant's nuclear·safety. The report recommended that the DCPP plant evaluate the seismic capacity of the main turbine thrust bearings and upgrade the bearings, if necessary. Mr. Fiori reported that in the intervening years since the 2010 Enercon report was written, that issue has been resolved favorably and that the suggested long-term vulnerability of the thrust bear·ings is not a major issue. He provided the FFT with copies of a detailed evaluation performed by the thrust bearing manufacturer quantifying the worst-case damage scenario for the effects of a seismic event below the plant's design basis earthquake. The detailed evaluation concluded that the amount of damage would be lower than assumed in the Enercon report and that the subsequent repairs could likely be accomplished in about a month.

Conclusions: **The DCISC reviewed a 2010 seismic consultant report on the seismic response of non-safety related structures and equipment at DCPP (the "Enercon report") and found that, in conjunction with follow-on PG&E technical analyses, no concerns affecting nuclea1· safety were identified. Additionally, the DCISC concludes that the performance of building sti·uctures at DCPP during a seismic event lower than the design-basis earthquake would not represent a significant hazard to the safety of personnel needed to respond following a seismic event at DCPP. One non-safety item, the main turbine thrust bearings, although susceptible to earthquake forces, would require about one month to repair, if damaged.**

Recommendations: **None**

3.10 Review of Proposed Changes to NRC Regulation 10 CFR 50.59

The DCISC FFT met remotely with Michael Richardson, Regulat01y Services Supervisor, to discuss how DCPP treated proposed changes to the NRC Code of Federal Regulations, 10 CFR 50.59, "Changes, Tests and Experiments." The DCISC last reviewed DCPP's experience with 10 CFR 50.59 in July 2021 (Reference 6.17), concluding the following:

> *DCPP's program for managing plant changes under JO CFR 50.59 was being properly implemented and ensured that changes made to the facility were adequately reviewed to determine their impact upon the facility and its licensing basis.*

Mr. Richardson provided an overview of the 10 CFR 50.59 regulation, the pmpose of which is to provide a mechanism for a nuclear power plant to make changes to its physical facility or procedures and programs without prior regulat01y approval provided certain conditions were met. The required conditions for acceptable changes included detennining that the change did not create any new hazards/accidents that had not previously been evaluated and did not decrease the perfo1mance of strnctures, systems or components that were necessa1y to mitigate accidents. Nuclear Energy Institute (NEI) document 96-07, "Guidelines for 10 CFR 50.59 ln1plementation," provides NRC-endorsed indust1y guidance for the change management process.

DCPP's 10 CFR 50.59 program was integrated in the plant's program for managing the licensing basis which was governed by Procedure TS3.ID2, "Licensing Basis Impact Evaluations," a copy of which was provided to and reviewed by the FFT. The procedure required that all proposed changes be reviewed using a three-step process as follows:

1. Applicability Dete1mination - an initial review is performed to determine which regulations and/or programs may govern a proposed change.

2. 10 CFR 50.59 Screening Evaluation-if theApplicability Dete1mination concludes that a proposed change is governed by the regulations, then a high-level screening review is perfo1med to dete1mine if a full IO CFR 50.59 change evaluation is required

3. 10 *CPR* 50.59 (Full) Evaluation - if the Screening Evaluation concludes that more infmmation is needed to determine the impact of the change, then a detailed evaluation is performed to determine the full effects of the proposed change, how the change affects the licensing basis, and if the proposed change does or does not require prior NRC approval.

It was reported that NRC may be considering changes to 10 *CPR* 50.59 as a risk-informed regulation. The Nuclear Energy Institute (NED had presented information on the changes about a year ago; however, DCPP reported that it was too early in the process to become involved. The DCISC should review any changes, should they occur, when the cmTent NRC review of 50.59 is completed.

Conclusion: The NRC was in the early stages of making risk-informed basis changes to theh· regulation 10 CFR 50.59, "Changes, Tests, and Experiments." DCPP was aware of the changes but believed it **was too early to get involved in the review process and meanwhile would continue to implement the existing rule. The DCISC should review any changes, should they occur, when the current NRC review of 50.59 is completed.**

Recommendations: None

3.11 Maintenance Depa1tment Update

The DCISC *PPT* met with Ken Pazden, Maintenance Manager for Electrical, Instrumentation & Controls, and Mechanical Maintenance, for an update on the DCPP Maintenance Department. The DCISC last reviewed Maintenance in May 2022 (Reference 6.18), when it concluded the following:

> *Maintenance Department performance at DCPP continued to be good. The DCISC should review Maintenance Department pe1formance again in about one year given recent organizational changes and staffing reductions. Also, the DCISC should review the Voluntary Separation Program that was recently initiated by PG&E and which could have a significant effect upon staffing at DCPP.*

Regarding personnel resources in Maintenance, out of 300 approved (and 270 cmTent) positions, 96 would be eligible for retirement in August 2023. Because of this and the possibility of operating for another five years to 2030, Maintenance is aggressively hiring all functions. Additionally, Maintenance utilizes an on-site contractor, BHI, with approximately 45 personnel typically.

Mr. Pazden reviewed various industry performance indicators for maintenance with the *PPT*. Maintenance performance was rated as Green (good) and stable based on the performance indicators.

Conclusion: DCPP Maintenance Department overall performance was reported as Green (good) and stable based on industry performance indicators. Maintenance was aggressively hiring for possible retirements and a five-year plant operations extension to 2030.

Recommendations: **None**

3.13 Obse1ve DCPP Management Review Meeting (Remote)

The DCISC FFT (Budnitz and Wardell) remotely obse1ved the March 27, 2023 meeting of the DCISC Management Review Team. The last DCISC review of this meeting (then called the Station Oversight Committee) was at the DCISC June 2021 Public Meeting (Reference 6.19).

The stated purpose of the meeting was as follows:

> *Review of key indicators, peiformance indicators, excellence plans and department dashboards that focuses excellence standards and leadership behaviors to drive sustainable station peiformance and continuous improvement.*

The stated desired outcome was the following:

> *Challenge progress against action plan due dates, measurable results, and identify additional actions needed to address peiformance shortfalls with a sense of urgency.*

The meeting agenda was as follows:

1. Safety Minute (AED, CPR)
2. Review Desired Outcomes
3. Chair Opening Comments & Welcome
   - Metric Review
   - Gaps to Excellence
   - Perfo1mance Improvement: Red & Yellow Indicators
4. Perfo1mance Improvement Discussion
5. Break
6. Metric Review
7. Safety Dashboard & Excellence Plan
8. Engineering & Equipment Reliability Dashboard & Excellence Plan
9. Roundtable
10. Chair Closing Remarks
11. Actions and Meeting Evaluation
12. Adjourn

The meeting was characterized by good participation, concise and concrete presentations/explanations, and pa1ticipants' willingness to accept new action items. The meeting was strongly focused on excellent perfo1mance, paiticularly in the areas of operational reliability, event avoidance, and personnel safety.

Conclusions: The March 27, 2023 DCPP Management Review Meeting was effectively facilitated with good participation and a strong focus on excellent performance in operational reliability, event avoidance, and personnel safety.

Recommendations: None

4.0 CONCLUSIONS

4.1 The regular meetings between DCISC and DCPP Officers and Directors continue to be beneficial for both organizations.

4.2 DCPP's September 14, 2022 emergency exercise critique determined that theexercise was satisfactory overnll, meeting all major objectives. The critique was comprehensive and thorough, including many lessons-learned for improved future performance. Three gaps to excellence were identified and corrected.

4.3 The plant's **PMO++** initiative to evaluate capital projects and plant maintenance activities to support extended operation through 2030 is proceeding satisfactorily. The initiative rev:ie•N is expected to be completed in time for the DCISC to complete its review and to develop conclusions at its June 28-29, 2023 Public Meeting, satisfying the California Senate Bill 846 requirement.

4.4 The meeting with the NRC Senior Resident Inspector was beneficial, and the DCISC should continue the meetings.

4.5 DCPP's Radiation Monitoring System, which is performing satisfactorily, is under consideration for short-term improvement or long-term full replacement for extended operations from 2025 to 2030 and possibly beyond. A life cycle management study is being considered. The DCISC should continue to follow DCPP's review and decision.

Eagle 21, the original Reactor Protection System, is performing satisfactorilyand has the benefit of a recent decision by the manufacturer to produce and supply needed replacement parts with a service contract to industry. Thus, DCPP plans to maintain its current Eagle 21 system fo1· the five-year extended operations. This appeared satisfactory to the DCISC Fact-finding Team.

4.6 The DCPP 230kV and 500kV Switchyard DC Control Power System was considered as "Acceptable" by PG&E as determined by its opernting 1·eliability and periodic inspections and tests.

4.7 DCPP appeared to be proceeding appropriately in upgrading and adding new Aging Management Plans for systems and equipment for its NRC License Renewal application to be submitted in late 2023.

4.8 DCPP's wide-ranging and longstanding program for achieving and maintaining seismic safety is robust and has adequate resou1·ces. Important new analyses were being developed at the time of this meeting and were expected to be available over the next several months, i.e., second quarter 2023. To support the DCISC's legislative mandate under SB 846 to perform a seismic-safety evaluation, the DCISC currently has sufficient information to complete the evaluation. This DCISC will also need to review the new reports and evaluations as they become available, including the contribution of FLEX capabilities to further reduce seismic risk. At this time, the DCISC concludes that there are no concerns with the adequacy of seismic safety at DCPP.

4.9 The DCISC reviewed a 2010 seismic consultant report on the seismic response of non-safety related structures and equipment at DCPP (the "Enercon report") and found that, in conjunction with follow-on PG&E technical analyses, no concerns affecting nuclear safety were identified. Additionally, the DCISC concludes that the performance of building structures at DCPP during a seismic event lower than the design-basis earthquake would not represent a significant hazard to the safety of personnel needed to respond following a seismic event at DCPP.

4.10 The NRC was in the early stages of making risk-informed basis changes to their regulation 10 CFR 50.59, "Changes, Tests, and Experiments." DCPP was aware of the changes but believed it was too early to get involved in the review process and meanwhile would continue to implement the existing rule. The DCISC should review any changes, should they occu1·, when the current NRC review of 50.59 is completed.

4.11 DCPP Maintenance Department overall performance was reported as Green (good) and stable based on industry performance indicators. Maintenance was aggressively hiring for possible retirements and a five-year plant operations extension to 2030.

5.0 RECOMMENDATIONS

None

6.0 REFERENCES

6.1 "Diablo Canyon fudependent Safety Committee Thirty-third Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023", Approved September 20, 2023, Volume II, Exhibit D.7, Section 3.12, "Meetings with DCPP Officers."

6.2 Ibid., Exhibit D.3, Section 3.10, "Obse1ve Evaluated Emergency Preparedness Exercise."

6.3 Ibid., Exhibit D.6, Section 3.4, "Revised Capital Project Plan."

6.4 Ibid., Exhibit D.7, Section 3.3, "Meet with NRC Senior Resident Inspector."

6.5 Ibid., Exhibit D.l, Section 3.9, "Radiation Monitoring System."

6.6 "Diablo Canyon Independent Safety Committee Twenty-third Annual Rep01t on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2013 - June 30, 2014", Approved October 14, 2014, Volume II, Exhibit D.5, Section 3.7 "Plant Protection System (Eagle 21) Replacement."

6.7 "Diablo Canyon Independent Safety Committee Thi.tty-third Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023", Approved September 20, 2023, Volume II, Exhibit D.6, Section 3.12, "Transmission System Update."

6.8 "Diablo Canyon Independent Safety Committee Nineteenth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2009 - June 30, 2010", Approved October 17 2010, Volume II, Exhibit D.2, Section 3.10, "Aging Management (Equipment Reliability."

6.9 "Diablo Canyon Independent Safety Committee Thi.t·ty-Third Annual Repo1t on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023," Approved September 13, 2023, Volume II, Exhibit D.5, Section 3.4, "Comprehensive Review of the Seismic Safety Program."

6.10 Ibid., Exhibit D.7, Section 3.14,"SB846 Requi.t·ements Regarding an Updated Seismic Assessment."

6.11 Ibid., Exhibit B.6, "Approval of November 2022 Fact-finding Report."

6.12 "Seismic Probabilistic Risk Assessment for the Diablo Canyon Power Plant. Units 1 and 2 - Response to NRC Request for Infonnation Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1: Seismic of the Near-Te1m Task Force Review of Insights from the Fukushima Dai-lchi Accident," submitted to the US Nuclear Regulato1y Commission as an attachment to PG&E letter DCL-18-027, Aplil 24, 2018, NRC ADAMS Accession Number ML1 8l20A201.

6.13 "Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Unce1tainty and Use of Experts", R.J. Budnitz (chair), G. Apostolakis, D.M. Boore, L.S. Cluff, K.J. Coppersmith, C.A. Cornell, and P.A. Morris (comprising the "Senior Seismic Hazard Analysis Committee," "SSHAC"), Rep01t NUREG/CR-6372, Lawrence Live1more National Laboratory, sponsored by the U.S. Nuclear Regulatory Commission, U.S. Department of Energy, and Electric Power Research Institute (1997), NRC ADAMS Accession Numbers ML080090003 and ML080090004.

6.14 "Updated ImplementationGuidelines for SSHAC Hazard Studies," US Nuclear Regulat01y Commission, Rep01i NUREG-2213 (October 2018), NRC ADAMS Accession Number ML18282A082.

6.15 "Seismic Hazard Screening Repo1i, Diablo Canyon Power Plant Units 1 and 2," submitted to the Nuclear Regulato1y Commission as an attachment to PG&E letter DCL-15-035, "Response to NRC Request for lnfo1mation pursuant to 10 CFR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Te1m Task Force Review of Insights from the Fukushima Dai-ichi Accident; Seismic Hazard and Screening Report," March 11, 2015, NRC ADAMS Accession Numbers ML15070A607 and ML15070A608.

6.16 "Seismic Assessment of Diablo Canyon Power Plant Non-Safety-Related Strnctures, Systems, and Components," Enercon Se1vices, Inc., Oakland, CA 94621, March 2010.

6.17 "Diablo Canyon Independent Safety Committee Thirty-Third Annual Rep01i on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2021 -June 30, 2023," Approved September 29, 2022, Volume II, Exhibit D.1, Section 3.7, "Program for Managing Changes Under 10CFR50.59."

6.18 Ibid., Exhibit D.9, Section 3.13, "Maintenance Department Update."

ATTACHMENT B

DIABLO CANYON INDEPENDENT SAFETY COMMITTEE

Report on

Fact-Finding Meeting at DCPP
on April 18, 19 and 20, 2023

by

Peter Lam, Member, and
Richard D. McWhorter and R. Ferman Wardell, Consultants
with Consultant Andrew C. Kadak, Supporting

1.0 SUMMARY

The results of the DCISC April 18, 19 and 20, 2023, Fact-Finding Meeting for the Diablo Canyon Power Plant (DCPP) in Avila Beach, CA, are presented. Although the Fact-Finding Team (FFT) was on-site at DCPP, po1tions of the meeting were held remotely. The subjects addressed and summarized in Section 3 are as follows:

1. Conective Action Review Board
2. Trends in Plant Status Control Events
3. Equipment Long Range Plan Reviews (PMO++)
4. Licensed Operator Simulator Continuing Training Class Observation
5. Fire Protection Program and Systems
6. Conective Action Program and Human Perf01mance Update
7. Meet with Nuclear Regulat01y Commission (NRC) Senior Resident Inspector
8. Meet with DCPP Officer
9. Reactivity Management Progran1
10. Reactor Coolant System
11. Compressed Air Systems

2.0 INTRODUCTION

This Fact-Finding Meeting for the DCPP was held to evaluate specific safety matters for the DCISC. The objective of the evaluation was to dete1mine if PG&E's perf01mance is appropriate and whether any areas revealed observations which are imp01tant enough to wanant finther review, follow-up, or presentation at a public meeting. These safety matters include follow-up and/or continuing review effo1ts by the Committee, as well as those identified as a result of reviews of various safety-related documents.

Section 4 - Conclusions, highlights the conclusions of the FFT based on items repo1ted in Section 3 -Discussion. These highlights also include the team's suggested follow-up items for the

DCISC, such as scheduling future Fact-Finding Meetings on the topic, presentations at future public meetings, and requests for future updates or inf01mation from DCPP on specific areas of interest, etc.

Section 5 - Recommendations, presents specific recommendations to PG&E proposed by the FFT. These recommendations will be considered by the DCISC. After review and approval by the DCISC, this Fact-Finding Report, including its recommendations, will be provided to PG&E. The Fact-Finding Report will also appear in the DCISC Annual Report

3.0 DISCUSSION

3.1 Corrective Action Review Board

DCISC Consultants McWhorter and Kadak remotely observed a meeting of the DCPP Corrective Action Review Board (CARB). The DCISC last observed a CARB meeting in April 2022 (Reference 6.1), when it concluded the following:

> *The April 13, 2022, DCPP Corrective Action Review Board (CARB) meeting moved along expeditiously, although thoroughly, effective y resolving the issues and actions on its agenda. There was good participation by CARB attendees.*

The CARB's purpose is to provide a venue for station management to demonstrate commitment to Corrective Action Program (CAP) excellence. The CARB fulfills a need for senior management oversight of the CAP, and this oversight function includes:

- Reviewing Root Cause Evaluations (RCEs) for accuracy, completeness and alignment of the problem, causes and corrective actions
- Approving extensions to the due dates for Corrective Actions to Prevent Recurrence (CAPRs)
- Approving Effectiveness Evaluations for CAP resolutions
- Periodically reviewing CAP metrics to ensure the CAP 1s meeting management expectations
- Reviewing and dispositioning requests for changes to Cause Evaluations
- Reviewing Notifications screened by the Notification Review Team, which performs the initial screening of all Notifications

The membership of the CARB consists of regular and alternate members designated in writing by the Station Director, and CARB meetings are held as necessa1y, typically on a weekly basis. This meeting was chaired by Dennis Petersen, the Station Director.

The agenda for this meeting included the following:

- Safety Minute
- Facilitative Leadership Minute
- Review Desired Outcomes

- Verify Quomm
- Review of Previous Meeting Minutes, Action Items, and Evaluation
- Review Open Root Cause Evaluations Notifications and Tasks
- Review Conective Action Program Index (Performance Indicators)
- Review Selected Open Significance Level 1 and 2 Work Group Evaluations
- Review Condition Reports and Recommend Eagle Eye Award* Nominations
- Review Action Items and Meeting Evaluation

> * *The Eagle Eye Award recognizes those who identify and help solve Corrective Action Program (CAP) issues that prevent or decrease risk to the organization related to safety, reliability, cost or compliance or suggest significant process enhancements or performance improvements.*

The Consultants observed that the meeting was effectively managed, covering items on the agenda efficiently while allowing adequate tin1e for any participants to question and discuss items of interest in more detail. There was good participation by all CARB attendees. The Consultants noted that the agenda for this meeting was more administrative in nature than is typical, focusing on CAP metrics and tracking of open items. The DCISC should plan to observe another CARB meeting in the near future to allow for additional observations of the CARB's handling of more substantive issues.

Conclusions: The April 18, 2023, DCPP Corrective Action Review Board (CARB) meeting covered items on the agenda efficiently while allowing adequate time for any participants to question and discuss items of interest in **more detail. There was good participation by CARB attendees.**

Recommendations: None.

3.2 Trends in Plant Status Control Events

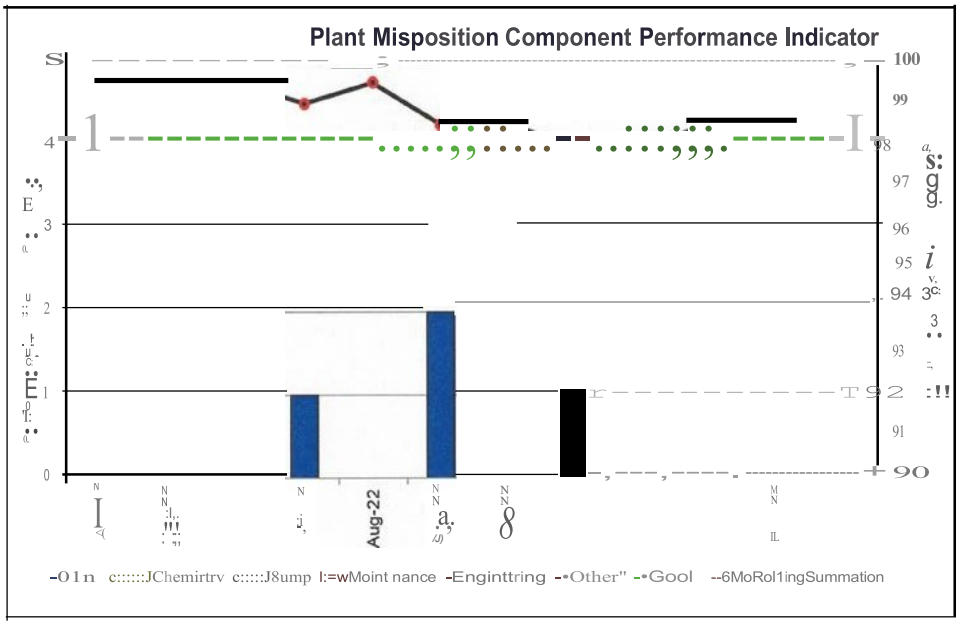
The DCISC FFT met with Brent Dvoracek, Performance Shift Manager, to receive an update on trends in plant status control events, primarily within the Operations Department. The DCISC last reviewed this topic in December 2021 (Reference 6.2), when it concluded the following:

> *DCPP's corrective actions for past problems in Plant Status Control continue to be effective. Plant Status Control performance has improved and is beingsustained at a high level.*

The term Plant Status Control Events generally refers to events in which an operator or technician manipulates the wrong component (such as a valve or switch) or places a component in the wrong position. In late 2017, challenges in the area of Plant Status Control performance became an issue and continued through 2019. As a result, Plant Status Control performance weakness was escalated by Quality Verification to the Station Director in July 2019. Operations developed a Plant Status Control Action Plan to address this performance decline which included a common

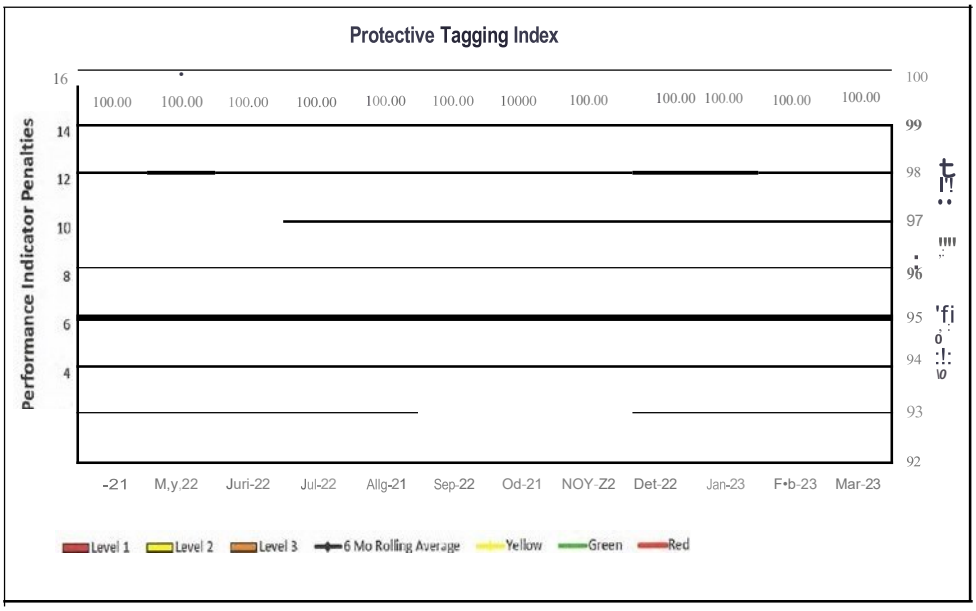
cause evaluation, increased obse1vations and communications, and a video that was distributed site-wide to demonstrate strong component positioning behaviors. In March 2020, December 2020, and December 2021, the DCISC reviewed the effectiveness of actions taken to improve Plant Status Control and found that perfmmance was good and being sustained at a high level.

Mr. Dvoracek repo1ted that the Operations Depa1tment obse1ved a trend of a number of Level 3 (minor; minimal impact to operations, safety or personnel) misposition events dming the second half of 2022. There was one Level 3 event in July 2022, two Level 3 events in September 2022, and one Level 3 event in November 2022. Following the events in September 2022, a Notification was created (SAPN 51178834) to document the declining perfo1mance trend and initiate con-ective actions. A copy of the Notification was provided to and reviewed by the FFT. Con-ective Actions included issuing depaitment communications regarding the nature of the events, creating a new Depaitment Focus Area related to Plant Status Control, and having supe1visors perform an obse1vation blitz to obse1ve and critique status control activities in the plant. The FFT found that there were 41 observations perfo1med in response to the Notification and that lessons learned were effectively captured and communicated to the department. Additionally, the FFT reviewed the four misposition events and agreed with the plant's classification that they were ofve1y low safety significance. Mr. Dvoracek reported that perfo1mance had been good since November 2022 and the Notification regarding the declining perfo1mance trend was recently closed. Although minor, the event trend was analyzed and con-ected to prevent more significant events. The Pe1fo1mance Indicator showing the occmTence of the four 2022 events and more recent trend was as follows:



Plant Misposition Perf01mance Indicator

The FFT also inquired about the cun-ent status and trends for clearance and tagging events within the Operations Depa1tment, and Mr. Dvoracek repmted that there had been no events in cleai·ance and tagging activities since September 2021. He provided a copy of the Tagging Performance Indicator which showed the sustained high perfmmance as follows:



Tagging Perfonnance Indicator

The FFT also inquired about the cmTent status of training of new operators for the Operations Department, and Mr. Dvoracek reported that DCPP was cmTently holding training classes for 19 new Non-Licensed Operators, 12 new Reactor Operators, 12 new Senior Reactor Operators, and 8 current operators upgrading from Reactor Operator to Senior Reactor Operator.

Conclusions: DCPP's performance in Plant Status Conh·ol has been good except for a series of minor events that occurred in late 2022. Although minor, the trend was analyzed and corrected to prevent more significant events. The causes of those events were effectively identified and conected, and subsequent performance is being sustained at a high level. Performance in tagging operations has been excellent.

Recommendations: None.

3.3 Equipment Long Range Plan Reviews (PMO++)

The DCISC FFT met with Allen Wilson, Director of Projects, and Trevor Marks, Project Supervisor, for an update on Equipment Long Range Plan Reviews under DCPP's current program for perfornling such reviews which is referred to as the "PMO++" Program. The DCISC last reviewed the PMO++ Program in March 2023 (Reference 6.3), concluding the following:

> *The plant's PMO++ initiative to evaluate capital projects and plant maintenance activities to support extended operation through 2030 is proceeding satisfactorily. The initiative review is expected to be completed in time for the DCISC to complete its review and to develop conclusions at its June 28-29, 2023, Public Meeting, satisfying the California Senate Bill 846 requirement.*

At the request of the FFT, Mr. Wilson reviewed the recent histmy of the management of maintenance activities and projects at DCPP. During the period from after the signing of the Joint Proposal in 2016 until the passage of Senate Bill 846 (SB846) in 2022, DCPP continued to perfo1m all Preventive Maintenance (PM) activities as well as all Priority 1, 2 and 3 (quality and safety-related) CoITective Maintenance (CM) activities on safety-related equipment, equipment important to safety, and risk-significant equipment. However during that same period, DCPP reviewed other PM and CM activities (non-safety related/non-risk significant PMs and Priority 4 and 5 CMs) and chose to eliminate or reduce the scope of some of those PMs and CMs which were not needed to suppmt operations through the then planned cessation of power operations in 2025. This effo1t followed an industry-wide initiative, called Preventive Maintenance Optimization (PMO), in which plant maintenance was optimized resulting in data-based equipment maintenance decisions. Additionally, all capital projects were similarly reviewed with a result that only projects required for regulatory compliance or safety were authorized and most projects planned only for modernization were cancelled. The DCISC performed reviews of these initiatives in the past (prior to the decision to extend operations) and found them satisfactmy.

Following the passage of SB846, DCPP initiated its cmTent effort to review the long-range maintenance and project plans for station equipment. The new effort was named "PMO++," and its objective was the following:

> *"In preparation for License Renewal and Extended Operations, we are taking a holistic look at equipment/system's overall health to determine and prioritize outstanding work scope based on Maintenance Plans in grace or Preventive Maintenance Change Requests that were approved with rationale stating end of license is 2024/2025, Corrective Maintenance Orders that have been pushed to beyond 2025, Open SAPNs I cognitive trending done by plant personnel, License Renewal activities, and any other inputs such as Life Cycle Maintenance studies, industry peers, Operating Experience.* "

The PMO++ Progran1 began in December 2022 with initial reviews completed by the end of January 2023. A cross-functional team reviewed a comprehensive list of programs and documents including the following:

- Co1Tective Maintenance
- Preventive Maintenance
- Smveillance Tests
- License Renewal/Aging Management Programs
- Inventories of Critical Spai·es and Repair Parts Equivalency Evaluations
- Modifications and Design Changes
- End of Life Grace Periods (pre-dete1mined, pre-approved schedule extensions)
- Cognitive Trending via SAPNs (Conective Action Notifications) and Interviews

Mr. Wilson provided an ove1view of the results of the reviews of PMs and CMs. He repo1ted that approximately 200 PM plans were reinstated, and a small number of new PM plans were added to the maintenance planning database. For perspective, DCPP's PM plans contain about 12,000 total PM activities. Approximately 300 Priority 4 and Priority 5 CM activities were reinstated. For

perspective, DCPP's typical backlog of open Priority 4 and Priority 5 CM work is about 3,000 items with about 100 CM activities being worked per day.

Regarding capital projects and other equipment issues that were not covered by PM and CM plans, the PMO++ Program in early 2023 identified approximately 560 potential projects and plant concerns for possible action to support the potential five-year operations extension. Dming Febmary and March 2023, reviews were performed to rank the list as a first step to determine which activities would actually be initiated. The ranking process focused upon using risk insights prioritized based on safety, regulatory compliance, environmental compliance, and reliability/efficiency. The perspective that the reviewers maintained throughout the ranking process was to work to maintain the cmTent situation of DCPP as a safe, efficient and reliable plant throughout the period of extended operations. One question that was asked throughout the process of ranking the projects was, "What is the risk if that particular activity is not completed?" Additionally, the reviewers considered the complexity of implementation pa1ticularly with regards to the time required for project planning and execution as well as the possibility of unintended consequences for major changes. Mr. Wilson noted that activities necessary for license renewal were considered 'must-do' and were being initiated outside of the PMO++ Program.

At the time of this Fact-Finding Meeting (late April 2023), approximately 250 projects were identified for consideration of prioritization for implementation dming the extension of operations. The 250 projects had been initially ranked, but reviews and refinement of the rankings were still in progress. Specifically, senior management reviews were not yet complete, and two industry peer reviews were planned to be performed in May 2023. Mr. Wilson reported that the preliminary results called for about 50 projects to be completed within the next three years with about 12 of those 50 to be performed during the upcoming Refueling Outage 1R24 in the fall of 2023. Regarding the independent review of maintenance required by SB846, consultants had recently been selected to perform the review and that review would soon begin. DCPP expected that the SB846 independent review would be completed by October 2023. The FFT concluded that DCPP's process for reviewing the need for changes to PMs, CMs, and projects tosupport extended operations appeared well planned and implemented to date.

The FFT then requested to review the detailed output of all portions of DCPP's maintenance and project reviews as soon as possible. This was necessary for the DCISC to meet the SB846 requirement as follows:

> *"The commission {California Public Utilities Commission} shall review the reports and recommendations of the Independent Safety Committee for Diablo Canyon described in Section 712.1. If the Independent Safety Committee for Diablo Canyon's reports or recommendations cause the commission to determine, in its discretion, that the costs of any upgrades necessary to address seismic safety or issues of deferred maintenance that may have arisen due to the expectation of the plant closing sooner are too high to justify incurring, or if the United States Nuclear Regulat01y Commission's conditions of license renewal require expenditures that are too high to justify incurring, the commission may issue an order that reestablishes the current expiration dates as the retirement date, or that establishes new retirement dates that are earlier than provided in subparagraph (A) of*

paragraph (1), to the extent allowable under federal law, and shall provide sufficient time for orderly shutdown and authorize recovery of any outstanding uncollected costs and fees."

In response to the FFT's request, DCPP stated that it desired to complete all internal/peer reviews and obtain senior management approvals before providing the detailed info1mation to the DCISC. DCPP proposed to provide the DCISC with copies of the CM and PM reviews during the DCISC's Fact-Finding Meeting in early May 2023 and to provide copies of the PMO++ Program review list following the two peer reviews planned for mid-May (likely in early June). The DCISC FFT confened internally and concluded that this was appropriate in that it would avoid the possibility of confusion or misinfonnation that could occur if the info1mation provided by DCPP to the DCISC was not in final f01m and approved by senior management. Unfortunately, this timetable would not supp01t the DCISC completing its reviews prior to its June 2023 Public Meeting, which was the original target date to provide timely information to the California Public Utilities Commission. Instead, the reviews would likely be completed during the DCISC's July and August Fact-Finding Meetings with discussion and approval at the DCISC's next Public Meeting in late September 2023.

Conclusions: DCPP's process for reviewing the need for changes to Preventive Maintenance activities, Corrective Maintenance activities, and projects to support five years of extended operations (the PMO++ Program) appeared well planned and implemented to date. Final detailed outputs of the process were not yet available for review by the DCISC, and the DCISC should complete those reviews during futm·e Fact-Finding Meetings as soon as the detailed information becomes available. Unfortunately, DCPP's current timetable fo1· providing the information would not support the DCISC completing its reviews prior to its June 2023 Public Meeting, which was the original target date to provide timely information to the California Public Utilities Commission.

Recommendations: None.

3.4 Licensed Operator Simulator Continuing Training Class Obse1vation

The DCISC FFT obse1ved a Licensed Operator Continuing Training (LOCI) session in the DCPP Control Room Simulator. The DCISC last observed a simulator training class in December 2021 (Reference 6.4), when it concluded the following:

A Licensed Operator Continuing Training simulator session was well prepared, contained appropriate objectives, and was professional y conducted by the Training staff Operators performed well in responding to the simulated off-normal events. The DCISC observed a number of inactive Licensed Operators in training and considers DCPP 's *plan to maintain a high number of inactive Licensed Operators in off-shift positions an excellent approach to reduce the risk of dropping below the required number of Licensed Operators due to unexpected operator losses as the plant approaches the cessation of power operations.*

Most Licensed Operators at DCPP are assigned to one of five rotating shift crews, and those crews rotate through a five-week schedule of four work weeks managing operations in the plant followed by one work week dedicated solely to the LOCT program (when the plant is not in an outage). Also, there are Licensed Operators who are assigned staff positions other than rotating operating shifts who are also assigned to train with the rotating shift crews. The LOCT week consists of classroom instrnction, simulator exercises, dynamic learning activities, self-study, and testing. Overall, each Licensed Operator spends approximately six weeks per year (depending on outage schedules) in fo1mal training. The LOCT program is designed to confo1m to requirements of the fustitute of Nuclear Power Operations (INPO), and it receives and maintains plant training program accreditation through regular INPO reviews. The NRC also regularly inspects the LOCT program toensure that it meets regulat01y requirements for maintaining the proficiency of licensed operators.

The FFT observed two sections of a series of four short simulator scenarios during which training staff were providing licensed operators with opp01tunities to perf01m refresher training on Emergency Operating Procedures (EOPs) in an info1mal, non-graded environment. The full training session was scheduled for about 2.5 hours and encompassed four sho1i scenarios driving the use ofEOPs as follows:

- EOP E-0, "Reactor Trip or Safety Injection"
- EOP FR-S.l, "Response to Nuclear Power Generation Anticipated Transient Without Scram"
- EOP FR-H.l, "Response to Loss of Secondary Heat Sink"
- EOP ECA-0.0, "Loss of All AC Power"

A copy of the lesson plan for the simulator training session was provided to and reviewed by the FFT. Training objectives and expected operator actions were identified for each of the above events, and the crew was evaluated in their ability to complete all of the required actions using task and communications practices which met performance expectations. The FFT directly obse1ved the final portion of the third scenario, Loss of Secondaiy Heat Sink, and all of the fomih scenario, Loss of All AC Power. Following the simulator scenai·ios, the FFT observed the operators perfo1ming self critiques during which minor crew deficiencies were appropriately identified and discussed. Overall, the simulator training appeared to be effectively conducted, and operators perf01med well during the scenario.

Conclusions: A Licensed Operator Continuing Training simulator session was well prepared, contained appropriate objectives, and was professionally conducted by the Training staff. Operators performed well in responding to the simulated off-normal events.

Recommendations: None

3.5 Fire Protection Program and Systems

The DCISC FFT met with John Cote, Fire Protection Engineer, to review the current status of the Fire Protection Program and Fire Protection Systems at DCPP. The DCISC last reviewed the Fire Protection Program in March 2021 (Reference 6.5), when it concluded the following:

> *The DCPP National Fire Protection Association-805 Fire Protection Program and the Fire Department itself both appeared satisfactory based on periodic exercises and audits and inspections by regulatory organizations.*

The DCISC last reviewed Fire Protection Systems in August 2020 (Reference 6.6), when it concluded the following:

> *Over the last few years, an increased level of attention to the health of DCPP's Fire Protection and Detection Systems has improved system performance, and the number of impainnents has been significantly reduced. This is excellent performance and a notable contribution to improving overall safety at DCPP.*

Mr. Cote provided the FFT with a copy of the Fire Protection Program Health Repo1i. The Health Repo1t showed Green (Healthy) performance overall for the four quarters ending in December 2022. The Health Report reported the following ratings by major program categories:

- Program Personnel - White (Needing Improvement) overall with two White subcategoties due to the DCPP Fire Chief being in their position less than three years, and attendance at only two of the desired three peer and industry benchmark activities.
- Program Infrastructure - Green (Healthy) overall with a White subcategory due to uncertainties in long range planning for extended operations.
- Program Implementation- Green overall with a White subcategory due to a recent non-cited violation from the NRC (discussed below).
- Equipment Performance - White overall with two White subcategories due to a high backlog of maintenance work orders older than 24 months and reliability below goals for the Incipient Fire Detection System (IFDS, discussed below).

The Program Health Report also reported additional information on paths forward to resolve the above deficiencies as well as the fact that the program was last presented to the Plant Health Committee for their review in July 2022. In general, Mr. Cote reported that the National Fire Protection Association (NFPA)-805 based program was now five years old and working well overall. The last Nuclear Energy Insurance Liability audit was completed during 2022 with no major issues. Recently, the NRC had extended the interval for their Fire Protection Program inspections from three years to four years, making the next major NRC Fire Protection inspection at DCPP due in 2025. There were no reportable fires on site at DCPP in the last year.

Regarding the health of Fire Protection Systems, Mr. Cote reported that most of the systems were in good health with a few exceptions. The Incipient Fire Detection System (IFDS) was in Maintenance Rule Category (a)(l) due to poor reliability for which the plant had changed the periodicity and methods for performing system surveillances, and system reliability was being monitored to determine if the changes had been effective in improving reliability. Fire doors were generally in good condition with only one door cunently needing replacement. Fire water systems

were also generally in good condition with several improvement items being reviewed under the PMO++ Program (see Section 3.3 above) for implementation to address long-te1m maintenance issues such as piping c01Tosion. fu response to the FFT's question, Mr. Cote confirmed that Fire Protection Systems would be covered by at least three Aging Management Plans (AMPs) which would be put in place as a part of license renewal. He expected the AMP inspections to begin within the next month.

The FFT inquired about the details regarding a recent Non-Cited Violation issued by the NRC related to testing of the IFDS. Mr. Cote provided the FFT with a copy of the associated Notification (SAPN 51175083) and reviewed the issue with the FFT. The testing issue regarded how the system was monitored for adequate air flow at each sample point where the system drew in air to monitor for pa1ticulates indicative of a fire. Flow balancing for each sample point was performed when the system was installed in 2018, but DCPP did not make flow balancing a regular Preventive Maintenance (PM) activity at that tin1e. During the 2020 timeframe, a technician questioned whether or not periodic flow balance testing should be performed. DCPP inquired with the vendor about the question, and the vendor stated that periodic flow balance testing was not required. However, in 2021, DCPP began flow balance testing as a good practice and subsequently created a PM task to be perfo1med annually. fu the meantime, a DCPP employee submitted an allegation to the NRC on the topic, and the NRC reviewed the issue. The NRC review determined that periodic flow testing was required under the NFPA 72 code, and the NRC issued a Non-Cited Violation for DCPP's failure to perform flow balance tests prior to 2021. The FFT concluded that this issue was of low safety significance and found that DCPP's coITective actions were appropriate.

Conclusions: DCPP's Fire Protection Progrnm and Fire Protection Systems were in good health overnll. Minor equipment issues were being apprnpriately tracked for resolution.

Recommendations: None.

3.6 CoITective Action Program and Human Performance Update

The DCISC FFT, along with Consultant Kadak participating remotely, met with Matt Birkel, Performance Improvement and CoITective Action Program (CAP) Manager, and Colt Wells, Perfo1mance Improvement and CAP Supervisor, to review the cunent status of the CAP and for an update on Human Performance (HU) at DCPP. The DCISC last reviewed Human Perfo1mance in April 2022 (Reference 6.7), when it concluded the following:

> *DCPP's Human Perfonnance has been good based on the trend in the level of Human Performance (HU) events. DCPP had one HU event at the highest or Station Level since September 2020, which is good performance. Even with good performance, DCPP's goal is for zero HU events.*

At the request of the FFT, Mr. Birkel reviewed the process within the CAP program for oliginating and reviewing deficiencies. The process begins when any individual at the station identifies any type of problem and reports it using PG&E's data management system refeITed to by the vendor's

name, SAP. The identification of a problem in SAP is refened to as a Notification (SAPN). Following entry into SAP, the Notification is reviewed by multiple entities as follows:

1. Initial Operability Determination- Shift operators review all Notifications periodically during the shift to detennine if there is any immediate impact to the operability of equipment required for safety or emergency response. If there is an impact to equipment operability, operators take the required actions per the Technical Specifications or other procedural requirements. Operators are required by procedure to complete and record their reviews of all Notifications by the end of each shift.

2. Notification Review Team (NRT) -The NRT meets daily to review all Notifications submitted since the last review. The NRT performs an initial classification of Notifications into "DA," for conditions adverse to quality, or "DN" for work-only conditions not adverse to quality. DNs may be assigned for further action and remain open until that action is complete, or they may be closed if no further action is detemiined to be necessary. If a Notification is classified as a condition adverse to quality, then a separate DA Notification is opened and used to assign responsibilities for performing a cause evaluation for the issue and initiating additional conective actions. The NRT also determines the level of cause evaluation to be completed. Meetings of the NRT are periodically observed by the DCISC, which last observed a meeting in March 2022 (Reference 6.8).

3. Daily Review Team (DRT) - The DRT meets daily to review all Notifications that involve plant maintenance activities and prioritize resolution of the issue in the plant's schedules for managing maintenance work.

4. Senior Leadership Team (SLT) - The SLT meets daily and provides senior management with an opportumty to review all classifications made by the previous day'sNRT.

5. Conective Action Review Board (CARB) - The CARB meets periodically primarily to review cause evaluations and conective actions taken in response to Notifications, but it also reviews the classification of Notifications made by the NRT. The DCISC periodically observes CARB meetings (see Section 3.1).

Mr. Birkel reviewed the numbers and tracking of CAP Notifications. Approximately 30,000 Notifications ar·e initiated each year at DCPP with about 80 per day average during normal operations and about 200 per day average during Refueling Outages. DCPP strives to maintain a low threshold for submission of Notifications and encourages all employees to report deficiencies no matter how small the issue may seem. This approach is considered an industry best practice and fundamental to maintaining a sound Nuclear Safety Culture at the station. He reviewed with the FFT the various reports that are regularly produced to tr·ack the large number of activities that are continuously being worked as a part of the CAP. The primary report by which the status of CAP activities is tr·acked is the CAP Station Index which tracks the following major metrics:

- DA Throughput (the ratio of closed to open DA over last 90 days)

- OpenDAs
- Open Level 5 DNs
- Average Age of Open DAs
- Notifications Created
- Percent DAs Identified

Additionally, other rep01ts tracked the status of other items such as the 20 oldest DA Notifications, open Root Cause Evaluation actions, and Long-Te1m C01Tective Actions for Significance Level 1, 2 and 3 Notifications. The monthly Perf01mance Improvement Status Summary also provided a regular list of Notifications related to declining trends in perf01mance at the station as well as open Notifications that were subinitted anonymously. The DCISC is regularly provided with copies of these rep01ts for its review.

The FFT inquired about the results of the NRC's recent Problem Identification and Resolution (PI&R) Inspection conducted in December 2022. Overall, the NRC PI&R Inspection concluded that DCPP was complying with the regulations and standards for problem identification and that employees appeared willing to raise nuclear safety concerns. However, one finding of ve1y low safety significance was identified for untimely implementation of the process for prioritizing and evaluating problems. Mr. Birkel explained that the NRC found that DCPP failed to process some Notifications for review by operators by the end of the shift. Specific examples included three instances where engineers inspecting concrete deficiencies evaluated minor deficiencies as acceptable in the field rather than f01warding the issue for prompt review by operators. Also, the NRC found a few inconsistencies in how Notifications were classified as DAs or DNs. Specifically, some Notifications regarding Ininor (housekeeping) issues under the Seisinic Induced Systems Interaction program were being classified as DNs when they should have been classified as DAs.

Mr. Birkel provided a list and copies of 30 Notifications for issues that were identified by the NRC Pl&R Inspection. The FFT reviewed the Notifications and concluded that all were of low safety significance and not indicative of major issues in the CAP program at DCPP. Mr. Birkel repo1ted that the lessons learned from the NRC Pl&R Inspection had been communicated to station personnel and he believed that the number of Notifications generated had increased which indicated that employees had become more sensitive for entering issues into the CAP. Lastly, the FFT asked about a comment in the Pl&R Inspection report regarding personnel from Security and Engineering expressing concern regarding station management's decisions made with regards to c01Tecting conditions adverse to safety. Mr. Birkel reported that station management reviewed the concerns and convened an ad-hoc meeting of the Nuclear Safety Culture Monitoring Panel which reviewed the concerns along with all recent anonymous Notifications submitted during the same period. The panel concluded that the problem was limited in scope and limited to the time period following a difficult Refueling Outage in the fall of 2022 and prior to the decision to extend DCPP operations beyond 2025.

Regarding the specific CAP area of HU, DCPP reports and classifies all HU events and records via the CAP for action and resolution. The classifications are as follows:

- Station Level Events (SLEs; highest significance)

- Depaiiment Level Events (DLEs)
- Organizational Leaming Opporiunities (OLOs; lowest significance)

The criteria for classification are provided in detail in DCPP Procedme OM15.ID11, "Human Performance Event Response." The criteria are divided into the following categories:

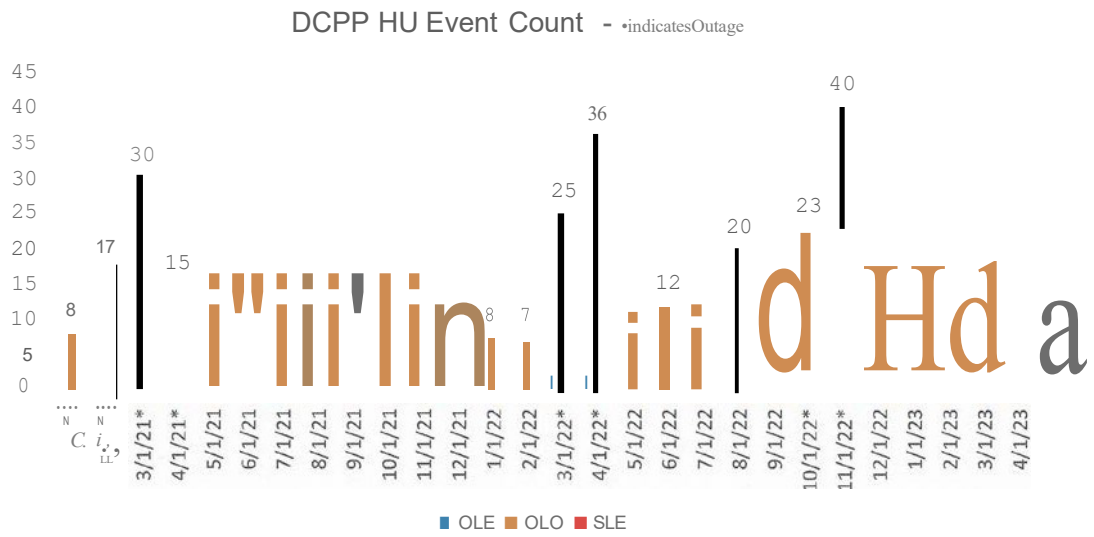
- Nuclear Safety
- Radiological Safety
- Industrial Safety
- Facility Operation
- Regulatory Event
- Emergency Preparedness
- Other Deficiencies

Mr. Birkel provided the FFT with the following table and graph showing the monthly data and trends in HU events since Janua1y 2021:

Month	SLE	DLE	OLO
Jan-21			8
Feb-21			17
Mar-21*		1	30
Apr-21*	1		15
May-21			10
Jun-21			8
Jul-21		1	7
Aug-21			12
Sep-21			12
Oct-21			9
Nov-21		1	10
Dec-21		1	13
Jan-22			8
Feb-22			7
Mar-22*		2	25
Apr-22*		2	36
Mav-22			7
Jun-22			12
Jul-22			8
Aug-22			20
Sep-22		2	12
Oct-22*		1	23
Nov-22*		1	40
Dec-22		1	18
Jan-23			15
Feb-23			8
Mar-23			16

* indicates outage month

Human Performance Events Table



Human Perf01mance Events Graph

The FFT noticed two trends: First, the highest numbers of HU events occmTed during outages, which is typical because that is when most work is performed. Second, the vast majority of events were classified as Organizational Learning Opportunities, which means very few of the HU events were significant enough to be classified as SLEs or DLEs. Mr. Birkel also provided data showing that approximately 850 additional issues over the past two-year period were f01mally evaluated by the HU review process and dete1mined not to meet the criteria for classification as an HU event. The FFT concluded that the high number of events reviewed by the program along with the high number of OLOs recorded represented a ve1y conse1vative and safety-focused approach to repo1ting, analyzing, and learning from all issues that could be caused by human enors.

The FFT identified the topic of the one SLE reported in the above figures as an event occuning on April 18, 2021, when operators and maintenance personnel identified that two cooling water hoses inside the Unit 2 Main Generator had been incoITectly installed by a contractor. This issue was previously reviewed by the DCISC during its April 2021 Fact-Finding Meeting (Reference 6.9).

The FFT also inquired regarding the details and circumstances smrnunding an HU-related issue raised by a member of the public during the DCISC's February Public Meeting. The issue concerned 11 qua1ters (three-month periods) of water quality discharge data shown as eIToneously submitted to governing agencies on a publicly available website maintained by the U.S. Environmental Protection Agency (USEPA). Mr. Birkel provided the FFT with a copy of the Notification (SAPN 51180233) generated by DCPP upon learning of the issue and reviewed the details of the issue with the FFT. The issue involved the fact that a DCPP technician inconectly input data into the California Integrated Water Quality System by reporting the station cooling water discharge average and maximum discharge temperatures instead of the average and maximum differential temperatures (difference between cooling water intake and discharge temperatmes). Once the e1rnr was identified, the data were conected and demonstrated that all permit limits for differential temperatme were complied with throughout the period. The state water authority considered this issue as a typographical eITor and not a violation of DCPP's National Pollutant Discharge Elimination System (NPDES) pe1mit. The event was reviewed in

accordance with the process described above and classified as an OLO (no regulatory violation or impact to station operations). The FFT also reviewed the information from the USEPA that was provided by the member of the public and confumed that the USEPA data showed 11 non-compliances but no violations for the period. The FFT concluded that this was a very low-level HU event with no safety significance, and it had been appropriately reviewed and acted upon by DCPP.

Conclusions: DCPP's Corrective Action Program was performing well in that issues at the station were being effectively identified, evaluated, and tracked for resolution. DCPP's Human Performance has been excellent over the last two years based on data and trends in Human Performance (HU) events. DCPP has had no HU events since April 2021 receiving the highest classification of significance as a Station Level Event.

Recommendations: None.

3.7 Meet with NRC Senior Resident Inspector

The DCISC FFT met with Mahdi Hayes, NRC Senior Resident Inspector, and Jennifer Mezaros, Acting Resident Inspector on rotational assignment to DCPP, for an update. The DCISC meets regularly with the NRC Resident Inspectors and last met with the Resident Inspectors during its March 2023 Fact-Finding Meeting (Reference 6.10), when it concluded the following:

> *The meetingwith the NRC Senior Resident Inspector was beneficial, and the DCISC should continue the meetings.*

The items discussed in this meeting included the following:

- Recent NRC Inspection Activities
- DCPP's Ongoing Reviews of C01Tective Maintenance, Preventive Maintenance, and Projects (the PMO++ Program)
- License Renewal Inspection Plans

Conclusions: The meeting with the NRC Resident Inspectors was beneficial, and the DCISC should continue the meetings.

Recommendations: None.

3.8 Meet with DCPP Officer

The DCISC Member met with Maureen Zawalick, Vice President, Decommissioning and Technical Services, to discuss items from this fact-finding meeting and other items of mutual interest. The DCISC last met with a DCPP Officer or Director during its March 2023 Fact-Finding Meeting (Reference 6.11), when it concluded the following:

The regular meetings between DCISC and DCPP Officers and Directors continue to be beneficial for both organizations.

Conclusions: The regular meetings between DCISC Members and DCPP Officers and Directo1·s continue to be beneficial for both organizations.

Recommendations: None.

3.9 Reactivity Management Program

The DCISC FFT met with Dan Blount, Supe1visor, Reactor Engineering, and Joseph Lee, Reactor Engineer, for an update on DCPP's Reactivity Management Program (RMP). The DCISC last reviewed the RMP in May 2021 (Reference 6.12), when it concluded the following:

DCPP has an effective Reactivity Management Program, which ensures conservative reactivity management by promoting a reactivity-conscious culture. The proper control of core reactivity and spent fuel continues to be a long-standing fundamental principle in maintaining nuclear plant safety and reliability.

Reactivity is defined in DCPP's controlling Procedure OPl .ID3, "Reactivity Management Program," as "the fractional change in neutron population from one neutron generation cycle to the next, or the measure of departure from criticality." In general, it is a measure of the potential for a nuclear core to increase or decrease in its chain reaction rate or power level. It is important to control reactivity in order to maintain safe control of the nuclear reactor itself. The procedure defines the roles, responsibilities and actions associated with the control of reactivity to ensure safe and reliable operation. It provides guidance to ensure that all plant evolutions affecting reactivity will be controlled, safe, and conse1vative. The goal of the RMP is to prevent reactivity-related events.

The Operations Manager is responsible for plant reactivity management, including the direct control of reactivity, and for ensming conse1vative actions with regard to nuclear fuel integrity during power operations, shutdown conditions, fuel handling, and storage. Reactor Operators (ROs) and Senior Reactor Operators (SROs) are responsible for fulfilling the requirements of the RMP, including: (1) ensuring that expected responses to a reactivity change are identified andfully understood prior to initiating any action that affects reactivity, (2) closely monitoring appropriate indications for reactivity changes to verify the expected magnitude, direction, and effects, (3) remaining alert for situations that could affect reactivity, and initiating appropriate conservative con-ective actions, (4) reducing reactor power or tripping the reactor without the need for concun-ence of the unit Shift Foreman or reactivity SRO when the RO deems that the action is immediately necessa1y to protect the reactor core, and (5) maintaining the reactor core parameters within established limits.

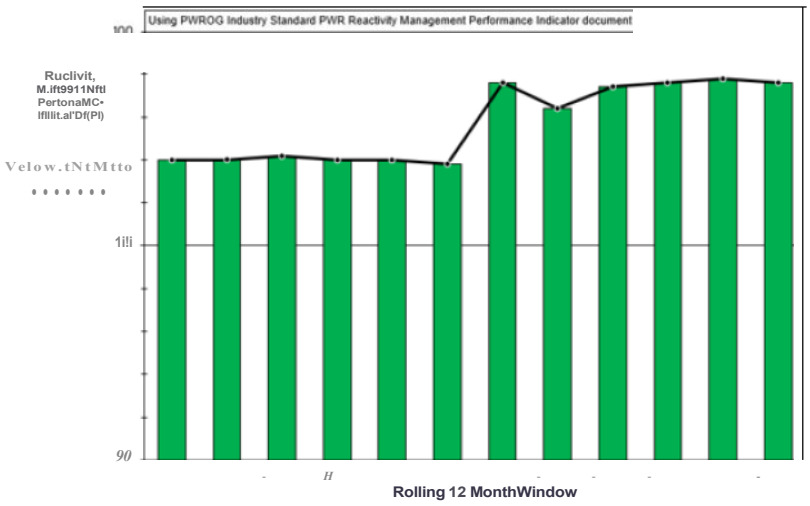
The Reactivity Management Leadership Team (RMLT) is a team of individuals representing Operations Se1vices, Maintenance Se1vices, Engineering Se1vices, Learning Se1vices, and the Con-ective Action Program. The team reviews reactivity events and adverse trends to identify

needed conective actions and recommend additional training or qualification for groups that can affect reactivity. RMLT activities include implementing reactivity management performance indicators; reviewing Notifications and industry events for reactivity events, adverse trends, and needed c01Tective actions; and classifying reactivity events.

Mr. Lee provided the FFT with copies of the Janua1y 18, 2023, RMLT Quaiterly Meeting Minutes and the April 19, 2023, meeting agenda. The FFT found that the meeting appeared to have followed the applicable procedure and focused closely on reactivity-related events, none of which was significant. The meeting appeared to meet all objectives.

DCPP's RMP performance indicators were discussed with Mr. Lee. He repmted that the industry standai·d had recently changed the calculation for the indicators slightly and DCPP had changed its program accordingly. He reviewed the calculation basis with the FFT and refened the FFT to the list of recent RMP events contained in the above RMLT Meeting Minutes which were used in the calculation. The FFT reviewed the lists ofRMP events and found that events occmTing within the last 12 months were of low safety significance. Additionally, it was noted that the indicators for both units showed a low occmTence and significance of Reactivity Management events for the past 12 months. The Reactivity Management Performance Indicators ai·e shown below:

Unit 1 Reactivity Management Performance Indicator



Unit 2 Reactivity Management Peiformance Indicator

Lastly, Mr. Lee reported that DCPP completed a biennially required RMP Quick-Hit Self-Assessment (QHSA) in August 2022 and provided the FFT with a copy of the QHSA. TheQHSA found that the program was effectively implemented and met industry standards. There were no deficiencies or gaps identified, and there were two enhancements identified.

<u>Conclusions:</u> DCPP has an effective Reactivity Management Program, which ensures conservative 1·eactivity management by promoting a reactivity-conscious culture. Program Performance Indicators showed a low occuITence and significance of Reactivity Management events for the past 12 months.

<u>Recommendations:</u> None.

3.10 <u>Reactor Coolant System</u>

The DCISC FFT met with Waleed Ahmed, Str·ategic Engineer, and Brandon Mainini, Supervisor, Prima1y Systems, for an update to review the health of the Reactor Coolant System (RCS) at DCPP. The DCISC last reviewed the health of the RCS in August 2021 (Reference 6.13), when it concluded the following:

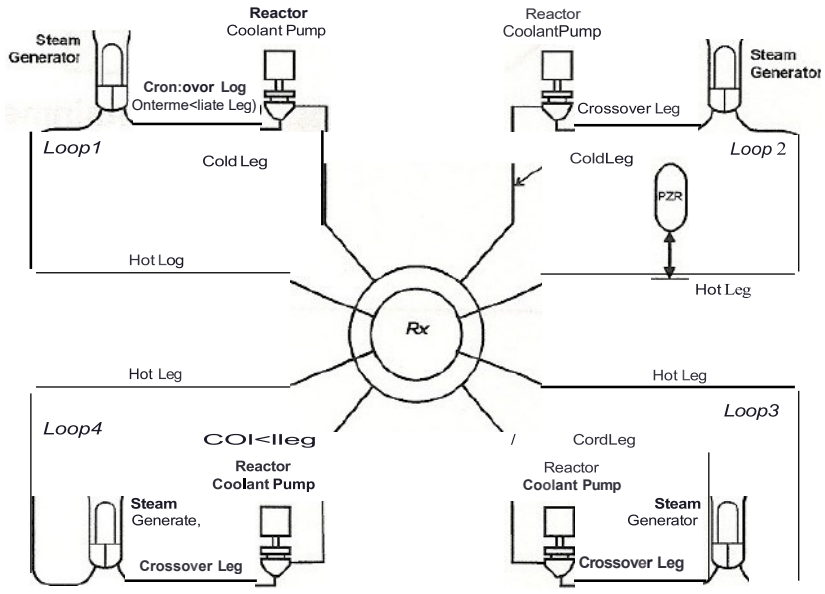
> *The DCPP Reactor Coolant System is in Green (Good) health with several minor issues which are being tracked and resolved. The system has operated reliaNy.*

The purpose of the RCS is to transfer heat generated by the fission process in the reactor core to the secondary plant steam system as well as provide a coolant pressure boundary, serve as the second banier against release of fission products, and promote natural circulation. The system consists of:

- Reactor Vessel containing the nuclear core
- Pressurizer connected to the system to maintain pressure

- Four parallel heat transfer loops connected to the Reactor Vessel with each loop consisting of the following:
  - One Steam Generator which serves as a heat sink and heat exchanger to transfer heat to the secondary steam plant
  - One Reactor Coolant Pump (RCP) which circulates water in the loop
  - Interconnecting loop piping
- Taps for parameter (temperature, pressure, flow) measuring instnunents

A basic RCS piping flow diagram is shown below:



Reactor Coolant System Flow Diagram

Mr. Ahmed provided the FIT with copies of the latest RCS System Health repo1is for both units and reviewed system issues as follows:

Unit 1

Unit 1's RCS was classified as Green (Healthy) with the following issues challenging system health:

- A number of Core Exit The1mocouples had failed, and their replacements had been defened. A bridging strategy was in place, and adequate margin remained in calculations using data from the Core Exit The1mocouples. This issue was being tracked in the Co1Tective Action Program.

- Elevated RCS leak rates, likely from small an1ounts of RCS valve stem leak offs, were placing a burden on operators to drain the Pressmizer Relief Tank (PRT) on a more

frequent basis than desired. All Technical Specifications for leak rates continued to be met with adequate margin, and this issue was being tracked in the Conective Action Program.

- A new RCP Vibration Monitoring System was installed in 2019 to replace the original system which had become obsolete. The new system regularly experienced communications alanns for which the cause had proven difficult to determine. The system had been modified to automatically reset whenever the communication alann occmTed.

Unit2

Unit 2's RCS was classified as Green (Healthy) with the following issues challenging system health:

- A number of Core Exit The1mocouples had failed, and their replacements had been defened. A bridging strategy was in place, and adequate margin remained in calculations using data from the Core Exit The1mocouples. This issue was being tracked in the Conective Action Program.

- Elevated Hydrogen concentration in the Unit 2 PRT has resulted in Operations perfmming more frequent PRT purges to keep the PRT gas space hydrogen concentration within specifications. The source of the hydrogen was most likely from small amounts ofleakage past steam space relief valves on the Pressurizer. All Technical Specifications for leak rates continued to be met with adequate margin, and this issue was being tracked in the Conective Action Program.

- The Unit 2 RCP Vibration Monitoring System was considered obsolete, and its replacement was cancelled due to the Unit 1 issue discussed above. Cunently, there were no plans for replacement of the Unit 2 RCP Vibration Monitoring System although that could change with the possibility of the extension of power operations after 2025.

The FFT inquired regarding the condition of RCP seals, and Mr. Ahmed reported that the eight RCP seal packages cunently in service were perfmming as expected with one cmTent issue. The Number 2 Seals on RCPs 1-3 and 1-4 were showing some indications of slightly elevated leak off rates. As a result, the leak off was being monitored and seal package replacements were being considered during the upcoming Refueling Outage 1R24. The RCP 1-3 and 1-4 seal packages were installed during Refueling Outage 1R22 (almost two refueling cycles ago), and the seal packages were typically expected to last three cycles. Mr. Ahmed noted that the vendor was cunently evaluating the possibility of extending the expected seal package life from three to four cycles through the use of soft palis (such as o-rings) designed for a longer service life.

The FFT then asked Mr. Ahmed about the status of the following issues that were reviewed by the DCISC during previous Fact-Finding Meetings and which could be candidates for fu1iher action with the possibility of the extension of power operations after 2025:

- RCP Motor Maintenance - Motor and flywheel inspections along with motor overhauls will continue to be performed at their previously planned periodicities.

- RCP Turning Vane Bolts - A project has been proposed for funding under the PMO++ Program to perfmm a detailed study of the failme risk of the RCP Turning Vane Bolts over the period of extended operations. CmTently, it was believed that the bolts might not need to be inspected or replaced prior to 61 Effective Full Power Years (EFPY), which would be beyond a possible 20-year license renewal period.

- Pressurizer Heaters-Cunently, welds and electrical components of the Pressmizer Heaters were being regularly inspected to address concerns found elsewhere in the industry. To date, no signs of leakage from Pressurizer Heater welds have been found at DCPP, but several heaters have failed electrically. The heaters cmTently have adequate design margin, but replacements are being considered as a part of the PMO++ Project.

- Control Rod Guide Tubes - CurTent industry guidance recommended inspecting the Contr·ol Rod Guide Tubes every 20 EFPY. As DCPPs Reactor Vessel Heads were replaced in 2009 and 2010, it was expected that the first inspections would be due about five years after the start of an extension of power operations.

- Reactor Vessel Level Indication System and Core Exit Thermocouples - Mr. Ahmed said that he believed that both systems were being considered for repair/replacement under the PMO++ Project but refened the FFT to the Instrumentation and Controls Group for additional details.

- Reactor Vessel Inspections - Mr. Ahmed repo1ted that to support a period of extended operations, DCPP would need to perform extensive Reactor Vessel inspections during the next two Refueling Outages on each unit (1R24, 2R24, 1R25 and 2R25). During Refueling Outages 1R25 and 2R25 (the first outages following the start of the period of proposed extended operations), both the Upper and Lower Internals of the Reactor Vessels would need to be removed to allow access for a complete inspection of all components including inspecting all accessible internal welds.

Lastly, the FFT requested an update on plans to remove another Reactor Vessel weld coupon from Unit 1 dming the upcoming Refueling Outage 1R24. Mr. Ahmed reported that the weld coupon desired to be removed is contained in a capsule, "Capsule B," which was installed in a tube attached to the outside wall of the core banel (part of the lower internals). The capsule is intended to be retrieved using special tooling via removal of a plug from the top of the tube. In 2010, attempts to remove the plug from the tube were unsuccessful, and removal of the capsule was defened. After the Joint Proposal was executed, the planned removal of the capsule was cancelled entirely as testing of the weld coupon was needed only to suppo1t License Renewal. With the cunent possibility of extended operations, DCPP plans to make another attempt to retrieve the capsule during the upcoming Refueling Outage 1R24 in the fall of 2023. The vessel vendor has proposed to retry the same removal method used in 2010 with the addition of mechanically agitating the plug and/or using a clamping tool to assist with its removal. If those methods fail, the removal of the capsule would likely be defened to Refueling Outage 1R25 (the first Unit 1 outage following the start of the period of extended operations) when the Lower Internals were

planned to be removed, allowing access for cutting open the tube located on the outside of the core banel.

The FFT inquired about the required timing of Reactor Vessel weld coupon removal and analysis to suppo1t License Renewal. Mr. Ahmed explained that the Unit 1 Reactor Vessel had received about 33 EFPY of fluence (bombardment with neutron flux) to date. At the end of a 20-year license renewal period (60 years total operation), it was forecasted that the vessel would receive about 54 EFPY of fluence. To meet the regulations and standards for analysis, the weld coupon needs to have received one to two times the vessel fluence expected at the end of the license renewal pe1iod, or between 54 and 108 EFPY. It was currently forecasted that the weld coupon in Capsule B would have received about 98 EFPY of fluence if removed in Refueling Outage 1R24 or 100 EFPY of fluence if removed in Refueling Outage 1R25. (The weld coupon receives a higher fluence than the Reactor Vessel wall because it is located closer to the core.) Therefore, the weld coupon would have received the conect amollllt of fluence required to be used for analysis under the applicable regulations and standards regardless of whether it was successfully retrieved in either Refueling Outage 1R24 or Refueling Outage 1R25.

Conclusions: DCPP's Reactor Coolant Systems' health was rated as Green (Healthy) with several minor issues being tracked for resolution in the Corrective Action System. The DCISC should follow up on the status of reviews for actions being considered under the PMO++ Program to address several long-term issues.

Recommendations: None.

3.11 Compressed Air Systems

The DCISC FFT met with Adam Day, Strategic Engineer, to review the health of Compressed Air Systems at DCPP. The DCISC last reviewed the health of the Compressed Air Systems in July 2020 (Reference 6.14), when it concluded the following:

> *The DCPP Compressed Air System, with its new compressors and soon-to-be replaced air dryers, was in good health and operating properly. The system engineer appeared knowledgeable and proactive about his system.*

The Compressed Air System is common to and se1ves both llllits and is divided into two subsystems: Instiument Air System (IAS) and Service Air System (SAS). The IAS serves various valves and instiuments on both units. It is Class 2, having redundancy and high-quality components typical of Class 1 (safety-related), but it is not designed for seismic loads nor supplied by safety-related electrical power sources. Although not safety-related itself, a loss of the IAS can cause plant ti·ansients, including a turbine/reactor trip. Because the IAS is not Class 1, all lAS-supplied air operated valves required for safe shutdown are supplied with an additional source of assured air from a local backup air or niti·ogen system designed to Class 1 standards. The backup systems are passive with air or nitrogen accumulators located with and dedicated to the operation of individual valves required for safe shutdown of the plant.

The IAS supplies clean, chy, pressurized air primarily to serve air-operated valves and instrnments needed to operate the plant and to safely shut the plant down. The IAS is supplied by three primary full-capacity, rotary-screw air compressors, Plant Air Compressors (PACs) 0-5, 0-6, and 0-7, which supply clean, chy, pressurized air primarily to air-operated valves and instruments needed. Normally, one rotary-screw compressor is required for plant operation. Four additional paliial-capacity reciprocating air compressors (PACs 0-1 through 0-4) are maintained on site and, although not normally used, serve the IAS as needed. Mr. Day repo1ied that a long-standing project to replace all seven of the IAS PACs was successfully completed since the DCISC's last review. The SAS se1ves high-volume, non-critical plant uses (such a condensate polishing) and air supply connections located throughout the station that are used for maintenance activities. The SAS is supplied by two rotaiy air compressors (original equipment) which are frequently supplemented by po1iable compressors during outages. Both systems have a series of air filters, airmyers, and air receivers (storage tanks) located downsu-eam of the compressors.

Because they are designated as "Tier 2" systems, formal health reports were not required to be completed for the IAS ai1d SAS. However, Mr. Day repmied that he would consider overall System Health to be healthy but needing improvement due to recuning minor equipment issues. He reviewed the status of vai·ious minor issues with the FFT including software issues with the new PACs, clogging of cooling water filters, air chyer reliability, and excessive cycling of the PACs. All of the minor issues were being adch·essed through the Conective Action Program and Mr. Day provided the FFT with copies of several Notifications related to the issues discussed.

Conclusions: DCPP's Compressed Air Systems were operating well to supply clean and dry air to plant equipment with minor issues being tracked for resolution in the Corrective Action Program. A long-term project to replace all seven of the plant's Instrument Air Compressors has been successfully completed.

Recommendations: None.

4.0 CONCLUSIONS

4.1 The April 18, 2023, DCPP Corrective Action Review Board (CARB) meeting covered items on the agenda efficiently while allowing adequate time for any participants to question and discuss items of interest in more detail. There was good participation by CARB attendees.

4.2 DCPP's performance in Plant Status Control has been good except for a series of minor events that occurred in late 2022. Although minor, the trend was analyzed and corrected to prevent more significant events. The causes of those events were effectively identified and corrected, and subsequent performance is being sustained at a high level. Performance in **tagging operations has been excellent.**

4.3 DCPP's process for reviewing the need for changes to Preventive Maintenance activities, Corrective Maintenance activities, and projects to support five years of extended operations (the PMO++ Program) appeared well planned and implemented

to date. Final detailed outputs of the process were not yet available for review by the DCISC, and the DCISC should complete those reviews during future Fact-Finding Meetings as soon as the detailed information becomes available. Unfortunately, DCPP's current timetable for providing the information would not support the DCISC completing its reviews prior to its June 2023 Public Meeting, which was the original target date to provide timely information to the California Public Utilities Commission.

4.4 A Licensed Operator Continuing Training simulator session was well prepared, contained appropriate objectives, and was professionally conducted by the Training staff. Operators performed well in responding to the simulated off-normal events.

4.5 DCPP's Fire Protection Program and Fire Protection Systems were in good health overall. Minor equipment issues were being appropriately tracked for resolution.

4.6 DCPP's Corrective Action Program was performing well in that issues at the station were being effectively identified, evaluated, and tracked for resolution. DCPP's Human Performance has been excellent over the last two years based on data and trends in Human Performance (HU) events. DCPP has had no HU events since April 2021l'eceiving the highest classification of significance as a Station Level Event.

4.7 The meeting with the NRC Resident Inspectors was beneficial, and the DCISC should continue the meetings.

4.8 The regular meetings between DCISC Members and DCPP Officers and Directors continue to be beneficial for both organizations.

4.9 DCPP has an effective Reactivity Management Program, which ensures conservative reactivity management by promoting a reactivity-conscious culture. Program Performance Indicators showed a low occurrence and significance of Reactivity Management events for the past 12 months.

4.10 DCPP's Reactor Coolant Systems' health was rated as Green (Healthy) with several minor issues being tracked for resolution in the Corrective Action System. The DCISC should follow up on the status of reviews for actions being considered under the PMO++ Program to address several long-term issues.

4.11 DCPP's Compressed Air Systems we1·e opernting well to supply clean and dry air to plant equipment with minor issues being tracked for resolution in the Corrective Action Program. A long-term project to replace all seven of the plant's Instrument Air Compressors has been successfully completed.

5.0 RECOMMENDATIONS

5.1 None.

6.0 REFERENCES

6.1 "Diablo Canyon Independent Safety Committee Thi1ty-second Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2021 - June 30, 2022", Approved September 28, 2022, Volume II, Exhibit D.8, Section 3.13, "Obse1ve Conective Action Review Board Meeting."

6.2 Ibid., Exhibit D.5, Section 3.4, "Trends in Plant Status Control Events."

6.3 "Diablo Canyon Independent Safety Committee Thirty-Third Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023," Approved September 13, 2023, Volume II, Exhibit D.8, Section 3.3, "Equipment Long Range Plan Reviews (PMO++)."

6.4 "Diablo Canyon Independent Safety Committee Thiity-Second Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2021 - June 30, 2022," Approved October 19, 2022, Volume II, Exhibit D.5, Section 3.7, "Licensed Operator Simulator Training Class Obse1vation."

6.5 "Diablo Canyon Independent Safety Committee Thi1ty-First Annual Repo1i on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2020 - June 30, 2021," Approved October 20, 2021, Volume II, Exhibit D.7, Section 3.7,"Fire Protection: NFPA-805."

6.6 Ibid., Exhibit D.2, Section 3.4, "Fire Protection and Detection Systems."

6.7 "Diablo Canyon Independent Safety Committee Thiity-Second Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2021 - June 30, 2022," Approved October 19, 2022, Volume II, Exhibit D.8, Section 3.11, "Human Performance Update."

6.8 Ibid., Exhibit D.7, Section 3.4, "Attend Notification Review Team Meeting."

6.9 "Diablo Canyon Independent Safety Committee Thirty-First Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2020 - June 30, 2021," Approved October 20, 2021, Volume II, Exhibit D.8, Section 3.5, "Human Performance Update."

6.10 "Diablo Canyon Independent Safety Committee Thiity-Third Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023," Approved September 13, 2023, Volume II, Exhibit D.8, Section 3.4, "Meet with NRC Senior Resident Inspector."

6.11 Ibid., Section 3.1, "Meet with DCPP Officer, Site Vice-President Adam Peck."

6.12 "Diablo Canyon Independent Safety Committee 1birty-First Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2020 - June 30, 2021," Approved October 20, 2021, Volume II, Exhibit D.9, Section 3.1,"Reactivity Management Update."

6.13 "Diablo Canyon Independent Safety Committee Thi1ty-Second Annual Repo11 on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2021 - June 30, 2022," Approved October 19, 2022, Volume II, Exhibit D.2, Section 3.9,"Reactor Coolant System Health."

6.14 "Diablo Canyon Independent Safety Committee Thirty-First Annual Repo11 on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2020 - June 30, 2021," Approved October 20, 2021, Volume II, Exhibit D.1, Section 3.2,"Compressed Air System Review with System Engineer."

ATTACHMENT C

DIABLO CANYON INDEPENDENT SAFETY COMMITTEE REPORT

Report on

Fact-Finding Meeting with DCPP
on May 2-3, 2023
by

Per F. Peterson, Member
and
R. Ferman Wardell and Richard D. McWhorter, Consultants

1.0 SUMMARY

The results of the DCISC Fact-finding meeting held on May 2-3, 2023, at the Diablo Canyon Power Plant (DCPP) in Avila Beach, CA are presented. The subjects addressed and summarized in Section 3 are as follows:

1. Radiation Monitoring System
2. Buried Piping and Tanks Program
3. Refueling Outage 1R24
4. Equipment Reliability Program
5. Non-Licensed Operator Training
6. FLEX and Probabilistic Risk Assessment
7. Meet with DCPP Officer
8. PMO++ Process and Results
9. License Renewal Application and Aging Management Plans
10. Industry Efforts to Evaluate the Radiological Consequences of a Release of Radionuclides from a Crack in a Spent Fuel Storage Cask
11. Workplace Seismic Safety
12. Local NRC Meeting on DCPP Regulatory Performance and License Renewal

2.0 INTRODUCTION

This Fact-Finding meeting with DCPP was made to evaluate specific safety matters for the DCISC. The objective of the evaluation was to determine if Pacific Gas and Electric's (PG&E's) performance is appropriate and whether any areas revealed observations, which are important enough to wanant further review, follow-up, or presentation at a public meeting. These safety matters include follow-up and/or continuing review efforts by the Committee, as well as those identified as a result of reviews of various safety-related documents.

Section 4 - Conclusions highlights the conclusions of the Fact-Finding Team based on items reported in Section 3 - Discussion. These highlights also include the team's suggested follow-up items for the DCISC, such as scheduling future Fact-Finding Meetings on the topic, presentations

at future public meetings, and requests for future updates or information from DCPP on specific areas of interest, etc.

Section 5 - Recommendations presents specific recommendations to PG&E proposed by the Fact-Finding Team. These recommendations will be considered by the DCISC. After review and approval by the DCISC, the Fact-Finding Repo11, including its recommendations, will be provided to PG&E. The Fact-Finding Repo11 will also appear in the DCISC Annual Repo11.

3.0 DISCUSSION

3.1 Radiation Monitoring System

The DCISC Fact-finding Team (FFT) met with Kevin O'Neill, System Engineer for the Radiation Monitoring System (RMS), and Bob G01yance, Supervisor of Electrical and Instrumentation and Controls Engineering, for an update on the RMS in the context of DCPP extended operation and license renewals. The DCISC last reviewed the Radiation Monitoring System (RMS) in March 2023 (Reference 6.1), concluding the following:

> *DCPP's Radiation Monitoring System, which is performing satisfactorily, is under consideration for* [selective] *short-term improvement or long-term full replacement for extended operations from 2025 to 2030 and possibly beyond. A life cycle management study is being considered. The DCISC should continue to follow DCPP's review and decision.*

The RMS provides general area and process system radioactivity measurements and alarms, as well as automatic line isolations, to monitor and control personnel dose exposure and control the release of radioactive fluids in compliance with applicable regulations and plant Technical Specifications. It consists of 101 channels of radiation detectors located around the plant and associated electronic components, as well as wiring and displays located in the Control Room and other areas of the plant. The system components are diverse and came primarily from four manufacturers. The system components range in age from the 1970s to the 1990s and consist of both analog and digital components.

There are four groupings of instruments as follows:

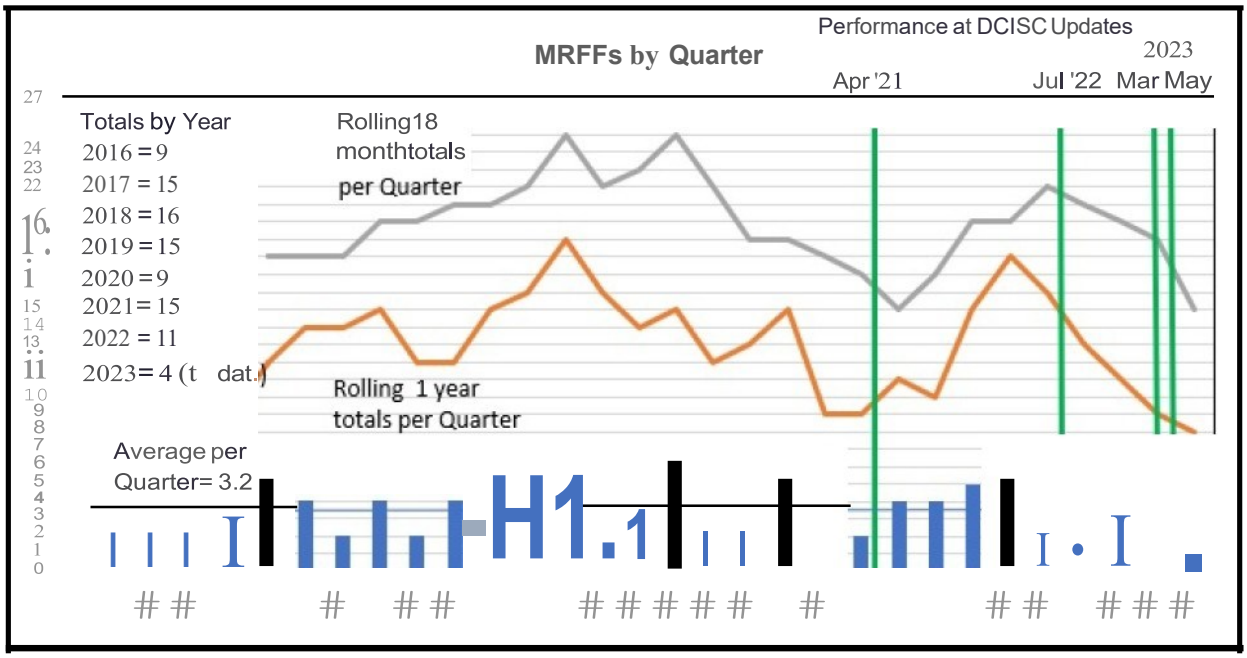
1. Original Westinghouse analog instrnmentation (~20%)
2. Victoreen analog instrumentation(~ 15-20%)
3. Eberline analog instlumentation (~15-20%)
4. Other one-offs (~40%)

In the early 1990s much of the Victoreen equipment was replaced with digital instrnments; however, that project was stopped due to cost.

Mr. O'Neil explained that DCPP was cmTently focused on maintaining and improving the reliability of the existing RMS by using the Preventative Maintenance Program and by low-cost

modifications to the greatest extent possible. In general, engineers and maintenance technicians were focused on improving the cunent equipment rather than perfo1ming large-scale upgrades or replacements.

The RMS was classified as a Tier 2 system, meaning periodic health repo1ts for the system were no longer required; however, Mr. O'Neill believed that the system would be rated as "Good and Improving." The prima1y measure of health is the number of Maintenance Rule Functional Failures (MRFFs.) The chart below shows the cmTent MRFF data. In general, DCPP's MR Program analyzes all functional failures in the system to dete1mine if the failures were preventable by changing maintenance activities. The number of RMS MRFFs cmTently placed several po1tions of the system into (a)(l) status under the MR Program, meaning that the system was not meeting established criteria for reliability. Mr. O'Neil provided an updated graph showing the trends of all MRFFs for the RMS over the last seven plus year·s. The trend ofMRFFs, which showed a decline in MRFFs during the DCISC's last review in 2021, had reversed and cunently showed a recent increase and subsequent decrease in the number of MRFFs as follows:



Radiation Monitoring System Maintenance Rule Functional Failures

About 70% of RMS MRFFs are caused by the following monitoring systems:

- Condenser Air Ejector Monitor
- Plant Vent Monitor
- Containment Atmosphere Monitors

All three monitoring systems are considered high p1101ity for full/partial replacement or repair, and the decision will be made along with other plant projects being reviewed in the PMO++ initiative for disposition for life extension.

DCPP is analyzing the system to decide on selective short-te1m improvements versus long-term wholesale changeout. The f01mer is faster and easier using known components, whereas the latter is complex with "first-of-a-kind" risk of new equipment. The DCISC should review this study and final decisions when available.

Conclusion: The DCPP Radiation Monitoring System health was considered "Good and Improving" with several of its subsystems having problems. These subsystems are being considered for selective replacement with the PMO++ process based on needs for life extension through 2030 and beyond. This process is expected to conclude in the second quarter of 2023. The DCISC is following the progress of this process and will repo1·t on it in **future fact-finding meeting.**

Recommendations: None

3.2 Buried Piping and Tanks Program

The DCISC FFT met with Dan Yoder, Program Owner for the Buried Piping and Tanks Program (BP&T Program) and (remotely) Carlos Lopez, License Renewal Capital Projects Team, for an update on the program. The DCISC last reviewed this program in July 2020 (Reference 6.2), when it concluded the following:

> *The DCPP Asset Management Plan for Buried Piping and Tanks appears to meet all requirements and to be implemented properly with satisfactory results assuring the leak tightness and structural integrity of buried components.*

The purpose of the BP&T Program is to provide increased assurance of strnctural and leakage integrity of buried piping and tanks. Special emphasis is placed on safety-related systems and those tanks and piping containing licensed (radioactive) material or environmentally hazardous material.

In 2009 the US nuclear industly committed to implement an industly initiative to manage buried piping integrity contained in document Nuclear Energy Institute (NEI) 09-14, "Guideline for the Management of Underground Piping and Tank Integrity." DCPP's program is based on NEI 09-14 and described in Procedure TS5.ID3, "Buried Piping and Tanks Progran1," a copy of which was provided to the Fact-Finding Team. As described in the procedure, the scope of this program is "to provide a reasonable assurance of stluctural and leakage integrity of all piping and tanks located outside of buildings and below grade elevation (whether or not they are in direct contact with the soil)." DCPP has a relatively small amount of buried piping on site compared to most other nuclear power plants.

NEI 09-14 requires the following types of systems to be included:

- Safety related
- Contain licensed material or are known to be contaminated with licensed (radioactive) material

- Contain environmentally hazardous material

For DCPP these systems are as follows:

- Condensate Polishing
- Auxiliaiy Saltwater
- Liquid Radwaste
- Diesel Fuel Oil
- Oily Water and Turbine Sump

Additionally, the Program also monitored and oppmtunistically inspected other systems, including:

- Spent Fuel Pool Cooling and Cleanup
- Service Cooling Water
- Makeup Water
- Fire Protection
- Compressed Air
- Nitrogen/Hydrogen

The BP&T Program prioritizes inspections based on risk. An industJ.y-standard software program and database (refened to as MapPro) contains all buried piping and tanks parameters (i.e., material, coatings, external environment, internal fluid, consequence of failure, and inspection results) and is used to dete1mine the likelihood of degradation and the possible consequences of a failure. Tue combination of the likelihood and consequences is then used to form the priority ranking of the piping and allows inspection effo1ts to be focused on the most significant sections of piping. The overall plan for inspections is documented in an Asset Management Plan (AMP) which is maintained as an engineering calculation and contJ.·olled by administrative procedures applicable to engineering calculations.

The DCPP risk model was updated for this AMP revision using the most cunent risk ranking algorithms and data from BPWorks. The latest inspections and operating experience information available were added to the model to enhance the model's accuracy in risk ranking.

Each buried system is described in detail, including location drawings and inspection plans and results. The following excerpt from the AMP of the Auxilia1y Saltwater System buried piping is one example:

> *"The Auxiliary Saltwater (ASPV) System is a safety-related system that supplies cooling water from the ultimate heat sink, the Pacific Ocean, to the component cooling water (CCPV)heat exchangers. The buried piping is composed of 24" Carbon Steel witha non-safety related coal-tar epoxy external coating anda safety-related internal PVC-like paraliner. The piping from the intak.e structure to about 30 feet before entering the turbine building is protected by an induced current cathodic protection (ICCP) system. The discharge portion, turbine building to ocean was not cathodical y protected, but a project was funded and cathodic protection installed in a portion of the Unit 1 discharge line following pipe external*

inspections in 1R20. A majority of the system is risk rated to be medium risk. However, the ASW discharge piping contains high risk piping segments because it is the licensed discharge path for radiological waste material delivered by the Liquid Radwaste System.

"Every sixth refueling outage, each unit's ASW system pzpmg (intake and discharge) is visually inspected. This inspection utilizes a robotic crawler equipped with a high-definition camera to inspect nearly 100% of the piping internally. A report is generated which compares any findings to previous inspections to monitor for new anomalies or changes in anomalies for trending. Together with an engineering evaluation of the data, recommendations are made for future inspections or repairs. These inspections provide a reasonable assurance of no leakage. The most recent Unit 1 internal and external ASW inspections were completed in 1R20 with the Unit 2 inspection coming up in 2R22. The ASW system as a whole will continue to be monitored and inspected to maintain reasonable assurance that the safety related system will retain its pressure boundary function. The total intake piping length is approximately 3,000-ftfor Unit 1 and 2,800-ftfor Unit 2. Each unit's discharge piping is approximately 400-ft long.

"At this time, the ASW system is the highest priority for the Buried Piping and Tanks Program. The in-soil discharge portion of the ASW piping has developed small blisters on the internal liner. This portion of pipe is considered high risk primarily because it contains licensed material, is buried in soil and has a safety-related function. Hence the detailed inspections performed in JR20 and the installation of Cathodic protection installed in portions of the ASW discharge piping in Unit 1. The previous Unit 2 internal inspection was performed in 2Rl 6. The next Unit 2 inspection will be performed in 2R22 after the frequency to perform this inspection was extended by the PMCR process."

Similarly, all of the other following buried systems and components have been tested, inspected, or have leak detection systems, all of which show no leakage or strnctural degradation, but some minor conosion or coating degradation. None of the conosion or degradation was deemed to wanant c01rection to maintain reasonable assmance of leak tightness.

- Liquid Radwaste Buried Piping
- Diesel Fuel Oil (Underground Piping & Bmied Tanks)
- Oily Water Separator, Turbine Building Sumps, and Wastewater Holding & Treatment Buried Underground Piping
- Condensate Polishing System (Buried Piping)

The AMP concludes that it complies with all reasonable assurance guideline document recommendations and fully satisfies all initiative requirements. It currently includes long-range planning up to the end of the Unit 1 and Unit 2 licenses.

The overall health of the BP&T Program was White (acceptable with improvement needed) due mainly to the Program Owner's short time (one year) in his position. That paiiicular measure was

Yellow whereas the health program requires a program owner to be in place for three years to achieve Green. The BP&T Program health attributes were as follows:

- Overall Health White
- Program Owner Yellow
- Program Infrastructure Green
- Program Implementation Green
- Program/Equipment Performance Green

There were no foreseeable major planned inspections or repairs through the former end of life in 2025. However with the plan to pursue NRC License Renewal, DCPP expects significant new efforis in this area to accommodate life extension, such as additional inspections, projects, and aging management plans. These efforis were getting underway. The DCISC should continue to follow these initiatives.

Conclusion: DCPP's Buried Pipe and Tanks Program health was rated as White (acceptable needing improvement) due to the program owner's time in position being one yea1· versus three years for Green. The remainder of health measures were all Green. Foi· the upcoming NRC License Renewal Application DCPP anticipated major efforts to augment inspections, projects, and aging management plans. The DCISC should follow these efforts.

Recommendations: None

3.3 Refueling Outage 1R24

The DCISC FFT met with Erik Werner, DCPP Outage Management Director, and Kristin Smith, License Renewal Coordinator, for a preview of Refueling Outage 1R24. The DCISC last reviewed a DCPP refueling outage (2R23) in December 2022 (Reference 6.3), when it concluded the following:

> *DCPP's Outage 2R23 was successful from a nuclear and personnel safety standpoint, meeting or exceeding all safety goals. One goal, outage length, was exceeded by almost five days due to repair of a Residual Heat Removal System isolation valve stem packi.ng leak, which was a prudent decision to assure safe, reliable operation after reaching full power.*

Refueling Outage 1R24 is scheduled to occur Fall 2023, and it is a pariicularly imporiant outage for the following reasons:

- Implementation of modifications, maintenance and inspections needed to supp01i NRC License Renewal
- Implementation of modifications and maintenance needed to suppori extended operation to 2030

- Removal of reactor vessel coupon for analyzing vessel fracture toughness to avoid the possibility of pressurized thermal shock induced failures

The scope of Refueling Outage 1R24 for the above items was known, but details were being developed for which DCPP was using their normal outage procedures and processes. Examples are scope determination, work order planning, milestones, resource allocations, and vendor and contractor agreements. DCPP provided the FFT an extensive list of cunent and new inspections required by NRC License Renewal. Examples of significant inspections are as follows:

- Steam Generator primary and secondary tube and vessel inspections
- Auxiliary Saltwater System (ASW) internal and external piping inspections and possible repairs (plans are in place for extension of catholic protection for buried ASW piping)
- Buried fire water piping inspections
- Makeup water buried piping inspections

Some examples of major outage projects were the following:

- New Condenser water box and tube sheet coatings
- New offsite power transformers
- PMO++ focus area improvements
- Improvements to Intake traveling screens
- Improvements to Reactor Vessel Level Indication System
- Improvements to the rod control system

Conclusions: DCPP was satisfactorily planning and preparing for its Refueling Outage 1R24, which is scheduled to occur Fall 2023. This is a particularly important outage because new modifications, maintenance activities, and inspections will be implemented for NRC License Renewal and likely extension of operations from 2025 to 2030, plus removal of a reactor vessel material coupon for analysis of vessel fracture toughness. The DCISC should review the detailed outage scope and outage safety plan in its August or September 2023 fact-finding meetings.

Recommendations: None

3.4 Equipment Reliability

The DCISC FFT met with Dallas Adams, Program Engineering Manager, for an update on DCPP Equipment Reliability (ER). The DCISC last reviewed ER in August 2022 (Reference 6.4) when it concluded the following:

> *DCPP's secondary system equipment reliability issues appeared to be satisfactorily addressed with specific action plans and an excellence plan. Recent results were showing improvement with a Unit 1 rating of Yellow and a Unit 2 rating of Green.*

DCPP classifies its equipment into several categories for pmposes of ER measures and actions. Class 1 is safety-related equipment, and Classes 2 and 3 are non-safety-related equipment important for power production and environmental protection. Also, as imp01iant as Class 1 is equipment included in the NRC Maintenance Rule (MR) program. DCPP pays most attention to Class 1 and MR classes, which are the classes also of impo1iance to the DCISC.

Historically in August 2022, the DCPP Qua1ierly Equipment Perfonnance Index (for Equipment Reliability) was Yellow for Unit 1 and Green for Unit 2. Unit 1's Yellow rating was due primarily to 1) a power reduction to conect Condenser saltwater in-leakage May 2021, 2) valve PC-14 malfunctioning in Ap1il 2022, 3) valve FW-1-67 leaking in May 2022, and 4) a steam leak on Feedwater Heater 1-1A in June 2022. Unit 2's Green rating was improved from its Red and Yellow rating immediately following the long-te1m Generator vibration problems in Febrna1y 2021 and FWH tube failures in October 2021; however, since then the unit has performed well and earned a Green rating in the past quaiier.

Because ER had been adversely affected by Seconda1y Systems, DCPP initiated a Secondary Systems Reliability Action Plan (in addition to following up on individual problem areas). DCPP was also working to drive improved behaviors and engagement of first- and second-line supe1visors. Utilization of the MEOW (Maintenance, Engineering, Operations and Work Control) fornm is being augmented to gather broader organizational suppo1i for critical equipment. DCPP's 2022 Equipment Reliability Excellence Plan has the objective of aligning station-wide engagement in a more proactive identification and resolution of ER issues. Specific actions are outlined for Operations, Maintenance, Engineering, Leaining Se1vices, and Organizational Effectiveness. These actions appeared satisfacto1y to the DCISC FFT.

In the latest (March 2023) Station Excellence Plan, ER had improved and was rep01ied as "Green with a stable trajectory." Among the noted improvements, seven of the Top Ten ER Issues were resolved in Refueling Outage 2R23. There has been one Consequential Equipment Failure in the past 12 months: a Unit 2 ramp down to 50% power due to a Circulating Water Pump issue. DCPP is now putting more emphasis on Non-Consequential Equipment Failures. Additionally, the PMO++ program's comprehensive review of systems long-te1m health is expected to help ER throughout extended power production.

Conclusions: DCPP's Equipment Reliability performance has improved substantially since 2021 and 2022, and its health has improved to Green (good) and stable.

Recommendations: None

3.5 Non-Licensed Operator Training

The DCISC FFT met with Guy Vaughn, lnstrnctor, Operations Training, to observe the Non-Licensed Operator training module "Main Generator Hydrogen (H2) and Carbon Dioxide (CO2) System." The DCISC las reviewed DCPP training in April 2023 (Reference 6.5) when it concluded the following:

A Licensed Operator Continuing Training simulator session was well prepared, contained appropriate objectives, and was professional y conducted by the Training staff Operators performed well in responding to the simulated off-normal events.

The FFT was provided with the lesson guide for the course. The guide was comprehensive and well written. The purpose of the Main Generator Hydrogen (Hz) and Carbon Dioxide (CO2) System is to:

- Provide adequate cooling of the generator while minimizing windage losses and maintaining a non-co1rnsive environment
- Provide a means of establishing a habitable atmosphere for personnel during maintenance while minimizing the risks of hydrogen explosion
- Provide a method of monitoring gaseous products that indicate insulation breakdown
- Keep hydrogen pmity, pressure, and temperature within limits
- Keep the circulating hydrogen diy and remove oil vapors from the gas
- Pressurize the stator cooling water head tank with hydrogen

The classroom training included the following topics:

- Purpose of the Main Generator Hydi·ogen (Hz) and Carbon Dioxide (CO2) System
- Basic system flow path
- System diagram
- System components
- Identify the components associated with the system
- Significant precautions and limitations associated with the system
- Operation of the system
- Abnonnal conditions associated with the system
- Significant Technical Specifications and Equipment Control Guidelines
- System intenelationships between the system and other plant systems

The instructor appeared knowledgeable and effective in explaining the system as well as keeping the students involved with questions and examples. The course materials were good. The students appeared interested and involved.

<u>Conclusions:</u> The DCPP Non-Licensed Operator training class on the Main Generato1· Hydrogen (H2) and Carbon Dioxide (CO2) System appeared satisfactory and effective.

<u>Recommendations:</u> None

3.6 <u>FLEX and Probabilistic Risk Analysis</u>

The DCISC FFT met Nathan Barber, Supe1visor, Risk and Regulato1y Initiatives, and Bill Conklin, FLEX Program Manager, for an update on the expected availability and perfo1mance of FLEX Program equipment during a seismic event. (FLEX is not an acronym but desclibes a str·ategy developed by the nuclear industry to provide diverse and flexible coping strategies and

p01iable equipment to address the loss of safety-related systems due to beyond design basis events.) The DCISC last reviewed this topic in April 2023 (Reference 6.6) when it concluded the following:

> *The Fact-Finding Team learned that a single FLEX Strategy was currently incorporated into DCPP's Probabilistic Risk Assessment and concluded that this appeared appropriate. The Fact-Finding Team recommends that additional Fact-Finding Meetings be scheduled to cover any remaining DCISC questions or issues raised by this review.*

This May 2023 Fact-finding agenda item discussion on FLEX and PRA was generally a repeat of that in the April 2023 Fact-finding meeting for the benefit of DCISC Member Per Peterson. The writeup here is similar to that in the April Fact-finding rep01t.

Prior to the Fukushima accident in 2011, DCPP had portable generators and other equipment to respond to beyond design basis events, under the post-September 11 tenorist event "B.5.b" orders from the NRC. Following the Fukushima accident, the broader FLEX Program was initiated by the industJ.y to procure additional (mostly po1table) equipment and components, and to develop guidelines, to mitigate various beyond design basis events such as occtmed at Fukushima. These events include loss of all station power; loss of the ultimate heat sink; natural events such as earthquakes, tsunamis, and local intense precipitation; and major fires or explosions. FLEX Equipment includes po1table diesel-driven pumps and electric generators along with any necessa1y associated plant connections, piping, cabling, contJ.·ols, instmmentation, and nUI11erous other items of equipment that could be needed by personnel when implementing FLEX StJ.-ategies. FLEX StJ.·ategies are pre-planned and validated guidelines for the use of FLEX Equipment in diverse situations to mitigate beyond design basis events.

The FFT asked DCPP to explain how FLEX StJ.-ategies were modeled and used in DCPP's Probabilistic Risk Analysis (PRA). Mr. Barber rep01ted that only one FLEX StJ.ategy was included in the plant's cmTent PRA. That FLEX StJ.·ategy provided steps that could be taken inside the plant to tie Direct CmTent (DC) Busses together in order to extend the life of batteries needed to supply contJ.·ol power to the Turbine-Driven Auxilia1y Feedwater Pump for greater than 24 hours during a Loss of All Alternating Cunent (AC) Power (offsite and onsite) event. (FLEX equipment external to the plant was assUI11ed to take 24 hours to be available and useful.) This Loss of All AC Power scenario could come from a Turbine Building collapse which damaged multiple AC power sources and which could be caused either by a beyond design basis major fire or by a mid-level seismic event. This FLEX StJ.·ategy did not require the movement or use of any external FLEX Equipment for success (defined as a "Phase 1" FLEX StJ.-ategy) but focused on guiding operators to complete tasks inside the plant that were above and beyond responses typical to events included in the plant's design basis. This particular FLEX StJ.·ategy was chosen for inclusion into the PRA because it provided a substantial reduction in calculated risk and used only actions that could be completed with high confidence in the expected situation and time period.

Mr. Barber added that DCPP was cmTently considering adding an additional FLEX Su-ategy into the plant's PRA. The FLEX Su-ategy that was being considered involved the use of a diesel-driven feedwater pllll1p (the Emergency Auxilia1y Feedwater Pump) to pllll1p water from outdoor storage

basins to feed the Steam Generators. This pa1ticular strategy was being considered because it could potentially reduce the calculated risks due to major fire events. DCPP considered it could be hard to demonstrate that this strategy would be effective following a major seismic event due to uncertainties with regards to the abilities of operators to gain access to the areas necessa1y to complete the strategy within the time constraints available before the effectiveness of the strategy would be significantly reduced.

Mr. Barber also added that for major eaithquakes, the PRA model assesses risk across an extremely broad range of seismic events (up to 6g) which includes events that could result in the complete failure of either or both of the Containment Building or the Auxilia1y Building (although fully seismically designed). Typically, the failure of either building is assumed to result in core damage due to the large amount of important equipment that is affected by the building's failure. Also in the cases of major building failures, it was very difficult to identify any specific scenarios where there was confidence that the plant could use FLEX Strategies to respond to the event and reduce the risk as calculated by the PRA. Because there is unce1tainty in whether the FLEX equipment would be serviceable following an eaithquake, and whether there would be access to move the equipment to locations where it could be used, the FFT asked about the roles that the plant fire depa1tment and security personnel would play following an ea1thquake to check FLEX equipment status and access. The FFT noted that although FLEX Strategies may or may not be perfo1med following an ea1thquake in a timeframe necessa1y to prevent core damage or a large radiological release (the standard PRA endpoints) depending upon the specific scenario, this does not reduce the value of the FLEX Strategies as they could still possibly be used to reduce the magnitude of core damage or radiological releases following a beyond design basis accident. In this regard, the PRA may appear to be a conservative analysis.

In general, Mr. Barber emphasized that the FLEX Program was designed for flexibility in responding to beyond design-basis events and not for responding to any pa1ticular event within any paiticular timeframe. As such, the industly standai·ds for PRA analyses would typically only allow consideration of the incorporation of Phase 1 FLEX Strategies. While there were many other accident response activities that could be completed using "Phase 2" FLEX Strategies (which use FLEX Equipment stored on site but outside the plant protected area), the uncertainty associated with the timeframes and probabilities of success for the use of such equipment is so high as to be inappropriate for use under the cmTent nuclear industry standards governing the PRA analysis. (There is also a catego1y of "Phase 3" FLEX Strategies which use FLEX Equipment staged at an offsite regional center.) For some ve1y large earthquake scenarios, responses would have to succeed within as little as four hours to have an impact in reducing the 1isk calculated from the PRA, and Mr. Barber explained DCPP's position that very few Phase 2 FLEX Strategies could be confidently assumed to be completed within that timeframe after a very large earthquake.

<u>Conclusions:</u> The DCISC Fact-Finding Team learned that a single FLEX Strategy was currently incorporated into DCPP's Probabilistic Risk Assessment (PRA) analysis of a greater than design basis earthquake with loss of AC power; however, the PRA considers the first 24 hours of an event, and FLEX is assumed not available for 24 hours, thus FLEX is not typically useful in **PRA analyses. The DCISC should also review post-earthquake procedures for the fire department and for security personnel with respect to FLEX equipment and plant access.**

Recommendations: **None.**

3.7 Meet with DCPP Officer

The DCISC FFT met with Maureen Zawalick, Vice-President, Business and Technical Services, to discuss items from this fact-finding meeting and other topics of interest. The DCISC last met with a DCPP officer in April 2023 (Reference 6.7) when it concluded the following:

> *The regular meetings between DCISC Members and DCPP Officers and Directors continue to be beneficial for both organizations.*

Conclusions: **The regular meetings between DCISC Members and DCPP Officers and Directors continue to be beneficial for both organizations.**

Recommendations: **None.**

3.8 PMO++ Process and Results

The DCISC FFT met with Allen Wilson, Director of Projects, and Michael Jackson, Manager of Project Services and License Renewal, for an update on the Equipment Long Range Plan Reviews under DCPP's cunent program for performing such reviews, which is refened to as the "PMO++" Program. The DCISC last reviewed PMO++ in April 2023 (Reference 6.8) when it concluded the following:

> *DCPP's process for reviewing the need for changes to Preventive Maintenance activities, Corrective Maintenance activities, and projects to support five years of extended operations (the PMO++ Program) appeared well planned and implemented to date. Final detailed outputs of the process were not yet available for review by the DCISC, and the DCJSC should complete those reviews during future Fact-Finding Meetings as soon as the detailed information becomes available.*

This May 2023 Fact-finding agenda item discussion on PMO++ was generally a repeat of that in the Aplil 2023 Fact-finding meeting for the benefit ofDCISC Member Per Peterson. The wliteup here is similar to that in the Aplil Fact-finding report.

At the request of the FFT, Mr. Wilson reviewed the recent hist01y of the management of maintenance activities and projects at DCPP. During the period from after the signing of the Joint Proposal in 2016 until the passage of Senate Bill 846 (SB846) in 2022, DCPP continued to perform all Preventive Maintenance (PM) activities as well as all Pliority 1, 2 and 3 (quality and safety-related) C01Tective Maintenance (CM) activities on safety-related equipment, equipment important to safety, and risk-significant equipment. However, during that same period, DCPP reviewed other PM and CM activities (non-safety related/non-risk significant PMs and Priority 4 and 5 CMs) and

chose to eliminate or reduce the scope of those PMs and CMs which were not needed to support operations through the then planned cessation of power operations in 2025. This effort followed the industry-wide initiative, Preventive Maintenance Optimization (PMO) in which plant maintenance was optimized, resulting in equipment-data-based maintenance decisions. Additionally, all capital projects were similarly reviewed with a result that only projects required for regulatory compliance or safety were authorized and most projects planned only for modernization were cancelled. The DCISC performed reviews of these initiatives in the past (prior to the decision to extend operations) and found them satisfactory.

Following the passage of SB846, DCPP initiated its cunent effort to review the long-range maintenance and project plans for station equipment. The new eff01t was named PMO++, and its objective was the following:

> *"In preparation for License Renewal and Extended Operations, we are taking a holistic look at equipment/system's overall health to determine and prioritize outstanding work scope based on Maintenance Plans in grace or Preventive Maintenance Change Requests that were approved with rationale stating end of license is 2024/2025, Corrective Maintenance Orders that have been pushed to beyond 2025, Open SAPNs I cognitive trending done by plant personnel, License Renewal activities, and any other inputs such as Life Cycle Maintenance studies, industry peers, Operating Experience."*

The PMO++ Program began in December 2022 with initial reviews completed by the end of January 2023. A cross-functional team reviewed a comprehensive list of documents including the following:

- Conective Maintenance
- Preventive Maintenance
- Smveillance Tests
- License Renewal/Aging Management Programs
- Inventories of Critical Spares and Repair Parts Equivalency Evaluations
- Modifications and Design Changes
- End of Life Grace Periods (pre-determined, pre-approved schedule extensions)
- Cognitive Trending via SAPNs (Conective Action Notifications) and Interviews

Mr. Wilson provided an overview of the results of the reviews of PMs and CMs. He rep01ted that approximately 200 PM plans were reinstated, and a small number of new PM plans were added to the maintenance planning database. For perspective DCPP's PM plans contain about 12,000 total PM activities. Approximately 300 Priority 4 and Priority 5 CM activities were reinstated. For further perspective DCPP's typical backlog of open Priority 4 and Priority 5 CM work is about 3,000 items with about 100 CM activities being worked per day.

Regarding capital projects and other equipment issues that were not covered by PM and CM plans, the PMO++ Program in early 2023 identified approximately 560 potential projects and plant concerns for possible action to support the potential five-year operations extension from 2025 to 2030. During February and March 2023, reviews were performed to rank the list as a first step to

determine which activities would actually be initiated. The ranking process focused upon using risk insights prioritized based on safety, regulatory compliance, environmental compliance, and reliability/efficiency. The perspective that the reviewers maintained throughout the ranking process was to work to maintain the cunent situation of DCPP as a safe, efficient and reliable plant throughout the period of extended operations. One question that was asked throughout the process of ranking the projects was, "What is the risk if that paiticular activity is not completed?" Additionally, the reviewers considered the complexity of implementation pa1ticularly with regards to the time required for project planning and execution as well as the possibility of unintended consequences for major changes. Mr. Wilson noted that activities necessa1y for license renewal were considered 'must-do' and were being initiated outside of the PMO++ Program.

At the time of this Fact-Finding Meeting (early May 2023), approximately 250 projects were identified for consideration of prioritization for implementationduring the extension of operations. The 250 projects had been initially ranked, but reviews and refinement of the rankings were still in progress. Specifically, senior management reviews were not yet complete, and two industry peer reviews were planned to be performed in May 2023. Mr. Wilson reported that the preliminaiy results called for about 50 projects to be completed within the next three years with about 12 of those 50 being perfo1med during the upcoming Refueling Outage 1R24 in the Fall of 2023. Regai·ding the independent review of "defened" maintenance required by SB846, consultants had recently been selected to perfo1m the review and that review would soon begin. DCPP expected that the SB846 independent review would be completed by October 2023. The FFT concluded that the DCPP process for reviewing the need for changes to PMs, CMs, and projects to suppo1t extended operations appeared well planned and implemented to date.

The FFT then requested to review the detailed output of all pmtions of DCPP's maintenance and project reviews as soon as possible. This was necessaiy for the DCISC to meet the SB846 requirement as follows:

> *"The commission shall review the reports and recommendations of the Independent Safety Committee/or Diablo Canyon described in Section 712.1. If the Independent Safety Committee for Diablo Canyon's reports or recommendations cause the commission to determine, in its discretion, that the costs of any upgrades necessary to address seismic safety or issues of deferred maintenance "*

In response to the FFT's request, DCPP stated that it desired to complete all internal/peer reviews and obtain senior management approvals before providing the detailed info1mation to the DCISC. DCPP provided the DCISC with copies of the lists of new and reinstated CMs and PMs during this May 2023 Fact-Finding Meeting and to provide a schedule for providing copies of the PMO++ Program review list following the two peer reviews planned for mid-May (likely in early June). The DCISC FFT confened internally and concluded that this was appropriate in that it would avoid the possibility of confusion or misinfo1mation that could occur if the info1mation provided by DCPP to the DCISC was not in final fmm and approved by senior management. Unfo1tunately, this timetable would not suppo1t the DCISC completing its reviews prior to its June 2023 Public Meeting, which was the original target date. Instead, the reviews would likely be completed during the DCISC's July and August Fact-Finding Meetings with discussion and approval at the DCISC's next Public Meeting in late September 2023. DCPP noted, and the FFT agreed, that this was an

ongoing process and that infmmation provided as mentioned above could change later. An example is emergent issues.

Finally, at the request of the FFT, DCPP agreed to provide as soon as possible its plan/schedule for providing the PMO++ output to the DCISC to support reviews in the July and/or August Fact-finding Meetings. Regarding the lists of new and reinstated CMs and PMs provided to the FFT, the FFT reviewed the documents and concluded that additional details were needed and would be followed-up on during the DCISC's July Fact-Finding Meeting.

Conclusions: DCPP's process for reviewing the need for changes to Preventive Maintenance activities, Corrective Maintenance activities, and p1·ojects to support five years of extended operations (the PMO++ Program) appeared well planned and implemented. Final detailed outputs of the process are expected to be available for review by the DCISC in July and/or August, permitting DCISC's conclusions and recommendations to be ready for approval at its September 2023 Public Meeting. (This type of review and approval process is a normal, ongoing one at DCPP, such that it **could change at any time.) The DCISC should complete those reviews during future Fact-Finding Meetings as soon as the detailed info1·mation becomes available.**

Recommendations: None

3.9 License Renewal Application and Aging Management Plans

The DCISC FFT met with Brandy Lopez, License Renewal Strategic Initiative Principal, and Michelle Olsorsky, License Renewal Engineer, for an update on DCPP's effmts to address NRC aging management requirements in its regulations on License Renewal. The DCISC last reviewed DCPP Aging Management Plans (AMPs) in March 2023 (Reference 6.9) when it concluded the following:

> *DCPP appeared to be proceeding appropriately in upgrading and adding new Aging Management Plans for systems and equipment for its NRC License Renewal application to be submitted in late 2023.*

DCPP has a 40-person project team reviewing the changes in NRC's regulations and guides for license renewal since DCPP filed its original application for license renewal in 2008. Members of the team were developing AMPs for systems and equipment as required for the License Renewal Application that DCPP expected to file by the end of 2023. Some existing AMPs were being updated for license renewal, such as the one for NFPA-805, Fire Protection. New AMPs were being initiated per NRC regulations, such as Cathodic Protection of Auxiliaiy Saltwater discharge p1pmg.

DCPP provided the FFT a copy of a March 17, 2023 letter to the NRC in response to their questions on aging management plans. These commitment lists were provided for NRC's exemption for allowing DCPP to submit its license renewal application with AMPs that will occur past the expiration date of the cmTent licenses. The letter included the following:

1. A commitment list of cuuent AMP inspections for the upcoming Refueling Outage 1R24 occurring Fall 2023 - these included 15 existing inspections and 20 new inspections. Examples are the following inspections:

    a. ASME Code inspections for Class 1, 2 and 3 pressure-retaining components
    b. Reactor head closure studs
    c. Boric acid conosion
    d. Flow acceleration conosion
    e. Steam Generator tube integrity
    f. Closed Cycle Cooling Water System
    g. Overhead cranes, hoists and trolleys
    h. Fire Water Systems

2. A commitment inspection schedule for DCPP commitments included in its withdrawn license renewal application. Examples include the following:

    a. Enhance Fire Protection program procedures for fire rated doors
    b. Enhance the Fuel Oil Chemistry Program
    c. fuspections of internal surfaces of various piping and ducting components
    d. Enhance the Lubricating Oil Analysis Program
    e. Enhance the Structures Monitoring Program
    f. Enhance the Transmission Conductor, Connections, Insulators, and Switchyard Bus Connections Program
    g. Enhance the Metal Fatigue of Reactor Coolant Pressure Boundary Program (This is an AMP which the DCISC is interested in monitoring and will add it to the Open Items List for review at future fact-finding meetings.
    h. Install impressed current cathodic protection for buried Auxiliary Saltwater System

DCPP plans to submit its License Renewal Application to the NRC by the end of 2023. The application will include the above inspections and AMPs, along with others which are required in revised NRC requirements since the DCPP application was withdrawn in 2018.

Conclusions: DCPP's plans and schedules appeared satisfactory for augmenting its Aging Management Plans for its application to the NRC for License Renewal.

Recommendations: None

3.10 Industry Efforts to Evaluate the Radiological Consequences of a Release of Radionuclides from a Crack in a Spent Fuel Storage Cask

The DCISC FFT met with Brandy Lopez, License Renewal Strategic Initiative Principal, and Michelle Olsorsky, License Renewal Engineer, for an update on industry efforts to evaluate the possible radiological consequences of a release of radionuclides from a Spent Fuel Storage

Cask should a through wall crack occur. The DCISC last reviewed this topic during its July 2022 Fact-Finding Meeting (Reference 6.10), when it concluded the following:

> *An industry study to analyze the dose consequences for a hypothetical through-wall crack of a spent fuel storage container continued to be in progress. A report on the study's results is expected to be issued in early 2023, and the DCISC should review the final report after its issuance.*

PG&E updated the DCISC regarding ongoing industly eff01ts to charactelize the possible radiological consequences of a release of radionuclides from a cask should a through-wall crack occur. In general, such cracks would have small ape1tures with low source te1ms inside the cask. Although the consensus of the industly was that such releases and their dose consequences would be small, more study was needed to fully quantify the effects. In 2017, the Electric Power Research Institute (EPRI) completed a study entitled, "Dry Cask Storage Welded Stainless Steel Canister Breach Consequence Analysis Scoping Study," which provided recommendations for additional research needed and described potential approaches for developing a consequence analysis for a scenario in which a crack grows through the wall of a d1y cask storage canister. It was anticipated at that time that EPRI would move fo1ward with developing a detailed study of the consequences. Dming its July 2022 review, the DCISC was informed that EPRI was in the process of completing several suppo1ting studies, and the final detailed study was expected to be issued in March 2023.

During this meeting, Ms. Lopez repo1ted that EPRl had recently modified its approach to the study. Completion of the expected repo1t would be delayed in order to obtain more research data regarding the isotope fractions expected for a release of gases from a spent fuel storage canister. Specifically, EPRl desired to obtain and include data from ongoing research into isotope fractions being performed by the Depaitment of Energy. The study and its report was cun-ently not expected to be completed by EPRl until at least 2025.

Conclusions: An industry study to analyze the dose consequences for a hypothetical through-wall crack of a spent fuel storage container was delayed until at least 2025 in **order to obtain additional research data from the Department of Energy. The DCISC should continue to monitor the status of the study and review the final report after its issuance.**

Recommendations: None.

3.11 Workplace Seismic Safety

The DCISC FFT met Mark Sciacca, Maintenance Supp01t Manager and Workplace Seismic Safety Coordinator, for an update on DCPP Workplace Seismic Safety. The DCISC last reviewed this item in May 2022 (Reference 11) when it concluded the following:

> *DCPP's Workplace Seismic Safety program appeared satisfactory and appeared to be properly implemented judging from a DCJSC Fact-finding Team tour of the lnstmmentation and Electrical Facility.*

fu the previous May 2022 DCISC fact-finding meetings received and reviewed DCPP's "Standards for Bracing Office Furniture, Cabinets, and Storage Racks Revision 2 (1/30/2020)." This document defines when and how to brace office furniture, file cabinets, bookcases, and storage racks. The policy is intended to protect personnel from injury and ensure egress routes are not blocked by office furniture impact. These standards appeared satisfacto1y. The FFT was informed that this document was unchanged and still in place.

Mr. Sciacca accompanied the FFT on a tour of the Maintenance Training Building observing tall furniture, shelves, cabinets, etc. that had the potential to fall on personnel or block passageways in the event of an ea1thquake. All items obse1ved were either properly attached to walls or had bottom weighting.

Conclusion: Offices, classrooms and shops in DCPP's Maintenance Training Building had the proper anchoring or bottom weighting of tall fumitu1·e to assure personnel safety in the event of earthquakes.

Recommendations: None

3.12 Local NRC Meeting on DCPP Regulato1y Perf01mance and License Renewal

DCISC Consultants McWh01ter and Wardell attended the local May 3, 2023 NRC Meeting on DCPP Regulato1y Perf01mance and License Renewal, and DCISC Member Bob Budnitz attended remotely. This is the most recent NRC meeting attended by the DCISC.

NRC speakers first described their regulations and regulatory process for inspecting and evaluating nuclear plant performance in meeting NRC regulations. They reported that DCPP perf01mance for the 2022 cycle was at the top of the perf01mance scale and that the NRC would be perfo1ming their n01mal inspections in the future.

NRC then described their regulations and process for nuclear plant license renewal, which is n01mally for 20 additional years. Several PG&E personnel attended and made brief presentations on their plans to submit their application for License Renewal to NRC by the end of 2023. There were many local organizations and individuals in attendance, who provided their opinions about DCPP's license extension. Most speakers were in favor oflicense extension.

Conclusions: The local NRC meeting on May 3, 2023 in San Luis Obispo was informative on NRC regulations, regulatory process, and license renewal. PG&E described their plans for applying for NRC license renewal. Many local organizations and individuals provided their opinions on DCPP license extension, most of which were favorable.

Recommendations: None

4.0 CONCLUSIONS

4.1 The DCPP Radiation Monitoring System health was considered "Good and Improving" with several of its subsystems having problems. These subsystems are being considered for selective replacement with the PMO++ process based on needs for life extension through 2030 and beyond. This process is expected to conclude in the second quarter of 2023. The DCISC is following the progress of this process and will report on it in future fact-finding meeting.

4.2 DCPP's Buried Pipe and Tanks Program health was rated as White (acceptable needing improvement) due to the program owner's time in position being one year versus three years for Green. The remainder of health measures were all Green. Fo1· the upcoming NRC License Renewal Application DCPP anticipated majoi· efforts to augment inspections, projects, and aging management plans. The DCISC should follow these efforts.

4.3 DCPP was satisfactorily planning and prepal"ing for its Refueling Outage 1R24, which is scheduled to occur Fall 2023. This is a particularly important outage because new modifications, maintenance activities, and inspections will be implemented for NRC License Renewal and likely extension of operations from 2025 to 2030, plus removal of a reactor vessel matel"ial coupon for analysis of vessel fracture toughness. The DCISC should review the detailed outage scope and outage safety plan in its August or September 2023 fact-finding meetings.

4.4 DCPP's Equipment Reliability performance has improved substantially since 2021 and 2022, and its health has improved to Green (good) and stable.

4.5 The DCPP Non-Licensed Operator training class on the Main Generator Hydrogen (H2) and Carbon Dioxide (CO2) System appeared satisfactory and effective.

4.6 The DCISC Fact-Finding Team learned that a single FLEX Strategy was currently incorporated into DCPP's Probabilistic Risk Assessment (PRA) analysis of a greater than design basis earthquake with loss of AC power; however, the PRA considers the first 24 hours of an event, and FLEX is assumed not available for 24 hours, thus FLEX is not typically useful in PRA analyses. The DCISC should also review post-earthquake procedures for the fire department and for security personnel with respect to FLEX equipment and plant access.

4.7 The regular meetings between DCISC Members and DCPP Officers and Directors continue to be beneficial for both organizations.

4.8 DCPP's process for reviewing the need for changes to Preventive Maintenance activities, Conective Maintenance activities, and projects to support five years of extended operations (the PMO++ Program) appeared well planned and implemented. Final detailed outputs of the process are expected to be available for review by the DCISC in July and/or August, permitting DCISC's conclusions and

recommendations to be ready for approval at its September 2023 Public Meeting. (This type of review and approval process is a normal, ongoing one at DCPP, such that it could change at any time.) The DCISC should complete those reviews during future Fact-Finding Meetings as soon as the detailed information becomes available.

4.9 DCPP's plans and schedules appeared satisfactory for augmenting its Aging Management Plans for its application to the NRC for License Renewal.

4.10 An industry study to analyze the dose consequences for a hypothetical through-wall crack of a spent fuel storage container was delayed until at least 2025 in order to obtain additional research data from the Department of Energy. The DCISC should continue to monitor the status of the study and review the final report after its issuance.

4.11 Offices, classrooms and shops **in** DCPP's Maintenance Training Building had the proper anchoring or bottom weighting of tall furniture to assure personnel safety **in the event of earthquakes.**

4.11 The local NRC meeting on May 3, 2023 in **San Luis Obispo was informative on NRC regulations, regulatory process, and license renewal. PG&E described their plans for applying for NRC license renewal. Many local organizations and individuals provided their opinions on DCPP license extension, most of which were favorable.**

5.0 RECOMMENDATIONS

None

6.0 REFERENCES

6.1 "Diablo Canyon fudependent Safety Committee Thirty-third Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023", Approved September 20, 2023, Volume II, Exhibit D.8, Section 3.5, "Radiation Monitoring and Eagle-21 Systems."

6.2 "Diablo Canyon fudependent Safety Committee Twenty-first Annual Repmt on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2020 - June 30, 2021", Approved October 18, 2021, Volume II, Exhibit D.l, Section 3.7"Bmied Piping and Tanks Program."

6.3 "Diablo Canyon fudependent Safety Committee Thi.tty-third Annual Repo1t on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023", Approved September 20, 2023, Volume II, Exhibit D.6, Section 3.2, "Outage 2R23 Results."

6.4 Ibid., Exhibit D.2, Section 3.9, "Equipment Reliability Update."

6.5 Ibid., Exhibit D.9, Section 3.4, "Licensed Operator Simulator Continuing Training Class Observation."

6.6 Ibid., Exhibit D.9, Section 3.3, "Equipment Long Range Plan Reviews (PMO++)."

6.7 Ibid, Exhibit D.9, Section 3.8, "Meet with DCPP Officer."

6.8 Ibid., Exhibit D.9, Section 3.3, "Equipment Long Range Plan Reviews (PMO++)."

6.9 Ibid., Exhibit D.8, Section 3.7, "Aging Management Plans for Extended Operations."

6.10 Ibid., Exhibit D.l, Section 3.12, "fudustry Efforts to Evaluate the Radiological Consequences of a Release ofRadionuclides from a Spent Fuel Storage Cask."

6.11 "Diablo Canyon fudependent Safety Committee Thirty-second Annual Repo1t on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2021 -June 30, 2022", Approved October 14, 2022, Volume II, Exhibit D.9, Section 3.1, "Workplace Seismic Safety."

ATTACHMENTD

DIABLO CANYON INDEPENDENT SAFETY COMMITTEE

Report on

Fact-Finding Meeting on May S, 2023
and Comprehensive Seismic Safety Update

by

Robert J. Budnitz, Member, and
Richard D. McWhorter and R. Ferman Wardell, Consultants

1.0 SUMMARY

The results of the DCISC May 5, 2023, Fact-Finding Meeting for the Diablo Canyon Power Plant (DCPP) are presented. The activities of the Fact-Finding Team (FFT) for this Fact-Finding Meeting were all perfo1med remotely. They consisted of pa11icipating in an open and public meeting of the Independent Peer Review Panel (IPRP) and then of accounting for IPRP comments by developing a comprehensive update of earlier DCISC Fact Finding repo11s on the topic of seismic safety. The subjects addressed and summaiized in Section 3 are as follows:

1. Independent Peer Review Panel Meeting on May 5, 2023
2. Comprehensive Seismic Safety Update

2.0 INTRODUCTION

This Fact-Finding Meeting for the DCPP was held to evaluate specific safety matters for the DCISC. The objective of the evaluation was to dete1mine if PG&E's pe1fo1mance is approp1iate and whether any ai·eas revealed obse1vations which ai·e impo1tant enough to wa1rnnt fmther review, follow-up, or presentation at a public meeting. These safety matters include follow-up and/or continuing review effo1ts by the Committee, as well as those identified as a result of reviews of various safety-related documents.

Section 4 - Conclusions, highlights the conclusions of the FFT based on items rep011ed in Section 3 - Discussion. These highlights also include the team's suggested follow-up items for the DCISC, such as scheduling future Fact-Finding Meetings on the topic, presentations at future public meetings, and requests for future updates or inf01mation from DCPP on specific areas of interest, etc.

Section 5 - Recommendations, presents specific recommendations to PG&E proposed by the FFT. These recommendations will be considered by the DCISC. After review and approval by the DCISC, this Fact-Finding Repo11, including its recommendations, will be provided to PG&E. The Fact-Finding Repo1t will also appear in the DCISC Annual Report. It is expected that this rep011

will be considered for full DCISC approval at its Public Meeting on June 28-29, 2023. Contingent upon approval, it will represent the Committee's position.

3.0 DISCUSSION

3.1 Independent Peer Review Panel Meeting on May 5, 2023

DCISC Members Dr. Robe1t Budnitz and Dr. Per Peterson; Consultants Fe1man Wardell, Richard McWho1ter, and Andrew Kadak; and Counsel Robe1t Rathie attended the May 5, 2023, remote public meeting of the State of California's Independent Peer Review Panel (IPRP)[1] for seismic studies at DCPP. However, only Dr. Budnitz participated actively in this public meeting and as pait of the scheduled program. The DCISC last obse1ved an IPRP meeting on October 26, 2022, when it concluded the following:

> *The Independent Peer Review Panel (IPRP) meeting was successful in clarifying its future role in light of Senate Bill 846. The DCISC should continue to attend future IPRP meetings and follow the IPRP's deliberations, findings, and recommendations.*

This meeting's agenda was as follows:

1. Introduction of meeting attendees, announcements, and agenda
2. IPRP comments and questions on the DCISC's rep01t on Diablo Canyon
3. Electiic Power Research Institute review
4. PG&E Updates:
    a. Selected Long Term Seismic Program (LTSP) research activities
    b. Turkey-Syria earthquake
    c. Questions
5. Open floor
    a. San Luis Obispo Mothers for Peace - Dr. Peter Bird declaration

The meeting was called to order and chaired by Mr. David Zizmor, California Public Utilities Commission Regulato1y Analyst. Besides the several IPRP members from va1ious California government agencies, the attendees included several PG&E expe1ts on seismology and seismicity, who collectively gave the PG&E presentation. In addition, there were about 20 other attendees, who were members of the public or representatives of various other organizations.

At the outset, Mr. Zizmor noted that because of directives contained in recent California legislation, Senate Bill 846 (SB846),[2] the IPRP and the DCISC now have a specific mandate to

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[1] In 2015 the California State Legislatme by enacting Public Utilities Code §712 directed the California Public Utilities Commission to convene and continue until August 26, 2025, an independent peer review panel to conduct an independent review of enhanced seismic studies and surveys of DCPP Units 1 and 2, including the Sllffotmding area of the facility and areas of nuclear waste storage.

[2] On September 2, 2022, Governor Newsom signed SB846 which allows for the potential expansion of operations at DCPP beyond the cmTent retirement dates, up to five additional years tmder specific conditions as provided. On

interact in the context of evaluating seismic-safety aspects of the proposal to extend the Diablo Canyon plant's licenses beyond thecunent expiration dates in 2024 and 2025. Specifically, SB846 by its enactment of Public Utilities Code §712.1 includes language that reads, "The DCISC shall ... consult with and incorporate into its assessments and recommendations the independent peer review panel established pursuant to Section 712."

The second item on the agenda was then introduced by Mr. Zizmor, who noted that the day before this meeting the IPRP had released to the public a new document (Reference 6.1.1), whose substance was comments andquestions for the DCISC based on the IPRP's review of the DCISC's November 2022 Fact-Finding Report (Reference 6.1.2).[3] Mr. Zizmor also introduced Dr. Robert Budnitz and noted that he would be the DCISC's spokesperson dming this IPRP meeting. Dr. Budnitz in tmn stated that although he would attempt to reply to the IPRP's technical questions and input, he was not in a position to speak formally for the DCISC. His remarks were to be understood as his own, not the DCISC's, although of course they were also understood to be his broad interpretations of the DCISC's positions and thinking. The DCISC responses to the IPRP comments and questions are incorporated into the DCISC's assessments and conclusions below in Section 3.2.

The principal discussion dming the meeting covered a series of questions, remarks, and elaborations based on the individual items in the IPRP's document regarding a review of the November 2022 DCISC Fact-Finding Report. Some of the IPRP feedback to the DCISC was seeking modifications to the Fact-Finding Report to provide more detail, or more references, or more explanations. Some of it was a set of requests for access to the underlying reports and documents that the DCISC relied on in reaching its conclusions. And some of the IPRP feedback led to technical back-and-forthdiscussion to explore a few technical questions raised by the IPRP, mostly to elaborate orally on what had been written in the IPRP's document cited above. For some of the questions raised, PG&E's representatives made informational comments and they provided an update, including a timeline, on plans for performing the new seismic-safety assessment that PG&E itself must perform as one of the mandates in SB846. Dr. Budnitz stated that the DCISC would try to reply to requests for information and further explanations and would supplement the Fact-Finding Report as appropriate.

The next agenda item was a discussion of a recent project performed by the Electr-ic Power Research Institute (EPRI). In a nuclear power plant, Nuclear Regulatory Commission (NRC) regulations require that certain specified structures and equipment that play important roles in maintaining nuclear safety in large earthquakes must be designed to a design-basis earthquake, the site-specific specification for which is contained in NRC regulations. Other structures and equipment are not required to be designed for the same site-specific specification for lar·ge earthquakes, and they are usually designed to other industry codes and standards. The EPRI study examined the behavior in earthquakes for this latter category of other structures and equipment.

January 20, 2023, the California Public Utilities Commission issued an Order Instituting Rulemaking (Rulemaking 23-01-007).

[3] The November 8,9,10, 2022 Fact-finding Rep01t was approved at the DCISC public meeting held on Febrmuy 15-16, 2023 public meeting and inco1porated, together with the other Fact-Finding Rep01ts approved at the Febma1y public meeting, into the record ofRulemaking 23-01-007 by the Administrative Law Judge's Ruling filed on April 20, 2023.

The next agenda topic consisted of a technical presentation by PG&E experts on their Long-Te1m Seismic Program (LTSP), a technical research program that is mandated as a license condition as part of the NRC's operating license for DCPP. PG&E described several ongoing LTSP technical research projects and their results, insights, and schedules. They described the principal motivation for this ensemble of projects as being to understand the various underlying seismic phenomena better and to reduce the unce1tainties wherever they could. Tue IPRP noted that each previous IPRP meeting had an agenda item in which PG&E desctibed elements of their LTSP, and that this presentation was mainly an update for some of the LTSP projects. PG&E's representatives agreed.

PG&E next described their recent activities to learn from the large earthquake in Februa1y 2023 in southern Turkey. PG&E explained that their lessons-learned work will go on for many months and will cover not only an investigation of how the ea1thquake source rupture and ground-motion propagation occurred but also how and why damage ensued for various items of equipment or vai·ious strnctures. PG&E's emphasis in learning from the damage info1mation was to info1m an evaluation as to whether PG&E might need to make any changes to DCPP or other PG&E facilities based on insights gained. PG&E noted that the lessons-learned work in Turkey involves many different groups of expe1ts from around the world, and that ultimately there will be the need to gather all the info1mation and insights into one or more comprehensive repo1ts. PG&E noted that its expe1ts will play an active role in this latter activity.

The PG&E technical presentation was accompanied by several question-and-answer interactions with IPRP members. The overall tone of the IPRP meeting's technical discussions of the LTSP program and the Turkish earthquake studies was respectful and technically inquisitive.

The final agenda item was a discussion of a recent filing by San Luis Obispo Mothers for Peace (SLOMFP) with the NRC (Reference 6.1.3) in an NRC generic environmental-impact proceeding. The filing contained a declaration by Dr. Peter Bird which said, in pa1t, that PG&E's seismic-hazard analysis for Diablo Canyon completed in 2015 (Reference 6.1.4) underestimated the seismic hazard.

Several technical issues raised in the SLOMFP document were discussed briefly by PG&E and IPRP attendees. The general tenor of the IPRP meeting's discussion was that there had not been enough time for it to be reviewed thoroughly, because this new filing had only been made public and come to the IPRP about a day before this meeting. It was clear·from the discussion that PG&E would be reviewing the document, and that the IPRP probably would be reviewing it too, although no commitments were made. Following the meeting, PG&E informed the DCISC that it plans to review Dr. Bird's declaration as a part of their upcoming new seismic-safety evaluation that is mandated by SB846. The DCISC will review PG&E's evaluation of Dr. Bird's declaration after the PG&E SB846 seismic-safety evaluation is complete.

As the meeting came to a close there was a btief discussion of the date for the next IPRP meeting. Although no specific date was announced, a next meeting was mentioned as likely in the late autumn of 2023, perhaps in November.

Conclusions: **The Independent Peer Review Panel (IPRP) meeting was successful in discussing the major items on its agenda, including providing feedback and comments from the IPRP to the DCISC about the DCISC's November 2022 Fact-Finding Report on seismic safety. The DCISC should take account of IPRP input as it finalizes its positions and conclusions on DCPP seismic safety. The DCISC should also continue to attend future IPRP meetings and consult with the IPRP concerning the IPRP's deliberations, findings, and recommendations.**

Recommendations: **None**

3.2 Comprehensive Seismic Safety Update

3.2.0 Background

On November 8, 2022, a DCISC Fact Finding Team (FFT) comprised of Robe1t Budnitz (member) and Richard McWhorter (consultant) met in person at the DCPP plant with Jeff Bachhuber, Director, Geosciences; Nathan Barber, Supervisor, Risk and Regulato1y Initiatives; Bill Horstman, Principal Civil Engineer; Nozar Jahangir, Manager, Seismic Engineering; Albeit Kottke, Geotechnical Ea1thquake Engineer; and Chris Madugo, Geosciences Consultant, for a briefing on the cmTent understanding of overall seismic safety at DCPP. The scope included reviewing the cmTent understanding of the seismic hazard, of the seismic ground motion at the site, of how seismic energy propagates within individual structures, of the seismic capacities and fragilities of structures and components, and of the overall systems response to postulated earthquakes as captured in the plant's Seismic Probabilistic Risk Assessment (SPRA) (Reference 6.2.1).

Following that meeting, the DCISC prepared a Fact Finding Repmt (Reference 6.1.2) that was reviewed and approved by the full DCISC at its Public Meeting on Febrna1y 15, 2023. That DCISC November 2022 repo1t also covered several other technical topics, but of relevance here is the seismic-safety section of that repo1t, Section 3.4, "Comprehensive Review of the Seismic Safety Program." The November 2022 approved repo1t represented the DCISC's then-cunent position on the technical issues within its scope. The report was provided to the public after its approval and was fo1warded to the Independent Peer Review Panel (IPRP) for its review, in confo1mance with recent California legislation, Senate Bill 846 (SB846).

The IPRP, in tmn, reviewed the seismic-safety sections of the DCISC's November 2022 report and fmwarded to the DCISC a document (Reference 6.1.1) containing technical comments and observations for DCISC consideration. These comments were then the subject of one of the principal agenda items during the IPRP's public meeting on May 5, 2023, as discussed above in Section 3.1.

In this repo1t, the DCISC has revised and updated the seismic-safety section of its November 2022 repo1t after considering the IPRP comments and also after accounting for other info1mation reviewed since November 2022. The revised and updated November 2022 seismic-safety repo1t is this section (Section 3.2) of this repo1t.

This review (as is hue of all similar DCISC safety reviews) was based on the experience and judgment of the DCISC members, assisted by the Committee's consultants. The plant's operational safety is the prima1y focus of the DCISC's work, and the DCISC does not use as a criterion a specific set of NRC safety regulations or guidance documents. Also, even though high reliability for many major equipment items may conu·ibute to achieving safety, whether the plant achieves high reliability in producing elecu-icity is not a p1ima1y factor that info1ms the DCISC's judgments, :findings, or recommendations.

The scope of the DCISC's review of seismic safety is limited, based on its charter, to those aspects of Diablo Canyon's seismic design and seismic pe1fo1mance that are related to whether a major radiological accident, involving potential radioactive releases, will occur. As noted above, the DCISC believes that its scope in reviewing seismic safety does not extend to evaluating seismic damage that can significantly disrupt the plant's ability to produce elecu-icity, if the scenario of concern poses little or no threat to the radiological safety of the public. That said, the DCISC has concluded that to the extent that workspace seismic safety could affect the response to a radiological accident, it is impmiant to operational safety, so seismic safety in some non-safety-related stI11ctures and workspaces has been regularly evaluated by the DCISC.

Another issue about the scope of the DCISC's safety reviews is impo1iant to emphasize. To wit, the DCISC has always understood its chatter as reviewing the safety of the plant as it sits today and as it is operated today. Whether the plant met a specific regulatmy requirement in times past, such as a design-basis requirement while it was under constiuction, has not generally been a question that the DCISC has considered as within its pmview, except insofar as understanding the original design criteria or the original regulatmy requirements can help a reviewer today to understand how safe the plant is today.

In the past the DCISC has extensively reviewed the DCPP plant's seismic safety in multiple Fact-Finding Meetings and through presentations at numerous DCISC Public Meetings. Also, the DCISC has had the benefit of presentations by PG&E on the seismic-hazard and seismic ground-motion aspects at several meetings in recent years of the IPRP. However, the review dming the DCISC Fact Finding meeting on November 8, 2022, was the DCISC's first fo1mal review of the overall program and was prompted by the proposed extension of power operations and directives contained in recent California legislation, SB846.

3.2.1 Senate Bill 846 Direction

The motivation for the comprehensive review in November 2022 was that recent legislation, SB846, enacted into law in early September 2022, directed the DCISC to review and evaluate seismic safety in the context of inquiring as to whether important seismic-safety upgrades would be needed to suppmi safe operation if the plant's operating period were to be extended beyond the cmTent NRC licenses that end in 2024 (Unit 1) and 2025 (Unit 2). The November 2022 Fact Finding meeting was intended to provide impo1iant info1mation to suppo1i the DCISC review and evaluation required by SB846. The scope of this repo1i not only includes a repo1i on that Fact-Finding Meeting and of insights gained from considering the IPRP panel's comments and review, but also includes the broad conclusions of the DCISC on the question raised by SB846, which is whether impmiant seismic safety upgrades would be needed to suppo1i safe operation after 2025.

3.2.2 Seismic Safety Analysis Process

To analyze the level of seismic safety achieved by the design of a complex nuclear power reactor one needs the following types of info1mation:

a. The analysis needs to identify each potential accident sequence that could be initiated by a large ea1thquake and that could lead to a core-damaging accident.

b. The analysis needs to be able to differentiate among the core-damaging sequences so as to identify, for each one, whether it would lead to a small or no release of radioactivity, or would lead to a significant release of radioactivity (what the NRC has called a "large release"), and if so whether that large release would occur relatively quickly (what the NRC has called a "large early release") or would occur only after a significant delay.

c. For those seismic-initiated accident sequences of concern that are associated with a radioactive release, the analysis needs to characterize the release in te1ms of timing, energy content, radioactivity content, and a few other parameters required to fully desclibe how the potential release would ensue and why.

d. The analysis needs to identify, for each sequence being analyzed, the "size" of the earthquake ground motion at the site that causes the sequence. Here the word "size" is intended as shmthand for a variety of different characteristics of the eaithquake ground motion at the site, such as the amplitude of the acceleration, its duration, its frequency spectrum, whether the acceleration is associated with significant displacement or velocity, and a few other features.

e. Because ea1thquake ground motion can anive at the site with different "sizes," the analysis needs to include the likelihood of occunence as a function of "size," which is commonly known as and tabulated or displayed as the family of "seismic hazard cmves." This likelihood is generally characterized by its annual probability of occunence.

f. For each seismic accident sequence of interest, the analysis needs to include the various contributing failures, including not only the seismic-caused failures but also any human e1rnrs or non-seismic failures that contribute or pa1ticipate in the accident sequence.

g. The accident sequence and their temporal relationships need to be described in the analysis; also, each failure of a stmcture or component needs to be characterized in a way that allows an understanding of how and why it paiticipates in the sequence of events, which specific failure mode of each ea1thquake-damaged item is the issue, and any conelations among the various failures. The general understanding of what "failure" means for a structure or component is a failure to perfo1m the item's safety function or cause another st111cture or component to fail to perfo1m its safety function.

h. Crncially, for each identified accident sequence, the analysis needs to quantify the sequence's likelihood, characterized by its annual probability of occun-ence.

1. Because each of the many issues mentioned above is typically not known exactly, but only known with some unce1iainty, the analysis needs to include a quantification of the unce1iainty, how it arises, what is its character, and why. Unless the characterization of the unce1iainties is done appropriately, the usefulness of the analysis infonnation for decision-making about safety can in some circumstances be seriously diminished.

After each seismic accident sequence has been identified and analyzed as above, theanalysis needs to "roll up" the ensemble - essentially summing up the various accident sequences. The result is the development of broad measures of seismic safety such as the overall ammal frequency of sequences that involve seismic-induced core damage, approaches by which FLEX[4] equipment and other recovery capabilities could mitigate damage and prevent core damage, the overall annual frequency of a large seismic-caused radiological release, and any other figures-of-merit that a decision-maker might wish to know about.

One crncial use of the info1mation is that, depending on the risk level, possible improvements in the seismic safety of the design and operation can be identified, including specific actions that could be taken under the FLEX program. Insights such as these are ve1y impo1iant outputs of the analysis described above.

3.2.3 Background on Previous DCPP Seismic Safety Analyses

a. DCPP Probabilistic Seismic Hazard Analysis

The most comprehensive inf01mation about the various sources of earthquakes that might threaten the plant (Sections 3.2.2.d. and e. above), about the ground motion at the site arising when any of those ea1ihquakes might occur, and about the unce1tainties in the various aspects of the analysis is found in PG&E's most recent seismic study, the "Diablo Canyon Probabilistic Seismic Hazard Analysis" (PSHA) study published in 2015 (Reference 6.2.2). Since that study was completed, additional research has been completed to supplement that study which provides additional valuable info1mation.

b. DCPP Seismic Probabilistic Risk Assessment

The rest of the needed information (Sections 3.2.2.a. to c. and f. to h. above) is found in PG&E's "Diablo Canyon Seismic Probabilistic Risk Assessment" (SPRA), published in 2018 (Reference 6.2.1). The SPRA's analysis has information about how the earthquake ground motion affects (and damages) each imp01tant strncture and component at DCPP; about how likely that damage is, as a function of the "size" of the ground motion; about each seismic-initiated accident sequence, including the contributing failures, the timing,

[4] FLEX is not an acronym but describes a strategy developed by the nuclear industly to provide diverse and flexible coping strategies to address the loss of safety-related systems due to ce11ain beyond design basis events. It is a group of supplemental components, many of them po11able, which are seismically stored, and can be made available for timely attachment to pennanent plant systems for accident mitigation.

and the phenomena; about whether each sequence involves impmtant radioactive releases, and if so how those releases are characterized; and about the uncertainties in the various aspects of the analysis.

As discussed below, both the PSHA and the SPRA were subject to extensive outside peer review during their development and were reviewed by the NRC and the DCISC after their completion.

c. DCPP Long Term Seismic Program

Since the plant started operation in the 1980s, PG&E has been canying out a Long-Term Seismic Program (LTSP), a program under which PG&E has undertaken a large number of projects to assure that the Diablo Canyon Power Plant is adequately designed and operated to provide safety against potential very lar·ge earthquakes. The LTSP is required by the NRC as a license condition for operating DCPP. The DCISC has reviewed the LTSP several times in recent years (References 6.2.3 and 6.2.4), as has the State of California's IPRP.

The LTSP program involves four different technical areas, covering an understanding of the following:

1. The seismic hazar·d (the various seismic sources)
2. The seismic ground motion arising at the site and the in-strncture energy propagation
3. The seismic fragility of components and strnctures
4. The plant seismic response (an analysis of the plant's var·ious systems and the role of the operators)

d. Nuclear Industry Activities Affecting DCPP Seismic Programs

In addition to the above, important activity in the broader nuclear industry has occmTed over the years to inform and support the development of Diablo Canyon's PSHA and its SPRA. To wit:

In the mid-l 990s, a major advance occuned when a new methodology, known now as the Senior Seismic Hazard Analysis Committee (SSHAC) methodology was developed (Reference 6.2.5). It has since been used and adopted worldwide for the performance of major PSHA studies like that done at DCPP. This methodology includes specific guidance on how to structure a peer review, which the methodology requires. The SSHAC methodology has been endorsed by the NRC for such use (References 6.2.6 and 6.2.7), and the DCISC agrees that this endorsement is appropriate.

Starting in the ear·ly 1990s, another major advance occuned when the An1erican Society of Mechanical Engineers (ASME), later joined by the An1erican Nuclear· Society (ANS), developed standards with requirements for performing a nuclear

power reactor PRA, including an SPRA (Reference 6.2.8). It too has been used and adopted worldwide for the performance of major SPRA studies like that done at DCPP. This standard also includes specific requirements on peer reviews. It has also been endorsed by the NRC for such use (Reference 6.2.9), and the DCISC agrees that this endorsement is appropriate.

Also, significant research activity worldwide has occuned over the years, and continues today, that has provided additional understanding of each of the major technical areas involved in the above. Keeping abreast of that activity is important, and the DCISC believes that the PG&E scientists and engineers involved in the various seismic studies have done that (and are and have long been acknowledged as being among the industry leaders in both the PSHA and the SPRA areas).

3.2.4 Topics Reviewed During the November 2022 Fact-Finding Meeting

The DCISC Fact Finding Team requested that PG&E discuss two broad topics during the November 2022 Fact-Finding Meeting:

- Provide a general update on the status of seismic hazard evaluations, seismic fragility evaluations, and the SPRA for DCPP.

- Provide any new information or developments in this area that could affect license renewal and/or the proposed extension of operations beyond 2025.

Most of the technical topics are covered within the scope of the LTSP. Also, most of the technical topics are encompassed in various major PG&E technical reports developed several years ago in response to a 2012 NRC request for information (Reference 6.2.10) after the Fukushima nuclear accident in Japan.

Specifically, as mentioned above, the plant undertook a major and comprehensive new evaluation of the seismic hazard, known as the Diablo Canyon Probabilistic Seismic Hazard Assessment (PSHA), published in 2015 (Reference 6.2.2). That evaluation, which was performed according to the universally adopted methodology for such PSHA studies (References 6.2.5, 6.2.6 and 6.2.7), was reviewed by the NRC, and also by the DCISC. The NRC review was published in2016 (Reference 6.2.11). The NRC's overall conclusion in that review was, "Based on this review, the NRC staff concludes that the licensee conducted the seismic hazard reevaluation using present-day methodologies and regulato1y guidance, it approp1iately characterized the DCPP site given the info1mation available, and it met the intent of the guidance for dete1mining the reevaluated seismic hazard." The DCISC's review was also favorable (References 6.2.12 and 6.2.13).

Also in the same period, PG&E undertook a modern update of their plant SPRA, which had first been developed in the late 1980s, and had been kept up to date throughout the inte1vening years. That most recent SPRA was published in 2018 (Reference 6.2.1). That SPRA was also reviewed and found acceptable by the NRC staff (Reference 6.2.14). The DCISC also reviewed that repo1t favorably at that time and found it to have been of

excellent quality. Concerning the SB846 direction to the DCISC, it is important to note that the DCISC did not at the time of the SPRA's completion identify any in1p01tant safety improvements that would be needed, and the plant was judged to be adequately safe in the area of seismic safety (Reference 6.2.15).

Given this histo1y, the purpose of the November 2022 Fact-Finding Meeting was principally to ask and to discuss, in each of the technical areas encompassed by overall seismic safety, *"What is new since those comprehensive and thoroughly-reviewed evaluations were completed in the mid- to late 2010s?"*

3.2.5 Results of the November 2022 Fact-Finding Meeting

The Fact-Finding Team found that in recent years a good deal of new information continues to be developed in the areas of seismic hazard and seismic ground-motion characterization, because those are "fast moving" areas of technical work. This includes both work specifically relevant to the DCPP plant site and its regional setting along with work elsewhere in the US and worldwide that advances the community's understanding and its analysis capabilities. However, rather little new info1mation has been developed in the areas of seismic fragilities and the plant's SPRA model, in pait because those are not "fast moving" areas where significant technical advances ai·e occuning now.

a. Understanding of Seismic Hazard and Seismic Site Ground Motion

PG&E, through their LTSP studies, continues to develop new info1mation about several technical topics within the broader scope. The DCISC has reviewed the broader LTSP program several times over the past decade. Concerning the seismic sources, the topics now being studied include:

- Studies of fault locations, geometries, stress distributions, and potential fault linkages
- Research on slip rates on the major nearby faults (mainly but not exclusively the Hosgri and Shoreline Faults)
- Sh1dies of potential ea1thquakes that could occur off of recognized fault sources
- Seismic fault displacement modeling
- Advances in ground-motion modeling to incorporate non-ergodic approaches and potential time-dependency of the hazard
- Sh1dies of paleoseismic data on the eastern Los Osos Fault
- Sh1dies of deformed marine tenaces to constrain the uplift rate of the Irish Hills
- Sh1dies using modern Global Positioning System geodetic data
- Studies of nearby precariously balanced rocks
- Studies and evaluations of the numerous very small eaithquakes that continue to occur both near the DCPP site and in the broader region of interest

Concerning characterizing the ground motion as it propagates from source to site, research continues on:

- Using improved data from recent small-magnitude ea1thquakes
- hnproving the models
- Matching models more closely to the regional and local-site data
- Accounting more accurately for va1ious directivity effects

Concerning local site effects, research continues on:

- Using improved data, both local site data from recent small-magnitude ea1thquakes and information from broader data sets
- Local site characterization
- The effects associated with potentially very long-duration eaithquakes

On many of these topics, PG&E's LTSP personnel collaborate with groups and agencies unaffiliated with PG&E that have important reseai·ch projects and data-gatheringprograms. Some of these are collaborations with the US Geological Smvey or various California state agencies, and some of them are collaborations with other groups ai·ound the US and around the world. PG&E also continues to maintain its own network of seismic monitoring instruments both on and offshore in the area near the Diablo Canyon plant and also in the broader region.

As noted above, the DCISC has been reviewing the LTSP program for many years and has also had the benefit of over a decade of meetings and reviews by the State of California's IPRP. The DCISC continues to find this ve1y extensive program to be of excellent quality. The overall approach is satisfact01y to the DCISC and has also been reviewed by the NRC (Reference 6.2.11) with the same general conclusion.

Concerning the impact of any recent new info1mation that would supplement the previous work, the DCISC concludes that there is nothing in any recent new info1mation on either seismic hazai·d or seismic ground motion that would change the broader understanding of those topics as embedded in the earlier 2015 PG&E report (Reference 6.2.2), or that could lead to new safety insights. In each area of study, the DCISC believes that the recent new info1mation has either reinforced previous understanding or added new insights that reinforce earlier conclusions about overall seismic safety. In the DCISC's view, none of the new info1mation that has become available since 2015 has challenged any of the 2015 report's major conclusions. Uncertainties ai·e being reduced, small changes in some technical details have emerged, and some of the research has pointed out where additional studies can help to reduce the uncertainties still further. That work is beneficial and continues, but it does not affect any existing conclusions or insights.

Of course, new seismic data (both local and worldwide) and new analyses and interpretations of existing data emerge continually, as has always been the case and as will continue in the future. The DCISC's review of PG&E's geosciences team and its work has supp01ted the DCISC's conclusion that PG&E is continually and competently working to analyze this new info1mation and respond to it as needed.

One piece of new inf01mation that is yet to be reviewed is a document recently filed by the San Luis Obispo Mothers for Peace, a non-profit group concerned with the dangers posed by DCPP, with the NRC (Reference 6.1.3) in an NRC generic environmental-impact proceeding. The filing contained a declaration by Dr. Peter Bird which said, in pali, that PG&E's seismic-hazard analysis for Diablo Canyon completed in 2015 (Reference 6.2.2) underestimated the seismic hazard. This is a seismic-hazard issue that is of recent vintage that PG&E has info1med the DCISC will be reviewed as part of the broader SB846-mandated seismic-safety review that PG&E will be doing in the coming months. The DCISC will review PG&E's evaluation of Dr. Bird's declaration after the PG&E SB846 seismic-safety evaluation is complete and will perfo1m additional reviews as needed. This is a good example of how new info1mation needs to be reviewed and understood as it arises.

b. Understanding of Seismic In-strncture Energy Propagation and the Seismic Fragility of Components and Strnctures

The SPRA of 2018 (Reference 6.2.1) included a reevaluation of the way seismic energy, once it ruTives at the base mats (foundations) or anchorages of the vru·ious DCPP strnctures, affects those strnctures and propagates through them to the individual components. It also included a major reanalysis or reevaluation of the probabilistic seismic capacities or fragilities of the many individual structures and components, using standard methodologies and following the requirements of the NRC-endorsed ASME-ANS SPRA standard (Reference 6.2.8), including that standru·d's peer review requirements. PG&E reported to the Fact-Finding Team that those earlier structural analyses and models along with the data on which they were based remain valid today, in prui because the techniques for developing the underlying strnctural models are considered quite mature and have not changed. PG&E also rep01ted that this is true of the methods now used for analyzing the seismic fragilities of individual strnctures and components, which provide the likelihood that a given earthquake load would cause enough damage to the item so that it could not perf01m its safety function. Although there is some ineducible unce1tainty due to aleatory variability, arising from the intrinsic ineducible variability in some of the issues or phenomena, PG&E reported that the methodology for analyzing seismic fragilities is well defined, widely used, and very mature. On both of these topics, involving the structural analyses and the fragilities analyses, the DCISC concurs.

From time to time a new analysis is required when a configuration changes, unless a scoping study concludes that the change is unimp01tant. PG&E reported to the Fact-Finding Team that in all of the relevant areas, nothing new or different has emerged of impoliance, meaning that the previous safety insights remain valid. The DCISC concludes that there is nothing new with regards to energy propagation in structures or the fragilities of structures and components that would modify the insights of the most recent SPRA in these ru·eas.

c. The Seismic Probabilistic Risk Assessment Systems Model

The information about the seismic hazard, ground motion, and fragilities all feed into the SPRA's systems model, which identifies the many different potential seismic-initiated

accident sequences of concern and analyzes each of them. That work is done using what is called the SPRA systems model. There is an underlying SPRA "internal initiators" systems model for the various accident sequences, most of which can be initiated by non-seismic upset conditions or events ("internal initiators") as well as by a large eaiihquake. That systems model then needs to be modified and adapted to analyze each eaithquake-initiated sequence of interest. The methodology for this aspect of the overall SPRA analysis is widely used worldwide, quite mature, and embedded in both international and domestic standai·ds. Specifically in regard to the DCPP analysis, the 2018 SPRA analysis (Reference 6.2.1) used standard methodologies and followed the requirements of the NRC-endorsed ASME-ANS PRA Standard (Reference 6.2.8), including the peer review requirements.

As with the seismic-hazard analyses, PG&E reported to the Fact-Finding Team that those earlier analyses are still valid today. Of course, from tin1e to time a new analysis is required when a configuration changes, or a procedure has changed, or the underlying failure rate data (including human-enor data) have changed. However, as with the other areas, PG&E reported to the Fact-Finding Team that in the systems-modeling area nothing new has emerged of importance, meaning that the previous safety insights remain valid. Tue DCISC's concludes that there is nothing new with regards to system modeling that would modify the insights of the most recent SPRA in that area.

d. Uncertainties in the Analysis

As mentioned above, the overall analysis must deal with and incorporate an analysis and discussion of the various uncertainties. Many of the uncertainties are in the numerical values used in or arising from the analysis, but some of them are more qualitative in nature. In both the PSHA analyses of seismic hazard and the SPRA analyses of overall seismic risk, the various uncertainties are typically divided into two different types, so-called "epistemic" uncertainties (ai·ising from uncertainty in a measurement or from incomplete knowledge about a phenomenon) and "aleatory vai·iability" uncertainties (arising from the intrinsic random variability in some of the issues or phenomena, such as the unknowable time when the next large earthquake might occur on one of the nearby faults). These distinctions are explained and standard methods for their analysis in both the PSHA and the SPRA ai·e contained in the ASME-ANS PRA standard (Reference 6.2.8). Also as noted earlier, if the characterization of the uncertainties is not done appropriately, the usefulness of the analyses can in some circumstances be seriously diminished. The DCISC's recent reviews continue to conclude that the seismic PRA's uncertainty analyses ai·e competently performed, clearly explained, and very useful to support decision-making. The cmTent research work that PG&E is performing under the LTSP, as described above, will likely continue to reduce overall uncertainties, fill in gaps, and enhance confidence in the validity of the underlying understanding. And if unexpected new areas of information arise, these will need to be incorporated fully. The DCISC will continue to be alert to these developments in the course of its ongoing safety reviews.

e. Other seismic-safety information

Three other sources of infmmation have provided additional insights to assist the DCISC in this evaluation.

1) One is the PG&E review of the adequacy of the seismic design of Diablo Canyon's spent fuel pools. This review was perfonned as pali of the post-Fukushima analyses required by the NRC and was reported in a separate PG&E report to the NRC in 2017 (Reference 6.2.16). PG&E concluded, using assessment criteria that the NRC had approved, that the new seismic-hazard info1mation developed in the previous few years did not lead to any additional compromises to the seismic safety of the spent fuel pools.

2) Another impmtant analysis was completed in 2020 by B.J. GaITick and D. Wakefield at University of California at Los Angeles (UCLA), supported by PG&E (Reference 6.2.17). That UCLA study examined spent-fuel-pool safety, the safety of on-site transpmtation of spent fuel and radioactive waste from the reactor area to the Independent Spent Fuel Storage Installation (ISFSI) area, and the safety of the ISFSI facility itself. Its analysis, which evaluated the Holtec system that comprises the existing ISFSI storage system design, covered seismic safety along with other potential accident scenarios and provided important information and insights about risks at the spent fuel pools and the ISFSI arising from large earthquakes. Its broad conclusion regarding seismic safety was that the overall risk to the public arising from challenges to the spent fuel pools or the ISFSI at that time was well within acceptable levels. The DCISC was briefed on this study during a public meeting on July 1, 2020, reviewed it, and concuned in its results (Reference 6.2.18).

3) The third additional source of information is the 2018 PG&E "Mitigating Strategies Assessment" repmt (Reference 6.2.19). This repmt, required by the NRC (Reference 6.2.20), asked whether any safety backfits or other changes would be necessary in light of the new seismic-hazard information developed in the previous few years. PG&E's analysis identified none, and this was concuned in by the NRC.

3.2.6 Seismic Events and Reactor Vessel Pressurized Thermal Shock

Among questions asked in the context of the May 5, 2023, IPRP meeting was a question related to reactor vessel material coupons which are used in support of analyses used to understand the radiological damage to the vessel over time and also the susceptibility of the reactor vessel to Pressurized The1mal Shock (PTS). Technical analyses performed in suppmt of NRC mlemaking activities related to PTS have demonstrated that earthquakes are not a significant contributor to the overall risk of occmTence of a PTS event (Reference 6.2.21). The DCISC has reviewed these analyses and concurs with their conclusions. Accordingly, the DCISC believes that the issue of reactor vessel coupons at DCPP is being appropriately addressed in other forums not related to seismic issues and need not be addressed as a part of its seismic safety reviews.

3.2.7 Additional DCISC Fact-Finding Meetings Related to Seismic Safety

In the period since the November 2022 DCISC meeting, the DCISC conducted two additional Fact- Finding meetings (in January and March 2023) that included reviews of

topics related to DCPP seismic safety. They were the January 2023 Fact-Finding meeting (Rep01i in Reference 6.2.22) and the March 2023 Fact-Finding meeting (associated with a Rep01i that will be concun-ently approved and that is cited here as Reference 6.2.23). The topics covered in these Fact-Finding meetings included (a) details about PG&E's plans to perfo1m the updated seismic assessment required to be completed by SB846 (in the January repo1i); (b) FLEX equipment capabilities during and after a large ea1ihquake (in the Januaiy report); and (c) a review of the 2010 Enercon Se1vices repo1i regarding seismic vulnerabilities of non-safety strnctures and equipment (in the March repo1i). Because those other Fact-Finding repo1ts are already available (the Janua1y repo1t) or will be publicly available concmTently with the availability of this rep01i, the technical issues will not be addressed here.

3.2.8 **Conclusions**

As background, when the DCISC reviewed the PG&E probabilistic seismic hazard analysis (PSHA) in 2016 and the seismic probabilistic risk assessment (SPRA) in 2018, the Committee was satisfied that the seismic safety achieved by DCPP was acceptable at that time - indeed, the DCISC believed that it represented industry-leading performance in the seismic safety achieved by the facility (Reference 6.2.15).

Based on its review as reported here, the DCISC has developed the following broad conclusion:

After reviewing the new and updated information presented by PG&E in the November 2022 Fact-Finding Meeting, supplemented by earlier DCISC Fact-Finding Meetings and Public Meeting presentations, by other industry-wide information, and by information arising from both the October 2022 IPRP meeting and the May 2023 IPRP meeting, the DCISC concludes that the seismic safety of the DCPP reactors is fully adequate now, and requires no additional upgrades or other changes to bring it up-to-date or to improve it. The DCISC also concludes that no upgrades or improvements to seismic safety would be necessary to assure that the seismic safety of the DCPP reactors would be adequate for extended operation beyond 2025, if so authorized.

Based on its review, the DCISC has three recommendations for its own future reviews:

First, the DCISC should review any new seismic-related information that could be forthcoming when PG&E submits a new (updated) License Renewal Application to the NRC at the end of 2023. The DCISC should undertake a thorough review of that submittal's sections relevant to seismic safety, as well as any underlying information that PG&E will rely on in that submittal.

Second, the DCISC should review the seismic-safety review that PG&E will conduct as required by California legislation SB846.

Third, the DCISC should review any analyses that maybe performed by the NRC or other entities in response to the May 2, 2023, SLOMFP filing with the NRC claiming that PG&E has underestimated the seismic hazard at DCPP. It is currently understood that this filing will be evaluated by PG&E as a part of the SB846-mandated seismic-safety review and the DCISC should review PG&E's evaluation of this filing following its completion.

3.2.9 Recommendations

None.

4.0 CONCLUSIONS

4.1 The Independent Peer Review Panel (IPRP) meeting was successful in discussing the major items on its agenda, including providing feedback and comments from the IPRP to the DCISC about the DCISC's November 2022 Fact-Finding Report on seismic safety. The DCISC should take account of IPRP input as it finalizes its positions and conclusions on DCPP seismic safety. The DCISC should also continue to attend future IPRP meetings and consult with the IPRP concerning the IPRP's deliberations, findings, and recommendations.

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5.0 RECOMMENDATIONS

5.1 None.

6.0 REFERENCES

6.1.1 "May 5, 2023, IPRP Comments and Questions on DCISC Februa1y 2023 Fact Finding Rep01ts," available at URL as follows: https://www.cpuc.ca.gov/industries-and-topics/electrical-energy/electric-costs/diablo-canyon-independent-peer-review-panel.

6.1.2 "Diablo Canyon Independent Safety Committee Thirty-Third Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023," Approved September 13, 2023, Volume II, Exhibit D.5, Section 3.4, "Comprehensive Review of the Seismic Safety Program."[5]

6.1.3 "Comment (0021) from Diane Cunan on behalf of San Luis Obispo Mothers for Peace on PR-51 - Renewing Nuclear Power Plant Operating Licenses - Environmental Review," submitted to the US Nuclear Regulato1y Commission on May 2, 2023, NRC ADAMS Accession Number ML23123A410.

6.1.4 "Seismic Hazard Screening Rep01t, Diablo Canyon Power Plant Units 1 and 2," submitted to the Nuclear Regulat01y Commission as an attachment to PG&E letter DCL-15-035,

[5] In preparing Fact Finding Repo1ts, each of which was or will be approved by the DCISC at either the DCISC September 2022, Febmary, and June 2023 public meetings and which repo11s will be included as exhibits in the DCISC's 33rd Annual Rep011 (July 1, 2022 through June 30, 2023), the DCISC Members and Technical Consultants follow the DCISC's established practice of including references in those Fact Finding Reports to the section of the 33rd Annual Rep011 where another Fact Finding Rep011 or the Minutes of a public meeting will be included as an exhibit.

"Response to NRC Request for Information pursuant to 10 CPR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident; Seismic Hazard and Screening Rep01i," March 11, 2015, NRC ADAMS Accession Numbers ML15070A607 and ML15070A608.

6.2.1 "Seismic Probabilistic Risk Assessment for the Diablo Canyon Power Plant. Units 1 and 2 - Response to NRC Request for Infonnation Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1: Seismic of the Near-Te1m Task Force Review of Insights from the Fukushima Dai-ichi Accident," submitted to the US Nuclear Regulatory Commission as an attachment to PG&E letter DCL-18-027, April 24, 2018, NRC ADAMS Accession Number ML1 8l20A201.

6.2.2 "Seismic Hazard Screening Rep01i, Diablo Canyon Power Plant Units 1 and 2," submitted to the Nuclear Regulatory Commission as an attachment to PG&E letter DCL-15-035, "Response to NRC Request for Information pursuant to 10 CPR 50.54(f) Regarding the Seismic Aspects of Recommendation 2.1 of the Near-Te1m Task Force Review of Insights from the Fukushima Dai-ichi Accident; Seismic Hazard and Screening Repo1i," March 11, 2015, NRC ADAMS Accession Numbers ML15070A607 and ML15070A608.

6.2.3 "Diablo Canyon Independent Safety Committee Twenty-Ninth Annual Repo1i on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2018 - June 30, 2019," Approved October 23, 2019, Volume II, Exhibit D.7, Section 3.4, "Long Te1m Seismic Program Update."

6.2.4 "Diablo Canyon Independent Safety Committee Thirty-Third Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023," Approved September 13, 2023, Volume II, Exhibit D.3, Section 3.5, "Long Te1m Seismic Program Update."

6.2.5 "Recommendations for Probabilistic Seismic Hazard Analysis: Guidance on Unce1iainty and Use of Expe1ts", R.J. Budnitz (chair), G. Apostolakis, D.M. Boore, L.S. Cluff, K.J. Coppersmith, C.A. Cornell, and P.A. MoITis (complising the "Senior Seismic Hazard Analysis Committee," "SSHAC"), Repo1t NUREG/CR-6372, Lawrence Live1more National Laborato1y, sponsored by the U.S. Nuclear Regulato1y Commission, U.S. Depruiment of Energy, and Electiic Power Research Institute (1997), NRC ADAMS Accession Numbers ML080090003 and ML080090004.

6.2.6 "Practical Implementation Guidelines for SSHAC Level 3 and 4 Hazard Studies," US Nuclear Regulat01y Commission, Report NUREG-2117 (February 2012), NRC ADAMS Accession Number ML12118A445.

6.2.7 "Updated Implementation Guidelines for SSHAC Hazard Studies," US Nucleru·Regulato1y Commission, Repo1i NUREG-2213 (October 2018), NRC ADAMS Accession Number ML18282A082.

6.2.8 "Standard for Level I/Large Early Release Frequency Probabilistic Risk Assessment for Nuclear Power Plant Applications," Standard ASME/ANS RA-Sa-2009, American Society of Mechanical Engineers/American Nuclear Society (2009). *Note: This standard has been updated recently, but the Diablo Canyon PRA, including the Seismic PRA, was done according to this earlier version of the standard, which remains valid.*

6.2.9 "An Approach for Dete1mining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Info1med Activities," US Nuclear Regulato1y Commission, Regulatory Guide 1.200, Revision 2 (March 2009), NRC ADAMS Accession Number ML090410014.

6.2.10 "Request for Info1mation Pursuant to Title 10, 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," US Nuclear Regulatory Commission letter to all power reactor licensees (March 12, 2012), NRC ADAMS Accession Number ML12053A340.

6.2.11 "Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2, - Staff Assessment of Information Provided under Title 10 of the Code of Federal Regulations Pait 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Te1m Task Force Review of Insights from the Fukushima-Dai-ichi Accident," NRC letter to PG&E (December 21, 2016), NRC ADAMS Accession Number ML16341C057.

6.2.12 "Diablo Canyon Independent Safety Committee Twenty-Fifth Annual Repo1t on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2014 - June 30, 2015," Approved October 20, 2015, Volume II, Exhibit D.7, Section 3.2 "PG&E Seismic Study."

6.2.13 Ibid., Exhibit B.15, "Minutes of the DCISC Public Meeting June 16 and 17, 2015."

6.2.14 "Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2 - Staff Review of Seismic Probabilistic Risk Assessment Associated with Reevaluated Seismic Hazard - Implementation of the Near-Term Task Force Recommendation 2.1, Seismic," US Nuclear Regulato1y Commission letter to PG&E (January 22, 2019), NRC ADAMS Accession Number ML18254A040.

6.2.15 "Diablo Canyon Independent Safety Committee Twenty-Ninth Annual Repo1t on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2018 - June 30, 2019," Approved October 23, 2019, Volume II, Exhibit B.6.

6.2.16 "Spent Fuel Pool Evaluation Supplemental Report. Response to NRC Request for Information Pursuant to 10 CFR 50.54(f) Regarding Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," submitted to the US Nuclear Regulato1y Commission as an attachment to PG&E letter DCL-17-108 (December 18, 2017), NRC ADAMS Accession Number MLl 7352A703.

6.2.17 "Probabilistic Risk Assessment of Nuclear Power Plant Spent Fuel Handling and Storage Programs: Methodology and Application to the Diablo Canyon Power Plant," B. John

Garrick and Donald J. Wakefield, Repmt GIRS-2020-3/L, published by the UCLA B. John Garrick Institute for the Risk Sciences, Los Angeles (Febrnary 17, 2020).

6.2.18 "Diablo Canyon Independent Safety Committee Thirtieth Annual Repmt on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2019- June 30, 2020," Approved September 30, 2020, Exhibit B.9.

6.2.19 "Mitigating Strategies Assessment (MSA) repo1t for the New Seismic Hazard Infmmation," submitted to the US Nuclear Regulato1y Commission as an attachn1ent to PG&E letter DCL-18-026 (Ap1il 24, 2018), NRC ADAMS Accession Number ML18120A119.

6.2.20 "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigating Strategies for Beyond-Design-Basis External Events," US Nuclear Regulatmy Commission, NRC Interim Staff Guidance JLD-ISG-2012-01, Revision 2, (Febrna1y 2017), NRC ADAMS Accession Number ML17005A188.

6.2.21 A. M. Kolaczkowski, D. Kelly, and D. W. Whitehead, Sandia Letter Repo1t to the NRC, "Estimate of External Events Contlibution to Pressurized The1mal Shock (PTS) Risk" (October 1, 2004), NRC ADAMS Accession Number ML042880476.

6.2.22 "Diablo Canyon Independent Safety Committee Thiity-Third Annual Repo1t on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2022 - June 30, 2023," Approved September 13, 2023, Volume II, Exhibit D.8, Section 3.9, "FLEX Program Capabilities During a Seismic Event," and Section 3.14, "California Senate Bill 846 Requirements Regarding an Updated Seismic Assessment."

6.2.23 Ibid., Exhibit D.8, Section 3.9, "Review of the 2010 Enercon Services Report Regarding Seismic Vulnerabilities."