UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

April 27, 1984

Looks good
Lets do. Q
4/30

MEMORANDUM FOR: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

FROM: Richard H. Vollmer, Director
Division of Engineering

SUBJECT: RESOLUTION OF DIABLO CANYON PIPING DESIGN ISSUES

The Division of Engineering plan for resolution of issues related to design of piping at Diablo Canyon is enclosed. The plan outlines the staff and licensee actions necessary to close out the seven piping-related license conditions now in place by Commission order. Our current estimate of the resources necessary for timely resolution of these issues is 0.4 psy and $120 K of contractor support.

Each of the seven conditions will be assigned to a specific group for review of the licensee's submittals, audits and plant walkdowns as necessary and preparation of the SER input. The group leaders will be selected from the members of the peer review panel that was organized to review the concerns expressed by Mr. Yin. In addition to the assigned NRR, IE and Region I staff we have planned for participation by two individuals from each of Battelle Columbus Laboratories, INEL and ETEC.

For most of the license conditions, we anticipate a submittal from the licensee that will be reviewed as the basis for on-site audits. The audits will be scheduled as soon as practicable after the licensee has provided adequate documentation to assure that a meaningful audit is possible. Initial submittals from the licensee are expected on or shortly after April 27, 1984.

Although our completion of these activities will depend on the timeliness and adequacy of the licensee submittals, our estimate based on current knowledge of licensee action on these issues is mid-June. By next Friday, after review of the first submittals, we will be in a better position to judge a completion date.

lets review when ready

Resources and the time necessary to complete other Diablo Canyon responsibilities of DE, including the scheduled inspection of the IDVP piping review program, are included in this estimate.

D-18

We would appreciate your feedback on the program we have outlined and the acceptability of the tentative schedule.

Richard H. Vollmer, Director
Division of Engineering

Enclosure: As stated

cc: E. Case
D. Eisenhut
J. Knight

License Condition 1: Review of Computer Analyzed Small Bore Pipe Supports

Item

1. Staff develops approach to be followed in selecting audit sample.

2. PG&E notifies NRC that review of computer analyzed small bore piping analysis is complete enough for audit.

3. Staff schedules audit at project offices.

4. NRC audit team selects approximately 15 supports for review.

5. PG&E provides analysis packages for selected supports. Review by staff.

6. Staff completes review of initial 15, discuss findings and determines need to review additional supports.

7. Prepare SSER, assuming review beyond initial 15 is not required.

License Condition 2: Requirements for Closely Spaced Supports

Item

1. PG&E submits to NRC a report on rigid supports installed in close proximity to rigid restraints or anchors. The report will include a numerical breakdown of the cases involved, the shimming criteria to be used by PG&E, and a description of the program to be followed in the shimming process. PG&E will provide their schedule for performance of shimming.

2. Staff review of PG&E program.

3. Staff schedules audit at site

4. Preparatory discussions at site. Observation of cases where shimming is not needed. Selection of cases to be observed by staff where shimming is needed. Staff walkdown with PG&E to observe field preparations for shimming of approximately 8 cases.

5. Staff independent verification of completed shimming by PG&E of the 8 cases.

6. Prepare SSER.

License Condition 3: Review of Snubbers Close to Rigid Supports and Anchors

Item

1. PG&E submits a report to the NRC identifying all snubbers located in close proximity to rigid supports and anchors, describing their snubber lock-up motion criteria, and demonstrating how piping and pipe support licensing criteria are met.

2. Staff reviews PG&E report.

3. Staff schedules audit at project.

4. Staff reviews five specific analyses at project offices. This effort will include a review of piping analyses and verification of the adequacy of adjacent supports/anchors.

5. Prepare SSER.

License Condition 4: Thermal Gaps

Item

1. PG&E submits a report to NRC documenting the pipe supports in which thermal gaps were included in the analysis. The report will include a description of the analysis methods where gaps are to be retained, and the proposed gap monitoring program. The report will also document the cases in which retention of the gaps has been found to be unnecessary and a summary of the analyses that support this conclusion.

2. Staff review of PG&E report.

3. Staff schedules audit at project offices and site.

4. Staff reviews of approximately four pipe stress thermal analyses at project offices.

5. Staff travels to site from project offices.

6. Staff walkdown for monitoring of thermal movements and observation of modifications to remove gaps.

7. Prepare SSER.

License Condition 5: Walkdown of Mainsteam and Main Feedwater Piping Systems

Item

1. PG&E notifies NRC of the schedule for hot walkdown of the mainsteam piping systems.

2. Staff schedules audit at project offices and site.

3. Staff reviews mainsteam piping thermal analyses, hot walkdown procedures and locations identified by PG&E for taking measurements of thermal movements.

4. Staff travels to site from project offices.

5. Staff observes PG&E walkdown and makes independent observations of results as compared to predictions.

6. Staff discusses with PG&E the follow-up actions needed to reconcile observations with predictions and to alleviate any unintended restraints.

7. Prepare SSER, assuming additional observation of follow-up actions is not needed.

License Condition 6: Quick Fix and DP Programs

Item

1. PG&E submits program for review of Quick Fix and DP activities.

2. Staff reviews PG&E program.

3. Staff schedules audit at project offices and site.

4. Staff discusses with PG&E the implementation of the Quick Fix and DP programs. PG&E provides documentation examples of the original Quick Fix and DP programs for NRC review.

5. Staff discusses PG&E approach to review of the programs per the license condition. Staff returns to Bethesda.

6. PG&E notifies NRC that review of DP and Quick Fix activities is sufficiently complete for audit of results.

7. Staff reviews sample Quick Fix and DP documentation to verify that the areas of concern identified in L.C. 6 have been properly treated.

8. Staff travels to site from project offices.

9. Staff performs site walkdown of quick fix implementation on hardware.

10. Prepare SSER.

License Condition 7: Resolution of Technical Topics

Item

1. PG&E submits to NRC proposed additions and modifications to design criteria addressing the resolution of the technical topics (a) thru (f).

2. Staff reviews PG&E proposed resolutions.

3. Meeting between staff and PG&E in Bethesda to resolve differences and agree on implementation of modified design criteria.

4. PG&E notifies NRC that implementation of modified design criteria is sufficiently complete for audit.

5. Staff schedules audit at project offices.

6. NRC audit team selects approximately 15 supports for review.

7. PG&E provides analysis packages for selected supports. Review by staff.

8. Staff completes review of initial 15, discuss findings and determines need to review additional supports.

9. Prepare SSER, assuming review beyond initial 15 is not required.

Summary of Resources

License Condition	Staff	Cost*
1	0.13 psy	$24.7k
2	0.06 psy	$10.8k
3	0.06 psy	$11.5k
4	0.06 psy	$10.8k
5	0.22 psy	$39.6k
6	0.2 psy	$37.5k
7	0.18 psy	$31.4k
	0.91 psy	$166.3k
Participation in Additional Yin Inspections	0.43	$76.4k
Total Resources	1.34	$242.7k

*Costs based on contractor rates for all aspects, although about 1/3 of review team personnel will be NRC staff.

ROUTING AND TRANSMITTAL SLIP

Date 3/14

TO: (Name, office symbol, room number, building, Agency/Post)	Initials	Date
1. F. Rosa		
2. B. Sheron		
3. T. Marsh		
4. C. Liang		
5.		

Action		File		Note and Return	
Approval		For Clearance		Per Conversation	
As Requested		For Correction		Prepare Reply	
Circulate		For Your Information		See Me	
Comment		Investigate		Signature	
Coordination		Justify			

REMARKS

Attached are new/revised write-ups for Diablo RHR. Please review and let me know if they can be in next SSER cycle.

DO NOT use this form as a RECORD of approvals, concurrences, disposals, clearances, and similar actions

FROM: (Name, org. symbol, Agency/Post)	Room No.—Bldg.
Hans Schierling	12B
	Phone No. 27(ow

5041-102

OPTIONAL FORM 41 (Rev. 7-76)
Prescribed by GSA
FPMR (41 CFR) 101-11.206

* GPO: 1983 O - 381-529 (232)

due COB 3/15

FOIA 84-741 & 742

D 13

Task: Allegation 39

(previously addressed in SSER 21)

ATS No.: RV 83A47 BN No.: 83-169 (10/20/83)

Characterization

There is no control room annunciation provided to alert the operators(s) when the RHR letdown line has been isolated during Modes 4, 5, and 6 (hot shutdown, cold shutdown, and refueling respectively).

Related Allegations: 37, 40, 45, 177

Implied Significance to Plant Design, Construction, or Operation

Previously addressed in SSER 21.

Assessment of Safety Significance

In SSER 21 the staff stated that indication provided in the control room of RHR letdown line isolation includes position indication for two valves in series as well as RHR system flow, pressure, and pump status information. Although these features provide a capability to assess RHR status, the staff has recognized the need for installation of a RHR low flow alarm. Accordingly, the licensee was required to install a RHR low flow alarm during the first refueling.

Staff Position

In SSER 21 the staff stated that this allegation does not involve considerations that question plant readiness for power ascension testing or full power operation. In a letter of February 15, 1984 the licensee committed to install the RHR low flow alarm prior to entering Mode 1, i.e. operation above 5 percent power. The licensee also provided the administrative controls and procedures that are now in effect. Based on this committment, the staff finds these controls and procedures acceptable for the interim, i.e. until installation of the alarm. The staff concludes that the issue is resolved with regard to criticality and lower power operation.

Action Required

The staff requires that the low flow alarm be installed prior to entering Mode 1 and that the licensee advise the staff of the completion of the installation prior to Mode 1.

TASK: Allegation 45

(Previously addressed in SSER 21)

ATS NO.: RV 83A47 BN NO.: 83-169 (10/20/83)

Characterization:

Section 5.5 of the Diablo Canyon FSAR describes the autoclosure interlock for the RHR suction line isolation valves (8701 and 8702). Section 3.4.9.3.a of the Diablo Canyon Technical Specifications requries power to be removed from these isolation valve operators during Mode 4 (hot shutdown, RCS cold leg temperature is less than 323°F), Mode 5 (cold shutdown) and Mode 6 (refueling). This requirement defeats the function of autoclosure interlock for the valves.

Related Allegations: 37, 39, 40, 177

Implied Significance to Plant Design, Construction or Operation

As stated in SSER 21, as the result of Technical Specification Section 3.4.9.3.a, the isolation valves will be left in an open position with power removed during low pressure/temperature operation of the plant. The automatic closure ~~interlock~~ feature of these isolation valves causes them to lose their design function. This will result in a situation in which insufficient isolation capability exists to prevent an intersystem LOCA between high pressure RCS and the low pressure RHR system.

Assessment of Safety Significance

As stated in SSER 21, the staff concluded in Diablo Canyon SSER 13 that the licensee should be required to provide an alarm to alert the operator to a degradation in ECCS during long term recirculation. A low flow alarm was stated to be an acceptable method to satisfy this concern and the staff indicated that an alarm should be installed at the first refueling outage. Until then, procedures and dedicated operators were to be implemented during long term recirculation to manage and monitor ECCS performance.

Staff Position

As stated previously in SSER 21, to implement the staff position stated in SSER 13, the installation of a low flow alarm for RHR pump protection is being considered as a license condition in the Diablo Canyon full power license. Additionally, it is the staff position that power be available to the RHR MOVs when in a shutdown condition. However, there is a question as to when these requirements should be implemented. If the low flow alarm were not installed until the first refueling outage, removing ~~reinstating~~ power to the RHR MOVs in the meantime would result in the autoclosure interlock being defeated and, thus, unable to provide protection against intersystem LOCA.

In a letter dated February 15, 1984 the licensee committed to install the RHR low flow alarm prior to entering Mode 1, i.e. operation above 5 percent power. The licensee also provided the administrative controls and procedures that are now in effect. Based on the committment the staff finds these controls and procedures acceptable for the interim, i.e. until installation of the alarm. The staff concludes that this issue is resolved with regard to criticality and low power operation.

Action Required

The staff requries that the low flow alarm be installed prior to entering Mode 1 and that the licensee advise the staff of the completion of the installation prior to Mode 1. after installation of the low flow alarm the staff will require that power to the isolation valves be reinstated during low pressure/temperature operation (Modes 4, 5 and 6) of the plant.

Task: Allegation 177

ATN No. None BN No.: None

Characterization

The allegation relates to the RHR pump common suction line valve control and a potential damage to RHR pumps due to loss of suction as a result of a single failure.

Related Allegations: 37, 39, 40, 45 (previously discussed in SSER 21)

Implied Significance to Plant Design, Construction or Operation

The RHR suction line from the RCS hot leg in the Diablo Canyon design contains two isolation valves (8701 and 8702) in series that are normally closed during power operation and hot standby condition (Modes 1, 2 and 3) The RHR suction line from the RCS hot leg is only used during Mode 4 (hot shut-down with RCS cold leg temperature less than 323 °F), Mode 5(cold shutdown) and Mode 6 (refueling). A postulated inadvertent closure of either isolation valve (8701 or 8702) in the RHR suction line during plant shutdown could cause potential damage to both RHR pumps.

Assessment of Safety Significance

This allegation overlaps concerns previously expressed in Allegations 40 and 45 which have been addressed by the staff in Diablo Canyon SSER No. 21. This concern also has been discussed by the staff at an ACRS meeting on February 10, 1984.

The potential damage of both RHR pumps due to loss of suction as a result of a single failure is prevented by the following provisions:

1. In response to the staff requirement in SSER 21 regarding Allegation 45, PG&E has committed, in a letter dated February 15, 1984, to install the RHR low flow alarm prior to entry into power operation (i.e. Mode 1 with associated decay heat generation). The low flow alarm will be set so that sufficient time would be available to alert the operators to trip the RHR pumps before pump damage occurs.

2. The current Technical Specifications and operating procedures for Diablo Canyon Unit 1 preclude the inadvertent closure of either of the two RHR pump suction line isolation valves (8701 and 8702) by maintaining the valves in an open position with power removed for the valve operators during Modes 4, 5 and 6.

The applicant stated at the ACRS meeting on February 10, 1984 that RHR pump damage could occur in 10 to 15 minutes following loss of suction flow. Operating experience from the Calvert Cliffs Nuclear Power Plant showed that the RHR pump seals were damaged approximately 15 minutes after loss of suction flow. The failure of both RHR pumps is an event beyond the design basis and its occurence is highly unlikely based on the plant specific design and administrative controls discussed above. However, if failure of both RHR pumps should occur during plant shutdown, the following steps could be taken to maintain a safe shutdown condition:

1. If both RHR pumps failed during the period when the decay heat level is still relatively high, then the plant conditions would permit decay heat to be removed by the steam generator(s). Condensate supplied from the condensate storage tank, raw water reservior, and the auxiliary salt water system (unlimited supply) via temporary connections could provide a long term source of auxiliary feedwater for decay heat removal.

2. If the steam generator(s) were not available, and the decay heat is relatively low, one RHR pump is generally used to remove decay heat with one pump in standby, in accordance with the requirements of Technical Specifications 3.9.8.2. In case the operating RHR pump is damaged due to closure of a suction valve, the standby RHR pump could be used to continue the decay heat removal function after the closed suction isolation valve(s) is manually opened by an operator. Analyses indicate that if all decay

heat removal capability were lost at the time of reactor trip, at least 2 hours would be available for the operators to restore decay heat removal capability before core uncovery. If decay heat removal capability were lost while on RHR cooling, considerably more time than 2 hours would be available for operator action to correct the situation.

3. If both RHR pumps were damaged while the steam generators were open for maintenance (or during any other period in which all steam genrators were unavailable), the charging pumps or safety injection pumps could be used to inject water into the RCS for core cooling. If the manways on the steam generator primary side were open for maintenance, water would flow out the manways and onto the floor of the containment. The containment spray system and the fan coolers, which are independent from the RHR system, could be used to remove decay heat inside containment to the ultimate heat sink via the component cooling water or the essential service water system.

4. Diablo Canyon Operating Procedure No. EOP-17 addresses the emergency procedure under the condition that both RHR pumps are damaged during plant shutdown.

In summary, the staff recognizes that closure of either of the two isolation valves in series in the RHR hot leg suction line would prevent the RHR system from performing its decay heat removal function and could result in damage to the RHR pumps if not corrected. Our evaluation has concluded that:

a. Although the staff did not specifically evaluate the Diablo Canyon RHR system against the criteria of BTP RSB 5-1 at the time the system was reviewed, the staff concludes that the system meets the intent of BTP RSB 5-1 for Class 2 plant implementation. The only deviation we have identified is the lack of a qualified auxiliary feedwater supply in excess of 8 hours. However, there are other diverse auxiliary feedwater sources available, which, while not designed to safety grade standards, nontheless provide a high degree of assurance that an ample auxliary feedwater supply will be available.

b) Technical Specifications and administrative procedures are in place at the plant to assure that the two series isolation valves in the RHR suction line are locked open with power sources removed from the valve operators. Moreover, a RHR low flow alarm will be installed and made operational prior to power operation to ensure that the operators will be alerted to any low flow condition that would occur in the RHR suction line, such as could occur from a closed isolation valve. Given spurious isolation valve closure as an initiating event, the failure of the operators to follow administrative procedures and technical specifications, combined with a failure of the low flow alarm or the operators to take corrective action in the presence of a low flow alarm must be postulated in order for RHR pump damage to result.

The staff considers that the need to postulate two independent failures to lose the RHR capability meets the intent of the single failure criteria.