DIABLO CANYON INDEPENDENT SAFETY COMMITTEE

Report on

Fact-Finding Meeting at DCPP
on April 17-18 2024

by

Peter Lam Member, and R. Ferman Wardell, Consultant

1.0 SUMMARY

The results of the DCISC April 17-18, 2024, Fact-Finding Meeting at the Diablo Canyon Power Plant (DCPP) in Avila Beach, CA, are presented. Although the Fact-Finding Team (FFT) was on-site at DCPP, portions of the meeting were held remotely. The subjects addressed and summarized in Section 3 are as follows:

1. Plant As Low As Reasonably Achievable (ALARA) Committee Meeting
2. Reactivity Management Update
3. NRC Senior Resident Inspector
4. Digital Systems Update
5. Observe Maintenance Activity
6. Outage 2R24 Safety Plan and Outage Status
7. Operations Update and Operational Decision-Making (ODM) Process
8. Emergency Diesel Generator 2-2 Maintenance Outage Window
9. Meet with DCPP Officer Maureen Zawalick
10. Margin Management Update
11. Reactor Coolant System Boric Acid Leak Root Cause Evaluation
12. Intake Cove Dredging Update

2.0 INTRODUCTION

This Fact-Finding Meeting at the DCPP was held to evaluate specific safety matters for the DCISC. The objective of the evaluation was to determine if PG&E's performance is appropriate and whether any areas revealed observations which are important enough to warrant 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 FFT 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 FFT. These recommendations will be considered for approval by the DCISC at its next Public Meeting. 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 Observe Plant As Low As Reasonably Achievable (ALARA) Committee Meeting

The DCISC FFT met with Brandy Lopez, DCPP Liaison to the DCISC, to observe the April 17, 2024 meeting of the DCPP As Low As Reasonably Achievable (ALARA) [radiation exposure] Review Committee (ARC) meeting. The DCISC last observed an ARC meeting in September 2019 (Reference 6.1) when it concluded the following:

> *The meeting of the ALARA Review Committee was well managed, and the High Radiological Risk Plans presented were appropriate to minimize personnel radiation exposure.*

The ALARA Committee is governed by DCPP Procedure RP1.ID1, Revision 14, "ALARA Program." This procedure defines ALARA as follows:

> *The act of making every reasonable effort to maintain exposures to radiation as far below the applicable dose limits as is practical taking into account the state of technology, the economics of improvements in relation to the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and other socioeconomic considerations, and in relation to utilization of nuclear energy and licensed material in the public interest.*

And the ALARA Review Committee is defined as follows:

> *A team of individuals from senior management representing operations services, maintenance services, engineering services, outage management, strategic projects, and radiation protection, which provides formal oversight, direction, and accountability for DCPP radiological performance, including the ALARA Program.*

The ARC is required to meet at least semi-annually. It meets more frequently during refueling outages to plan and monitor outage radiation dose goals. This April 17, 2024 meeting occurred ten days after the start of Outage 2R24, and its purpose was to evaluate outage ALARA performance and to determine whether the outage ALARA goal was still applicable.

The Radiation Protection (RP) ALARA Group originally presented to the ARC a proposed goal of 29.518 person-Rem for the outage. The ARC later raised that goal to 31.028 person-Rem for added outage scope.

The accumulated personnel radiation dose to date was reported as 6.427 person-Rem, which was 20.7% of the total goal. Accounting for the total dose to date and remaining work in the outage resulted in an expected outage dose at the end of 2R24 of 28.7 person-Rem, which included 4.67 person-Rem of emergent work. The ARC concluded that the outage goal of 31.028 person-Rem did not require any update.

One remaining emergent work item was the replacement of one Reactor Coolant Pump seal with an estimated dose of 1.690 person-Rem, which was considered to be within the expected dose.

Conclusions: The April 17, 2024 meeting of the ALARA Review Committee to evaluate the Outage 2R24 personnel radiation dose to date and dose goal appeared to be thoughtfully and effectively implemented. Outage ALARA performance to date was as expected with no surprises.

Recommendations: None

3.2 Reactivity Management Update

The DCISC FFT met with Dallas Adams, Engineering Programs Manager; Daniel Blount, Supervisor, Reactor Engineering; and Santash Patel, Reactor Engineer, for an update on the DCPP Reactivity Management Program (RMP). The DCISC last reviewed the DCPP RMP in April 2023 Reference 6.2) when it concluded the following:

> *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.*

Reactivity is defined in DCPP's controlling Procedure OP1.ID3, Revision 19, "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 conservative. 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 ensuring conservative 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 and fully 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 corrective actions, (4) reducing reactor power or tripping the reactor without the need for concurrence of the unit Shift Foreman or reactivity SRO when the RO deems that the action is immediately necessary 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 Services, Maintenance Services, Engineering Services, Learning Services, and the Corrective Action Program. The team reviews reactivity events and adverse trends to identify needed corrective 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 corrective actions; and classifying reactivity events.

The DCPP Team provided the FFT with copies of the following RMLT Quarterly Meeting Minutes:

- July 19, 2023
- December 6, 2023
- January 17, 2024
- April 3, 2024

The FFT found that these meetings followed the applicable procedure and focused closely on reactivity-related events, none of which was significant. The meetings appeared to meet all objectives.

A Reactivity Management Issue is any plant issue or event that does not meet expectations of the RMP. There are six different Significance Levels, based on plant impact, as follows:

Significance Level	Plant Impact	Description
1	Highest	Fundamental Organizational Breakdown
2		Violation of Design or Licensing Basis
3		Violation of Process/Procedural Requirements
4		Precursor
5	Lowest	Concern
6	None	No impact. Trending purposes only

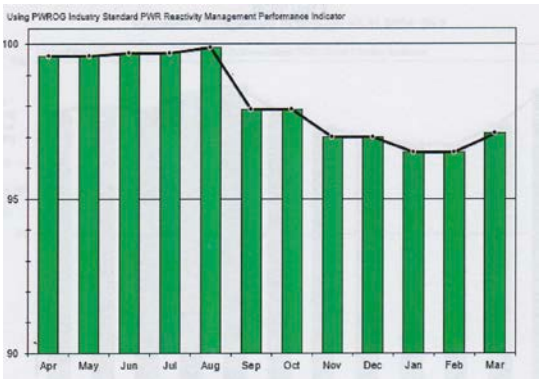
Since January 1, 2024, there have been 37 issues or events which could have affected reactivity. All, except two, were classified as Significance Level 6, no plant impact, trending purposes only. The following two were classified as Significance Level 4, Precursors:

- Unit 1 West Moisture Separator Reheater High Pressure Drain Tank Dump Valves Open

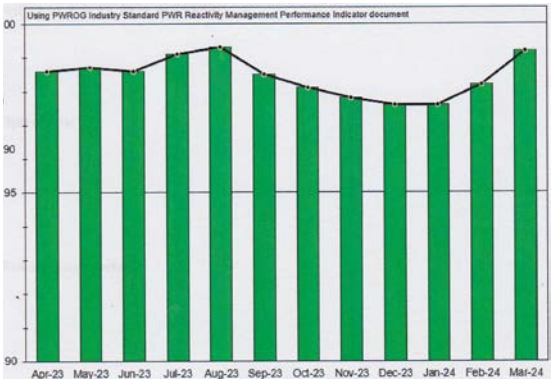
- Arcing on Unit 2 Main Bank Transformer A Lightning Arrestor

The FFT considered that these statistics represented good performance.

The Reactivity Management Performance Indicators are shown below (up is good):



Unit 1 RM Performance Indicators



Unit 2 RM Performance Indicators

<u>Conclusions</u>: DCPP's Reactivity Management Program, which ensures conservative reactivity management by promoting a reactivity-conscious culture, appears effective. Program Performance Indicators are good and improving. They show a low occurrence rate and significance of Reactivity Management events for the past 12 months.

<u>Recommendations</u>: None

3.3 <u>Meeting with NRC Senior Resident Inspector</u>

The DCISC FFT met with Mahdi Hayes, NRC Senior Resident Inspector, for an update. The DCISC meets regularly with the NRC Resident Inspectors and last met with the Resident Inspector during its March 2024 Fact-Finding Meeting (Reference 6.3), when it concluded the following:

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

The items discussed in this meeting included the following:

- Recent and Future NRC Inspection Activities
- Refueling Outage 2R24 Results
- Replacement plans for the NRC Resident Inspector who Transferred to NRC Headquarters
- Unit 1 Reactor Pressure Vessel Embrittlement
- Inspections of DCPP Upcoming Transfers of Spent Fuel from the Spent Fuel Pool to the Independent Spent Fuel Storage Installation

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

Recommendations: None

3.4 Digital Systems Update

The DCISC FFT met with Dan Blount, Supervisor, Digital Systems, for an update. The following representatives of the California Department of Water Resources joined the meeting remotely: Christian Arechavaleta, Deb Luchsinger, Eric Blocher, and Jerry Bischof.

The DCISC last reviewed DCPP Digital Systems in November 2021 (Reference 6.4), when it concluded the following:

> *The DCPP Digital Control Systems were all reported to be in good health and have been successfully included in the DCPP Cyber Security Program.*

In this case the term 'digital' means that control functions have been changed from electro-mechanical analog control to digital computer control, in many cases due to obsolescence or scarcity of spare parts of older analog components. This change from electro-mechanical to computers matters because the latter have become more precise, reliable and flexible, ultimately providing a safer operating plant. There are eight primary digital control systems at DCPP as listed below with installation dates:

1. Turbine Control System (2004)
2. Feedwater Control System (2005)
3. Process Control System (2012)
4. Two Meteorological Towers (2016)
5. Intake Travelling Screens (2017)
6. Units One and Two Spent Fuel Pool Bridge Cranes (2017-2018)
7. Plant Process Computer (2019)
8. Unit 1 Control Room Main Annunciators (Outage 1R22) [spares to Unit 2]
9. Transient Recording System (design completed 2018)

The purpose of the digital Turbine Control System is to regulate the governor valve position which in turn controls steam flow during all modes of turbine operation. Essentially, the system controls the turbine generator during plant startup, normal operations, and plant shutdown.

The purpose of the Feedwater Control System is to automatically maintain Steam Generator water levels during steady-state and transient operations. The system restores and maintains the water levels within safe levels during normal unit transients. Newer controls have reduced or eliminated operator interaction during system transients, prevented unnecessary plant trips, and simplified operation.

The Process Control System (PCS) converts physical plant parameters such as temperature, pressure, level, and flow into electrical signals during normal operation. The PCS then uses signals for plant control (pumps, valves, heat exchangers, and tanks), operator indication, and computer monitoring and recording. The recorded signals are used by Operations to trend parameters and also to provide a historical performance record which assists in identifying any system degradation.

The Transient Recording System servers perform data storage and recording for the Emergency Response Facility Data System (ERFDS), whose primary function is to monitor and display plant parameters used for post-accident monitoring. The ERFDS assists the control room operators and emergency support personnel in making rapid assessments of plant safety status during accidents or abnormal operations.

DCPP initiated a comprehensive digital control system review in 2018 to develop a long-term strategy to assure that its digital control assets would function reliably and maintain good digital infrastructure through 2025 without facing emergent issues needing corrective action. This strategy concluded that the then-existing digital control systems would continue to perform their functions satisfactorily until the end of power operations in 2025 with no new digital systems needing to be added with one exception: the Condensate Polisher computers (programmable logic controllers)which are being replaced. All of these digital system controls have been successfully included in the DCPP Cybersecurity Program.

DCPP's digital control systems have been operating as designed and have helped take a burden off operators due to their wide span of control and flexibility. The installation of one remaining digital control system replacement is currently planned: the Unit 1 Control Room Main Annunciator System.

Conclusions: The DCPP Digital Control Systems were all reported to be in good health. The digital systems have proved effective in reducing operator burden and minimizing plant transients. They are protected from outside or inside tampering by the DCPP Cyber Security Program.

Recommendations: None

3.5 Observe DCPP Maintenance Activity

DCISC FFT Consultant, Mr. Wardell, met with Ken Pazden, Maintenance Manager, for a tour of the main deck of the Turbine Building to observe Maintenance work in progress for Outage 2R24 in progress. The DCISC last observed maintenance work in the plant in March 2024 (Reference 6.5), when it concluded the following:

> *The DCISC Fact-Finding Team toured the Unit 2 Control Room and maintenance work areas in the Turbine Building. Work was being managed properly, and all areas were clean, orderly, and well lit, with equipment in excellent condition.*

The Main Turbine and Generator had been taken apart for their periodic maintenance. Mr. Wardell observed the lifting of the Main Feedwater Pump Turbine Steam Chest, a heavy metal enclosure weighing about 10 tons. The Maintenance Team was attaching the bottoms of four lifting slings, one to each corner of the chest. The tops of the slings were attached to the hook of the Turbine Building Gantry Crane. The Crane Operator was in the operator compartment and was in communication visibly and via radio with the Lift Leader. Before the actual lifting took place, several small test lifts were used to verify the capability of the lift rig and the balance of the chest being lifted.

Conclusions: The DCISC observation of the lifting of the 10-ton Main Feedwater Pump Turbine Steam Chest by DCPP Maintenance Technicians found that the process was performed properly and carefully, using appropriate safety measures and procedures.

Recommendations: None

3.6 Outage 2R24 Safety Plan and Outage Status

The DCISC FFT met with Erik Werner, DCPP Outage Director, to review the Outage 2R24 Outage Safety Plan and outage status. The DCISC last reviewed these topics in March 2024 (Reference 6.6), when it concluded the following:

> *DCPP's preparations for Refueling Outage 2R24 were progressing satisfactorily with some planning activities behind schedule due to the large volume of planned work. The draft Outage Safety Plan appeared to be comprehensive and effective for maintaining an appropriate safety margin during upcoming planned outage activities.*

The purpose of the Outage Safety Plan was to provide information on outage safety requirements and highlight potential higher risk activities to plant staff. The intent of the Outage Safety Plan was to provide a concise document for use in evaluating plant conditions during Modes 5 (Cold Shutdown) and 6 (Refueling) to ensure the key safety functions are satisfied. He also provided a copy of the most recent procedure governing the Outage Safety Plan, AD8.DC55, "Outage Safety Schedule," Revision 48.

DCPP initiates the Outage Safety Plan when the plant reaches Mode 5, Cold Shutdown. A key element of the Outage Safety Plan was the 2R24 Schedule Evaluation. DCPP uses "Phoenix," a computer-based tool used online to analyze changes in risk using the PRA model when equipment is removed from service for maintenance. As the PRA model does not extend to shutdown conditions, Phoenix is used during outages via the loading of deterministic fault trees for shutdown conditions based on the Outage Safety Checklists. An "N+1" Defense in Depth (DID) approach, where N generally represents the minimum number of equipment sets needed to maintain a key safety function, is then utilized by Phoenix to evaluate the availability of the key safety functions. This DID Status is represented by the following four-color definitions:

- Green – represents DID greater than N+1, where N is the minimum number of components needed to maintain a key safety function with more than one backup means of support.
- Yellow – represents DID equals N+1, which is considered the normal DID. Key safety functions are fully supported with at least one backup means of support.
- Orange – represents a DID equals N condition, where key safety functions are supported, but the normal desired DID is not met, and compensatory measures must be put in place.
- Red – represents a DID less than N condition in which key safety functions are not supported.

DCPP considers a status of Green or Yellow as acceptable for planned outage activities because key safety functions are fully supported with at least N+1 DID. Contingency plans provide an additional approach to DID, because they provide a backup safety function should a minimum safety function become unavailable. DCPP avoids planned activities which result in Orange conditions, and Red conditions are prohibited.

The Refueling Outage 2R24 Schedule Evaluation contained no Orange or Red conditions and three individual Yellow conditions. The three Yellow conditions were driven by one planned drain down of the Reactor Coolant System (RCS) to mid-loop conditions to support valve repairs and two periods where only one source of offsite power would be available with the RCS at a reduced water inventory. The first of these three conditions had taken place without problems earlier in the outage during initial drain down of the RCS. The remaining two conditions would be performed later in the outage as the plant was being returned to power.

All outage goals were on-track to being met, and all major outage work activities were on track, including aging management inspections for the License Renewal Application, which was a major part of the outage.

Conclusions: The DCPP Outage 2R24 was progressing on track to meet all outage goals. Aging management inspections for the License Renewal Application were being performed as planned. The Outage Safety Plan was being followed closely with no exceptions to date.

Recommendations: None

3.7 Operations Update and Operational Decision-Making Process

The DCISC FFT met with Brian Bridges, Operations Shift Manager, for an update on Operations status and performance and the DCPP Operational Decision-Making (ODM) Process. The DCISC last reviewed Operations activities in November 2023 (Reference 6.7), when it concluded the following:

> *DCPP is taking the appropriate actions to assure the plant is staffed with the proper numbers of qualified and trained licensed and non-licensed operators. It appears there is satisfactory operator staffing to operate DCPP safely.*

The DCISC last reviewed DCPP ODM in September 2020 (Reference 6.8), when it concluded the following:

> *The DCPP Operational Decision-Making (ODM) Program procedure and five ODMs reviewed appeared appropriate to the DCISC Fact-finding Team.*

Operations Staffing

In anticipation of power operations ceasing in 2025 DCPP offered a two-tier retention plan to retain essential personnel, especially in Operations, until that shutdown date. The first tier of four years covered 2016-2020 with a 98% participation, and the second tier of three years covered 2021-2023 and ended August 31, 2023 with a greater than 95 % participation. Then, in its Senate Bill SB-846 the California Legislature removed all California restrictions on continuing power operation through 2030 and required additional hiring as well as another employee retention program.

New classes of non-licensed operators were begun in January 2023 (21 candidates) and August 2023 (17 candidates). A license operator upgrade class (Reactor Operator to Senior Reactor Operator) was completed in March 2023, and subsequently a new one began that is scheduled to complete in summer 2024. Completion of these classes will help keep operator staffing at full levels. Additionally, a new class of 11 Chemistry/Radiation Protection Technicians has just been completed, and another class of nine began in December 2023. Because of anticipated future turnover and retirements, as usual, more licensed operators will be needed, and another class is in the planning stage. It appeared to the FFT that Operations will continue to be adequately staffed.

The number of “no solo operators,” operators whose work is limited to not working alone on selected activities due to health concerns, is small with essentially no impact on staffing or assignments.

Operations Performance

The DCISC FFT received and reviewed the Operations Performance Improvement Dashboard, which contained important measures of performance for Operations Services through March 2024 included performance of Operations crews as well as Chemistry and Radiation Protection, which are part of Operations Services. The measures were predominantly Green (Good). Three significant measures showed the following scores:

- Clearance and Tagging Yellow
- Component Mispositioning Green
- Drill/Exercise Performance Green

Operational Decision-Making ODM)

The DCPP ODM Procedure OP1.ID7, Revision 18, “Operational Decision Making,” had not changed significantly since the DCISC’s last review in September 2020. The ODM procedure is not intended to be used for Control Room immediate decisions in response to off-normal conditions. In all cases, during plant transients, response shall be by using approved plant operating

procedures. The ODM procedure is intended to be used to address degraded conditions only when the unit is in a stable condition.

Degraded conditions may involve reductions in operating/safety margins or encroachment on system/component reliability that occur over days or weeks. Examples include:

- Increased primary system or containment leakage that remains below operational or licensed limits
- Step changes in vibrations that remain at alert levels
- Numerous or long-term valve or pump leaks
- Fuel defects or increased corrosion rates
- Chronic or aggregate equipment material deficiencies
- Degraded conditions requiring a Prompt Operability Assessment
- Potential challenges to equipment covered by Technical Specifications

The Station Director is the Decision Maker (or assigns a Decision Maker) for decisions that involve outage extensions of greater than 24 hours, potential NRC Notice of Enforcement Discretion, decisions that involve changes in mode or power level, short duration action statements, or changing curtailment schedules. The Decision Maker typically assigns a Decision Team, which is composed of individuals with expertise in diverse areas applicable to the decision at hand. For evolutions that involve a significant degradation in safety margin, an individual with a Senior Reactor Operating License will be designated to lead the Decision Team.

The Decision Team meets and follows a prescribed process to collect and analyze data and formulate a decision using/considering the following:

1. Gathers validated information from diverse sources including key stakeholders
2. Defines full scope of the degraded conditions considering operational effects, safety margins, personnel safety, and business impacts
3. Defines the timeliness of solution implementation considering the rate of degradation and consequences of exceeding margins or limits
4. Uses risk evaluation and appropriate problem analysis tools
5. Considers the operational impact of options with the rigorous application of operating experience, Probabilistic Risk Assessment, licensing and design bases, and engineering and operational judgment

When its decision is made, the Decision Team obtains final approval from the Station Director who reports the decision to the Site Vice-President. The decision is communicated to plant personnel and is implemented. An effectiveness review is performed about six months after completion of the ODM.

The FFT reviewed the following four ODMs:

1. The ODM decision was to conservatively ramp Unit 2 down and separate from the grid to perform a replacement of the Phase A Lightning Arrestor prior to wet weather conditions. The decision has been made to commence a ramp on Friday nightshift with

maintenance being performed on Saturday. This was the safe and conservative decision and no weather conditions that would allow for a failure of the Lightning Arrestor are in the forecast prior to the selected date. In addition, even though no degraded condition was identified on Phases B or C, there will also be an extent of condition inspection to ensure reliability of the remaining Lightning Arrestors for the remainder of the Unit 2 operating cycle.

2. This ODM was generated due to High Swell Warning conditions that are anticipated on 12/28/2023. ODM decisions and actions will be tracked with a SAPN (Corrective Action Program Notification). The decision was to remain at 100% power.

3. This ODM was due to High Swell Warning conditions that were anticipated on 12/30/2023. Operations implemented OP O-28 "Operations Intake Response to Storms or Biofouling". The decision was to ramp to 50% on both units. The team used current plant and equipment status, swell projections, the Kelp Attack Team (KAT) model, and station operating experience of similar events to align on this decision.

4. An ODM meeting was held to address the Unit 2 condenser saltwater in-leakage. The final ODM decision was made to perform the Unit 2 condenser leak search and tube plugging with the U2 tunnel cleaning. The decision included pulling up the Unit 2 tunnel cleaning date to the week of 11/10/23. The crew also had adverse condition monitoring in place with predetermined thresholds.

The ODM process is a useful tool in reviewing and making decisions for operational problems. The DCPP ODM procedure appeared satisfactory. The four ODMs reviewed appeared satisfactory.

Conclusions: DCPP Operations is fully staffed for continued operation through 2030 and beyond as required. Overall Operations performance indicators are predominantly Green (good), The DCPP Operational Decision-Making Process has been effectively implemented to develop appropriate and safe decisions to address operational issues and events.

Recommendations: None

3.8 Emergency Diesel Generator 2-2 Maintenance Outage Window

The DCISC FFT met with Dan McBride, Operations Manager, for an update on the DCPP Emergency Diesel Generator (EDG) 2-2 Maintenance Outage Window event. The DCISC last reviewed DCPP EDGs in January 2024 Reference. 6.8), when it concluded the following:

> *The DCPP Emergency Diesel Generators for both units are rated in Green Health (Healthy) with a few challenges in fuel oil day tank level instruments and panel alarm relay modules. Satisfactory plans for these challenges are underway.*

The EDGs are safety-related pieces of equipment whose functions are as follows:

- To furnish sufficient electric power to mitigate a design basis accident in one unit and safely bring the other unit to cold shutdown when both the 230kV and 500kV offsite power sources are unavailable.

- To act as a backup source of power to enable the reactor to continue to produce power for 72 hours whenever there is no accident condition, but one of the two offsite power sources is inoperable.

- To furnish power sufficient for an emergency shutdown of the plant whenever the offsite power sources are not available.

The EDG Fuel Oil Supply system has enough fuel capacity to provide seven days of onsite power generation: (a) in order to operate the minimum required Engineering Safety Features equipment following a design basis Loss-of–Coolant Accident for one unit, and the equipment in the second unit is in either the hot or cold shutdown condition, or (b) when the equipment for both units is in either the hot or cold shutdown condition. Each nuclear operating unit is supported by three EDGs dedicated to the respective unit, and the EDGs can be cross connected to the other unit using temporary cables. The EDGs are each rated to deliver approximately 2,600 kW on a continuous basis and are designed to start automatically when needed.

EDG 2-2 is normally aligned to the “H” Electrical Bus. During an EDG 2-2 Maintenance Outage Window in early March 2024, Auxiliary Building Exhaust Fan E-1 tripped offline, and became inoperable. Redundant Fan E-2 started automatically, but Fan E-2 was powered from the “H” Electrical Bus and could not be considered operable to meet Technical Specifications Limiting Condition for Operation (LCO) requirements due to the inoperable EDG 2-2. Because both trains of Auxiliary Building Exhaust were then considered inoperable, Technical Specification 3.0.3 was entered and provided a limit of four hours in which to make repairs or to initiate a unit shutdown if repairs could not be completed in that timeframe. Technical Specification 3.0.3 was entered and provided a limit of four hours in which to make repairs or the EDG would be declared inoperable, requiring initiation of unit shutdown if repairs could not be completed in that timeframe.

Investigations found that the associated electrical breaker on Fan E-1’s electrical supply showed a hot spot (indicative of heating from a poor electrical connection). Because repairs would take longer than four hours, DCPP requested an Enforcement Discretion from NRC for a longer repair period. The request was based on risk-informed analysis (probabilistic risk analysis by the PG&E Probabilistic Risk Analysis Group). The NRC approved the request, repairs were performed, and the unit remained operational. The risk-informed analysis showed the risk of the longer than four-hour outage was acceptably low.

Separately, but related, is the fact that PG&E had submitted a License Amendment Request (LAR) for NRC approval of a DCPP program for Risk-Informed Completion Time, which would permit PG&E to extend allowable Technical Specification outage times based on risk-informed analysis without prior NRC approval. NRC approval of the LAR is expected in May or June 2024.

Conclusion: DCPP's obtaining of an NRC Enforcement Discretion to extend the Technical Specification allowed outage time for Emergency Diesel Generator-related repairs appeared appropriate.

Recommendations: None

3.9 Meet with DCPP Officer

The DCISC FFT met with Maureen Zawalick, Vice-President, Technical and Business Services, for a general update. The DCISC last met with a DCPP Officer in March 2024 (Reference 6.9) when it concluded the following:

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

The discussion centered on the agenda items in this fact-finding meeting and other items of mutual interest.

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

Recommendations: None

3.10 Margin Management Update

The DCISC FFT met with Dylan Ross, Supervisor, Mechanical Design Engineering, for an update on DCPP Margin Management. The DCISC last reviewed Margin Management in May 2020 (Reference 6.10) when it concluded the following:

> *DCPP's Margin Management Program has been replaced with a reduced-scope Margin Management Process in order to eliminate activities that were duplicative with other programs. The revised process was well-documented and appeared to be effective, and the process owner was very knowledgeable.*

The primary goal of the Margin Management Process was to identify issues where margin degradation was occurring over time and ensure that margins are monitored and maintained over time. The FFT obtained and reviewed a copy of the governing Procedure, TS5.ID2, Revision 23, "Margin Management," which had been basically unchanged since the DCISC's last review. The procedure defined systems within the process scope to be DCPP Maintenance Rule risk significant systems as well as systems whose failure could prevent the function of safety-related systems, structures, or components, cause a trip, or cause a safety system actuation. The specific systems were listed in an attachment to the procedure. The procedure stated that the goal of the process was to ensure that configurations were conservatively maintained within design requirements and that design requirements were conservatively maintained within the design basis. In general,

engineers, maintenance, and operations personnel were responsible for continually reviewing sources of margin issues and identifying any changes that might encroach on design or operating margin. Personnel who identified a potential low margin issue were required to report the issue in the Corrective Action Program.

Once an issue was identified, a knowledgeable engineer was required to evaluate and rank the issue per a matrix contained in an appendix to the procedure that used an assessment of both the probability and the consequence of a significant reduction in margin. Rankings assigned to each issue were listed as:

Probability

1. Margin is inadequate for long-term operation.
2. Margin will become inadequate for long-term plant operation without attention at or before the next refueling outage.
3. Margin is likely to become inadequate for long-term plant operation without attention.
4. Margin may become inadequate for long-term plant operation without attention.
5. Margin is not likely to become inadequate for long-term plant operation.

Consequences

1. Significant safety, regulatory, or operational risks if margin is not restored.
2. Significant safety, regulatory, or operational risks if margin continues to degrade.
3. Significant safety, regulatory, or operational risks if margin degrades.
4. Present margin is sufficient to avoid significant safety, regulatory, or operational risks.
5. Previously identified margin concern has been resolved. No degrading margin trend.
6. No current margin concerns exist; but new requirements are likely to create margin issues.

Margin Management risk scores were tallied by the Margin Management Process Owner or another engineer and reviewed by the Margin Management Subcommittee (MMSC). The rankings produced a risk score that was then categorized as either Green, White, Yellow, or Red. Red or Yellow issues were tracked on the Top Margins Issues List, and issues other than Red and Yellow were tracked for resolution through the Corrective Action Program.

The MMSC consisted of the Margin Management Process Owner, an Engineering Manager, and three System or Component Engineers, and it was considered a subcommittee of the Plant Health Committee (PHC). Typically, the MMSC would meet monthly or as needed upon the identification of any new Red or Yellow issues. The duties of the MMSC included:

- Providing oversight for activities performed related to margin issues
- Reviewing new margin issues for validity
- Assigning owners to margin issues
- Assigning risk scores
- Determining whether the margin needs to be restored
- Ensuring the proposed resolution is appropriate and timely
- Tracking issue resolution to completion

The Margin Management Process Owner was responsible to present issues to the MMSC and to maintain the Top Margins Issues List, which was a list of the highest ranked DCPP margin issues as established by the MMSC. A copy of the Top Margin Issues List was provided quarterly to the PHC for their review. The procedure appeared comprehensive and effective.

A copy of the current Top Margin Issues List was provided to the FFT. The list contained three margin issues, each of which were categorized as Yellow, as follows:

- Ultimate Heat Sink – An analysis was originally to have been required to justify Pacific Ocean (the DCPP Ultimate Heat Sink) temperature above 64°F (now 67.68°F) with one Component Cooling Water (CCW) heat exchanger in service or 70°F (now 73.75°F) with two CCW heat exchangers in service. Currently a modification to these heat exchangers is planned to improve their performance; however, a License Amendment Request will need to be submitted to NRC for a Technical Specification change.
- A modification is needed to both units' Turbine Control Systems to improve synchronization with the generator. The modifications will be performed in the R25 refueling outages.
- An Instrument and Control modification is needed to the Main Steam Safety Valves to maintain or improve their margins. These modifications will be performed in the R25 refueling outages.

The above two items on the Top Margin Issues List both represented items that over time could result in a significant reduction in margin if not adequately monitored or corrected. The FFT inquired regarding the relationship of the Margin Management Process to other programs at the station. Programs such as Environmental Qualification and Seismic Qualification had their own systems for tracking margin. Additionally, the Design Change Process always required Design Engineers to review the effects of any changes upon margins.

Conclusions: The DCPP Margin Management Process was well-documented and appeared to be effectively implemented, and the process owner was very knowledgeable.

Recommendations: None

3.11 Reactor Coolant System Boric Acid Leak Root Cause Evaluation

Note: The actual Root Cause Evaluation report was classified CONFIDENTIAL on CERTREC. I have sent this FF writeup to Brandy Lopez to see if it is OK to release Publicly and will change it if necessary.

The DCISC FFT met with Mark Sciacca, Director of Nuclear Projects, for an update on this boric acid leak on a 2-inch diameter vent pipeline line directly off the Reactor Coolant System (RCS) that was identified in October 2022. The following representatives of the California Department of Water Resources joined the meeting remotely: Christian Arechavaleta, Deb Luchsinger, Eric Blocher, and Jerry Bischof.

The DCISC last reviewed this issue in August 2023 (Reference 6.11) when it concluded the following:

> *The Unit 2 boric acid leak in the early stages of Outage 2R23 was identified and resolved appropriately. The preliminary root cause was identified as a faulty weld exacerbated by normal vibration of the piping system. DCPP also expanded the review to include other similar welds on both units as an extent of condition review. The corrective action to cut out the weld for examination and apply a weld overlay to rejoin the joint appeared appropriate.*

The event, which occurred during Outage 2R23 stemmed from an inspection at the 91-foot level of Unit 2 Containment by In-service Inspection engineers for boric acid leaks which can cause corrosion. The engineers spotted a white deposit on the overhead. Scaffolding was constructed, the insulation removed, and the presence of boric acid confirmed on a 2" vacuum fill line coming off the Loop 1 Reactor Coolant System cold leg. There was no active leakage when the boric acid was discovered, but there was evidence of past leakage when the plant was operating at full pressure and temperature.

This issue was documented in the Corrective Action Program for resolution. The boric acid leak occurred from a socket weld which developed a crack. A Root Cause Evaluation was initiated, headed by Mr. Sciacca, a welding engineer. A Licensee Event Report (LER) was submitted to the NRC.

Upon observing the weld and reviewing the original weld documentation and quality control inspections, it was determined that the original weld was faulty. The combination of faulty weld and normal vibration in the system from the Reactor Coolant Pumps caused a fatigue failure – a crack – to develop. The faulty weld, exacerbated by normal piping vibration from Reactor Coolant Pumps, was the root cause of the leak.

It was concluded under the mechanical engineering codes that a weld overlay would be appropriate, and an overlay was installed, which would be good for one operating cycle. Now, in the current Refueling Outage 2R24 this line will be replaced, including new welds. The FFT concluded the event had very little safety significance and was a good catch by the in-service inspection engineers.

<u>Conclusions</u>: The DCPP Unit 2 boric acid leak caused by vibration of an original faulty weld of a two-inch stainless steel socket connection was discovered in a normal walkdown. The initial temporary repair was a weld overlay, and the final resolution was replacement of the line in Outage 2R24. The DCISC concluded that this root cause determination and corrective action were appropriate.

<u>Recommendations</u>: None

3.12 Intake Cove Dredging Update

The DCISC FFT met with Trevor Rebel, Environmental Permitting Manager, Mark Sciacca, Manager of Projects, and Tom Jones, Regulatory, Environmental and Repurposing Senior Director, for an update on the current DCPP Intake Bay maintenance and dredging operations. Because this portion of the fact-finding meeting was held at the boat dock and on the boat, DWR was unable to participate remotely; however, a draft copy of this section of this report was sent to them.

The following was reported in the DCISC's December 2023 DCISC Fact-finding report (Reference 6.12):

> *This update was prompted by DCISC's receipt of an email from a member of the Alliance for Nuclear Responsibility (A4NR) with two attachments received by mail from an anonymous source, alleging certain improprieties related to dredging and diving operations at the DCPP Intake Cove. A summary of the alleged improprieties was as follows:*
>
> - *The allegation was made anonymously by a "concerned plant associate and citizen" due to a fear of retaliation from PG&E.*
> - *The dredging of the Intake Cove had been deferred, including an inference that cost was the basis for the deferral.*
> - *In lieu of dredging, divers were using fire hoses to push large amounts of sand towards the Circulating Water System intakes. As a result, trenches in front of the intake had been created.*
> - *The movement of sand by divers had been going on for years but recently became more frequent.*
> - *The practice of sand movement by the divers was illegal.*
> - *Concerns once voiced "from there" were unvalued and dismissed, and employees could be reluctant to discuss the issue.*

The DCISC last reviewed this operation in January 2024 (Reference 6.13), when it concluded the following:

> *The DCISC investigation into the anonymous dredging allegation revealed no improprieties regarding the dredging operation itself, permitting, legality, or nuclear safety. An investigation by the DCPP Employee Concerns Program Office found no evidence of this issue having been reported to it.*

Intake Maintenance Activities

DCPP has been performing Intake Maintenance using divers as follows since the plant went into service:

- Routine manual Bar Rack kelp and algal cleaning
- Sand management at Bar Racks using fire water and fire hoses
- Sand "dune" management to "notch" dune for diver safety

- ASW forebay sand movement using fire water and fire hoses
- Gate guide cleaning
- Wet forebay scraping and cleaning
- Kelp harvesting
- Water has been flowing since ~ 1974
- Maintenance activities have taken place for 30+ years

There have been no significant issues with the periodic Intake maintenance.

As stated in the above conclusion, the January Fact-finding Meeting follow-up was to discuss actions taken by the DCPP Employee Concerns Program (ECP) Office. Ms. Wells, Manager ECP, reported that the ECP Office performed an extensive search of its database for the following key words: “dredging”, “retaliation”, “intake cove”, and “anonymous” in an effort to see if the allegation had been reported in the ECP. There was nothing actionable found as a result of this search.

The diving teams used in this “sand movement” were all commercial businesses, and not PG&E employees. The ECP Office met with the diving teams in a “Listening and Learning Session;” however, no new information on the operation or new concerns were brought out.

This discussion took place at the DCPP boat dock and in the DCPP boat, which is used for environmental sampling, shoreline inspections and monitoring, and plant tours by water. DCISC Consultant Wardell received an update of Intake maintenance activities which were ongoing.

<u>Dredging Project</u>

- A dredging permit application was submitted to the California Coastal Commission July 21, 2023 with the intention to dredge in Fall 2023.
- The one-time dredging project was postponed to Spring 2024
- A revised permit application was submitted January 8, 2024 with expected approval in mid-May 2024.
- Dredging operations are scheduled to take place during the month of June 2024.
- Dredging will return the Intake Channel to its original nominal 36 feet by removing up to 70,000 cubic yards of sand and silt.

DCISC Consultant Wardell at Intake dredging site and near the plant.

Conclusions: DCPP's routine maintenance of its Intake Cove, primarily Bar Rack cleaning and sand movement, has been performed since the plant went into operation without any significant issues. The purpose of the planned dredging operation is to move and remove large amounts of sand which had built up in front of the main intake structure and threatened to restrict Condenser Circulating Water flow and thus power production. Safety-related Auxiliary Saltwater System flow, also from this intake, was not threatened as its flow rate was much less than that for the Circulating Water System that provides cooling to the main condensers.

Recommendations: None

4.0 CONCLUSIONS

4.1 The April 17, 2024 meeting of the ALARA Review Committee to evaluate the Outage 2R24 personnel radiation dose to date and dose goal appeared to be thoughtfully and effectively implemented. Outage ALARA performance to date was as expected with no surprises.

4.2 DCPP's Reactivity Management Program, which ensures conservative reactivity management by promoting a reactivity-conscious culture, appears effective. Program Performance Indicators are good and improving. They show a low occurrence rate and significance of Reactivity Management events for the past 12 months.

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

4.4 The DCPP Digital Control Systems were all reported to be in good health. The digital systems have proved effective in reducing operator burden and minimizing plant transients. They are protected from outside or inside tampering by the DCPP Cyber Security Program.

4.5 The DCISC observation of the lifting of the 10-ton Main Feedwater Pump Turbine Steam Chest by DCPP Maintenance Technicians found that the process was performed properly and carefully, using appropriate safety measures and procedures.

4.6 The DCPP Outage 2R24 was progressing on track to meet all outage goals. Aging management inspections for the License Renewal Application were being performed as planned. The Outage Safety Plan was being followed closely with no exceptions to date.

4.7 DCPP Operations is fully staffed for continued operation through 2030 and beyond as required. Overall Operations performance indicators are predominantly Green (good), The DCPP Operational Decision-Making Process has been effectively

implemented to develop appropriate and safe decisions to address operational issues and events.

4.8 DCPP's obtaining of an NRC Enforcement Discretion to extend the Technical Specification allowed outage time for Emergency Diesel Generator-related repairs appeared appropriate.

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

4.10 The DCPP Margin Management Process was well-documented and appeared to be effectively implemented, and the process owner was very knowledgeable.

4.11 The DCPP Unit 2 boric acid leak caused by vibration of an original faulty weld of a two-inch stainless steel socket connection was discovered in a normal walkdown. The initial temporary repair was a weld overlay, and the final resolution was replacement of the line in Outage 2R24. The DCISC concluded that this root cause determination and corrective action were appropriate.

4.12 DCPP's routine maintenance of its Intake Cove, primarily Bar Rack cleaning and sand movement, has been performed since the plant went into operation without any significant issues. The purpose of the planned dredging operation is to move and remove large amounts of sand which had built up in front of the main intake structure and threatened to restrict Condenser Circulating Water flow and thus power production. Safety-related Auxiliary Saltwater System flow, also from this intake, was not threatened as its flow rate was much less than that for the Circulating Water System that provides cooling to the main condensers.

5.0 RECOMMENDATIONS

5.1 None.

6.0 REFERENCES

6.1 Diablo Canyon Independent Safety Committee Twenty-ninth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2019 – June 30, 2020," Approved October 15, 2020, Volume II, Exhibit D.3, Section 3.2, "As Low As Reasonably Achievable (ALARA) Review Committee Meeting"

6.2 Diablo Canyon Independent Safety Committee Thirty-Second 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.9, Section 3.10, "Reactivity Management Process Update."

6.3 Diablo Canyon Independent Safety Committee Thirty-Fourth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2023 – June 30, 2024," Approved October 9, 2024, Volume II, Exhibit D.7, Section 3.12, "Meet with NRC Senior Resident Inspector"

6.4 Diablo Canyon Independent Safety Committee Thirty-Second Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2021 – June 30, 2022," Approved September 16, 2022, Volume II, Exhibit D.4, Section 3.4, "Digital Systems Update."

6.5 Diablo Canyon Independent Safety Committee Thirty-Fourth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2023 – June 30, 2024," Approved October 9, 2024, Volume II, Exhibit D.7, Section 3.6, "Plant Tour."

6.6 Ibid, Exhibit D.3, Section 3.11, "Outage 2R24 Scope and Schedule."

6.7 Ibid., Exhibit D.4, Section 3.1 "Operations Update."

6.8 Diablo Canyon Independent Safety Committee Thirty-Fourth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2020 – June 30, 2021," Approved October 15, 2021, Volume II, Exhibit D.3, Section 3.11, "Operational Decision Making."

6.9 Diablo Canyon Independent Safety Committee Thirty-Fourth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2023 – June 30, 2024," Approved October 9, 2024, Volume II, Exhibit D.7, Section 3.10, "Meet with DCPP Officer."

6.10 Diablo Canyon Independent Safety Committee Twenty-Eighth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2019 – June 30, 2020," Approved October 13, 2020, Volume II, Exhibit D.9, Section 3.8, "Margin Management Program."

6.11 Diablo Canyon Independent Safety Committee Thirty-Fourth Annual Report on the Safety of Diablo Canyon Nuclear Power Plant Operations, July 1, 2023 – June 30, 2024," Approved October 15, 2024, Volume II, Exhibit D.2, Section 3.8, "Boric Acid Leak Root Cause Evaluation."

6.12 Ibid., Exhibit D.5, Section 3.5, "Intake Cove Maintenance and Dredging Project Update."

6.13 Ibid., Exhibit D.6, Section 3.9, "Intake Dredging Update."