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May 12, 2000

PG&E Letter DCL-00-071

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 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 00-02
Refueling Water Purification System Upgrade and Temporary Reverse Osmosis Skid Installation To Support RWST Cleanup During Power Operation

Dear Commissioners and Staff:

Enclosed is an application for amendment to Facility Operating License Nos. DPR-80 and DPR-82 in accordance with 10 CFR 50.90. This license amendment request (LAR) addresses two related unreviewed safety questions (USQs). The first USQ pertains to a design upgrade of the refueling water purification (RWP) system to permit reclassification of this system from design class II/non-seismic category 1 to design class I/seismic category 1. The purpose of this upgrade is to permit filtering of the refueling water storage tank (RWST) water while the RWST is required to be operable. The design upgrade includes a combination of analyses, inspections, component dedications, and physical changes.

Currently, the RWP system piping is a non-safety-related system separated from the safety-related safety injection (SI) system by a manually operated code boundary valve. PG&E previously operated with the RWST connected to the non-seismically qualified RWP piping while the RWST was required to be operable, relying on an operator to close the code boundary valve if any safety injection related event (loss-of-coolant accident [LOCA], main steam line break, etc.) or a seismic event took place. During a July 1998 investigation of this operation, it was concluded that insufficient time exists to credit operator action. Consequently, an immediate corrective action was taken on July 2, 1998 to prohibit the opening of the code boundary isolation valves whenever the RWST is required to be operable. This action ensures that the RWST remains operable and is capable of performing its safety function.

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PG&E determined that this issue was not reportable based on an evaluation which concluded that the RWP system piping would maintain its structural integrity to the extent it would not experience gross failure and the pressure boundary would remain intact during a seismic event. Therefore the RWST would have maintained its safety function and was not outside design basis for a LOCA or main steam line break coincident with a seismic event.

The second USQ involves crediting operator action to close a manual code boundary valve connected to the RWST following a seismic event or safety injection. It is desired to recirculate the RWST inventory through a non-seismically qualified reverse osmosis system for purposes of removing silica from the RWST water. The control of silica is required to meet reactor coolant chemistry limits. Maintaining low reactor coolant system silica concentrations minimizes fuel clad crud deposition which can adversely affect the corrosion resistance and heat transfer properties of the fuel clad.

A description of the proposed changes, and the bases for the changes, are provided in Enclosure A. The proposed Final Safety Analysis Report changes are noted on the marked-up copy in Enclosure B. A drawing depicting the RWP system upgrade and a drawing depicting the RWST interface with the temporary reverse osmosis system is contained in Enclosure C.

PG&E requests that this LAR be assigned a medium priority for review and approval, since there is no immediate safety concern. However, in order to support installation of the RWP system upgrade prior to its anticipated need, PG&E requests that the amendments be approved by March 1, 2001, and that the amendments be made immediately effective upon issuance by the NRC, to be implemented following upgrade of the RWP system.

Sincerely,

Gregory M. Rueger

cc: Edgar Bailey, DHS
Steven D. Bloom
Ellis W. Merschoff
David Proulx
Diablo Distribution

Enclosures
KJS

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

	)	Docket No. 50-275
In the Matter of	)	Facility Operating License
PACIFIC GAS AND ELECTRIC COMPANY	)	No. DPR-80
	)	
Diablo Canyon Power Plant	)	Docket No. 50-323
Units 1 and 2	)	Facility Operating License
	)	No. DPR-82

AFFIDAVIT

Gregory M. Rueger, of lawful age, first being duly sworn upon oath says that he is Senior Vice President - Generation of Pacific Gas and Electric Company; that he is familiar with the content thereof; that he has executed LAR 00-02 on behalf of said company with full power and authority to do so; and that the facts stated therein are true and correct to the best of his knowledge, information, and belief.

Greg Rueger

Gregory M. Rueger
Senior Vice President
Generation

Subscribed and sworn to before me this 12th day of May, 2000.

Lisa M. Nelson

Notary Public
State of California
County of San Luis Obispo

LISA M. NELSON
Commission # 1258688
Notary Public - California
San Luis Obispo County
My Comm. Expires Mar 31, 2004

REFUELING WATER PURIFICATION SYSTEM UPGRADE AND TEMPORARY REVERSE OSMOSIS SKID INSTALLATION TO SUPPORT RWST CLEANUP DURING POWER OPERATION

A. DESCRIPTION OF AMENDMENT REQUEST

This license amendment request (LAR) proposes to allow the design upgrade of the refueling water purification (RWP) system from design class II/non-seismic category 1 to design class I/seismic category 1 for purposes of permitting cleanup of the refueling water storage tank (RWST) water while the RWST is required to be operable. Currently, using the RWP system to cleanup the RWST, while the RWST is required to be operable, could render the RWST inoperable during a seismic event. To accommodate the RWST cleanup while it is required to be operable, the RWP system would be upgraded to design class I/seismic category 1. However, since the RWP system exists as installed per original design, all the requirements of design class I piping per ANSI B31.7, with 1970 Addenda, cannot be met without extensive effort at a high cost. The addition of automatic isolation valves at the RWP/SI system interface was considered but not chosen due to insufficient RWST inventory margin to compensate for valve closure time and instrument uncertainty.

This LAR also proposes to allow the crediting of operator action to isolate a manual code boundary valve connected to the RWST following a seismic event or safety injection. It is desired to take suction from the RWST through an existing tank drain line to facilitate RWST recirculation through a non-seismically qualified reverse osmosis system while the RWST is required to be operable. This reverse osmosis system will be used to remove silica from the RWST water. Since a safety-related osmosis system is not readily available, the only feasible method of ensuring RWST inventory is maintained, while removing silica from the RWST contents, is to credit operator action.

B. BACKGROUND

Refueling Water Purification System Upgrade

The RWP system is a subsystem of the spent fuel pool cooling system. The primary RWP function is to maintain optical clarity of the spent fuel pool water. This system is also used to purify the refueling water in the refueling canal and the RWST. Prior to plant refueling outages, the RWP system could be used to cleanup the RWST prior to filling the refueling cavity. The RWP system is also used to recirculate the RWST for representative sampling purposes. The RWP system was designed, fabricated, and installed under the ANSI B31.1.0-1967

Power Piping Code as a non-seismic category I/design class II system. The RWP system is separated from the seismic category I/design class I RWST by a normally closed, manually operated, design class I code boundary valve.

During normal operation (Modes 1 to 4), the RWST is required to be available to maintain a borated water supply for accident mitigation purposes following a loss-of-coolant accident (LOCA) or main steam line break (MSLB). The RWST is aligned to the suction of the safety injection pumps, residual heat removal pumps, and containment spray pumps during normal operation. The suction of the charging pumps is automatically aligned to the RWST on a safety injection signal. During refueling operation (Modes 5 to 6), the RWST is required to be operable as a borated water supply if the boric acid storage system is not operable. The contents of the RWST are used to flood the refueling cavity during refueling operation. The water in the RWST is borated to ensure that shutdown margin is maintained when the reactor is at cold shutdown conditions. During a seismic event, the failure of the non-seismic category I RWP system piping must be considered, potentially resulting in loss of RWST inventory when the code boundary valve is open and the RWP system is aligned to the RWST.

Prior to July 2, 1998, plant procedures allowed interconnection of the RWP system and the RWST, while the RWST was required to be operable, for cleanup of the RWST inventory. To justify this configuration, operator action was credited to close the manual code boundary valve if a seismic, LOCA, or MSLB event took place. This operator action was intended to prevent a loss of RWST inventory below Technical Specification (TS) limits if a seismic event induced a system pressure boundary failure of the RWP piping while the code boundary valve is open. During investigation of this manual operator action time assumption, it was discovered that operator action could not be taken in sufficient time to ensure that the design required volume is maintained in the RWST to perform its function following a LOCA coincident with a seismic event. In addition, it was unclear if the assumed operator action was consistent with NRC guidance contained in NRC Information Notice 97-78.

An immediate corrective action was taken on July 2, 1998 to maintain the code boundary valve closed when the RWST is required to be operable. This action ensures that the RWST remains operable and is capable of performing its safety function.

PG&E determined that this issue was not reportable and concluded that the non-seismic category I/design class II RWP system pressure boundary would not experience a gross failure during a seismic event. Therefore the RWST would have maintained its pressure boundary and provided the required safety function without being outside the design basis for a LOCA or MSLB event.

Temporary Reverse Osmosis Skid Installation To Support RWST Cleanup

A reverse osmosis (RO) skid mounted system is proposed to be used to reduce RWST silica concentration levels during power operation (while the RWST is required to be operable) following upgrade of the RWP system to seismic category I. Filtration and demineralization of the RWST contents with the RWP system is a prerequisite to removing silica with a reverse osmosis (RO) system. Excessive clogging of the RO system pre-filter and reverse osmosis membranes will occur if the RWST contents are not filtered and demineralized prior to use of the RO system. The RO system is expected to be used for approximately 1 month during the cycle to reduce RWST silica concentration.

C. JUSTIFICATION

Refueling Water Purification System Upgrade

Required RWST volume must be maintained during a LOCA or MSLB event coincident with a seismic event, while the RWST is aligned to the RWP system and required to be operable. To allow the use of the RWP system while the RWST is required to be operable, the RWP system will be upgraded from design class II/non-seismic category I to design class I/seismic category I. These RWP upgrades will ensure RWP pressure boundary integrity is maintained during a seismic event and provide reasonable assurance of maintaining the RWST water inventory above the minimum required by the TS. With these RWP system upgrades, credit will no longer need to be taken for operator action to close the code boundary valve between the RWST and the RWP system following a LOCA or MSLB coincident with a seismic event.

The RWP upgrades will allow use of the RWP system, while the RWST is required to be operable, to cleanup the RWST contents through the in-series RWP filter, spent fuel pool demineralizer, and spent fuel pool resin trap filter. Processing the RWST contents through the RWP system enables the removal of radiological impurities to ensure RWST activities and radiation exposure rates are within 10 CFR 20 limits and As Low As Reasonably Achievable (ALARA). Recirculation of the RWST provides tank mixing for representative chemical sampling purposes. Also, pre-refueling outage treatment of the RWST contents ensures that refueling water clarity requirements are maintained for fuel transfer and inspection purposes. The water clarity is both a personnel and equipment safety consideration. This upgrade will not impact the RWP functions for maintaining water clarity of the spent fuel pool.

Previously, PG&E has upgraded a non-seismic category I/design class II system to seismic category I/design class I; that is, the upgrade to the spent fuel pool cooling system. The spent fuel pool cooling system upgrade is discussed in Table 3.2-4, Sheet 28b of Amendment 4 to the operating license application for OL-DPR-82, dated February 28, 1974.

Temporary Reverse Osmosis Skid Installation To Support RWST Cleanup

The RWST silica concentrations have been increasing due to spent fuel pool Boroflex™ panel silica deterioration and silica migration from the spent fuel pool to the reactor cavity during refueling outage fuel transfer operation. Increasing silica levels in the RWST mix with reactor coolant each refueling outage in the reactor cavity, thus increasing silica concentrations in the reactor coolant system (RCS). The RCS silica concentration limit is less than or equal to 1 ppm based on current Westinghouse fuel warranty limits. Currently, RCS silica concentrations are reduced within the established limit by dilution. However, based on silica trending of the RWST contents, future dilution methods may not be capable of lowering RCS silica levels below the 1 ppm limit. The removal of silica from the RWST is preferred to removing silica from the spent fuel pool. Industry experience has shown that removal of silica from the spent fuel pool only leads to further deterioration of the Boroflex™ and possibly a return to even higher silica concentrations in the spent fuel. A skid mounted RO system can be employed to effectively reduce the RWST silica concentration below 1 ppm during power operation. The effective use of an RO system to reduce RWST silica concentration during power operation has been proven at other nuclear power plants such as South Texas Project and Crystal River.

D. SAFETY EVALUATION

Refueling Water Purification System

The RWP system is a subsystem of the spent fuel pool cooling and cleanup system. The spent fuel pool cooling and cleanup system is designed to remove the decay heat generated by stored spent fuel assemblies from the spent fuel pool water. A secondary function of the system is to clarify and purify the spent fuel pool. This system is also available to purify and provide the necessary water clarity of the transfer canal, refueling cavity water, and RWST contents. Each unit has a completely independent spent fuel pool cooling and cleanup system. The spent fuel pool cooling and cleanup system is not required for safe shutdown and has no accident mitigation function. This is a manually controlled system and redundancy of the subsystems is not required based on the large heat capacity and slow heat up rate of the spent fuel pool. Similarly, use of the RWP system to cleanup the RWST does not require redundancy as this function is not required for accident mitigation. The RWP system, however, needs to maintain its pressure boundary following a seismic event to ensure that adequate RWST inventory is maintained to mitigate the consequences of a design basis accident. Connections are provided to recirculate the contents of the RWST through the RWP system. The system takes suction from a 4 inch line branching off the Emergency Core Cooling System (ECCS) pump suction piping and discharges to the safety injection pump return header to the RWST. The RWP pump provides the motive force to recirculate the RWST's contents through the RWP filter, spent fuel pool demineralizer, and spent fuel pool resin trap filter, and then back to the RWST.

The RWP pump is a horizontal centrifugal unit which is operated manually from a local station. The RWP pump, piping, and valves have a design pressure of less than 150 psig and a design temperature of less than 200°F. The RWP system components are currently PG&E design class II / non-seismic category I. The current design of the RWP system is in accordance with design class II systems, structures, and components which are important to reactor operation but not essential to safe shutdown and isolation of the reactor, and failure of which would not result in the release of substantial amounts of radioactivity.

Refueling Water Storage Tank

During normal operation (Modes 1 to 4), the RWST maintains the borated water supply required by the ECCS pumps and the containment spray pumps to mitigate the consequences of a LOCA or MSLB. During normal operation, the RWST is aligned to the suction of the safety injection pumps, residual heat removal pumps, and containment spray pumps. The suction of the charging pumps is automatically aligned to the RWST on a safety injection signal. During refueling operation (Modes 5 to 6), the RWST provides a borated water supply if the boric acid storage system is not operable. During refueling operation (Modes 5 to 6), the content of the RWST is used to supply borated water to the refueling canal for refueling operation.

The TS required minimum RWST volume during Modes 1 to 4, including usable and unusable volume, is 400,000 gallons. In the event of a LOCA, this volume provides a sufficient amount of borated water to meet the following requirements:

1. Provide adequate coolant during the injection phase to meet ECCS design objectives.

2. Increase the boron concentration of reactor coolant and recirculation water to a point that ensures no return to criticality with the reactor at cold shutdown.

3. Provide a portion of the volume to the containment sump to permit the initiation of post LOCA recirculation cooling.

4. Provide adequate supply to meet containment spray requirements.

The TS required minimum contained RWST volume during Modes 5 to 6 is 50,000 gallons to ensure negative reactivity control is available during refueling operation.

The portions of the RWST piping and valves which provide suction for the ECCS pumps are seismic category I, PG&E design class I, quality code class III components. The RWST is designed to remain functional during a double design earthquake (DDE) and a Hosgri earthquake (HE). The DDE is used for Diablo Canyon Power Plant as the equivalent to the safe shutdown earthquake (SSE) of Regulatory Guide 1.29. The HE is a postulated Richter magnitude 7.5 earthquake centered along an offshore zone of geological faulting known as the "Hosgri Fault".

RWP System and RWST Interface

The RWP system is a non-seismic category I, design class II system (PG&E code class "E") which connects to the seismic category I, design class I, quality code class III (PG&E code class "C") RWST piping. Enclosure C contains a drawing of the RWP/RWST interface. The normal suction flowpath is from the main supply header to the ECCS pumps through a manually operated, normally sealed closed code boundary valve (SFS-1-8758, SFS-2-8758). The alternate suction flowpath is through the containment spray pump suction line, through a manually operated normally sealed closed code boundary valve (SFS-1-8788, SFS-2-8788), and a manually operated normally closed valve (SFS-1-72, SFS-2-72) upstream. The alternate suction flowpath will not be included as part of the RWP system upgrade since it is only used during Modes 5 and 6, during which time the boric acid storage system can be credited as the borated water source. The piping in each flowpath is a nominal 4 inch diameter in size. The discharge of the RWP system is through the safety injection pump miniflow recirculation header and through a manually operated normally closed valve (SI-1-8973, SI-2-8973). This return header is connected to the RWST at an elevation above that required to meet the minimum TS tank volume. Although this header is above that required to meet the minimum water volume, it is designed as a design class I/seismic category I line.

Proposed Modification to RWP System

To allow processing of the RWST contents through the RWP system while the RWST is required to be operable, portions of the RWP system will be upgraded to meet the intent of a design class I/seismic category I piping system.

Upgrading the piping and components of the RWP system will provide reasonable assurance that the RWST pressure boundary is maintained when the two systems are interconnected. The upgrade will consist of a design change involving:

1. Seismically qualifying the RWP system to meet seismic category I criteria. This involves analyzing, modifying, or replacing RWP system piping and associated equipment, components, and supports as necessary.

2. System reclassification from design class II to design class I, PG&E piping code class "D". The original code of construction for the RWP system design, fabrication, and installation was ANSI B31.1.0-1967 (PG&E piping code class "E"). This reclassification will identify all components in the RWP system as PG&E piping code class "D". The PG&E piping code class "D" classification will impose the requirements that all future work on this system meet the requirements of design class I/seismic category I, quality class III (ANSI 18.2 safety class 3), similar to PG&E piping code class "C". The following activities define the minimum requirements for upgrading to PG&E piping code class "D" as defined in the Q-List:

   - perform stress analysis of pipe and pipe supports in accordance with design class I criteria. This analysis will use ASTM A-312 Type 304 stainless steel for the current piping, and conservatively reduce piping stress allowables for undocumented welded joints. The reduction in allowables will utilize the rules of ASME Section VIII, Table UW-12 as guidance,

   - perform suitable non-destructive surface examinations of pipe welds at random locations, accessible for inspection,

   - perform suitable material property verifications of the stainless steel pipe material at random locations,

   - perform expansion anchor bolt torque inspections on all modified pipe supports, and a single bolt at each base plate on all existing pipe supports, at accessible locations (ALARA guidelines), which are not modified. If failures are detected, inspection of all bolts at that base plate will be performed,

   - evaluate all system components such as pumps, demineralizers, etc. to verify they remain within allowable design class I stresses and replace components which cannot be qualified to maintain pressure boundary integrity with safety-related components/materials,

- perform seismically induced system interaction (SISI) evaluations to ensure that the upgraded system cannot be adversely impacted by non design class I system piping,

- reclassify instrumentation pressure boundary portions, including indicators and instrument valves as applicable, from instrument class II to instrument class IC,

- reclassify the upgraded portions of the RWP system as PG&E piping code class "D" to ensure all future repair and replacement activities meet the requirements of PG&E piping code class "C" which is equivalent to ASME Section III, Subsection ND (quality class III, RG 1.26 quality group C),

- include the RWP system in PG&E's Inservice Inspection Program under the rules of ASME Section XI, class 3,

- define design class I boundaries within the RWP system, and impose administrative controls to ensure design class I isolation from design class II is maintained,

- monitor the RWP system in accordance with the Maintenance Rule Program.

Due to inaccessibility, it may not be possible to inspect all RWP system pipe welds. However, the RWP system is a low energy system, experiencing relatively low pipe stresses during operation with the maximum operating conditions less than 150 psig and 200°F. Also, the RWP system piping was fabricated and erected by the same contractor who installed Design Class I system piping, and the piping materials used in construction are similar to those used in other design class I systems. Further, the system has been in service for over 15 years with no known material degradation. Therefore, based on these considerations and the design upgrade measures described above, there is reasonable assurance that the upgraded RWP system will maintain its pressure boundary integrity during RWST recirculation and tank cleanup operations while the RWST is required to be operable.

Operation of the RWP System to Clarify RWST Contents

The RWP system will be used to purify and recirculate the RWST contents while the RWST is required to be operable. Suction from the RWST to the RWP pump suction will be obtained by opening the manually operated valves in the suction and discharge flowpaths. The RWST contents will typically flow through the

RWP filter, the spent fuel pool demineralizer, and the spent fuel pool resin trap filter and then be returned to the RWST, with the RWP pump providing the motive force. During this operation, separation of the RWST contents and the spent fuel pool contents in the spent fuel pool cooling loop portion of the spent fuel cooling system will be maintained by manual isolation valves which are administratively kept closed. Also, the boundary between the non-safety-related portions of both the RWP and spent fuel pool cooling systems will be maintained by administratively controlling the code boundary valves closed.

The RWP system upgrade to seismic category I criteria will ensure the pressure boundary integrity of the piping aligned to the RWST is maintained during a seismic event while the RWP system is aligned to the RWST. With the RWP system upgraded to seismic category I, the seismically induced passive failure of the RWP system need not be considered. Thus the loss of RWST contents due to a seismic event, while the RWP system is aligned to the RWST, does not need to be considered.

Use of the RWP system will not result in dilution of the borated RWST water. The RWP filter and spent fuel pool resin trap filter do not retain boron since boron freely flows through these filters. The spent fuel pool demineralizer does not remove boron since it is a mixed resin bed anion/cation device which only removes positive and negative ions. During RWP system use to clarify RWST contents, all manual system code boundary valves between the RWP system and spent fuel pool cooling will be administratively maintained closed. Redundant valves are not required to maintain the boundary since the valves are locally operated manual valves which do not perform an active function.

The RWST is part of the emergency core cooling system which is an engineered safety feature. Each engineered safety feature is designed to tolerate a single active failure during the injection phase immediately following the accident, or to tolerate a single active or passive failure during the long-term recirculation phase following the accident. While the RWP system is aligned to the RWST, only an active failure which may occur in the RWP system and which may affect the RWST inventory must be considered. The RWST is not part of the post accident cold leg recirculation phase flowpath and a passive failure in the safety-related portion of the system need not be considered.

The only RWP system component that can experience an active failure is the RWP purification pump. The other RWP system components in the RWP flowpath such as the piping, non-powered valves, RWP filter, spent fuel pool resin trap filter, and the spent fuel pool demineralizer, are passive components. The active failure of the RWP purification pump would result in loss of recirculation flow through the RWP system. This would have no adverse effect on plant safety since the RWP system is not credited for accident mitigation or safe shutdown of the plant, and no loss of engineered safety features would result. The loss of the RWP pump's function to provide recirculation flow does not impact the operability of the RWST/RWP pressure boundary. Also, if the RWP pump continues to operate during a design basis event, the recirculation process will not reduce the RWST water inventory nor the ECCS pump suction supply. The increase in RWST discharge flow due to an operating RWP pump will not adversely impact the required net positive suction head of the operating ECCS pumps.

Similar Piping Upgrade to Spent Fuel Pool Cooling System

Previously, PG&E has upgraded a non-seismic category I/design class II system to a seismic category I/design class I system; that is, the upgrade to the spent fuel pool cooling system.

The spent fuel pool cooling system was originally classified as design class II, in accordance with the design criteria approved during the licensing for construction of Diablo Canyon. After the design, fabrication, and erection of Diablo Canyon piping had commenced, Regulatory Guide 1.29 was issued with the recommendation that the cooling loop for the spent fuel pool cooling system be seismic category I. A piping design analysis, including seismic loads, was performed to assure the cooling loop conformed to design class I, quality code class III piping criteria. A random liquid penetrant examination program was performed for representative samples of the cooling loop piping of the spent fuel pool cooling system to assure that the piping met or exceeded all quality code class III nondestructive examination requirements. This program included examination of installed piping and welds. The piping was considered to be seismic category I following the completion of the above tasks. The spent fuel pool cooling system upgrade is discussed in Table 3.2-4, Sheet 28b of Amendment 4 to the operating license application for OL-DPR-82, dated February 28, 1974.

Temporary Reverse Osmosis Skid Installation To Support RWST Cleanup

It is proposed to use a reverse osmosis skid mounted system to reduce RWST silica concentration levels while the RWST is required to be operable following upgrade of the RWP system. Filtration and demineralization of the RWST contents with the RWP system is a prerequisite to removing silica by a reverse osmosis system.

The RWST silica removal operation time depends on the RO system's operating capabilities and effective performance, RWST tank volume, initial RWST silica concentration, and the final required RWST silica concentration. Based on a projected RWST silica concentration of approximately 6 ppm following refueling cycle 10 of Diablo Canyon Units 1 & 2, and a desired silica concentration limit of below 1 ppm, it is estimated that the RWST silica removal operation will take approximately 1 month to complete during the cycle.

To support use of a RO system to reduce silica concentration in the RWST, a design change to the RWST piping will be made. A design class I passive flow limiting device will be added to the RWST drain piping connection. The flow limiting device will be sized to restrict the maximum leakage from the RWST inventory such that the minimum volume required by the RWST TS is maintained under maximum pressure drop conditions during a 1 hour operator action period required to isolate the RO system. The maximum RWST leakage flowrate allowable will be minimized and kept to that required to meet the RO system design capacity (currently a capacity of approximately 50-75 gpm). The RWST drain line which provides suction to the RO system does not provide flow to any safety-related equipment. In addition, a design class I manual isolation valve will be added upstream or downstream of the flow limiting device, such that the capability is available to isolate the design class I RWST piping from the non-design class I RO skid. All piping and valves will be designed or qualified to design class I/seismic category I up to the discharge of the flow limiting device or the isolation valve (if it is provided downstream of the flow limiting device). This will ensure RWST pressure boundary integrity during a seismic event.

The non-seismic category I/non-design class I RO system is contained on a skid. The skid will be located on the 115 foot elevation inside the auxiliary building in the cask washdown area or outside the auxiliary building near the RWST. The RO system suction will be connected by a hose to the RWST drain piping connection located at the bottom of the RWST outside the auxiliary building. The RO system discharge will be connected by a hose to the RWST overfill line at an open ended connection located in the cask washdown area of the auxiliary building. The RWST overfill line empties into the top of the RWST such that no RWST inventory is lost due to a failure of the RO system discharge hose. The RO system process reject waste stream will be directed to the radioactive waste system through local plant drains.

The RO system outlet boron concentration will be less than the inlet concentration. Thus the RO system has a boron recovery rate which is less than 100 percent. Therefore, boron makeup to the RWST will be required to replenish boron removed during the RO system operation. The RO system boron recovery rate will be verified through testing prior to initial installation into the plant.

Prior to a batch operation of the RO system, it will be verified that there is adequate RWST boron concentration margin such that the concentration will be maintained above the RWST TS minimum boron concentration during RO system operation. The RO system boron recovery rate will be monitored by grab samples taken off the system inlet and outlet after each batch operation. Following each batch RO system operation, the RWST will be recirculated with the RWP system, and the RWST will be sampled to check the boron concentration. Replenishment of the boron concentration will be made as needed prior to recommencing RO system operation. These measures will ensure the RWST boron concentration is maintained above the TS minimum boron concentration during RO system operation.

Prior to a batch operation of the RO system, it will be verified that there is adequate RWST volume margin above the RWST TS minimum required volume. Adequate volume margin is defined as that required to compensate for potential volume loss through the RO system flow limiting device and normal RO system operating losses through the reject waste stream. The potential volume loss through the RO system flow limiting device will be defined as the maximum volume which would be lost from the RWST during a 1 hour time period at the maximum flow through the flow limiting device. For example, for a flow limiting device with a maximum flow rate of 75 gpm, the potential volume loss would be 4500 gallons. The RO system operating losses through the reject waste stream depend on the RO system process flow and are typically 0.5 gpm to 10 gpm. The volume loss due to the normal RO system operation will depend on the RO system process flow and the total batch operation time of the RO system. The RO system operating loss will be monitored throughout RO system operation while the RWST is required to be operable.

During initial startup of the RO system, a dedicated operator will walk down the system and check for leaks. During operation of the RO system while the RWST is required to be operable, the dedicated operator will be assigned to monitor the RO system operation and inspect for leaks.

The active failure of the RO system would result in loss of recirculation flow through the RO system. This would have no adverse effect on plant safety since the RO system is not credited for accident mitigation or safe shutdown of the plant, and no loss of engineered safety features would result. The non-seismic category I/non-design class I RO system components and hoses may fail during a seismic event or during normal RO system operation, resulting in a loss of RWST inventory. In the event of a leak in the RO system, a seismic event, or a safety injection, the dedicated operator will be required to close the RWST drain line manual isolation valve to isolate the RO system from the RWST. In order to ensure the RWST volume margin verified prior to the batch operation is not exhausted and that the RWST is maintained above its TS minimum level, the operator action to close a manual isolation valve will be required within 1 hour. The RO system operating procedure will contain the minimum RWST volume and boron concentration requirements prior to starting the RO system, the required operator action, and the operator response time required to isolate the RO system. Also, the required action will be discussed by the shift foreman with the dedicated operator at the tailboard session performed prior to each batch RO system operation. The dedicated operator will be trained on the RO system operation, the required operator action to isolate the system from the RWST, and the required 1 hour response time. During operation of the RO system while the RWST is required to be operable, the dedicated operator will have continuous capability to communicate with the control room by telephone, radio, pager, or the plant public announcement system.

Operator action will begin upon identification of a leak in the RO system piping or hoses, a seismic event, or a safety injection. A leak in the RO system piping and associated hoses can be readily detected by the dedicated operator assigned to monitor the RO system since the piping and hoses will be visible and contained in a small area. A seismic event can be detected by the dedicated operator through ground motion during the event or through notification from the unit shift foreman. A safety injection will be identified by the shift foreman who will notify the dedicated operator through direct or indirect (telephone, radio, pager, or plant public announcement system) communications. The only action required by the dedicated operator will be to close the RWST drain line isolation valve located at the bottom of the RWST outside the auxiliary building. No additional support personnel or equipment will be required for the dedicated operator to close the manual isolation valve. The valve will be located just above ground elevation (115 foot) and therefore will be easily accessible. Since the isolation valve will be a passive device, the active failure of the valve need not be considered. The distance between the RO system skid and the valve will be within approximately 100 feet, thus the time for the dedicated operator to get to the valve will be negligible. There are no other valves in the immediate vicinity and the valve location will be easily identified by the RO system hose which will be connected to the RWST drain line. Emergency lighting is available in the cask washdown area and East exit door area of the auxiliary building as well in the outdoor area around the RWST in the event offsite power is lost. Due to the low RWST flowrate through the flow limiting device and the location of the manual valve outside, there is no potential for flooding which may prevent the operator from reaching the isolation valve. There will be no potential harsh or inhospitable environmental conditions at the valve location since it will be outside and there are no main steam lines in the vicinity of the valve, the cask washdown area of auxiliary building, or the transition area between the valve and the cask washdown area. Based on this information, there is reasonable assurance that the dedicated operator can close the RWST drain line isolation valve within 1 hour. In the unlikely event the operator closes the wrong valve by mistake, the RO system leak will continue. Since the RO system and connections are contained in a small area, the operator will be able to quickly identify continued RO system leakage and correct the mistake by closing the RWST drain line isolation valve.

ANSI/ANS-58.8, "Time Response Design Criteria for Safety-Related operator Actions," 1994, provides estimates of reasonable response times for operator actions taken to mitigate design basis events. The ANSI/ANS-58.8 diagnosis time for a safety injection signal due to occurrence of a large break LOCA, a condition 4 event, is 20 minutes. Application of the diagnosis time for a safety injection signal based on a large break LOCA is conservative, since a safety injection signal also occurs for condition 3 events which are more frequent such as a small break LOCA or a steam generator tube rupture. The ANSI/ANS-58.8 diagnosis time for a condition 3 event is 10 minutes. The indication time of the safety injection from the initiation of the design basis event is a maximum of 3 minutes. The ANSI/ANS-58.8 fixed operator time for an action outside the control room is 30 minutes. The 30 minute operator time is very conservative for this case since a dedicated operator will be stationed in the area where the action needs to be taken. The variable operator time for the operator to get to the valve and to isolate the RWST drain line isolation valve is estimated to be approximately 2 minutes. The process time for the dedicated operator to verify the valve is closed, and if needed, to verify the leak is isolated, is estimated to be approximately 5 minutes. The total time estimate for the operator action based on a conservative application of the methodology of this standard is approximately 60 minutes. This conservative time estimate is acceptable since it is the same as the 1 hour time period after which the RWST volume would fall below the TS minimum level.

ANSI/ANS-58.8 also requires that safety-related operator actions shall be credited only where a single operator error of omission does not result in exceeding any limiting design requirement for the design basis event under consideration. The large break LOCA, small break LOCA, and main steam line break events credit RWST volume. A seismically induced failure of the RWST drain line coincident with one of these events and subsequent failure of the operator to manually close the RWST drain line isolation valve may impact the event response. Following a design basis double ended guillotine large break LOCA, the RWST will drain to the low level alarm within 14 minutes and the ECCS pump suction switchover to the containment sump will be initiated. For the small break LOCA event, the peak cladding temperature and recovery of the core liquid level to the top of core occur within 1 hour for all breaks analyzed. Prior to a batch operation of the RO system, it will be verified that there is adequate RWST volume margin above the RWST TS minimum required volume to compensate for the volume which would be lost from the RWST during a 1 hour time period at the maximum flow through the passive flow limiting device. The flowrate through the flow limiting device will be small compared to the maximum flow of two containment spray pumps, two charging pumps, and two safety injection pumps (8600 gpm). Thus, there is no impact on the ability of the operators to perform the ECCS switchover from the injection phase to the cold leg recirculation phase and the licensing basis of 32,500 gallons will be maintained in the RWST following completion of switchover. The volume of water lost from the RWST through the passive flow limiting device is small compared to the volume of water in the containment sump post-LOCA. Thus, there is a negligible impact on the containment sump level post-LOCA. Therefore, failure of the operator to manually close the RWST drain line isolation valve will have no adverse affect on the design basis large break and small break LOCA events. Only a small fraction of the RWST inventory is used during the mitigation of a main steam line break event since the primary system remains intact. Thus the failure of the operator to manually close the RWST drain line isolation valve will have no adverse affect on the design basis main steam line break event.

The operator action does not impact other aspects of the facility described in the Final Safety Analysis Report. Closing the RWST drain line isolation valve to isolate the RO system will not affect the flow distribution of RWST contents to safety-related equipment. The action will not complicate required control room operator responses to design basis events since the actions are being performed by a dedicated operator who is assigned to perform the task.

E. NO SIGNIFICANT HAZARDS EVALUATION

PG&E has evaluated the no significant hazards considerations (NSHC) involved with the proposed amendment, focusing on the three standards set forth in 10 CFR 50.92(c) as set forth below:

> *"The commission may make a final determination, pursuant to the procedures in paragraph 50.91, that a proposed amendment to an operating license for a facility licensed under paragraph 50.21(b) or paragraph 50.22 or for a testing facility involves no significant hazards considerations, if operation of the facility in accordance with the proposed amendment would not:*
>
> *(1) Involve a significant increase in the probability or consequences of an accident previously evaluated; or*

(2) *Create the possibility of a new or different kind of accident from any accident previously evaluated; or*

(3) *Involve a significant reduction in a margin of safety.*

The following evaluation is provided for the NSHCs.

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

   The upgrade of the refueling water purification (RWP) system piping will allow connection of the RWP system to the refueling water storage tank (RWST) while the RWST is required to be operable. The installation and use of a reverse osmosis (RO) system will allow removal of silica from the RWST while the RWST is required to be operable. The upgrade to the RWP system piping and use of the RO system does not involve any changes or create any new interfaces with the reactor coolant system or main steam system piping. Operation of the RWST is required to mitigate a loss-of-coolant and main steam line break accident, therefore, the connection of the RWP system to the RWST and use of the RO system would not affect the probability of these accidents occurring.

   Neither the RWP system nor the RO system are credited for safe shutdown of the plant or accident mitigation. The upgrade to the RWP system piping to seismic category I will prevent seismically induced failure of the RWP system piping and thus prevent a loss of RWST inventory while the RWP system is connected to the RWST. The RWST can perform its safety function with an active failure in the RWP system in the short term phase of an accident while the RWP system is connected to the RWST. The RWST can perform its safety function with an active or passive failure in the RO system in the short term phase of an accident. Since the RWST inventory is not credited in the long term phase of an accident, active and passive failures in the RWP or RO system in the long term phase of an accident need not be considered.

   Continuous operation of the RWP pump during a design basis event will not reduce the RWST water inventory nor the emergency core cooling system (ECCS) pump suction supply. The increase in RWST discharge flow due to an operating RWP pump will not adversely impact the required net positive suction head of the operating ECCS pumps.

   A combination of design and administrative controls ensure that both the RWP and RO systems maintain RWST boron concentration and tank volume requirements whenever the contents of the RWST are processed through these systems. Potential boron dilution or volume losses of the RWST inventory during tank processing through the RWP system is prevented by administratively maintaining closed all manual boundary valves within the RWP system while the RWP system is used to clarify RWST contents. Prior to RO system operation, the RWST volume margin will be verified to be adequate to compensate for postulated RO system line losses and process losses through the RO system reject waste stream. The waste stream losses will be monitored throughout RO system operation. The RO system is designed to maintain a high boron recovery rate, which will be verified through testing prior to initial installation. Potential boron dilution during each batch operation of the RO system is prevented through verifying RWST boron margin prior to RO system operation and monitoring the RO system boron recovery rate by grab samples taken of the system inlet and outlet after each batch operation. Following each batch operation of the RO system, RWST mixing and sampling will be performed to verify the RWST boron concentration, and boron additions to the RWST will be made accordingly. Since the RWST will continue to perform its safety function, overall system performance is not affected, assumptions previously made in evaluating the consequences of the accident are not altered, and the consequences of the accident are not increased.

Therefore, the changes will not increase the probability or consequences of an accident previously evaluated.

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

The upgrade of the RWP system piping to seismic category I will prevent seismically induced failure of the RWP piping. An active RWP pump failure will not result in a loss of the RWST safety function. An active or passive failure in the RO system will not result in loss of the RWST safety function. Adequate RWST volume and boron margin will be verified prior to RO system operation, the RO system boron recovery rate will be monitored by grab samples taken of the system inlet and outlet after each batch operation, a flow limiting device will limit the maximum potential RWST inventory loss rate to a low value, and operator action can be taken within 1 hour to isolate the RO system from the RWST. The upgrade to the RWP system and use of the RO system do not impact any other systems and thus cannot create a new failure mode in another system which could potentially create a new type of accident.

Therefore, the proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

Neither the RWP system nor the RO system are credited for safe shutdown of the plant or accident mitigation. The upgrade to the RWP system piping to seismic category I will prevent seismically induced failure of the RWP system piping and prevent loss of RWST inventory due to a seismic event while the RWP system is connected to the RWST. The RWST can perform its safety function with an active failure in the RWP system in the short term phase of an accident while the RWP system is connected to the RWST. The RWST can perform its safety function with an active or passive failure in the RO system in the short term phase of an accident. Since the RWST inventory is not credited in the long term phase of an accident, active and passive failures in the RWP or RO system in the long term need not be considered.

Adequate RWST volume and boron margin will be verified prior to RO system operation, a flow limiting device will limit the maximum inventory loss rate to a low value, and operator action can be taken within 1 hour to isolate the RO system from the RWST. The RO system waste stream losses will be monitored throughout RO system operation.

Potential boron dilution of the RWST inventory during tank processing through the RWP system is prevented by administratively maintaining closed all manual boundary valves within the RWP system while the RWP system is connected to the RWST. The RO system is designed to maintain a high boron recovery rate, which will be verified through testing prior to initial installation. Potential boron dilution during each batch operation of the RO system is prevented through verifying RWST boron margin prior to RO system operation and monitoring the RO system boron recovery rate by grab samples taken of the system inlet and outlet after each batch operation. Following each batch operation of the RO system, RWST mixing and sampling will be performed to verify the RWST boron concentration, and boron additions to the RWST will be made accordingly. These measures will ensure the TS minimum RWST boron concentration is available to mitigate the short term consequences of a small break LOCA, large break LOCA, or main steam line break accident.

Therefore, the change does not involve a significant reduction in a margin of safety as defined in the basis for any TS.

F. NO SIGNIFICANT HAZARDS DETERMINATION

Based on the above safety evaluation, PG&E concludes that the changes proposed by this license amendment request satisfy the NSHC standards of 10 CFR 50.92(c), and accordingly a no significant hazards finding is justified.

G. ENVIRONMENTAL EVALUATION

PG&E has evaluated the proposed changes and determined the changes do not involve: (I) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluents that may be released offsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed changes meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Therefore, pursuant to 10 CFR 51.22(b), an environmental assessment of the proposed change is not required.

PROPOSED CHANGES TO FINAL SAFETY ANALYSIS REPORT

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Table 3.2-2 Notes

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(4) Systems or portions of systems that are required for reactor shutdown and residual heat removal

(5) Those portions of the main steam, feedwater, and steam generator blowdown systems extending from and including the secondary side of the steam generators up to and including the outermost containment isolation valves, and connected piping up to and including the first valve (including a safety or relief valve) that is either normally closed or capable of automatic closure during all modes of normal reactor operation [see Note (v)]

(6) Auxiliary saltwater, component cooling water, and auxiliary feedwater systems or portions of these systems that are required for emergency core cooling, postaccident containment heat removal, postaccident containment atmosphere cleanup, and residual heat removal

(7) Component cooling water system and seal water systems, or portions of these systems that are required for functioning of other systems or components important to safety

(8) Those portions of systems (other than the radioactive waste management systems) that contain or may contain radioactive material and whose postulated failure could result in conservatively calculated potential offsite exposures in excess of 0.5 rem whole body (or its equivalent to parts of the body) at the site boundary or beyond

(9) Systems or portions of systems that are required to supply fuel for emergency equipment

(10) Systems or portions of systems that are required for (a) post accident monitoring of RG 1.97 Category 1 variables and (b) actuation of systems important to safety

(11) The protection system [see Note (ii)]

(12) The spent fuel storage pool structure, including the spent fuel racks ~~[see Note (iii)]~~

(13) The reactivity control systems, i.e., control rods, control rod drives, and boron injection system, that are required to achieve safe shutdown of the plant

(14) The control room, including its associated vital equipment and life support systems, and any structures or equipment inside or outside of the control room whose failure could result in incapacitating injury to the operators

(15) Reactor containment structure, including penetrations [see Note (iv)]

(16) Systems or portions of systems that are required to provide heating, ventilating, and/or air conditioning for safety-related equipment/areas

(17) Portions of the onsite electric power system, including the onsite electric power sources, that provide the emergency electric power needed for functioning of plant features included in Items (1) through (16) above

(18) Portions of the spent fuel pool cooling system used to remove spent fuel decay heat from the spent fuel pool, and portions of the refueling water purification system used to recirculate and cleanup the contents of the refueling water storage tank.

Notes:

(i) A system boundary includes those portions of the system required to accomplish the specified safety function and connected piping up to and including the first valve (including a safety or relief valve) that is either normally closed or capable of automatic closure when the safety function is required.

(ii) For purposes of these criteria, the protection system encompasses all electrical and mechanical devices and circuitry (from sensors to actuation devices input terminals) involved in generating those signals associated with the protective function. These signals include those that actuate reactor trip and, in the event of a serious reactor accident, that actuate ESFs such as containment isolation, safety injection, pressure reduction, and air cleaning.

~~(iii) The spent fuel pool cooling system at DCPP is classified Design Class II. However, in accordance with RG 1.13[4], natural surface cooling plus backup Design Class I makeup water sources have been provided to protect against postulated spent fuel pool cooling system failures. In addition, the spent fuel pool cooling loop, piping, and supports were analyzed and qualified in accordance with Design Class I criteria.~~

(iv) SSCs that form interfaces between Design Class I and Design Class II or III features are designed to Design Class I requirements.

(v) Certain valves in these systems that are used for accident mitigation only, and do not support safe shutdown following an HE, were qualified for active function for an HE to provide increased conservatism in accordance with Reference 7.

3.2.2 SYSTEM QUALITY GROUP CLASSIFICATIONS

GDC 1 requires that systems and components essential to the prevention of accidents be designed, fabricated, erected, and tested to quality standards commensurate with the importance of the safety functions to be performed. This section describes the quality classification system that has been used to implement quality standards that satisfy Criterion 1 for DCPP fluid systems and fluid system components. The discussion also shows the relationship of this classification system to fluid system and fluid system components

(2) Systems or portions of systems that are connected to the reactor coolant pressure boundary and are capable of being isolated from the boundary during all modes of normal reactor operation by two valves, each of which is either normally closed or capable of automatic closure

(3) Those portions of systems other than radioactive waste management systems that contain or may contain radioactive material, and whose postulated failure could result in conservatively calculated potential offsite exposures in excess of 0.5 rem whole body (or its equivalent to parts of the body) at the site boundary or beyond

(4) Component cooling water system and seal water systems, or portions of these systems, that are required for functioning of other systems or components important to safety

(5) Portions of the spent fuel pool cooling system required for spent fuel cooling, and the refueling water purification system whose postulated failure could result in a loss refueling water storage tank inventory.

Code Class III fluid systems and fluid system components are listed in the DCPP Q-List (see Reference 8), along with the industry codes and standards used for their design, fabrication, erection, and testing.

3.2.2.4 Other Fluid Systems and Fluid System Components

Fluid systems and fluid system components that are not part of the reactor coolant pressure boundary, not essential to shut down the reactor and maintain it in a safe condition, and not essential to prevent or mitigate the consequences of accidents that could result in potential offsite exposures comparable to the guideline exposures of 10 CFR 100, are not included in the Design Class I classification.

These other systems and components are classified as Design Class II or III and are listed in the DCPP Q-List (see Reference 8), along with the industry codes and standards used for their design, fabrication, erection, and testing. They comprise a design class, but have not been assigned a code class. Design Class II includes the fluid systems and fluid system components identified as Quality Group D in SG 26 and as radioactive waste management system in RG 1.143, i.e., those fluid systems and fluid system components that contain or may contain radioactive material, but whose failure would not result in calculated potential exposures in excess of 0.5 rem whole body (or its equivalent to parts of the body) at the site boundary. These fluid systems and fluid system components are in conformance with the accepted industry codes and standards in effect during the design and construction of DCPP. If they were designed and constructed to codes and standards outside of the requirements of SG 26 or RG 1.143, additional quality standards have normally been applied so that the intent has been met.

3.2.2.5 Summary of System Quality Group Classifications

Table 3.2-2 summarizes the design and quality group classifications applied to the DCPP SSCs and their relationships to the other methods of classification.

TABLE 3.2-2 NOTES

An exception exists to the above for Quality Code Class III piping Code Class D piping. These are systems or portions of systems which were originally constructed as Design Class II and were subsequently upgraded to Design Class I because of later requirement. For such piping, the design analysis is in accordance with Design Class I criteria. All construction, repair, or replacement performed after the upgrade is in accordance with Design Class I requirements.

(g) Feedwater piping from the (final) main feedwater check valve to the steam generator; auxiliary feedwater from the main feedwater line back to the second check valve; main steam piping from the steam generator to the main steam isolation valve; steam generator blowdown piping from the steam generator to the first valve outside containment; design to ANSI B31.1-1967; fabrication, erection, and inspection to ASME B&PV Code Section I-1968. Requirements for the main steam safety valves are in accordance with ASME B&PV Code Section III-1968.

(h) Design to ANSI B31.1-1967. Fabrication, erection, and inspection to ANSI B31.7-1969 with 1970 Addenda, Class I.

(i) This piping code class applies to 1) the spent fuel pool cooling loop, 2) ~~and~~ the auxiliary feedwater pump suction piping from the fire water storage tank, and 3) the refueling water purification loop from and to the refueling water storage tank. This piping was upgraded from Design Class II Code Class E. B31.1 applies for work performed prior to the upgrade. B31.7 applies to work performed after the upgrade.

(j) Piping is seismically qualified for the Hosgri earthquake.

(k) Piping originally installed as Design Class II and has been qualified seismically for the Hosgri earthquake, but is Design Class I for repair, replacement, and new construction.

(l) Certain Design Class II and III SSCs have seismic qualification requirements and may be designated as Seismic Category I; these SSCs are designated as QA Class S.

(m) Auxiliary Boiler 0-2 and its external piping conforms to ASME B&PV Code Section I-1980 through summer 1980 Addenda.

9.1.3.2 System Description

The spent fuel pool cooling and cleanup system, shown in Figure 3.2-13, removes decay heat from fuel stored in the spent fuel pool. Spent fuel is placed in the pool during the refueling sequence and stored there until it is shipped offsite. Heat is transferred through the spent fuel pool heat exchanger to the component cooling water system (CCWS).

When the spent fuel pool cooling and cleanup system is in operation, water flows from the spent fuel pool to the spent fuel pool pump suction, is pumped through the tube side of the heat exchanger, and is returned to the pool. The suction line, which is protected by a strainer, is located at an elevation 4 feet below the normal spent fuel pool water level, while the return line contains an antisiphon hole near the surface of the water to prevent gravity drainage of the pool.

While the heat removal operation is in process, a portion of the spent fuel pool water may be diverted away from the heat exchanger through the refueling water purification filter, spent fuel pit demineralizer, spent fuel pit resin trap filter, and the spent fuel pit filter to maintain water clarity and purity. A resin trap and check valve, located upstream of the demineralizer, prevent backflushing demineralizer resins to the SFP. Transfer canal water may also be circulated through the same demineralizer and filter by opening the gate between the canal and the SFP. This purification loop removes fission products and other contaminants which could be introduced if a fuel assembly with defective cladding is transferred to the SFP.

The exposure rate at the pool surface is routinely monitored with radiation surveys and monitoring equipment (see Section 12.3). The major contributor to the surface dose is the radioactivity within the pool water and not the spent fuel assemblies stored in the pool. The spent fuel pool demineralizer will be used as necessary to maintain radiation exposures ALARA.

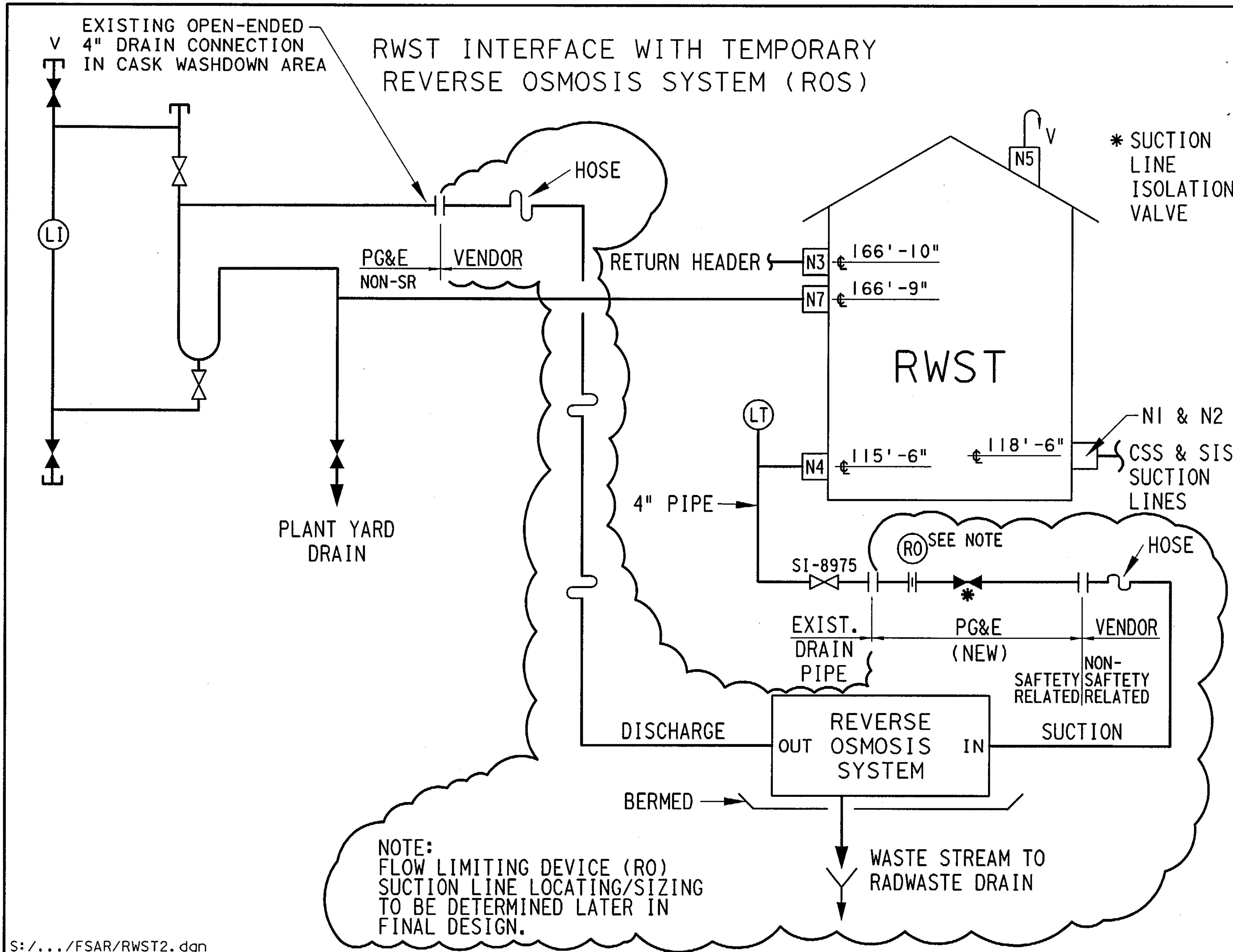
The spent fuel pool demineralizer and filter flowpath bypasses the spent fuel pool heat exchanger. The demineralizer and filter may be brought into or out of service by manual operation of isolation valves. No other operator action is required. The bypass flowpath can be through the filter only, or through the filter and demineralizer in series, as shown in Figure 3.2-13. The piping configuration allows an alternate flowpath that utilizes the refueling water purification (RWP) filter upstream of the spent fuel pool demineralizer to allow optimization of filter and demineralizer operation. The demineralizer may also be used in conjunction with the refueling water purification pump, filter, and resin trap to clean and purify the refueling water while spent fuel pool heat removal operations proceed.

The RWP system can be aligned to recirculate the contents of the refueling water storage tank (RWST). The RWP system is placed into service by manual operation of isolation valves and manual RWP pump start. This alignment enables tank mixing and cleanup of the RWST contents via the RWP filter, demineralizer, and resin trap filter. Processing the RWST contents through the RWP system enables the removal of radiological impurities to ensure RWST activities (ref. Table 12.1-13) and radiation exposure rates (ref. Table 12.1-14) are within 10CFR20 limits and are ALARA.

The RWP system filters and demineralizes the RWST water in order to maintain RWST water quality and clarity for fuel transfer and inspection purposes. Refueling water clarity is both a personnel and equipment safety, and radiation ALARA consideration. Also, the RWP system may be used to filter the contents of the RWST prior to employing a reverse osmosis system (ROS). The ROS is a temporary system, connected directly to the RWST, which may be used to reduce silica concentrations in the RWST. Design and administrative controls ensure minimum required RWST volume and boron concentrations are maintained throughout ROS operation.

During refueling outages, ~~C~~connections are provided such that the refueling water may be pumped from either the refueling water storage tank or the refueling cavity, through the filter, demineralizer, and resin trap and discharged to either the refueling cavity or the refueling water storage tank. In addition to this flowpath, it is possible to manually align the spent fuel pool cleanup system with the refueling water purification system to clean the refueling canal water during fuel movement. The RWP pump may also be utilized to pump down the refueling canal by pumping water to the liquid hold-up tanks (LHUTs) through the RWP filter. To further assist in maintaining spent fuel pool water clarity, the water surface is cleaned by a skimmer loop. Water is removed from the surface by the skimmers, pumped through a strainer and filter, and returned to the pool surface at three locations remote from the skimmers.

DRAWINGS OF REFUELING WATER PURIFICATION SYSTEM UPGRADE AND RWST INTERFACE WITH TEMPORARY REVERSE OSMOSIS SYSTEM



RWST INTERFACE WITH TEMPORARY
REVERSE OSMOSIS SYSTEM (ROS)
EXISTING OPEN-ENDED
4" DRAIN CONNECTION
IN CASK WASHDOWN AREA
V
LI
HOSE
PG&E
NON-SR
VENDOR
RETURN HEADER
N3
166'-10"
N7
166'-9"
N5
V
* SUCTION
LINE
ISOLATION
VALVE
RWST
LT
N4
115'-6"
118'-6"
N1 & N2
CSS & SIS
SUCTION
LINES
4" PIPE
PLANT YARD
DRAIN
RO
SEE NOTE
HOSE
SI-8975
EXIST.
DRAIN
PIPE
PG&E
(NEW)
VENDOR
SAFTETY
RELATED
NON-
SAFTETY
RELATED
DISCHARGE
OUT
REVERSE
OSMOSIS
SYSTEM
IN
SUCTION
BERMED
WASTE STREAM TO
RADWASTE DRAIN
NOTE:
FLOW LIMITING DEVICE (RO)
SUCTION LINE LOCATING/SIZING
TO BE DETERMINED LATER IN
FINAL DESIGN.
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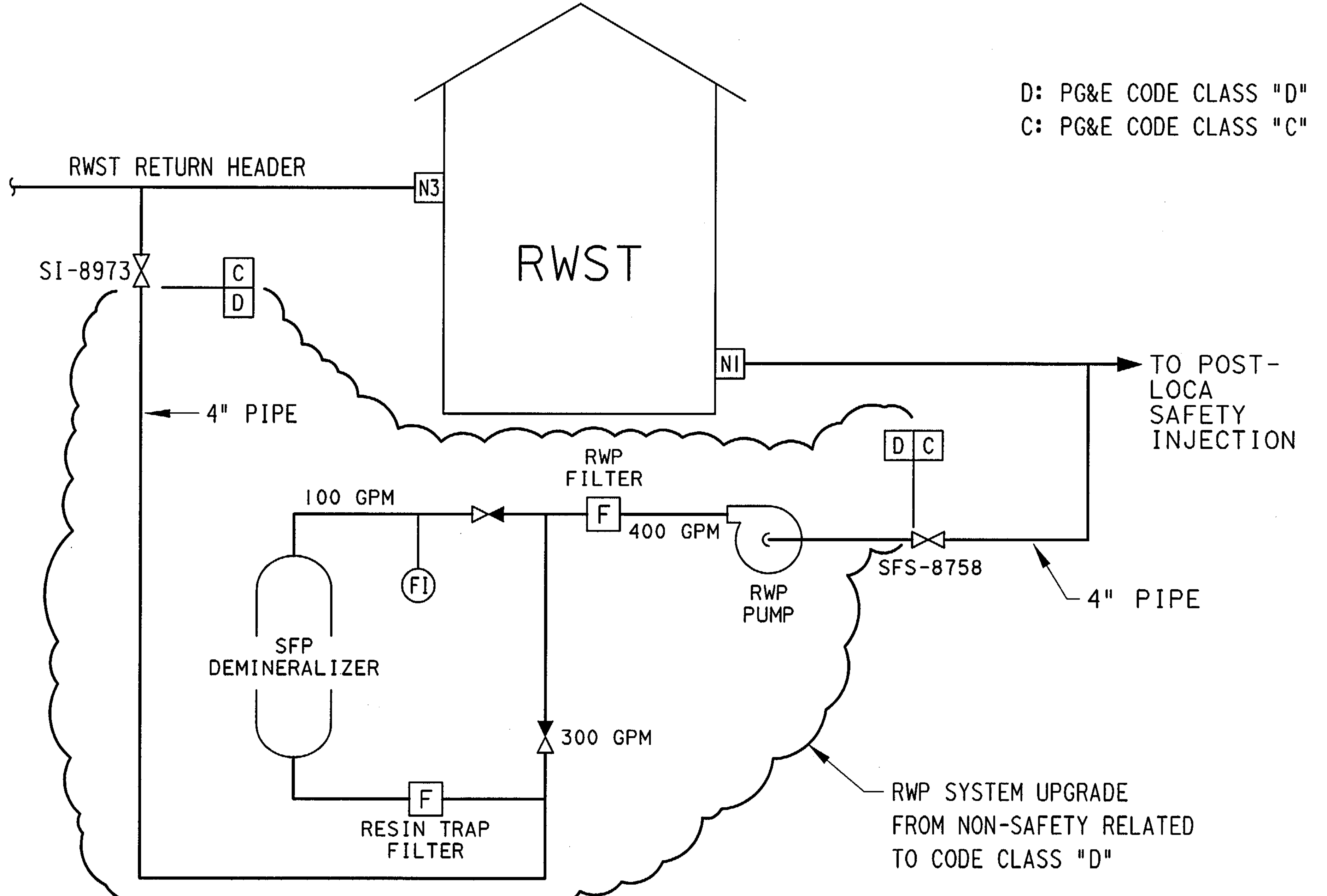
RWP SYSTEM UPGRADE: SIMPLIFIED DIAGRAM DEPICTING FLOW PATH WITH MAJOR EQUIPMENT SHOWN



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