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PG&E Letter DCL-07-112

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Docket No. 50-275, OL-DPR-80
Docket No. 50-323, OL-DPR-82
Diablo Canyon Units 1 and 2
License Amendment Request 07-05
Revision to Technical Specification 3.5.2 – Increase in Completion Time for Emergency Core Cooling System from 72 Hours to 14 days and Revision to Technical Specification 3.6.6 – Increase in Completion Time for Containment Spray System from 72 Hours to 14 Days

Dear Commissioners and Staff:

In accordance with 10 CFR 50.90, enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82 for Units 1 and 2 of the Diablo Canyon Power Plant (DCPP), respectively. The enclosed license amendment request (LAR) proposes to revise Technical Specification (TS) 3.5.2, "ECCS – Operating," and TS 3.6.6, "Containment Spray and Cooling Systems."

The DCPP emergency core cooling system (ECCS) consists of 3 separate subsystems: centrifugal charging, safety injection (SI) and residual heat removal (RHR). Each subsystem consists of two redundant 100 percent capacity trains. The proposed change to TS 3.5.2 involves extending the Completion Time (CT) of the ECCS from 72 hours to 14 days. Similarly, the proposed change to TS 3.6.6 involves extending the CT for one inoperable containment spray train from 72 hours to 14 days.

This LAR represents a risk-informed licensing change. The proposed change is consistent with the objectives of the NRC's Probabilistic Risk Assessment Policy which is based on the guidance in Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," for risk-informed changes.

Enclosure 1 contains a description of the proposed change, the supporting technical analyses, and the no significant hazards consideration determination. Enclosures 2

A001
A002

and 3 contain marked-up and retyped (clean) TS pages, respectively. Enclosure 4 contains the marked-up TS Bases changes for information only. TS Bases changes will be implemented pursuant to TS 5.5.14, "Technical Specifications Bases Control Program," at the time this amendment is implemented.

Pacific Gas and Electric (PG&E) Company has determined that this LAR does not involve a significant hazards consideration as determined per 10 CFR 50.92(c). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment needs to be prepared in connection with the issuance of this amendment.

The changes proposed in this LAR are not required to address an immediate safety concern. PG&E requests approval of this LAR no later than December 31, 2008. PG&E also requests that the license amendment(s) be made effective upon NRC issuance, to be implemented within 120 days from the date of issuance.

This communication contains no new commitments.

If you have any questions or require additional information, please contact Stan Ketelsen at (805) 545-4720.

I state under penalty of perjury that the forgoing is true and correct.

Executed on December 17, 2007.

Sincerely,

James R. Becker
Vice President - Diablo Canyon Operations and Station Director

Why1/4279/A0663605
Enclosures
cc: Gary W. Butner, Acting Branch Chief, California Department of Public Health
Elmo E. Collins, Regional Administrator, NRC Region IV
Michael S. Peck, DCPP NRC Senior Resident Inspector
Diablo Distribution
cc/enc: Alan B. Wang, Project Manager, Office of Nuclear Reactor Regulation

EVALUATION

1.0 DESCRIPTION

This letter is a request to amend the Facility Operating Licenses DPR-80 and DPR-82 for Units 1 and 2 of the Diablo Canyon Power Plant (DCPP), respectively.

This license amendment request (LAR) proposes to revise Technical Specification (TS) 3.5.2, "ECCS - Operating," to extend the Completion Time (CT) of the Required Action. The Emergency Core Cooling Systems (ECCS) at DCPP consists of 3 separate subsystems: centrifugal charging (high head), safety injection (SI) (intermediate head), and residual heat removal (RHR) (low head). Each of the 3 subsystems consists of two 100 percent capacity trains that are interconnected and redundant such that either train is capable of supplying 100 percent of the flow required to mitigate the accident consequences. This LAR proposes to add three new Required Actions to TS 3.5.2. New Required Action A.2.1 will verify that only one subsystem in one ECCS train is inoperable. New Required Action A.2.2 will determine there is no common cause failure in the same subsystem in the OPERABLE ECCS train. If the conditions in Required Actions A.2.1 and A.2.2 are met, new Required Action A.2.3 will allow restoring the inoperable ECCS train to OPERABLE status in 14 days.

Similarly, this LAR also proposes to change TS 3.6.6, "Containment Spray and Cooling Systems," CT of Required Action A.1 from 72 hours to 14 days for an inoperable containment spray train.

2.0 PROPOSED CHANGES

The proposed changes would add three new Required Actions to TS 3.5.2 as follows:

New Required Action A.2.1 states: Verify only one subsystem in one ECCS train is inoperable. It has a new CT of 72 hours.

New Required Action A.2.2 states: Determine there is no common cause failure in the same subsystem in the OPERABLE ECCS train. It has a new CT of 72 hours.

New Required Action A.2.3 states: Restore train to OPERABLE status. It has a new CT of 14 days.

The existing Note associated with this CT stating: "The Completion Time may be extended to 7 days for Unit 1 cycle 12 for centrifugal charging pump 1-1 seal replacement" is removed.

The proposed changes would also revise TS 3.6.6 as follows:

TS 3.6.6 Condition A CT is revised from:

"72 hours AND 10 days from discovery of failure to meet the LCO"
To:
"14 days AND 14 days from discovery of failure to meet the LCO."

The existing Note associated with this CT stating: "Condition A Completion Times may be extended to 14 days for Unit 2 cycle 12 for containment spray pump 2-2 control circuit cable maintenance" is removed.

In TS 3.6.6 Condition A CT, the "72 hours" CT has a logical connector with a 10-day CT measured from the time it was discovered that the LCO was not met. In this submittal, the logical connector "10 days from discovery of failure to meet the LCO" is changed to "14 days from discovery of failure to meet the LCO." This logic connector is typically used in TS sections with more than one function. In TS 3.6.6, the two functions are containment spray and containment cooling systems and this TS also addresses a Condition D when one train of containment spray and one train of containment cooling system are inoperable. The purpose of the logical connector is to prevent the situation when switching between Condition A and Condition D or Condition C and Condition D would allow indefinite continued operation without meeting the LCO of Conditions A or C. (See DCPP TS Section 1.3 example 1.3-3) The "14 days" is based on the longest CT of Condition A and Condition C. Condition A is revised from 72 hours to 14 days and Condition C is 7 days and 10 days from discovery of failure to meet the LCO. This is the least amount of time Condition A is allowed in this situation and is conservative. There is an industry-wide effort through Technical Specification Task Force (TSTF) Improved Standard Technical Specifications Change Traveler TSTF-439 to eliminate the second CTs limiting time from discovery of failure to meet an LCO in the TS. PG&E is planning to submit another LAR to the Commissioners to request elimination of this limiting time in the CT section of the TS.

Enclosure 2 contains marked-up TS pages. The proposed retyped TS is provided in Enclosure 3. The revised TS Bases is contained for information only in Enclosure 4.

3.0 BACKGROUND

3.1 System Descriptions

The ECCS functions to provide core cooling and negative reactivity to ensure that the reactor core is protected after a design basis accident. The ECCS consists of 3 separate subsystems: centrifugal charging, SI, and RHR. Each subsystem consists of two 100 percent capacity trains that are interconnected and redundant such that either train is capable of taking suction from the refueling water storage tank (RWST) and supplying 100 percent of the flow to the reactor core required to mitigate the accident consequences. The interconnecting and redundant subsystem design provides the operators with the ability to utilize components from opposite trains to achieve the required 100 percent flow to the core. Each ECCS train consists of an ECCS centrifugal charging pump (CCP), a SI pump, a RHR pump, piping, valves, and heat exchangers. The ECCS pumps are normally in standby mode. In Modes 1, 2, and 3, two independent and redundant ECCS trains are required by the TS to be OPERABLE to protect against a single failure, which could affect either train.

There are three phases of ECCS operation following a Loss of Coolant Accident (LOCA): injection, cold leg recirculation, and hot leg recirculation. In the injection phase, water is taken from the RWST and injected into the reactor coolant system (RCS) through the cold legs. When sufficient water is removed from the RWST to ensure that enough boron has been added to maintain the reactor subcritical and the containment recirculation sump has enough water to supply the required net positive suction head to the RHR pumps, suction is switched to the containment recirculation sump for cold leg recirculation. After several hours, the ECCS operation is shifted to the hot leg recirculation phase to provide reverse flow through the core to backflush out the high boron concentration that results from core boiling after a design basis cold leg break.

The ECCS subsystems are actuated upon receipt of a SI signal. For high head SI, two ECCS CCPs start automatically on an SI signal. Two ECCS CCPs, each with 100 percent flow capacity, are available to operate during the injection and recirculation phase following an accident to ensure that the SI function is fulfilled assuming a single active failure. On receipt of an SI signal, ECCS CCP suction flow is automatically transferred from the volume control tank to the RWST. The normal charging path is also automatically isolated on an SI signal and the ECCS injection path valves are automatically opened to provide flow to the RCS cold legs. When the RWST water inventory is depleted to RWST low level alarm, the RHR pumps are automatically shut down and the ECCS suction is manually transferred to the containment recirculation sump to place the system in the recirculation mode of operation. During the recirculation mode of operation, the RHR pumps provide suction to the ECCS CCPs and the SI pumps. The recirculation mode of operation consists of a cold leg recirculation phase in which flow is supplied to the RCS cold legs and a hot leg recirculation phase in which flow is supplied to the RCS hot legs.

The CS system is designed to provide containment atmosphere cooling to limit post accident pressure and temperature in containment to less than the design values. During a design basis accident inside containment, the CS system sprays RWST water, mixed with sodium hydroxide from the spray additive tank, into the upper region of containment. The CS system, together with the containment fan cooler units, provides the heat removal capability to reduce the containment pressure and temperature. The CS system is also credited to reduce fission products from the containment atmosphere. The CS system consists of two separate trains of containment spray pumps, spray headers, nozzles, valves and piping, and a common spray additive tank. Each train of the CS system is capable of providing the necessary spray to fulfill the design function required for containment atmospheric heat removal. The CS system takes suction from the RWST during the injection phase of operation. In the recirculation phase of operation, CS is supplied by manual realignment of the RHR pumps to supply the CS header after the low water level is reached in the RWST.

3.2 Purpose for Proposed Amendment

The proposed change to TS 3.5.2 will allow a longer CT to accommodate unplanned corrective maintenance and inspections. Within 72 hours after the TS 3.5.2 Condition A is entered, if it is verified that only one subsystem in one ECCS train is inoperable according to new Required Action A.2.1 and if it is determined that there is no common cause failure in the same subsystem in the OPERABLE ECCS train according to the new Required Action A.2.2, then the inoperable ECCS train can be restored to OPERABLE status per new Required Action A.2.3 within 14 days. If more than one ECCS subsystem is inoperable or common cause failure cannot be eliminated within 72 hours, the inoperable train(s) is required to be restored to OPERABLE status within 72 hours per Required Action A.1. The justification to extend the CT to 14 days is based on risk informed insight where the evaluation would meet the NRC risk informed criteria with the assumption that only one subsystem in one ECCS train is inoperable and with the elimination of conditional failure probability within the ECCS subsystems due to common cause failure.

Plant operating experience supports a longer CT for ECCS. PG&E has twice requested that the NRC approve one-time extensions of the CT associated with this TS to 7 days to accommodate at-power repair of the mechanical pump seals of CCP 2-1 in Unit 2 and CCP 1-1 in Unit 1. The existing TS CT of 72 hours was determined to be insufficient for the mechanical seal repair job and the unit would have had to be shut down 72 hours into the repair work in order to comply with the TS Required Action. These two one-time requests were granted by the NRC in License Amendments 146 for Unit 2 and 159 for Unit 1, and the seal repairs were completed without a unit shutdown.

The Note in TS 3.5.2 Condition A Completion Time is to be removed. The Note allows a one-time CT extension to 7 days for Unit 1 cycle 12 for CCP 1-1 seal replacement. The work was completed and since it is a one-time extension, the note is no longer required.

Similarly, the proposed change to TS 3.6.6 will allow a longer CT to accommodate unplanned corrective maintenance and inspections. Plant operating experience supports a longer CT for a CS train. PG&E has requested that the NRC approve a one-time extension of the CT associated with this TS to 7 days to accommodate an at-power repair of the control circuit of CS Pump 2-2. The request was granted by the NRC in License Amendment 173 for Unit 2, and the control circuit repair was completed without a unit shutdown.

The Note in TS 3.6.6 Condition A Completion Time is removed. The Note allows a one-time CT extension to 14 days for Unit 2 cycle 12 for CS pump 2-2 control circuit cable maintenance. The work was completed and since it is a one-time extension, the note is no longer required.

3.3 Risk-Informed Licensing Change

This LAR represents a risk-informed licensing change. The proposed change meets the criteria of Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications," for risk-informed changes.

As discussed in RG 1.177, acceptable reasons for requesting TS changes fall into the following categories, all of which apply to this LAR:

Improvement to operational safety: A change to the TS can be made due to reductions in the plant risk or a reduction in the occupational exposure of plant personnel in complying with the TS requirements.

Consistency with risk basis in regulatory requirements: TS requirements can be changed to reflect improved design features in a plant or to reflect equipment reliability improvements that make a previous requirement unnecessarily stringent or ineffective. TS may be changed to establish consistently-based requirements across the industry or across an industry group.

Reduce unnecessary burdens: The change may be requested to reduce unnecessary burdens in complying with current TS requirements, based on operating history of the plant or the industry in general. This includes extending CTs (1) that are too short to complete repairs when components fail with the plant at-power, (2) to complete additional maintenance activities at-power to reduce plant down time, and (3) provide increased flexibility to plant operators.

4.0. TECHNICAL ANALYSIS

4.1 Impact on Defense-In-Depth and Safety Margins

In addition to discussing the impact of the changes on plant risk, the traditional engineering considerations need to be addressed. These include defense-in-depth and safety margins. The fundamental safety principles on which the plant design is based cannot be compromised. Design basis accidents are used to develop the plant design. These are a combination of postulated challenges and failure events that are used in the plant design to demonstrate safe plant response. Defense-in-depth, the single failure criterion, and adequate safety margins may be impacted by the proposed change and consideration needs to be given to these elements.

Impact on Defense-In-Depth

A request is made through this LAR to extend the CT of TS 3.5.2 Condition A from 72 hours to 14 days on the condition that only one subsystem in one ECCS train is inoperable and there is no common cause failure in the same subsystem in the OPERABLE ECCS train. The purpose is to allow sufficient time to complete unplanned corrective maintenance and to avoid an unnecessary plant shutdown. This LAR also requests extension of the CT of one inoperable train of CS system from 72 hours to 14 days. The extension of the CT has no impact on the current safety analysis because one train of the ECCS or CS will still be available to perform the required safety function while in the TS action. There is no difference in the deterministic safety significance of a 72-hour CT and a 14-day CT. The difference in the current TS versus the proposed extension lies in the added risk due to the extension of the CT, which is evaluated in the Probabilistic Risk Analysis (PRA) section of this LAR.

The proposed change must meet the defense-in-depth principle, which consists of a number of elements. These elements and the impact of the proposed change on each follow:

- A reasonable balance among prevention of core damage, prevention of containment failure and consequence mitigation is preserved.

  The ECCS provides safeguard protection to the RCS and is designed to provide sufficient ECCS flow to the RCS to meet the design basis requirements in the plant accident analysis. The ECCS has two redundant trains to meet the single failure criteria. Similarly, the CS system, which is also part of the engineered safeguard systems, provides safeguard protection to the containment. It is also designed with two redundant trains to meet the single failure criteria. Providing an extended CT for returning the ECCS and the CS system to OPERABLE status has only a small calculated impact on the Core Damage Frequency (CDF) and Large Early Release Frequency (LERF). The proposed changes do not significantly degrade core damage prevention and compensate with improved containment integrity nor do these changes degrade containment integrity and compensate with improved core damage. The balance between prevention of core damage and prevention of containment failure is maintained. Consequence mitigation remains unaffected by the proposed changes.

  Furthermore, no new accident or transients are introduced with the requested changes and the likelihood of accidents or transients is not impacted. This is because there is no physical change made to the ECCS and CS system. Also, there are no new operational changes implemented to the plant as a result of the proposed TS changes that could introduce new accidents or transients or could increase the likelihood of an accident or transient.

  Increased CTs have the potential to lead to a reduction in the likelihood of transients or accidents caused by maintenance or test.

The additional time to complete maintenance reduces time pressure and thus provides an atmosphere more conducive to successfully completing repair and post maintenance test activities without inducing a plant event, and also conducive to reducing system realignment and reassembly errors. These remain unquantified benefits of the CT changes.

In summary, the balance between prevention of core damage, prevention of containment failure, and consequence mitigation is unaffected by this proposed change.

- Over-reliance on programmatic activities to compensate for weaknesses in plant design.

  The plant design will not be modified with the proposed extension of CT of the ECCS or the CS system. All safety systems will still perform their design functions, and there will be no reliance on additional systems, procedures, or operator actions. The calculated risk increase for the CT changes is very small and additional control processes are not required to be put into place to compensate for the slight risk increase.

- System redundancy, independence, and diversity are maintained commensurate with the expected frequency and consequences of challenges to the system.

  There is no impact to the redundancy, independence, or diversity of the ECCS or the CS system or to the ability of the plant to respond to an accident conditions with diverse systems. The redundant OERABLE train of the ECCS and the CS system will continue to be capable of performing the necessary safety functions consistent with the assumptions in the accident analysis. As a result, the redundant and diverse designs of these safety systems are not affected by this proposed change.

- Defenses against potential common cause failures are maintained and the potential for introduction of new common cause failure mechanisms is assessed.

  Defenses against common cause failures are maintained. There is no change to the physical design of the ECCS, or the CS system nor is there any new operational change introduced. As a result, there is no new potential common cause failure introduced. Also, the CT extensions requested are not considered sufficiently long to expect any new common cause failure mechanisms to arise. In addition, the operating environment for these components remains the same. Thus, new common cause failure modes are not expected.

- Independence of barriers is not degraded.

  The proposed CT extensions do not implement any physical change to the ECCS nor the CS system, and so the barriers protecting the public and the independence of these barriers is unchanged. With the implementation of 10 CFR 50.65, "Maintenance Rule," risk associated with on-line maintenance activities is assessed and managed. This ensures that multiple safety systems will not be taken out of service simultaneously during the extended CTs that could lead to degradation of these barriers and an increase in risk to the public. In addition, the extended CTs do not provide a mechanism that degrades the independence of the fuel cladding, RCS, and containment barriers.

- Defenses against human errors are maintained.

  No new operator actions related to the CT extensions are introduced and no changes to current operating, maintenance, or test procedures are required due to these proposed changes. Some new activities may be performed on these systems while at power, but these are not expected to introduce additional human errors or increase the frequency of human errors. Therefore defense against human errors is maintained.

  The increase in CTs provides additional time to complete troubleshooting, repair activities, and post maintenance testing, which will lead to improved operator and maintenance personnel performance resulting from reduced system realignment and reassembly errors.

- The intent of the General Design Criteria (GDC) in Appendix A to 10 CFR Part 50 is maintained.

  The proposed changes to extend CTs of the ECCS and the CS system do not modify the plant design bases or the plant design criteria. All the safety analyses associated with the ECCS and the CS system remain valid. Consequently, the plant design with respect to the GDC is not affected by this proposed change.

Impact on Safety Margins

The proposed CT extension is not in conflict with approved Codes and Standards relevant to the subject system. Also, it does not adversely affect any assumptions or inputs to the safety analysis and therefore, could not result in failure to meet the intended safety function because the redundant operable train of the CS system will continue to be capable of performing all the necessary safety functions consistent with the assumptions in the accident analysis. For the ECCS, although TS 3.5.2 Condition A allows one or more ECCS trains to be inoperable, the requirements to have at least 100 percent of the ECCS flow equivalent to a single OPERABLE ECCS train available are still enforced to meet the assumptions in the accident analysis. Therefore, the safety margins of the plant are not affected.

4.2 Assessment of Impact on Risk

Risk-informed support for these proposed changes is based on maintaining defense-in-depth, quantifying the PRA to determine the change in "at power" CDF and LERF resulting from the proposed increase in CTs for an inoperable train of CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem, continuation of the Online Risk Management Program to control performance of other risk significant tasks during the ECCS or CS train outage, and consideration of configuration-specific compensatory measures to minimize risk.

The risk impact of the proposed changes has been evaluated and found to be acceptable. Overall "at power" risk only increases incrementally and within acceptable limits. The effect on risk of the proposed increase in CTs for restoration of an inoperable train of the centrifugal charging subsystem, RHR subsystem, SI subsystem, or CS system has been evaluated using NRC's three-tier approach suggested in RG 1.177. The three tiers consist of:

Tier 1 - PRA Capability and Insights
Tier 2 - Avoidance of Risk-Significant Plant Configurations
Tier 3 - Risk-Informed Configuration Risk Management

Although RG 1.177 requires the evaluation of the proposed change on the total risk (i.e., on-line and shutdown risk), this evaluation only quantifies the on-line risk. This is conservative since the shutdown risk associated with the centrifugal charging and SI subsystems of the

ECCS will be reduced as a result of the proposed change. The shutdown risk averted may provide a qualitative risk benefit, but it is not credited or quantified in the risk evaluation. For the RHR subsystem, the proposed change to the CT applies to Modes 1, 2 and 3 only. The RHR subsystem TS 3.5.3 requirement during shutdown condition (Mode 4) is not changed per this LAR and therefore there is no change to the RHR subsystem shutdown risk. There is no risk associated with the CS system when the plant is in a shutdown condition because the system is not required in the shutdown modes and is not credited in any safe shutdown plan.

4.2.1 Tier 1: PRA Capability and Insights

Risk-informed support for these proposed changes is based on an evaluation of PRA calculations performed to quantify the change in CDF and LERF resulting from the increased CTs for the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem.

PRA Capability

The scope, level of detail, and quality of the Diablo Canyon Probabilistic Risk Analysis (DCPRA) are sufficient to support a technically defensible and realistic evaluation of the risk change from these proposed CT extensions. The DCPRA used in this evaluation is a full scope Level 1 and Level 2 PRA model that addresses internal, seismic, and fire events at full power. The DCPRA is performed for Unit 1, but it is equally applicable to DCPP Unit 2 because the two units are essentially identical.

The DCPRA is based on the original 1988 Diablo Canyon PRA that was performed as part of the long term seismic program (LTSP). The DCPRA-1988 was a full scope Level 1 PRA that evaluated internal and external events. The DCPRA was subsequently updated to support the Individual Plant Examination (IPE) (1991) and the Individual Plant Examination for External Events (IPEEE) (1993). Since 1993, several other updates have been made to incorporate plant and procedure changes, update plant specific reliability and unavailability data, improve the fidelity of the model, incorporate Westinghouse Owners Group (WOG) Peer Review comments, and support other applications, such as on-line maintenance, risk-informed in-service inspection, emergency diesel generator CT extension, and Mitigating System Performance Index (MSPI).

The enhancements to the DCPRA-1988 model include:

- Included the probability of a loss-of-offsite power (LOOP) subsequent to non-LOOP initiating events.
- Incorporated sixth diesel generator.
- Upgraded auxiliary saltwater system modeling to make it more consistent with the station blackout submittal.
- Allowed credit for cross-tie of vital 4kV buses. (i.e., one diesel generator (DG) feeds loads on two vital buses)
- Added 500kV switchyard model, to supplement 230kV switchyard.
- Updated initiating event frequencies to reflect data from NUREG-5750.
- Used the Rhodes Model to characterize the RCP seal performance on loss of cooling and seal injection.

The LERF figures of merit are calculated using the full Level 2 model.

The DCPRA is a living PRA, which is maintained through a periodic review and update process. Procedure TS3.NR1, "Probabilistic Risk Assessment (PRA)," establishes administrative controls for managing and maintaining the PRA program.

Peer review certification of the DCPRA, using the WOG Peer Review Certification Guidelines, was performed in May 2000. On the basis of its evaluation, the certification team determined that, with certain findings and observations addressed, the quality of all elements of the PRA would be sufficient to support risk significant evaluations with defense-in-depth input relative to the requested CT extension. The two A findings and all B findings and observations from this assessment, which involved risk elements that are needed to evaluate the proposed CT extension, have been appropriately dispositioned. As a result, a number of modifications were made to the PRA model prior to its use to support these proposed changes. A major enhancement was the reanalysis and updating of the pre- and post-initiating event human reliability assessments (HRA).

The upgraded HRA analysis was subjected to a focused peer review. All findings of this focused review will be dispositioned either by modification of the model or by treatment of the issue via a sensitivity study.

The B findings and observations from the WOG peer review were addressed during model updates in support of the EDG CTE license amendment request and MSPI calculations. Additionally, during the MSPI industry cross comparison, the DCPP model was not identified as an outlier.

In addition to the Peer Certification, three limited scope and independent assessments of the DCPP PRA Level 1 and Level 2 models have been performed by industry PRA experts (Gap Analyses) to support several risk-informed applications including MSPI and DCPP's transition to the National Fire Protection Association 805 Standard. Again, all the findings of these assessment have been or will be dispositioned either by modification of the model or by treatment of the issue via a sensitivity study. If changes to the model are made to address assessment comments and these changes affect the PRA results presented in this LAR, DCPP will evaluate the effect of these changes on the supporting calculation.

The latest update, the DC01 model, which was completed in January of 2006, uses as its base the model created to address the DG CT extension LAR. This model contains the following:

- The most recent data represented in PRA model DCC0DATA.
- The split of 480VAC from 4kV.
- The split of DC power into "early" and "late" DC power requirement.
- AC power system revision.
- Divided the loss of offsite power initiating event into three separate initiators to allow appropriate use of recovery factors.
- Merge of the seismic support event trees into the general transient event trees.
- Modification of various top events and event trees to support the MSPI and the Safety Monitor projects.
- Inclusion of the Fire Water Storage Tank (FWST) as a supplemental water source to the Condensate Storage Tank (CST) as required.
- Level 2 update.

DC01 Core Damage Frequency

- Internal 1.081E-5
- Seismic 3.774E-5
- Fire 1.701E-5
- Total 6.556E-5

The DCPRA is a living PRA, which is maintained through a periodic review and update process.

As a result of the sound basis of the original model as documented in NUREG-0675 Supplement No. 34 and NUREG/CR-5726, the considerable effort to incorporate the latest industry insights into the PRA, self-assessments, and certification peer reviews, PG&E is confident that the results of the risk evaluation are technically sound and consistent with the expectations for PRA quality set forth in RGs 1.177 and 1.174.

Fire and Other External Events

A fire analysis was conducted as part of the original DCPP PRA (DCPRA-1988) that was an element of the LTSP. The NRC reviewed the LTSP and issued Supplement 34 to the Safety Evaluation Report accepting DCPRA-1988. The Fire PRA was updated to support the 1993 IPEEE. Other than control room (CR) and cable spreading room (CSR) fire scenarios, the Fire PRA quantifies the CDF associated with most internal fire initiating events using the same linked event tree models as the internal and seismic events analyses. Separate event trees using conservative assumptions were developed for evaluating CR and CSR fire scenarios.

The evaluation of high winds, external floods, and other external events, which was done as part of the IPEEE, revealed no potential vulnerabilities. The proposed extension of the CTs of one inoperable train of the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem has negligible effect on the risk profile at DCPP from other external events.

Methodology

The general methodology of evaluating the proposed change involves identifying the areas of concern relating to a train of the CS system or centrifugal charging/RHR/SI subsystem being out of service for an extended time (i.e., 14 days) and quantifying its impact on risk. The areas of concern are:

1) The introduction of new initiating events or hazards,
2) Increase in the frequency of existing initiating events, and
3) Impact on the consequence of an initiating event.

Based on engineering judgment, it is determined that an increase in the out-of-service (OOS) time for a train of CS system or centrifugal charging subsystem/RHR subsystem/SI subsystem would not introduce a new initiating event and would not have impact on the frequency of existing initiating events.

The risk impact was evaluated using the following steps.

1) Calculate the base CDF and LERF using the baseline PRA model.
2) Modify the baseline model to reflect one train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem being OOS and recalculate the CDF and LERF.
3) Calculate the risk impact of the proposed change using the RG 1.177 risk metrics described below and compare them to the Acceptance Criteria.

The risk impact was evaluated for the CS system, charging subsystem, RHR subsystem, and SI subsystem individually and the cumulative risk impact was also evaluated by adding the risk for all these systems and subsystems together.

<u>Risk Metrics</u>

ΔCDF_{AVE} = change in the annual average CDF due to an expected unavailability of one train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem that could result from the increased CTs. This risk metric is compared against the criteria of RG 1.174 to determine whether a change in CDF is regarded as risk significant. These criteria are a function of the baseline annual average CDF, $CDF_{BASE.}$

$\Delta LERF_{AVE}$ = change in the annual average LERF due to an expected unavailability of one train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem that could result from the increased CT. Similar to ΔCDF_{AVE}, RG 1.174 criteria were also applied to judge the significance of changes in this risk metric.

ICCDP = incremental conditional core damage probability with one train of CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem being OOS for an interval of time equal to the proposed CT (i.e., 14 days). This risk metric is used as suggested in RG 1.177 to determine whether a proposed CT has an acceptable risk impact.

ICLERP = incremental conditional large early release probability with one train of CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem being OOS for an interval of time equal to the proposed CT. Similar to *ICCDP,* RG 1.177 criteria were also applied to judge the significance of changes in this risk metric.

The above risk metrics were quantified using the equations provided below.

<u>Change in CDF/LERF</u>

The change in the annual average CDF, ΔCDF_{AVE}, was evaluated by computing the following equation.

$$\Delta CDF_{AVE} = \left(\frac{T_{OOS}}{T_{YEAR}}\right) \times \left(CDF_{OOS} - CDF_{BASE}\right) \qquad \text{(Equation 1)}$$

where the following definitions apply:

T_{OOS} = Expected time that one train of CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem is expected to be unavailable per year as a result of the increased CT.

T_{YEAR} = Annual duration (8760 hours or 365 days)

$\left(\frac{T_{OOS}}{T_{YEAR}}\right)$ = Annualized fraction of time that one train of centrifugal charging subsystem, SI subsystem, or CS system is expected to be unavailable as a result of the increased CT.

CDF_{OOS} = Annual average CDF with one train of CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem OOS.

CDF_{BASE} = Baseline annual average CDF with average unavailability of the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem consistent with the current TS CT. This is the CDF result of the current baseline DCPRA.

$(CDF_{OOS} - CDF_{BASE})$ = Change (i.e., increase) in CDF due to one train of CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem being unavailable for a whole year.

A similar approach was used to evaluate the change in the average LERF ($\Delta LERF_{AVE}$).

$$\Delta LERF_{AVE} = \left(\frac{T_{OOS}}{T_{YEAR}}\right) \times \left(LERF_{OOS} - LERF_{BASE}\right) \qquad \text{(Equation 2)}$$

where the following definitions were applied:

$LERF_{OOS}$ = LERF evaluated from the PRA model with one train of CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem unavailable.

$LERF_{BASE}$ = Baseline annual average LERF with average unavailability of the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem consistent with the current TS CT. This is the LERF result of the current baseline DCPRA.

$(LERF_{OOS} - LERF_{BASE})$ = Change (i.e., increase) in LERF due to one train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem being OOS for a whole year.

Incremental Conditional Probabilities

The incremental conditional core damage probability (ICCDP) and incremental conditional large early release probability (ICLERP) are computed using their definitions in RG 1.177.

The ICCDP values are dimensionless probabilities used to evaluate the incremental probability of a core damage event over a period of time equal to the extended CT. This should not be confused with the evaluation of ΔCDF_{AVE}, in which the CDF is based on expected unavailability. However, the endstate frequencies used to calculate ICCDP/ICLERP are the same as those used to calculate the change in CDF/LERF as described in the previous section.

The ICCDP is calculated by multiplying the change in CDF by the proposed TS CT (T_{CT}). Therefore,

$ICCDP = (CDF_{OOS} - CDF_{BASE}) \times (T_{CT} / T_{YEAR})$ (Equation 3)

Similarly, ICLERP is defined as follows.

$ICLERP = (LERF_{OOS} - LERF_{BASE}) \times (T_{CT} / T_{YEAR})$ (Equation 4)

where T_{CT} is the proposed TS CT (i.e., 14 days) and T_{YEAR} is the annual duration (365 days).

Assumptions/Assertions

1. The calculations for change in CDF conservatively neglect the decrease in the CDF contribution that would result from avoiding a TS-driven shutdown required by the current TS CT.
2. The impact of a centrifugal charging subsystem, SI subsystem, or CS system being out of service at lower operating modes (i.e., 2, 3, and 4) is bounded by the power operations impact. Therefore no separate risk evaluation at the lower modes is necessary.
3. The internal fire events were not used in the quantification of LERF in this application on the basis that none of the fire events are considered to result in an inside containment pressurization event. In addition, no fire vulnerabilities with respect to large early releases were found in the IPEEE.

Input

In extending the CTs for a train of the CS system, SI subsystem, RHR subsystem, and centrifugal charging subsystem, the mean outage times per year, T_{OOS}, for a train of the CS system, SI subsystem, RHR subsystem, and centrifugal charging subsystem are expected to remain the same as the current ones since the maintenance of equipment in these system/subsystem will be performed with the same emphasis on timely completion as is currently practiced. Therefore, there will be no increase in the expected mean outage per year for a train of CS system, SI subsystem, RHR subsystem, and centrifugal charging subsystem, that is, T_{OOS} = 0.0.

Acceptance Criteria The acceptance guidelines for TS changes are provided in Sections 2.2.4 and 2.2.5 of RG 1.174 and for CT changes in Section 2.4 of RG 1.177.

The impact of the proposed change is considered very small and low risk if the estimated risk metric values are less than those listed below.

Risk Metric	**Acceptance Criteria**
ΔCDF_{AVE}	1.0 E-06 per reactor year
$\Delta LERF_{AVE}$	1.0 E-07 per reactor year
ICCDP	5.0 E-07
ICLERP	5.0 E-08

Results And Insights

Two sets of calculations were performed: (1) equipment taken OOS due to scheduled maintenance, and (2) equipment out of service due to unscheduled or corrective maintenance. In the first case, no failure of equipment is involved, whereas in the second case, a component is known to have failed and Section A.1.3.2.1 of RG 1.177, recognizes that the conditional failure probabilities of redundant equipment may be higher due to common cause possibilities.

The intermediate results of the risk evaluation for equipment removed from service due to scheduled maintenance are presented in Table 4-1. The table shows the results of the risk metric calculations for one train of the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem independently. The total base CDF (from the "Base Model") value is approximately 6.6 E-05 per year based on the average unavailability of the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem using plant specific data (i.e., the average unavailability based on current CTs and maintenance practices). Total base LERF is approximately 3.5 E-06 per year. The total base CDF and LERF values include contributions from internal, seismic, and fire events. However, contribution from fire events to LERF is insignificant. Each of the contributors is listed separately in the tables. Since the two trains in the CS system, centrifugal charging subsystem, and SI subsystem are not completely symmetrical, it is expected that the risk importance of the two trains in each of these systems will not be the same. It can be seen from Table 4-1 that CS Train A and RHR Train A are more risk significant in terms of LERF. However, RHR Train B is more risk significant in terms of CDF. Train B of the SI subsystem and centrifugal charging subsystem has greater risk importance than that of Train A in terms of CDF and LERF. The contributions from internal, seismic, and fire events are shown only for the more risk significant trains in Tables 4-2 and 4-3.

Table 4-1. Risk Metric for Each Train Taken Out of Service (OOS)

Risk Metric	Containment Spray System	Safety Injection Subsystem	Centrifugal Charging Subsystem	RHR Subsystem
CDF for Train A OOS	6.5557E-05	6.6401E-05	6.6499E-05	6.9677E-05
CDF for Train B OOS	6.5557E-05	6.7416E-05	6.7804E-05	6.9732E-05
LERF for Train A OOS	3.5133E-06	3.5065E-06	3.5066E-06	3.9877E-06
LERF for Train B OOS	3.5130E-06	3.5398E-06	3.5496E-06	3.9836E-06

From Table 4-2, contributions to the base case CDF are split approximately 58 percent due to seismic, 16 percent due to internal events, and 26 percent due to fire events. When a CS Train is OOS, there is no change in the CDF. This is expected since the CS system is not a mitigating system for core damage scenarios. With one train of SI subsystem or centrifugal charging subsystem OOS, the risk profile remains similar, with no significant change in the risk contribution from seismic and fire events. The increase in the CDF of about 3 percent is from the internal events and is due to the importance of the SI subsystem and centrifugal charging subsystem for LOCA events. With one train of RHR subsystem OOS, the relative contribution from seismic decreases slightly whereas the relative contribution from internal events increases slightly when compared to the base model results.

Table 4-2. Intermediate Results of Risk Evaluation for CDF					
CDF (per yr)	**Base Model**	**Containment Spray System**	**Safety Injection Subsystem**	**Centrifugal Charging Subsystem**	**RHR Subsystem**
Internal	1.0808E-05	1.0808E-05	1.2646E-05	1.2839E-05	1.4404E-05
Seismic	3.7735E-05	3.7735E-05	3.7735E-05	3.7951E-05	3.8008E-05
Fire	1.7014E-05	1.7014E-05	1.7035E-05	1.7014E-05	1.7320E-05
Total	**6.5557E-05**	**6.5557E-05**	**6.7416E-05**	**6.7804E-05**	**6.9732E-05**

Table 4-3 shows that contributions to the base case LERF are split approximately 54 percent due to seismic, and 46 percent due to internal events, with an insignificant contribution from the internal fire events. When a train of CS system, centrifugal charging subsystem, or SI subsystem is OOS, the risk profile remains approximately the same with the internal events contribution increasing by about 1 to 4 percent from the base model values. There is no change in the seismic induced LERF values for the CS system and SI subsystem and only a very slight increase (< 0.1 percent) for the centrifugal charging subsystem. However, the contribution from internal events (53 percent) to LERF is slightly higher than that from seismic events (47 percent) when one RHR subsystem train is taken OOS. The increase in LERF for the case of one RHR subsystem train removed from service is about 14 percent when compared to the base model results.

Overall, the relative change in LERF is much less than the change in CDF when a train of centrifugal charging subsystem or SI subsystem is unavailable. LERF is dominated by nonisolated steam generator tube rupture (SGTR) and Interfacing System LOCA (ISLOCA) events, which are only slightly sensitive to the availability of the centrifugal charging subsystem and SI subsystem, but more sensitive to the unavailability of the RHR subsystem.

Table 4-3. Intermediate Results of Risk Evaluation for LERF					
LERF (per yr)	**Base Model**	**Containment Spray System**	**Safety Injection Subsystem**	**Centrifugal Charging Subsystem**	**RHR Subsystem**
Internal	1.5968E-06	1.6214E-06	1.6479E-06	1.6555E-06	2.0953E-06
Seismic	1.8919E-06	1.8919E-06	1.8919E-06	1.8941E-06	1.8924E-06
Total	**3.4887E-06**	**3.5133E-06**	**3.5398E-06**	**3.5496E-06**	**3.9877E-06**

Risk Metric Calculation

For illustration purpose, the calculation of the risk metrics was performed for the CS system. The CDF and LERF values given a CS train is OOS used in the risk metric calculations below are those associated with the CS train that has the higher risk importance (with respect to LERF), that is, CS Train A.

1) Calculate the base CDF and LERF using the baseline PRA model.

   The results of the baseline model are:

   CDF_{BASE} = 6.5557E-05 per year

   $LERF_{BASE}$ = 3.4887E-06 per year

2) Modify the baseline model to reflect one of the CS trains being OOS and re-calculate the CDF and LERF.

   The recalculated CDF and LERF values (for CS train B) are:

   CDF_{OOS} = 6.5557E-05

   $LERF_{OOS}$ = 3.5133E-06

   The change (increase) in the CDF and LERF values are given by:

   $\Delta CDF = (CDF_{OOS} - CDF_{BASE})$ = 6.5557E-05 – 6.5557E-05

   = 0.0

   $\Delta LERF = (LERF_{OOS} - LERF_{BASE})$
   = 3.5133E-06 – 3.4887E-06
   = 2.46E-08

3) Calculate the RG 1.174 and RG 1.177 Risk Metrics

   Change in CDF/LERF

   Using the Equations 1 and 2, the changes in the annual average CDF and LERF are calculated as follows:

$$
\begin{aligned}
\Delta CDF_{AVE} &= \left(\frac{T_{OOS}}{T_{YEAR}}\right) \times \Delta CDF \\
&= \left(\frac{0.0 day}{365 day}\right) \times 0.0 \\
&= 0.0
\end{aligned}
$$

Similarly,

$$
\begin{aligned}
\Delta LERF_{AVE} &= \left(\frac{T_{OOS}}{T_{YEAR}}\right) \times \Delta LERF \\
&= \left(\frac{0.0 day}{365 day}\right) \times 2.46E-08 \\
&= 0.0
\end{aligned}
$$

Incremental Conditional Probabilities (ICP)

The ICPs for core damage and large early release are calculated based on Equations 3 and 4.

$ICCDP = (CDF_{OOS} - CDF_{BASE}) \times (T_{CT} / T_{YEAR})$

$= \Delta CDF \times (T_{CT} / T_{YEAR})$

$= (0.0/yr) \times (14\ days / 365\ days\ per\ yr)$

$= 0.0$

Similarly,

$ICLERP = (LERF_{OOS} - LERF_{BASE}) \times (T_{CT} / T_{YEAR})$

$= \Delta LERF \times (T_{CT} / T_{YEAR})$

$= (2.46E\text{-}08 / yr) \times (14\ days / 365\ days\ per\ yr)$

$= 9.44E\text{-}10$

Similar calculations were performed for the following cases:

- One SI subsystem taken OOS
- One centrifugal charging subsystem taken OOS
- One RHR subsystem taken OOS

The Table below summarizes the results of the risk metrics for all of the above cases:

Table 4-4 Summary of Risk Metrics				
Risk Metric	**One train of Containment Spray System**	**One train of SI Subsystem**	**One train of Centrifugal Charging Subsystem**	**One train of RHR Subsystem**
CDF_{OOS}	6.5557E-05	6.7416E-05	6.7804E-05	6.9732E-05
$LERF_{OOS}$	3.5133E-06	3.5398E-06	3.5496E-06	3.9877E-06
T_{OOS} (days)	0.0	0.0	0.0	0.0
ΔCDF	0.0000E+00	1.8590E-06	2.2470E-06	4.1750E-06
ΔLERF	2.4600E-08	5.1100E-08	6.0900E-08	4.9900E-07
ΔCDF_{AVG}	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$\Delta LERF_{AVG}$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
ICCDP	0.0000E+00	7.1304E-08	8.6186E-08	1.6014E-07
ICLERP	9.4356E-10	1.9600E-09	2.3359E-09	1.9140E-08

Conclusion

The Table below lists the results of the risk metrics along with their RG 1.177 acceptance criteria:

Table 4-5 Results of Risk Metrics along with RG 1.177 Acceptance Criteria						
Risk Metric	**RG 1.177 Acceptance Criteria**	**One train of CS System Out of Service (% of Risk Significant Criterion)**	**One train of SI Subsystem Out of Service (% of Risk Significant Criterion)**	**One train of centrifugal charging Subsystem Out of Service (% of Risk Significant Criterion)**	**One train of RHR subsystem Out of Services (% of risk Significant Criterion)**	**One CS train, one train of SI, charging, and RHR Subsystem Out of Service ** (% of Risk Significant Criterion)**
ΔCDF_{AVG}*	1.0 E-06	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
$\Delta LERF_{AVG}$ *	1.0 E-07	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
ICCDP	5.0 E-07	0.0 (0%)	7.13E-08 (14.2%)	8.62E-08 (17.2%)	1.60E-07 (32.0%)	3.18E-07 (63.5%)
ICLERP	5.0 E-08	9.44E-10 (1.9%)	1.96E-09 (3.9%)	2.34E-09 (4.7%)	1.91E-08 (38.3%)	2.44E-08 (48.8%)

Note:
* This unit is per reactor year
** This is the sum of the risk metrics from the CS system, SI, RHR, and Charging subsystems

The calculated risk metric values are all within acceptable limits and therefore from the risk informed perspective, the proposed change to the CT for one train of the CS system, SI subsystem, RHR subsystem, or centrifugal charging subsystem inoperable to 14 days has a negligible impact on overall plant risk. The last column of the above table also shows that the cumulative risk impact of the proposed changes to the completion time to 14 days for the CS system, SI subsystem, RHR subsystem, and centrifugal charging subsystem. The risk metric values in this column are equal to the sum of the risk metric values for the CS system, SI subsystem, RHR subsystem, and centrifugal charging subsystem. These values also meet the acceptance criteria for risk significance. The PRA analysis assumed that the trains of the centrifugal charging subsystem, RHR subsystem, and SI subsystem taken OOS are not done concurrently.

When a train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem is removed from service due to unscheduled or corrective maintenance where a component is known to have failed, the conditional failure probability of the redundant component may be higher due to common cause possibilities. For such conditions, the redundant equipment failure modes were adjusted to reflect the fact that a component (e.g., a pump) failure has already occurred, and that the redundant, identical component has not been tested and therefore has the potential for common cause failures. In this case, the conditional failure probability of the redundant component is numerically equal to:

(Common cause failure probability of two redundant components)/(Failure probability of a single component)

This is equal to the "beta" factor in the Beta-Factor model for two redundant components. The evaluation was performed by changing the CS, SI, RHR, and centrifugal charging pump common cause failure term to account for potential common cause failure of the redundant pump when one of the pumps is taken OOS for corrective maintenance. The results of this analysis are provided in the table below:

Table 4-6 Summary of Risk Metrics with Common Cause Failure Consideration

Risk Metric	One train of Containment Spray System	One train of SI Subsystem	One train of Centrifugal Charging Subsystem	One train of RHR Subsystem
CDF_{OOS}	6.5557E-05	6.7684E-05	7.0581E-05	8.4665E-05
$LERF_{OOS}$	3.5203E-06	3.5471E-06	3.6188E-06	7.5330E-06
T_{OOS} (days)	0.0	0.0	0.0	0.0
ΔCDF	0.0000E+00	2.1270E-06	5.0240E-06	1.9108E-05
ΔLERF	3.1600E-08	5.8400E-08	1.3010E-07	4.0443E-06
ΔCDF_{AVG}	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
$\Delta LERF_{AVG}$	0.0000E+00	0.0000E+00	0.0000E+00	0.0000E+00
ICCDP	0.0000E+00	8.1584E-08	1.9270E-07	7.3291E-07
ICLERP	1.2121E-09	2.2400E-09	4.9901E-09	1.5512E-07

The Table below lists the results of the risk metrics along with their RG 1.177 acceptance criteria:

Table 4-7 Results of Risk Metrics with Common Cause Failure Consideration along with RG 1.177 Acceptance Criteria						
Risk Metric	**RG 1.177 Acceptance Criteria**	**One train of CS System Out of Service (% of Risk Significant Criterion)**	**One train of SI Subsystem Out of Service (% of Risk Significant Criterion)**	**One train of centrifugal charging Subsystem Out of Service (% of Risk Significant Criterion)**	**One train of RHR subsystem Out of Services (% of risk Significant Criterion)**	**One CS train, one train of SI, charging, and RHR Subsystem Out of Service ** (% of Risk Significant Criterion)**
ΔCDF_{AVG}*	1.0 E-06	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
$\Delta LERF_{AVG}$ *	1.0 E-07	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)	0.0 (0%)
ICCDP	5.0 E-07	0.0 (0%)	8.16E-08 (16.3%)	1.93E-07 (38.6%)	7.33E-07 (147%)	1.01E-06 (202%)
ICLERP	5.0 E-08	1.21E-09 (2.4%)	2.24E-09 (4.5%)	4.99E-09 (10.0%)	1.55E-07 (310%)	1.63E-07 (327%)

Note:
* This unit is per reactor year
** This is the sum of the risk metrics from the CS system, SI, RHR, and Charging subsystems

As expected, the calculated risk metric values for the unscheduled/corrective maintenance case in Table 4-7 are higher than those values for the scheduled/preventive maintenance case in Table 4-5. For the CS system, centrifugal charging and SI subsystems, the ICCDP and ICLERP risk metric values are within RG 1.177 acceptance criteria for both scheduled/preventive and unscheduled/corrective maintenance cases. For the RHR subsystem, the ICCDP and ICLERP risk metric values are within RG 1.177 acceptance criteria for the scheduled/preventive maintenance case (Table 4-5) but exceed RG 1.177 acceptance criteria for the unscheduled/corrective maintenance case (Table 4-7).

To remediate the situation of a common cause failure of the RHR subsystem, the 14-day CT assumes that TS 3.5.2 actions are taken to determine that the redundant OPERABLE ECCS train is not inoperable due to common cause failure within 72 hours when the first ECCS train is declared inoperable. For this TS, which currently allows one or more ECCS trains to be inoperable but requires at least 100 percent of the ECCS flow equivalent to a single OPERABLE ECCS train available, this translates to determine that there is no common cause failure that prevents 100 percent of the ECCS flow equivalent to a single OPERABLE ECCS train being available. The TS 3.5.2 required actions eliminate having to consider conditional failure probability of the redundant RHR subsystem component due to common cause failures and thus only the ICCDP and ICLERP risk metric values for the scheduled/preventive maintenance case (Table 4-5) are applicable and the risk metric values are within RG 1.177 acceptance criteria. The 72-hour time limit is reasonable and is chosen so that the risk is no worse than the risk associated with the 72-hour CT for entering Required Action A.1 in the current TS 3.5.2.

Uncertainty Analysis

Although parametric uncertainty for CDF and LERF was not evaluated for the DC01 base PRA model, it was done in previous models. The parametric uncertainty in the results was well understood and no additional parametric uncertainty analysis was therefore performed for this application.

To address the modeling uncertainty for extending the CTs for the SI subsystem, centrifugal charging subsystem, RHR subsystem, and the CS system, the key contributors to the change with respect to CDF and LERF, were compared to the base model results. The key contributors to risk considered were the initiating events, system/top events, and event sequences leading to core damage and large early release. The results show that there are no key contributors that are unique to the change. The major contributors to the base case and the change cases are similar and they are associated primarily with the external events such as the seismic events. Seismic event frequency and seismic impact uncertainties stem from the uncertainty in the site hazard data and in the plant equipment fragility data. These two sources of uncertainty were evaluated, quantified, and presented in the plant's LTSP report.

An important parameter required for uncertainty evaluation in this study is the expected OOS time for the SI subsystem, centrifugal charging subsystem, RHR subsystem, and the CS system. It was indicated previously that the mean outage time per year, T_{OOS}, for a train of the SI subsystem, centrifugal charging subsystem, RHR subsystem, and CS system is anticipated to remain the same as the current ones since the maintenance of equipment in these systems/subsystems will be performed with the same emphasis on timely completion as is currently practiced. There is, however, uncertainty in the expected mean outage time for a train of these subsystems in future maintenance activities. To evaluate the uncertainty associated with this outage duration for a train of these systems/subsystems, a sensitivity calculation was performed for the risk metrics using an expected increase in the mean outage time per year equal to the current OOS time per year. Therefore, the increase in the mean outage duration per year used in this sensitivity analysis for one train of the CS system is 38 hours, for one train of the SI subsystem is 24 hours, one train of RHR subsystem is 27 hours, and one train of the centrifugal charging subsystem is 29 hours. The results of this sensitivity analysis are provided below for both the scheduled and unscheduled maintenance cases:

Table 4-8 Scheduled Maintenance Case

Risk Metric	ΔCDF_{AVG}*		$\Delta LERF_{AVG}$ *	
	Base Case	Sensitivity Case	Base Case	Sensitivity Case
Acceptance Criteria	1.0 E-06		1.0 E-07	
One train of CS System Out of Service (% of Risk Significant Criterion)	0.0 (0%)	0.0 (0%)	0.0 (0%)	1.07E-10 (0.1%)
One train of SI Subsystem Out of Service (% of Risk Significant Criterion)	0.0 (0%)	5.09E-09 (0.5%)	0.0 (0%)	1.40E-10 (0.1%)
One train of charging Subsystem Out of Service (% of Risk Significant Criterion)	0.0 (0%)	7.44E-09 (0.7%)	0.0 (0%)	2.02E-10 (0.2%)
One train of RHR Subsystem Out of Service (% of Risk Significant Criterion)	0.0 (0%)	1.29E-08 (1.3%)	0.0 (0%)	1.54E-09 (1.5%)
One CS train with one SI, one RHR, and one charging subsystem out of Service ** (% of Risk Significant Criterion)	0.0 (0%)	2.54E-08 (2.5%)	0.0 (0%)	1.88E-09 (1.9%)

Note:
* The unit is per reactor year
** This is the sum of the risk metrics from the CS system, SI subsystem, RHR subsystem, and centrifugal charging subsystem.

Table 4-9 Unscheduled Maintenance Case				
Risk Metric	ΔCDF_{AVG}*		$\Delta LERF_{AVG}$ *	
	Base Case	Sensitivity Case	Base Case	Sensitivity Case
Acceptance Criteria	1.0 E-06		1.0 E-07	
One train of CS System Out of Service (% of Risk Significant Criterion)	0.0 (0%)	0.0 (0%)	0.0 (0%)	1.37E-10 (0.1%)
One train of SI Subsystem Out of Service (% of Risk Significant Criterion)	0.0 (0%)	5.83E-09 (0.6%)	0.0 (0%)	1.60E-10 (0.2%)
One train of charging Subsystem Out of Service (% of Risk Significant Criterion)	0.0 (0%)	1.66E-08 (1.7%)	0.0 (0%)	4.31E-10 (0.4%)
One train of RHR Subsystem Out of Service (% of Risk Significant Criterion)	0.0 (0%)	5.89E-08 (5.9%)	0.0 (0%)	1.25E-08 (12.5%)
One CS train with one SI, one RHR, and one charging subsystem out of Service ** (% of Risk Significant Criterion)	0.0 (0%)	8.14E-08 (8.1%)	0.0 (0%)	1.31E-08 (13.1%)

Note:
* The unit is per reactor year
** This is the sum of the risk metrics from the CS system, SI subsystem, RHR subsystem, and centrifugal charging subsystem.

The sensitivity calculations for both the unscheduled/corrective maintenance case and the scheduled/planned maintenance case show that the risk metric values are also within the risk acceptable limits.

4.2.2 Tier 2: Avoidance of Risk-Significant Plant Configurations

There is reasonable assurance that risk-significant plant equipment configurations will not occur when the CS system, SI subsystem, RHR subsystem, or centrifugal charging subsystem is OOS using the proposed TS CT changes.

Technical Specifications and Safety Function Determination Program

Adhering to the current TS requirements will prevent many of the more risk significant configurations from being entered into. Specifically, there are requirements concerning the operability of containment fan cooling unit (CFCU) system as specified in LCO 3.6.6 (Condition D). Potential configurations that should be avoided while a CS train is out of service are: (1) unavailability of any CFCUs, and (2) any activities that could reduce the availability of the other CS train. In addition, the LCO 3.5.2 requires the operators to maintain a combination of equipment such that 100 percent of the ECCS flow equivalent to a single operable ECCS train remains available (that is, minimum of one operable centrifugal charging pump, SI pump, and RHR pump and applicable flow paths capable of drawing water from the RWST and injecting into the RCS cold leg). Similarly, potential configurations that should be avoided when one ECCS train is OOS involve work that could reduce the availability of the other ECCS train and this includes work on the support systems or any tests that will render the support systems inoperable.

The TS 5.5.15 Safety Function Determination Program (SFDP) requires provisions for cross-division checks to ensure a loss of the capability to perform a safety function assumed in the accident analysis does not go undetected. TS LCO 3.0.6 establishes requirements regarding supported systems when support systems are found inoperable. The SFDP implements the requirements of TS LCO 3.0.6. Upon entry into TS LCO 3.0.6, an evaluation is required to determine whether there has been a loss of safety function. Additionally, other appropriate actions may be identified as a result of the support system inoperability and corresponding exception to entering supported system Conditions and Required Actions. DCPP Procedure OP1.DC38 implements the SFDP as required by TS 5.5.15.

Risk Management and Compensatory Actions

The analysis performed to support extending the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem CT specifically constrained the maintenance of equipment in these system and subsystems. Use of the 14-day CT with concurrent maintenance of the centrifugal charging subsystem, RHR subsystem, and SI subsystem equipment on the ECCS system will not be allowed. Since these constraints are used to justify the extended CT, these configurations will not be entered into voluntarily. To ensure appropriate control over these constraints, these constraints are included in TS 3.5.2, Actions A.2.1 and A.2.2, and are described in the TS 3.5.2 Bases. The TS Bases changes will be implemented in accordance with TS 5.5.14, "Technical Specifications Bases Control Program," as part of the implementation process for the amendment.

The risk associated with having a train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem OOS will be managed by adhering to the requirements for online risk assessment and management as described in the DCPP Procedure AD7.DC6, "On-Line Maintenance Risk Management." In addition to the risk directly associated with the CS system, centrifugal charging subsystem, RHR subsystem, and SI subsystem unavailability, the procedure requires that potentially risk significant configurations during the unavailability period of a train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem are assessed and managed. Other risk management actions and restrictions used in the past at DCPP include:

- Risk awareness briefings for maintenance, operations, engineering, and other support personnel prior to the work.
- Maintenance performed around-the-clock to minimize the time spent with equipment unavailable.
- Establishment of back-out criteria and procedures in the event of unexpected conditions or configurations.
- Verification of redundant equipment operability and posting of signs.
- Walkdown of redundant or other important mitigation equipment (e.g., the other train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem, and/or their electrical power supplies and cooling water support) to ensure that equipment is in good material condition, with no work being performed that could jeopardize operation.
- Disallowance of work that may cause a trip hazard or elective maintenance on redundant equipment.
- Senior management on-shift support.

- Plan for no more than 50 percent of the CT for the maintenance without additional management approval.

4.2.3 Tier 3: Risk-Informed Configuration Risk Management Program

DCPP has developed a process for online risk assessment and management. Following the process and procedures ensures that the risk impact of equipment OOS while the plant is on-line is appropriately evaluated prior to performing any maintenance activity or following an equipment failure or other internal or external event that impacts risk. DCPP procedure AD7.DC6 provides guidance for managing safety function, probabilistic, and plant trip risks as required by 10 CFR 50.65(a)(4) of the Maintenance Rule. The procedure addresses risk management practices in the maintenance planning phase and maintenance execution (real time) phase for Modes 1 through 4. Appropriate consideration is given to equipment unavailability, operational activities such as testing, and weather conditions.

In general, risk from performing maintenance on-line is minimized by:

- Performing only those preventative and corrective maintenance items on-line required to maintain the reliability of structures, systems or components (SSC).

- Minimizing cumulative unavailability of safety-related and risk significant SSCs by limiting the number of at-power maintenance outage windows per cycle per train/component.

- Minimizing the total number of SSCs being OOS at the same time.

- Minimizing the risk of initiating plant transients (trips) that could challenge safety systems by implementing compensatory measures.

- Avoiding higher risk combinations of OOS SSCs using PRA insights.

- Maintaining defense-in-depth by avoiding combinations of OOS SSCs that are related to similar safety functions or that affect multiple safety functions.

- Scheduling in Train/Bus windows to avoid removing equipment from different trains simultaneously.

In general, risk is managed by:

- Evaluating plant trip risk activities or conditions and mitigating them by taking appropriate compensatory measures and/or ensuring defense-in-depth for safety systems that are challenged by a plant trip.

- Quantitatively pre-evaluate risk significant equipment OOS configurations affecting CDF by PRA methods.

- Qualitatively evaluate the ability of SSCs to support key safety functions that protect the fission product barriers such as fuel cladding, RCS boundary, and containment.

- Implementing compensatory measures and requirements for management authorization or notification for certain "high-risk" configurations resulting from planned maintenance.

Actions are taken and appropriate attention is given to configurations and situations commensurate with the level of risk as evaluated using AD7.DC6. This occurs both during the maintenance planning and execution phases.

For planned maintenance activities, an assessment of the overall risk of the activity on plant safety, including benefits to system reliability and performance, is currently performed and documented per AD7.DC6 prior to scheduled work. Consideration is given to plant and external conditions, the number of activities being performed concurrently, the potential for plant trips, and the availability and "health" of redundant trains.

Risk is evaluated, managed, and documented for all activities or conditions based on the current plant state:

- Before any planned or emergent maintenance is to be performed.
- As soon as possible when an emergent plant condition is discovered.
- As soon as possible when an external or internal event or condition is recognized.

Compensatory measures are implemented as necessary and if the risk assessment reveals unacceptable risk, a course of action is determined to restore degraded or failed safety functions first and the PRA aspects second.

For risk-significant plant components, the reliability and unavailability are monitored to demonstrate that their performance is adequate. If preestablished reliability or availability performance goals are exceeded, consideration must be given to the 10 CFR 50.65(a)(1) requirements, including increased management attention and goal setting, in order to restore reliability and availability to an acceptable level. This is performed for the risk-significant ECCS and CS systems.

4.2.4 Integrated Risk-Informed Assessment

The proposed changes to extend the allowable CTs for the Required Actions associated with restoration of an inoperable train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem, have been evaluated with a risk-informed approach. This approach demonstrates that the principles of risk-informed regulation are met for these proposed changes:

- The applicable regulatory requirements will continue to be met,
- Adequate defense-in-depth will be maintained,
- Sufficient safety margins will be maintained, and
- Any increases in CDF and LERF are small and consistent with the NRC Safety Goal Policy Statement and RGs 1.174 and 1.177.

Constraints on concurrent maintenance of the centrifugal charging subsystem, RHR subsystem, and SI subsystem equipment are needed to ensure that the risk increase due to the proposed change is small and are included in TS 3.5.2 Actions A.2.1 and A.2.2 to ensure they are applied. These constraints are factored into the CDF and LERF calculations. Other compensatory actions and restrictions identified by site risk management procedures are not quantified, but do have a real and substantial impact on the risk of taking a train of the CS system, centrifugal charging subsystem, RHR subsystem, or SI subsystem OOS.

4.2.5 Conclusion

The acceptability of the proposed CT extensions for the ECCS and CS system is based upon both a deterministic evaluation and a risk-informed assessment. The Defense-In-Depth and Safety Margins assessment concluded that there is no impact on the redundancy, independence, or diversity of these system and subsystems and all the elements of the defense-in-depth principle and safety margins can be met. The risk assessment concluded that the increase in plant risk is small and consistent with the NRC "Safety Goals for the Operations of Nuclear Power Plants; Policy Statement" as interpreted by NRC RGs 1.174 and 1.177.

5.0 REGULATORY ANALYSIS

5.1 No Significant Hazards Consideration

PG&E has evaluated whether or not a significant hazards consideration is involved with the proposed amendment by focusing on the three standards set forth in 10 CFR 50.92, "Issuance of amendment," as discussed below:

1. Does the proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

The proposed changes increase the Emergency Core Cooling System (ECCS) completion time (CT) to 14 days when one subsystem of one ECCS train is inoperable. Similarly, the proposed changes also increase the containment spray (CS) system CT to 14 days when one CS train is inoperable. These proposed changes do not physically alter any plant structures, systems, or components, and are not accident initiators; therefore, there is no effect on the probability of accidents previously evaluated. When one or more ECCS trains is inoperable, the Technical Specifications (TS) still requires at least 100 percent of the ECCS flow equivalent to a single OPERABLE ECCS train available. Similarly, when one CS train is inoperable, the TS still requires the redundant CS train to be OPERABLE. Therefore, redundant system and subsystems are still able to perform their safety functions. Also the proposed changes do not affect the types or amounts of radionuclides released following an accident, or affect the initiation and duration of their release. Therefore the consequences of accidents previously evaluated, which rely on the ECCS and CS system to mitigate, are not significantly increased.

Therefore, the proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed change create the possibility of a new or different accident from any accident previously evaluated?

Response: No.

There are no new failure modes or mechanisms created due to plant operation with an extended CT. Extended operation with one ECCS train with one subsystem inoperable or with one train of CS system inoperable does not involve any modification to the operational limits or physical design of the systems. There are no new accident precursors generated due to the extended CT.

Therefore, the proposed change does not create the possibility of a new or different accident from any accident previously evaluated.

3. Does the proposed change involve a significant reduction in a margin of safety?

Response: No.

The proposed change is based upon both a deterministic evaluation and a risk-informed assessment.

The deterministic evaluation concluded that though one ECCS train is inoperable for a longer period of time, the availability of the redundant OPERABLE ECCS train can still perform its safety function. Similarly, though one train of the CS system is inoperable for a longer period of time, the redundant OPERABLE CS train can still perform its safety function by providing at least the minimum spray flow to the containment assumed in the accident analyses.

The risk assessment performed to support this license amendment request concluded that the increase in plant risk is small and consistent with the NRC's Safety Goal Policy Statement, "Use of Probabilistic Risk Assessment Methods in Nuclear Activities: Final Policy Statement," and guidance contained in of Regulatory Guides (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing

Basis," and RG 1.177, "An Approach for Plant-Specific, Risk-Informed Decisionmaking: Technical Specifications."

Together, the deterministic evaluation and the risk-informed assessment provide assurance that the ECCS and the CS system will still meet their design requirements with the longer CTs proposed.

Therefore, the proposed change does not involve a significant reduction in a margin of safety.

Based on the above evaluation, PG&E concludes that the proposed change presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

5.2 Applicable Regulatory Requirements/Criteria

Since the mid-1980s, the NRC has been reviewing and granting improvements to TS that are based, at least in part, on PRA insights. In its final policy statement on TS improvements of July 22, 1993, the NRC stated that it...

> *...expects that licensees, in preparing their Technical Specification related submittals, will utilize any plant-specific PSA (probabilistic safety assessment) or risk survey and any available literature on risk insights and PSAs. Similarly, the NRC staff will also employ risk insights and PSAs in evaluating Technical Specifications related submittals. Further, as a part of the Commission's ongoing program of improving Technical Specifications, it will continue to consider methods to make better use of risk and reliability information for defining future generic Technical Specification requirements.*

The NRC reiterated this point when it issued the revision to 10 CFR 50.36, "Technical Specifications," in July 1995. In August 1995, the NRC adopted a final policy statement on the use of PRA methods in nuclear regulatory activities that improve safety decision making and regulatory efficiency. The PRA policy statement included the following points:

1. *The use of PRA technology should be increased in all regulatory matters to the extent supported by state-of-the-art in PRA methods and data and in a manner that compliments the NRC's deterministic approach and supports the NRC's traditional defense-in-depth philosophy.*

2. *PRA and associated analyses (e.g., sensitivity studies, uncertainty analyses, and importance measures) should be used in regulatory matters, where practical within the bounds of the state-of-the-art, to reduce unnecessary conservatism associated with current regulatory requirements.*

3. *PRA evaluations in support of regulatory decisions should be as realistic as practicable and appropriate supporting data should be publicly available for review.*

Regulatory Guidance associated with risk-informed TS changes is contained in NRC RG 1.174, "An Approach for Using Probabilistic risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," dated July 1998, and NRC RG 1.177, "An Approach for Plant-Specific Risk-Informed Decisionmaking: Technical Specifications," dated August 1998.

The acceptability of the proposed CT extensions for the ECCS and the CS system is based upon both a deterministic evaluation and a risk-informed assessment. The Defense-In-Depth and Safety Margins assessment concluded that there is no impact on the redundancy, independence, or diversity of these system and subsystems and all the elements of the defense-in-depth principle and safety margins can be met. The risk assessment concluded that the increase in plant risk is small and consistent with the NRC "Safety Goals for the Operations of Nuclear Power Plants; Policy Statement" as interpreted by NRC RGs 1.174 and 1.177. Therefore, based on these considerations discussed in the submittal, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

6.0 ENVIRONMENTAL CONSIDERATION

PG&E has evaluated the proposed amendment and has determined that the proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types, or significant increase in the amounts, of any effluent that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

Proposed Technical Specification Page (Mark-up)

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS - Operating

LCO 3.5.2 Two ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

-----NOTE-----
In MODE 3, both safety injection (SI) pump flow paths may be isolated by closing the isolation valve(s) for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND At least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	A.1 Restore train(s) to OPERABLE status	~~-----NOTE-----~~ ~~The Completion Time may be extended to 7 days for Unit 1 cycle 12 for centrifugal charging pump 1-1 seal replacement~~ 72 hours
	OR A.2.1 Verify only one subsystem in one ECCS train is inoperable	72 hours
	AND A.2.2 Determine there is no common cause failure in the same subsystem in the OPERABLE ECCS train	72 hours
	AND A.2.3 Restore train to OPERABLE status	14 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

Add new Required Actions A.2.1, A.2.2, and A.2.3

3.6 CONTAINMENT SYSTEMS

3.6.6 Containment Spray and Cooling Systems

LCO 3.6.6 The containment fan cooling unit (CFCU) system and two containment spray trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One containment spray train inoperable.	A.1 Restore containment spray train to OPERABLE status. 14 days	~~NOTE~~ ~~The Condition A Completion Times may be extended to 14 days for Unit 2 cycle 12 for containment spray pump 2-2 control circuit cable maintenance.~~ ~~72 hours~~ AND ~~10~~ days from discovery of failure to meet the LCO
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 5.	6 hours 84 hours
C. One required CFCU system inoperable such that a minimum of two CFCUs remain OPERABLE.	C.1 Restore required CFCU system to OPERABLE status.	7 days AND 10 days from discovery of failure to meet the LCO

(continued)

Proposed Technical Specification Changes (Retyped)

Remove Page	Insert Pages
3.5-3	3.5-3
3.6-13	3.6-13

3.5 EMERGENCY CORE COOLING SYSTEMS (ECCS)

3.5.2 ECCS - Operating

LCO 3.5.2 Two ECCS trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

--NOTE--
In MODE 3, both safety injection (SI) pump flow paths may be isolated by closing the isolation valve(s) for up to 2 hours to perform pressure isolation valve testing per SR 3.4.14.1.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One or more trains inoperable. AND At least 100% of the ECCS flow equivalent to a single OPERABLE ECCS train available.	A.1 Restore train(s) to OPERABLE status OR A.2.1 Verify only one subsystem in one ECCS train is inoperable AND A.2.2 Determine there is no common cause failure in the same subsystem in the OPERABLE ECCS train AND A.2.3 Restore train to OPERABLE status	72 hours 72 hours 72 hours 14 days
B. Required Action and associated Completion Time not met.	B.1 Be in MODE 3. AND B.2 Be in MODE 4.	6 hours 12 hours

3.6 CONTAINMENT SYSTEMS

3.6.6 Containment Spray and Cooling Systems

LCO 3.6.6 The containment fan cooling unit (CFCU) system and two containment spray trains shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One containment spray train inoperable.	A.1 Restore containment spray train to OPERABLE status.	14 days <u>AND</u> 14 days from discovery of failure to meet the LCO
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3. <u>AND</u> B.2 Be in MODE 5.	6 hours 84 hours
C. One required CFCU system inoperable such that a minimum of two CFCUs remain OPERABLE.	C.1 Restore required CFCU system to OPERABLE status.	7 days <u>AND</u> 10 days from discovery of failure to meet the LCO

(continued)

Changes to Technical Specification Bases Pages
(For information only)

BASES

ACTIONS (continued)

A.2.1, A.2.2, and A.2.3

These Required Actions allow restoring one inoperable ECCS train with no more than one inoperable subsystem to OPERABLE status with a CT of 14 days if it is determined that only one subsystem in one ECCS train is inoperable and that the OPERABLE subsystem is not inoperable due to common cause failure. The common cause failure investigation shall be associated with the subsystem failure that prompts the ECCS subsystem to be declared inoperable originally. The common cause failure evaluation can be performed by analyses, inspection, and/or testing. The addition of these Required Actions into this TS was per LA XX for Unit 1 and LA XX for Unit 2. The 14-day CT is intended to be used for unplanned corrective maintenance or inspections.

The justification to extend the CT to 14 days is based on risk-informed insight where the evaluation would meet the NRC risk informed criteria assuming only one subsystem in one ECCS train is inoperable and with the elimination of conditional failure probability of the redundant ECCS subsystem due to common cause failure. PRA analysis assumes no more than one subsystem in one ECCS train is inoperable. The PRA risk-insignificance thresholds are not met for the14-day Completion Time when a RHR subsystem component is found to be inoperable as a result of a higher conditional failure probability of the redundant component due to common cause failure. To comply with the assumption in the PRA analysis that only one subsystem in one ECCS train is inoperable and to eliminate the common cause failure concerns, the 14-day Completion Time assumes that actions are to be taken within 72 hours to determine that there is only one subsystem in one ECCS train inoperable and there is no common cause failure in the same subsystem in the OPERABLE ECCS train. The 72-hour Completion Time in Required Actions A.2.1 and A.2.2 are reasonable and is chosen so that the risk is no worse than the risk associated with the 72 hour Completion Time for Required Action A.1.

For planned preventive maintenance or inspections, the CT for the centrifugal charging, safety injection, or RHR subsystem is 72 hours per Required Action A.1 CT. This is to prevent accumulating excessive Maintenance Rule unavailability hours.

BASES

ACTIONS (continued)

B.1 and B.2

If the inoperable trains cannot be returned to OPERABLE status within the associated Completion Time, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to MODE 3 within 6 hours and MODE 4 within 12 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

BASES

ACTIONS

A.1

With one containment spray train inoperable, the inoperable containment spray train must be restored to OPERABLE status within ~~72 hours~~ 14 days. In this Condition, the remaining OPERABLE spray and cooling trains are adequate to perform the iodine removal and containment cooling functions. The ~~72 hour~~ 14-day Completion Time is based on PRA analysis and has taken ~~takes~~ into account the redundant heat removal capability afforded by the Containment Spray System, reasonable time for repairs, and low probability of a DBA occurring during this period.

This Completion Time was revised from 72 hours to 14 days by LA XX for Unit 1 and LA XX for Unit 2. The 14-day Completion Time is intended to be used for unplanned corrective maintenance or inspections

For planned preventive maintenance or inspections, the CT is 72 hours. This is to prevent accumulating excessive Maintenance Rule unavailability hours.

The ~~10~~ 14 days from discovery of failure to meet the LCO portion of the Completion Time for Required Action A.1 is based upon PRA analyses and engineering judgment. It takes into account the low probability of coincident entry into two Conditions in this Specification coupled with the low probability of an accident occurring during this time. Refer to Section 1.3, "Completion Times," for a more detailed discussion of the purpose of the "from discovery of failure to meet the LCO" portion of the Completion Time.

~~The Completion Time is modified by a Note that allows the Condition A Completion Times to be extended to 14 days for Unit 2 during cycle 12 for containment spray pump 2-2 control circuit cable maintenance. The 14-day Completion Time only applies to Unit 2 during cycle 12 and may only be used to support maintenance of the containment spray pump 2-2 control circuit cable. The 14-day Completion Times do not apply to Condition C and do not extend the Condition C Completion Time of 10 days from discovery of failure to meet the LCO. In the event Condition A is entered for greater than or equal to 10 days, and then Condition C is entered, the Condition C Completion Time must be considered not met.~~