Senate Bill 846 Independent Review Team Report

Introduction

In November 2009, Pacific Gas and Electric (PG&E) applied to the Nuclear Regulatory Commission (NRC) for renewal of the operating licenses for both Units 1 and 2 for 20 years, consistent with the timely renewal provisions 10 CFR 2.109(b). The NRC conducted a docketing acceptance review of the application, accepted it for docketing, and began the necessary safety and environmental reviews. In April 2011, PG&E requested that the NRC delay its decision on the Diablo Canyon Power Plant (DCPP) Units 1 and 2 license renewal application (LRA) to allow PG&E time to conduct additional seismic analyses in the wake of the March 11, 2011, Great Tohoku Earthquake off the East Coast of Japan which led to the Fukushima Daichi reactor accident. On June 2, 2011, the NRC staff published a safety evaluation documenting its safety review of the application to that point. On June 21, 2016, PG&E announced a Joint Proposal with Friends of the Earth, the Natural Resources Defense Council, Environment California, the International Brotherhood of Electrical Workers Local 1245, Coalition of California Utility Employees, and Alliance for Nuclear Responsibility to increase investment in energy efficiency, renewables, and storage, while phasing out nuclear power by 2025. Concurrently, as required by the Joint Proposal, PG&E requested that the NRC suspend its review of the DCPP Units 1 and 2 license renewal application. By letter dated March 7, 2018, PG&E requested to withdraw the license renewal application based on projected energy demands and other economic factors in the State of California (State). On April 16, 2018, the NRC granted the withdrawal, terminated its review, and closed the LRA docket.

On September 2, 2022, the Governor of California approved Senate Bill No. 846 (SB 846) which invalidated the January 11, 2018, California Public Utilities Commission's (CPUC) approval of PG&E's proposal to retire DCPP Units 1 and 2 when their 40-year operating licenses expired in November 2024 and August 2025, respectively. SB 846 required the CPUC to set new retirement dates for DCPP Units 1 and 2 conditioned upon the NRC extending the DCPP's operating licenses. PG&E is currently preparing a new LRA which is expected to be submitted to the NRC by the end of 2023.

As a result of the actions taken by the State on September 2, 2022, which allowed PG&E to pursue a LRA, by letter dated October 31, 2022, PG&E requested that the NRC resume its review of the previously submitted and subsequently withdrawn DCPP Units 1 and 2 LRA; PG&E also requested that the NRC confirm that PG&E was (and is again) in timely renewal under 10 CFR 2.109(b). In the alternative, PG&E requested an exemption from 10 CFR 2.109(b) and timely renewal protection that would allow PG&E to submit a license renewal application for DCPP Units 1 and 2 by December 31, 2023. The NRC staff responded to this request on January 24, 2023. In its response, the NRC staff explained it would not resume the review of PG&E's withdrawn application and stated that its response to PG&E's exemption request would be provided separately. On March 2, 2023, the NRC granted PG&E a one-time exemption for DCPP

Units 1 and 2, from 10 CFR 2.109(b) to allow PG&E to submit a license renewal application for the Diablo Canyon Power Plant, Units 1 and 2 no later than December 31, 2023.

A provision of SB 846 required PG&E to establish a covenant that the operator shall commission a study by independent consultants to catalog and evaluate any deferred maintenance at DCPP and to provide recommendations as to any risk posed by the deferred maintenance, potential remedies, and cost estimates of those remedies, and a timeline for undertaking those remedies. To meet this requirement PG&E hired two independent industry experts to conduct the independent study discussed in SB 846. To assist the industry experts, PG&E also provided a retired employee with substantial experience in plant maintenance and work planning at DCPP to provide related DCPP programmatic and process expertise. The following report provides the results of this independent review team's evaluation of deferred maintenance at DCPP Units 1 and 2.

Executive Summary

The Independent Review Team (IRT) conducted its review efforts between the months of April and October 2023. The primary activities conducted by the IRT included familiarizing itself with pertinent plant procedures and processes, reviewing information related to plant performance and maintenance activities, conducting interviews of cognizant management and personnel, visiting the site to personally inspect the material condition of plant systems and components, and observing various meetings associated with plant operations, maintenance, and outage planning. Appendices B and C provide details on the materials reviewed by the IRT during its review.

It is important to note that the IRT's purpose was not to assess the overall maintenance practices conducted at Diablo Canyon since 2016 nor the readiness of the plant systems and components to successfully operate beyond the current 2024 (Unit 1) and 2025 (Unit 2) license expiration dates. Additionally, this project was not intended to be a review of DCPP's Aging Management Programs (AMPs) which will be the subject of future NRC inspections once an LRA is submitted by PG&E.

The IRT was very intentional in focusing its efforts on the specific provision of SB 846 related to deferred maintenance. As described in the Background Section below, maintenance activities at a nuclear power plant can be separated into Corrective Maintenance (CM) and Preventive Maintenance (PM). The IRT focused its attention primarily on the PM program as that is where the greatest potential for deferred maintenance exists. While delays in completing CM can occur based on things like unavailability of parts, available staff and higher priority work, CM is conducted under a well-defined prioritization system. The IRT found no instances of CM associated with safety systems, systems important to safety, or plant reliability systems where delays in conducting the work posed a risk to continued safe operation of DCPP.

Regarding the DCPP PM Program, the IRT found it to be well-defined, well-executed and consistent with industry-wide standards and practices. As discussed in the Background Section below, with a nuclear PM program, maintenance is considered to be deferred if it is not completed within the grace period that is typically 25% of the assigned PM frequency. The IRT found no instances of deferred maintenance from the time that PG&E announced its decision in June 2016 to withdraw its initial 2009 LRA until the IRT review effort was conducted. The IRT focused much of its review efforts on the Preventive Maintenance Optimization (PMO) initiative that occurred in 2018 and the PMO++ initiative conducted in 2023. A large amount of attention was devoted to these two programs as they resulted in a number of changes to the scope and frequency of PM activities utilizing the PM Change Request (PMCR) process. The results of the IRT's review of these initiatives were that they were well-managed and that a conservative bias was applied in the approval of any PMCRs that resulted in an increased PM frequency or a reduction in PM scope. Also, the PMO++ effort revisited PMCRs that were changed because of the PMO initiative and the IRT determined that this activity either reaffirmed the basis for the change to the scope or frequency of a PM or modified the PM in consideration of the potential for entering a period of extended operation (PEO) assuming a successful LRA review by the NRC.

Many of the other activities conducted by the IRT (i.e., information reviews, interviews, meeting observations, plant inspections) enabled the IRT to determine that DCPP had been well-maintained, had a strong performance record based on both NRC and Institute of Nuclear Power Operations (INPO) measures and reports, and that the staff and management team was clearly focused on safe and reliable operation of the plant. Of note, is that during the IRT's observation of a planning meeting for the Unit 1 refueling outage that started on October 1, 2023, the IRT noted a substantial focus on including work identified by the PMO++ initiative as important to conduct to support safe and reliable operations entering the PEO.

As supported by the information provided in this report, the IRT determined that there was no preventive maintenance that was deferred and that efforts associated with modifying PMs through the PMCR review and approval process were conducted consistent with plant procedures and industry best practices. While there were frequency and scope changes made through the PMCR process, there were no PMs that would be described as deferred maintenance consistent with nuclear industry standard practices. Additionally, the CM program was effectively managed consistent with industry standards and practices. While there was some growth noted in CM backlogs as the plant was heading towards cessation of operations, this did not adversely affect any safety, important to safety, or plant reliability equipment or systems. Over the past several years, the CM backlogs have been reduced and are at levels consistent with good industry performers.

In conclusion, the IRT did not identify any deferred maintenance, thus there was no undue risk to plant operations. Therefore, the IRT did not have a need to identify any potential remedies, cost estimates of those remedies, nor a timeline for undertaking those remedies.

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Background

Corrective Maintenance (CM) represents a level of deficiency of a plant component that has failed or is significantly deficient such that failure is likely to occur within its operating cycle/ preventive maintenance interval and no longer conforms to or cannot perform its design function. Corrective maintenance has three classifications: corrective critical, corrective noncritical, and run to maintenance components. At DCPP, a Daily Notification Review Team (DRT) is responsible for screening of new equipment deficiencies that may impact plant equipment operability, reportability or personal safety. The DRT categorizes equipment deficiencies using a prioritization matrix. The matrix includes categories such as safety significance, risk significance, economic risks, operational burden, and regulatory impact.

The corrective maintenance process at DCPP uses the INPO AP-928 Work Management Process Description along with the DCPP procedure for conducting the DRT meeting to review incoming Condition Reports (CRs) for assigning priority to equipment deficiencies that need corrective maintenance. When appropriate, a Work Order (WO) is generated that captures the work assignment to correct the deficiency and can either be assigned to the Fix it Now (FIN) team for a near term repair activity or to one of the Maintenance shops for work to be planned and scheduled through the work management process. The DRT classifies CMs using a prioritization matrix that assesses equipment/plant deficiencies against 12 criteria classifications. Based on the review, a deficiency is assigned one of 5 prioritization levels:

- Priority 1: start work immediately and work 24 hours per day to complete.
- Priority 2: start work as soon as possible with a 7-day due date.
- Priority 3: emergent work that warrants scheduling inside T-3 scope freeze window within a 45-day due date.
- Priority 4: schedule in normal 12-week schedule matrix or next available Maintenance outage window within a two-year due date.
- Priority 5: work as time permits in deference to other higher priorities with a four-year due date.

Preventive maintenance (PM) is an activity that detects, precludes, or mitigates degradation of functional structures, systems, and components (SSCs) to sustain or extend its useful life by controlling degradation and failures to acceptable level. The objective of the PM program is to ensure safety and non-safety related SSCs are maintained in a condition that they will perform their intended functions. PMs are assigned a Due Date, which is the date established by adding a fixed number of calendar days to the last date the PM was performed. The fixed number of days is determined by the established PM frequency. As described in DCPP procedure MA1.ID27 “Preventive Maintenance Program”, and consistent with industry guidance, a grace period is also established for the PM task, which is the period between the due date and an overdue date for a PM. The overdue date is the last date for performance of a PM task, established by adding a percentage of the PM frequency to the due date not to exceed 2 years. Typically, the grace period is 25% of the established PM frequency. For example, a 12-month PM would have a grace period of 3 months. PMs in grace are not considered deferred. A

specific industry-wide metric is “PMs Deep in Grace” which provides licensees with continuous awareness of whether a PM is nearing its due date.

At DCPP, PM tasks are classified using 3 priorities. Priority 1: Regulatory/Critical – are tasks that directly implement license or regulatory requirements, are associated with safety related equipment, or implement or facilitate compliance with requirements from outside entities such as the NRC, Nuclear Electric Insurance Limited (NEIL), Occupational Safety and Health Administration (OSHA), or National Fire Protection Association (NFPA). Priority 2: Programmatic -are tasks on non-critical equipment that directly supports the operation of critical equipment. Priority 3: Economic – noncritical PM test that are overall cost beneficial. The PM program is a living program. It is a continuing process of optimizing PMs based on new information from internal and external sources including feedback from plant personnel on what they observed when conducting a PM activity, Maintenance Rule, vendor manuals, operating experience, system and component monitoring trends, plant design changes and Electric Power Research Institute (EPRI) PM template reviews.

The PM change process is controlled by use of a PM Change Request (PMCR). The PMCR documents the evaluation and reviews required to change a PM task or frequency. DCPP employs a PM Review Team (PMRT), which is a multi-discipline team that is responsible for the review and approval of PMCRs. A PMCR is submitted when information is obtained that indicates the existing PM frequency may not be appropriate for the given SSC. A PMCR could seek to extend or shorten the frequency of a given PM. PMCRs also include changes related to the task scope, as well as addition or deletion of a PM. This is an established nuclear industry practice. After a PMCR is reviewed and approved by the PMRT, it is provided to the Plant Health Committee (PHC) if it is a critical PM. The PHC is responsible for approving critical PM change requests. The PHC is a site committee consisting of senior plant managers with greater organizational responsibilities than PMRT members. Critical PM changes requesting either deletion, a frequency decrease or scope reduction must have a risk assessment performed. The PMCR is the process used to ensure PMs do not result in deferred maintenance. A common industry definition of “deferred maintenance“ is required maintenance that is not performed due to resource limitations, cost, nor lack of materials required for the task. In the nuclear industry, only overdue PMs without a PMCR justification would be considered deferred.

Due to the type of equipment and the PM requirement, a subset of PMs can only be conducted when the plant is in a shutdown condition. A significant aspect of planning for a refueling outage when these types of PMs would be performed is scheduling these PMs at the proper time during the outage. PMs scheduled for upcoming refueling outages are reviewed by a cross functional team, the Outage Scope Review Team (OSRT). DCPP’s outage management team is responsible for scoping and scheduling outage preventive maintenance activities in appropriate outages prior to the PM due date. Conservative decision making is used to address proposed outage PM scope change requests.

The Nuclear Regulatory Commission has a well-defined inspection program as part of its Reactor Oversight Process (ROP). A substantial portion of the inspection program is devoted to

conducting inspections of a licensee's maintenance programs and processes. The NRC's Inspection Procedures states that "M*aintenance is the primary means of mitigating and managing the effects of component degradation and failures. Operating experience shows that the lack of maintenance (component deficiencies not corrected) or improperly performed maintenance (maintenance activities not well controlled) can greatly contribute to the risk for event initiation and may cause SSCs to not function properly if called upon to mitigate the consequence of an event".*

Pertinent Inspection Procedures (IPs) are listed in Appendix C. DCPP's performance related to several specific IPs were of particular interest to the IRT. These included: (1) IP 71111.12, "Maintenance Effectiveness", the purpose of which is to review maintenance effectiveness issues associated with availability, reliability, common cause failures, and work practices of risk significant SSCs; (2) IP 71111.19, "Post-Maintenance Testing", the purpose of which is to verify that post maintenance test procedures and test activities were adequate to verify system operability and functional capability for the maintenance that was performed; and (3) IP 71111.22, "Surveillance Testing", the purpose of which is to verify that surveillance testing (including in-service testing) of risk-significant structures, systems, and components (SSCs) are capable of performing their intended safety functions and assessing their operational readiness.

Review Results

There are numerous procedures and processes that are used by DCPP to maintain equipment including the following:

- AD7.ID4, On-line Maintenance Scheduling
- AD7.ID2, Daily Notification Review Team
- TS5.ID1, System Engineering Program
- TS5.ID9, Plant Health Committee
- AD7.ID18, Plant Health Prioritization Committee
- AD8.ID5, Outage Scope Determination and Control Process
- MA1.ID27, Preventive Maintenance Program

These procedures were reviewed by the independent review team and are consistent with nuclear industry practices.

In 2018, DCPP initiated a PM Optimization Project (PMO) to review and assess current PM strategies. This initiative was in conjunction with a nuclear industry initiative "Delivering the Nuclear Promise "(DNP). The DNP consisted of a number of recommended actions licensees should consider implementing to reduce costs by taking actions such as streamlining processes and eliminating or reducing unnecessary activities. One of these actions was related to reevaluating a site's PM strategies. The intent of PMO was to right size and prioritize preventive maintenance plans to ensure maintenance was performed at an appropriate frequency. DCPP reviewed approximately 13,000 PM activities over a 7-month period using a cross discipline site team. As a result of the PMO approximately 4500 PMCRs were generated and approved by the PMRT or PHC as appropriate. Most of the approved PMCRs resulted in changing the PM tasks

and/or extending the frequency of the given PM. The review resulted in a resource and customer savings of about 20,000 person-hours. All changes were processed using the well-defined PMCR process. The focus of the initiative was on challenging priority 2 and 3 PM tasks and making appropriate changes to PMs. No priority 1, (Regulatory/Critical) PMs were affected by the PMO effort. Interviews were performed with site personnel including the past Planning Manager, the site PM coordinator, and an outage specialist regarding the PMO effort. All these individuals were intrinsically involved in the PMO effort. These interviews reinforced the IRT's perspective that the PMO effort was a comprehensive and well-managed activity. Notable insights from these interviews included:

- The guiding process for conducting the PMO was the DCPP PM program procedure.
- Evaluations associated with the decisions made on each PM frequency that was modified were captured in a PMCR.
- The PMRT reviewed and approved the vast majority of PMCRs (99%) resulting from the PMO effort.
- After completing the 2018 PMO initiative, the site closely monitored equipment performance to determine if there had been a change in a PM strategy and if the PM strategy change was a causal factor in the equipment reliability issue. No PMs that were changed because of the 2018 PM activity were reset to the original PM frequency as a result of equipment reliability issues or other factors.
- Interviewees stated that any equipment reliability issues that occurred post-PMCR changes were not related to deficient PMs (PMs with inadequate guidance) or the extension of a PM frequency.
- During the PMO review activity, system engineers were very aligned with the process and were actively engaged in supporting the program.
- After the PMO activity was complete there were some outage scope PMs where the frequencies were changed or were moved to future outages. This process was controlled initially by the Plant Health Committee (PHC) as described in DCPP Procedure TSS.ID9 "Plant Health Committee", and later controlled by the Outage Management Team (OMT) meeting process per DCPP Procedure AD8.ID1, "Outage Planning and Management". The OMT included a quorum of PHC voting members for approval of any outage PM changes.
- Any outage scope PM changes were related to power production activities and not safety related equipment or high-risk activities.
- Per the standard industry-accepted definition of deferred maintenance, DCPP has not deferred any maintenance.
- Compared to other nuclear sites, DCPP's decision-making practices emphasized prudent choices over those that were imply allowed when evaluating reduction in PM tasks or frequency changes.

In late 2022, a new site initiative was established called PMO++. This was established after the approval of SB 846 to take a holistic look at the site's readiness to operate beyond the initial 40-year licenses. The major focus of PMO++ was related to preparing DCPP for meeting license renewal requirements and supporting a period of extended operations. Integral to the conduct

of PMO++ was a review of equipment/system health and prioritizing future work scopes, especially for upcoming refueling outages. One of the significant activities performed by the PMO++ team was a review of past PM frequency changes made as a result of the PMO effort, CM work orders that had been extended beyond 2025, necessary license renewal activities and approved PMCRs that had been analyzed as not having to be performed prior to end of license dates of 2024/2025 for Units 1 and 2 respectively. The initiative was conducted between December 2022 and May 2023. With respect to PM tasks, approximately 90 new PMCRs were generated to change frequencies or reactivate PMs resulting from the prior PMO initiative. These PMs were related to balance of plant equipment and non-critical equipment and not safety related SSCs.

The IRT visited the site the week of August 14, 2023. During the visit, the IRT conducted plant walkdowns, attended multiple site meetings attendance and interviewed multiple DCPP staff members. Plant walkdowns included inspecting all elevations of the Turbine Building and Auxiliary Building, as well as the Control Room, Intake Structure and Transformer areas. Overall, the plant spaces entered during the walkdowns were well lit, clean with good housekeeping. There were only a small number of minor water/steam leaks noted and no oil leaking from equipment except for the 1A Transformer. (The IRT was informed that the oil leak repairs were completed during the current Unit 1 refueling outage). The overall material condition of the plant was good and in the upper tier of sites recently visited by the IRT.

Meetings attended by the IRT included: several daily Operational Focus Review Meetings, the Unit 1 - 24th refueling T-2 Outage Readiness Meeting, a Notification Review Team Meeting, the Senior Leadership Team Meeting, a Plan of the Next Day meeting, and the DWR/PG&E Maintenance Check-in Meeting. The meeting protocols, agendas, and discussions were consistent with nuclear industry standards and regulations. It was apparent to the IRT that site personnel were clearly focused on safe and reliable plant operation and assuring that the plant was going to be in a condition that will successfully support continued plant operation.

During its interview with a group of Maintenance supervisors and general foreman and in a separate interview with a group of engineering managers, supervisors and engineers the IRT asked the following questions:

- How would you characterize the effectiveness of the preventive maintenance program in preventing equipment failures and sustaining the equipment in good operating condition?
- Were there any long standing or chronic equipment issues that you were aware of?
- Have there been any recent critical component failures or forced outages caused by equipment failures?
- Do the maintenance craft have input or are they offered the opportunity to provide feedback on PM or CM strategies?
- What were the current backlogs for PM and CM? Did the backlogs grow over the past five years after the decision was made not to pursue license renewal? Was there a concerted effort to address work backlogs after the decision to continue operating the plant beyond its original license date?

- Do you have familiarity with the PMO and the PMO ++ efforts? How did you view their impact on plant equipment performance primarily through changes made to PM strategies?
- Were there any PM changes that you thought were inappropriate or nonconservative?
- Would you consider the PMO ++ effort as having effectively recentered the PM program with the right frequency and content?
- Is the Plant Health Committee process effective, particularly in how it considers proposed PM strategy changes?
- Is the site's predictive maintenance program effective in focusing attention on the long-term health of equipment such as pumps, motors, and transformers?
- Does the outage planning process provide the right focus on PMs and CMs on your systems or components? Are there any concerns with the scoping process?
- Were there any current staffing shortfalls that were impacting the ability of the site to properly maintain plan equipment?
- Were you aware of any regulatory issues associated with the site's maintenance programs (for example maintenance rule violations, unplanned LCO entries)?
- What is your perspective regarding the current state of equipment performance at DCPP and your level of confidence in the ability of the equipment to perform satisfactorily during the period of extended operation (PEO)?

The results of the interviews did not raise concerns about the current Preventive Maintenance program or the PMO and PMO++ initiatives. Most concerns raised by the interviewees related to plant equipment reliability centered around material availability and parts obsolescence. It was noted by the interviewees that the CM backlog had increased during the period of time after the decision was made to not pursue license renewal but was able to be maintained and stabilized and no safety related SSCs were impacted by this backlog increase. The interviewees noted concerns due to attrition that resulted in the loss of experience and proficiency within the staff. They were well aware of the efforts over the past 9 months to mitigate this concern by filing numerous open positions needed to support plant operations entering the PEO, but that it will take some time for these new hires to become fully proficient. The interviewees did note that some systems and components had received more attention over the last few years due to some observed performance issues such as the Fuel Transfer System, radiation monitors, Control Room Ventilation, and secondary system valves. These issues were not attributed to changes in the PM program but represented normal wear on systems that have been operating during the current licensing period of 40 years. The IRT noted this situation was typical of plants of similar vintage in the industry. Overall, the staff noted that they were confident in being able to handle any emergent equipment issues and in their capability to perform required CM and PM to keep the two units in excellent working order.

The Review Team attended the 1R24 Outage T-2 meeting on August 14, 2023. The outage was planned to occur in Fall 2023. During the meeting both PMO++ scope and License Renewal preparation activities that needed to be performed during the outage were central discussion

topics. The following activities were scheduled for 1R24 which address many of the primary and secondary system PMO++ scope recommendations:

- Replace RVLIS Bellows O rings, inspect capillary tubing and perform cap fill of the system
- Traveling screen frame replacements
- Main condenser expansion joints (dogbone) replacement
- Main condenser steam side lagging strap replacement
- Main condenser water box internal coatings
- Perform main circulating water pumps 1-1 and 1-2 motor air cooler PMs
- Condenser booster pump 1-1 pedestal replacement
- Diesel fuel oil storage tanks 0-1 and 0-2 overfill protection replacement
- Main generator cold gas RTD replacement (corrective maintenance)
- Stator water cooling thermocouple replacement repair
- Fiber optic vibration monitoring replacement/repair
- Main circulating water pump neutral winding relocation
- Transformer repairs/ refurbishment/ refilling of oil

Primary and secondary License Renewal activities scheduled included:

- AMP First-off Weld inspections and repair (if needed)
- Refueling water storage tank inspection
- Containment building 100% liner inspection/examination
- Reactor vessel capsule B removal
- Condensate polisher demineralizer vessel internal inspections 1-2, 1-3, 1-7
- Multiple Weld / line / component internal and external inspections
- Intake structure inspection
- Discharge structure / discharge conduit inspection
- 4 KV vital bus power supply to loads cable tan-delta testing
- 480 Volt cable megger testing
- Metal enclosed bus inspections

The team reviewed the following documentation associated with the PMO and PMO++ initiatives:

- PMO summary information
- PMCRs 2016 to 2018
- PMCRs 2019 to Present
- PMO++ PMCRs

Based on its industry experience, the team did not find any PMCRs involving a frequency change or deletion of a PM that were not appropriate. Documentation rationale was generally sound with some minor exceptions. The team did identify some PMCRs that required additional review including the following (the site was notified and committed to review these items for any potential changes or modifications):

- 2-TGMC Oil Pump replacement – PM was deactivated based on remainder of life. The next replacement wouldn't be until 2026.
- LT-7-210 LT-460 amplifier board– PM was deleted based on end of plant life. It was last performed in 2012. The life of the amplifier board is 26.7 years. If re-licensed, the PM would need to be performed in 2038.
- There were some Main Turbine valve actuator PMs deactivated. The team was informed that the Turbine team was evaluating all valve actuator PMs and frequencies.
- FW-1/2-FCVs and MS-1/2-PCVs actuator spring inspections were noted as inconsistent. Some had PMs, some did not.

Corrective maintenance backlogs were reviewed and were determined to be well-maintained and consistent with what is typically seen at good performing nuclear plants. As of the second quarter of 2023 (through June 2023) the DCPP Work Management Index was 100 and was in the first quartile in the industry. The Work Management Index provides an indication of how well a nuclear plant stays on top of its maintenance workload and includes sub-metrics related to timeliness and quality of planned work. The IRT noted that other key sub-metrics related to online deficient critical maintenance and online corrective non-critical maintenance were also in the top quartile of industry performance.

The site's performance with respect to corrective and deficient maintenance backlogs has improved since 2016. The site prioritizes plant deficiencies into corrective and deficient maintenance categories. Corrective maintenance is a deficiency that if not corrected can have an impact on a system or component's ability to perform its design function. Deficient maintenance is a deficiency that is not a threat to a component or equipment's design or performance function. Deficiencies are further classified as the following:

• CC: corrective critical (online or outage)

• CN: corrective non-critical (online or outage)

• DC: deficient critical (online or outage)

• DN: deficient noncritical (online or outage)

These categories are consistent with nuclear industry standards. In June 2016, total corrective and deficient backlogs for online and outage for the categories noted above was 478, with 32 items being corrective maintenance. In September 2023, the total corrective and deficient backlogs were 179. There were zero CC or CN online or outage deficiencies. At the time of the IRT's site visit in August 2023, DCPP had 70 equipment deficiencies in a Monitoring category that were related to issues such as: corrosion or rust on equipment; small oil, water or steam leaks; degraded insulation; paint touch ups; and some degraded seals. These were all relatively minor issues. The site also had approximately 2100 unscheduled work orders (WOs). These were deficiencies on "run to maintenance" components that would have low if any consequence if not

corrected. None of these were challenging plant performance and were classified as Priority 5 items.

The team reviewed a sample of station oversight reports over the past five years looking for any concerns or issues related to the execution of the corrective or preventative maintenance programs. The reports reviewed included: Nuclear Safety Oversight Committee (NSOC) reports, Quality Performance Assessment reports, and Nuclear Regulatory Commission (NRC) reports. In May 2018, the NSOC report noted that the PMO project was well defined, organized, and orchestrated with the potential to add significant value by reducing unnecessary PM work. It also noted that there was no evidence that technical conscience was reduced due to using the facilitative leadership decision making model. In October of 2018, the NSOC did note that there were some technical justifications for changes to preventative maintenance tasks owned by the Maintenance group that were insufficiently documented. The involved components were Priority 2 and below, so the consequences of the insufficient documentation justifications were low. In October 2019, NSOC noted that some aspects of the station's preventive maintenance program needed management attention due to 3 overdue PMs in 2019. These overdue PMs, which constituted deferred maintenance, were all related to the Power System Stabilizer on Unit 2. Delays in this maintenance were related to inability to meet prerequisite plant conditions to support maintenance activities including California Independent System Operator (CAISO) Grid Generation Restricted Maintenance Operations (RMO) during summer months. These PMs were successfully completed at first opportunity and with no issues noted. In February of 2020 this item was closed based on the station's corrective actions to address the issue. A review of NRC reports from the period did not reveal findings or violations related to implementation of the CM or PM programs at the site. Quality assessment reports also did not highlight any concerns with the PM or CM program management.

Recent Plant Performance History

Current plant performance based on 2nd quarter 2023 Industry-wide Performance Indicators was exemplary (the highest qualitative rating used in industry peer rankings). The Unit 1 and 2 overall index was 100 (100 represents the highest possible score). The station equipment performance index was first quartile (in the top 25% of all nuclear plants in the US). Consequential equipment failures were first quartile. The Maintenance and Work Management indices were both 100 representing first quartile performance. There were zero online critical PMs in the 2nd half of grace putting them in the first quartile. Total Maintenance consequential events were zero, also placing the site in the first quartile. Collectively, these metrics represent a high performing plant with strong maintenance and equipment performance.

Plant system health indicators were strong as measured by internal DCPP measures. Tier 1 systems are rated by a color-coded system with the following definitions:

- Green indicates the SSC has only minor or no performance issues.

- White indicates that all actions to correct major performance or system health issues with an SSC are complete or bridging strategies are in place with performance trending towards a specific goal or target.
- Yellow indicates the SSC has major performance or system health issues with bridging strategies and/or final corrective actions scheduled for implementation.
- Red indicates the SSC has major performance or system health issues and corrective actions are under development but not yet approved by the PHC.

Tier 1 systems include: emergency diesel generators, charging/safety injection systems, auxiliary feedwater systems, residual heat removal systems, component cooling water systems, auxiliary saltwater systems, condensate and feedwater systems, the main turbines, main generators, electrical distribution systems, and the reactor coolant systems. There are currently zero Red and one yellow SSC at DCPP. The yellow SSC categorization is associated with the Auxiliary Saltwater System (ASW) due to a March 2023 issue where a biolab PVC pipe leaked onto a circulating water pump raising concerns about possible bearing damage. Prompt corrective actions were taken to address the leaking pipe and the system health report is expected to be restored to normal status in the first quarter of 2024. No bearing damage was observed upon further inspection.

In addition to the good internal plant system health indicators discussed above, system performance as measured by the NRC's Maintenance Rule (10 CFR 50.65) program is also very good. The Maintenance Rule program is mandated by the NRC for periodically monitoring and assessing the performance of critical SSCs. There are two systems that are in category (a)(1) where actions are still in progress to address identified deficiencies. These are the Unit 1 Turbine Steam Supply where a non-safety related SSC was degraded and the Unit 1 Liquid Radwaste Systems where a surveillance test had exceeded acceptance criteria. Corrective actions for both systems have been completed and performance of these systems is being monitored to assure corrective actions were effective.

The IRT's review of the past six years of NRC inspection reports indicated that maintenance performance has been very good with only a handful of issues resulting in a Green finding (an issue that is considered to be of low safety significance and does not warrant any additional NRC follow-up effort) that were connected to either PM or CM. None of the issues that resulted in a Green finding were the result of deferred maintenance.

The NRC's annual evaluations of performance at DCPP have consistently placed the site at the highest level of regulatory performance. Since the time PG&E informed the NRC that it was withdrawing its License Renewal Application, DCPP had only received one inspection finding that was greater than Green in the NRC's Significance Determination Process (SDP). All of the NRC's Performance Indicators have been Green over this period of time as well. In 2016 DCPP received a White Finding (an issue of low to moderate safety significance) for an issue involving a malfunctioning limit switch that would have prevented an emergency core cooling valve from repositioning automatically if required. The ability to operate this valve manually was maintained. This issue was found during preventive maintenance activities during an outage.

The limit switch was repaired, and the NRC closed the finding after conducting an inspection to verify that DCPP's root cause evaluation and corrective actions were satisfactory to address the issue. (Inspection Report 05000275/2017040 and 05000323/2017040 dated 1/23/18).

Conclusion

The IRT determined that the DCPP PM and CM programs are consistent with nuclear industry standards. They have implemented these programs consistent with plant procedures with only some minor performance gaps noted in the review period that the IRT evaluated. DCPP's maintenance performance as assessed by external parties (i.e., NRC, DCPP QA and NSOC) was very good with only low-level issues identified. Changes to PM frequencies and PM deletions during the period utilizing the PMCR process were performed in conjunction with station approved procedures, with some minor exceptions noted by the IRT. However, these minor issues were subsequently addressed and did not create a past or current vulnerability to future plant performance. Multiple indications of an effective CM program were observed by the IRT. CM backlogs were in keeping with top industry performance, work backlogs consisted almost entirely of low priority work orders and the IRT noted that current site performance in work management was exemplary. During its extensive plant inspections, the IRT observed good material condition and housekeeping. The IRT also noted that the site planned to conduct multiple maintenance activities during both refueling outages 1R24 and 2R24 that DCPP management had identified as important to support operating in a PEO through the PMO++ initiative. The overall conclusion by the IRT is that DCPP has not experienced any deferred maintenance that would create a vulnerability to future plant operation or warrant any remediation actions.

Appendices:

Appendix A – Acronyms

Appendix B – DCPP Procedures and Documents Reviewed

Appendix C – NRC Inspection Reports and Assessment Letters and DCPP NSOC and QA Reports Reviewed

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Appendix A - Acronyms

Acronym	Definition
AMP	Aging Management Program
ASW	Auxiliary Saltwater System
CAISO	California Independent System Operator
CC	Corrective Critical
CFR	Code of Federal Regulations
CM	Corrective Maintenance
CN	Corrective Non-Critical
CPUC	California Public Utility Commission
CR	Condition Report
DC	Deficient Critical
DCPP	Diablo Canyon Power Plant
DN	Deficient Non-Critical
DNP	Delivering the Nuclear Promise
DRT	Daily Notification Review Team
DWR	Department of Water Resources
EPRI	Electric Power Research Institute
FCV	Flow Control Valve
FIN	Fix-it-Now
FW	Feedwater
INPO	Institute of Nuclear Power Operations
IP	Inspection Procedures
IRT	Independent Review Team
KV	Kilovolt
LCO	Limiting Condition for Operation
LT	Level Transmitter
MS	Main Steam
NEIL	Nuclear Electric Insurance Limited
NFPA	National Fire Protection Association
NRC	Nuclear Regulatory Commission
NSOC	Nuclear Safety Oversight Committee
OMT	Outage Management Team
OSHA	Occupational Safety and Health Administration
OSRT	Outage Scope Review Team
PCV	Pressure Control Valve
PEO	Period of Extended Operation
PG&E	Pacific Gas and Electric
PHC	Plant Health Committee
PHPC	Plant Health Prioritization Committee
PM	Preventive Maintenance

Appendix A – Acronyms (cont'd)

Acronym	Definition
PMCR	Preventive Maintenance Change Request
PMO	Preventive Maintenance Optimization
PVC	Polyvinyl Chloride
QA	Quality Assurance
RMO	Restricted Maintenance Operation
ROP	Reactor Oversight Process
RTD	Resistance Temperature Detector
RVLIS	Reactor Vessel Level Instrumentation System
SSC	System, Structure, and Component
WO	Work Order
WR	Work Request

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Appendix B – DCPP Procedures and Documents Reviewed

Procedures

- AD7.ID4, On-line Maintenance Scheduling
- AD7.ID2, Daily Notification Review Team
- AD8.ID1, Outage Planning and Management
- TS5.ID1, System Engineering Program
- TS5.ID9, Plant Health Committee
- AD7.ID18, Plant Health Prioritization Committee
- AD8.ID5, Outage Scope Determination and Control Process
- MA1.ID27, Preventive Maintenance Program

Internal Reports

- Plant Performance Improvement Reports Dated 7/18/23, 12/26/18, 7/31/19, 1/21/20, 10/7/20, 2/3/21, 7/22/21, and 8/3/22

- Site Excellence Plan Meeting Reports Dated December 2022 and June 2023

Miscellaneous Information and Reports

- 1R24 T-2 Readiness Review Meeting Package Conducted the week of August 14/15, 2023

- Daily Plan of the Day Meeting Packages for August 14, 15 and 16, 2023

- Diablo Canyon Independent Safety Committee Reports for Dates July 13, 26 and 27, 2023; August 9 and 10, 2023; and August 29 and 30, 2023

- 3rd Quarter 2023 System Health Reports for Unit 1 Condensate System, Unit 2 Emergency Diesel Generator System, Unit 2 Saltwater System, and Unit 2 Turbine Stator Cooling Water System

- Various Work Control Consolidated Reports from June 2016 through September 2023 related to Corrective Maintenance and Emergent Work

- PHC Maintenance Rule (a)(1) Report for period of Jan 18, 2023 – August 1, 2023

- Multiple Internal Data Bases related to reviewed and approved PMCRs including PMO and PMO++ activities

- PMO++ Internal Project Reports, Data Bases, Meeting Agenda, and Pre-Job Briefing

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Appendix C – NRC Inspection Procedures, Reports and Assessment Letters and DCPP NSOC and QA Reports Reviewed

Note that all inspection and assessment reports are for both Unit 1 and 2 (Docket Nos. 05000275 (Unit 1) and 05000323 (Unit 2))

Inspection Reports Reviewed

- IR 2023002 dated 8/14/23 – 2nd Quarter 2023 Integrated Inspection Report
- IR 2023010 dated 5/11/23 – Commercial Grade Dedication Inspection Report
- IR 2023001 dated 5/9/23 – 1st Quarter 2023 Integrated Inspection Report
- IR 2022004 dated 2/2/23 – 4th Quarter 2022 Integrated Inspection Report
- IR 2022003 dated 10/24/22 – 3rd Quarter 2022 Integrated Inspection Report
- IR 2022002 dated 8/10/22 – 2nd Quarter 2022 Integrated Inspection Report
- IR 2022011 dated 8/9/22 – Design Basis Assurance Inspection Report
- IR 2022001 dated 5/26/22 – 1st Quarter 2022 Integrated Inspection Report
- IR 2021004 dated 2/3/22 – 4th Quarter 2021 Integrated Inspection Report
- IR 2021003 dated 11/3/21 – 3rd Quarter 2022 Integrated Inspection Report
- IR 2021011 dated 9/10/21 – Design Basis Assurance Inspection Report (PORVs)
- IR 2021002 dated 8/2/21 – 2nd Quarter 2022 Integrated Inspection Report
- IR 2021001 dated 5/7/21 – 1st Quarter 2022 Integrated Inspection Report
- IR 2020004 dated 1/26/21 – 4th Quarter 2020 Integrated Inspection Report
- IR 2020010 dated 10/30/21 – Problem Identification and Resolution Inspection Report
- IR 2020003 dated 10/29/20 – 3rd Quarter 2020 Integrated Inspection Report
- IR 2020002 dated 7/22/20 – 2nd Quarter 2020 Integrated Inspection Report
- IR 2020001 dated 4/16/20 – 1st Quarter 2020 Integrated Inspection Report
- IR 2019004 dated 1/23/20 – 4th Quarter 2019 Integrated Inspection Report
- IR 2019003 dated 10/30/19 – 3rd Quarter 2019 Integrated Inspection Report
- IR 2019002 dated 8/1/19 – 2nd Quarter 2019 Integrated Inspection Report
- IR 2019010 dated 8/1/19 – Design Basis Assurance Inspection Report
- IR 2019001 dated 5/10/19 – 1st Quarter 2019 Integrated Inspection Report
- IR 2018004 dated 1/28/19 – 4th Quarter 2018 Integrated Inspection Report
- IR 2018003 dated 10/31/18 – 3rd Quarter 2018 Integrated Inspection Report
- IR 2018010 dated 8/22/18 – Design Basis Assurance Inspection Report
- IR 2018002 dated 7/24/18 – 2nd Quarter 2018 Integrated Inspection Report
- IR 2018008 dated 6/8/18 – Problem Identification and Resolution Inspection Report
- IR 2018001 dated 4/24/18 – 1st Quarter 2018 Integrated Inspection Report
- IR 2017040 dated 1/23/18 – NRC Supplemental Inspection Report and Assessment Follow-up Letter

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Appendix C – NRC Inspection Reports and Assessment Letters and DCPP NSOC and QA Reports Reviewed (cont'd)

NRC Inspection Procedures

- IP 71111.12, Maintenance Effectiveness
- IP 71111.13, Maintenance Effectiveness and Emergent Work Control
- IP 71111.18, Plant Modifications
- IP 71111.19, Post-Modification Testing
- IP 71111.20, Refueling and Other Outage Activities
- IP 71111.21N, Design Basis Assurance Inspection (Programs)
- IP 71111.21N.02, Design Basis Capability of Power Operated Relief Valves Under 10 CFR 50.55a
- IP 71111.22, Surveillance Testing
- IP 711152, Problem Identification and Resolution

Assessment Letters

- Annual Assessment Letter for Diablo Canyon Power Plant Report 2022006 dated 3/1/23
- Annual Assessment Letter for Diablo Canyon Power Plant Report 2021006 dated 3/2/22
- Annual Assessment Letter for Diablo Canyon Power Plant Report 2020006 dated 3/3/21
- Annual Assessment Letter for Diablo Canyon Power Plant Report 2019006 dated 3/3/20
- Annual Assessment Letter for Diablo Canyon Power Plant Report 2018006 dated 3/4/19

NSOC Reports

- NSOC Report of Site Visit March 28-31, 2016
- NSOC Report of Site Visit March 20-23, 2017
- NSOC Report of Site Visit January 8-11, 2018
- NSOC Report of Site Visit February 25-28, 2019
- NSOC Report of Site Visit February 24-27, 2020
- NSOC Report of Site Visit March 1-4, 2021

QA Reports

- 2018 Quality Performance Assessment Reports Dated 8/13/2018 and 12/6/18
- 2019 Quality Performance Assessment Reports Dated 6/26/19 and 12/17/19
- 2020 Quality Performance Assessment Reports Dated 7/2/20 and 12/14/20
- 2021 Quality Performance Assessment Reports Dated 5/17/21, 9/23/21 and 1/13/22
- 2022 Quality Performance Assessment Reports Dated 6/21/22 and 12/21/22