Public Service
Electric and Gas
Company

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United States Nuclear Regulatory Commission
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Gentlemen:

DETAILED CONTROL ROOM DESIGN REVIEW
SALEM GENERATING STATION
UNIT NOS. 1 AND 2
DOCKET NO. 50-272 AND 50-311

By letter dated June 4, 1987 (ref: NLR-N87101), Public Service Electric & Gas Company (PSE&G) submitted a schedule for implementation of the Detailed Control Room Design Review (DCRDR) modifications required by NUREG-0737. PSE&G committed to address over 200 Human Engineering Discrepancies (HED) in three phases during three consecutive refueling outages for each unit.

For Salem Units 1 and 2, PSE&G has resolved all HEDs identified in the June 4, 1987 letter as originally committed or as reevaluated in Attachment 1.

For Salem Unit 2, phases I and II of the DCRDR were completed during the fourth and fifth refueling outages. Phase III was completed during the sixth refueling outage which ended in May 1992 with the exception of HED-536. PSE&G requested and received an exemption to allow the HED-536 interconnections with Unit 1 to be completed during the tenth refueling outage. HED-536 was completed during the Unit 1 tenth refueling outage.

For Salem Unit 1, phases I and II were completed during the eighth and ninth refueling outages. Phase III was completed during the tenth refueling outage which ended in August 1992.

Attachment 1 contains the new resolution and justification for HEDs that were reevaluated.

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For HEDs that required procedure changes, all identified procedures have been changed. In addition, the Emergency Operating Procedures (EOPs) are written in accordance with the Westinghouse Owners Group (WOG) Guidelines. All station implementing procedures other than the EOPs are being revised during the Procedure Upgrade Project which is currently in progress. This project is scheduled to be completed by the end of March, 1993. Both the WOG Guidelines and the Procedure Upgrade Project include a human factors review of the procedures.

Should there be any questions with regard to this submittal, please do not hesitate to contact us.

Sincerely,

Attachment

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Licensing Project Manager

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ATTACHMENT 1
DCRDR PROGRAM CHANGES

1. HED-14 (UNIT 1 ONLY)

Description - Radiation Monitors on 1RP1 are above guideline requirement of 65 inches.

Original Recommendation - No changed recommended

Revised Recommendation - Letter dated November 14, 1986 (ref: NLR-N86146) - Change

Resolution - PSE&G is currently upgrading its Radiation Monitoring System. Relocation at this time is not practical and will be evaluated during the upgrade project.

2. HED-15 (UNITS 1 AND 2)

Description - Page System is not dedicated for either unit. There is no prioritization schedule to determine which unit has priority or which situations have priority. Therefore, interference may occur.

Recommendation - Modify page system to include capabilities for dedication/prioritization.

Resolution - Control of priority of the page system is maintained by the Nuclear Shift Supervisor and the Nuclear Control Room Operator. Also, operators have radios that provide necessary communications with the Control Room. Other communications systems available include the dial telephone and sound powered head sets. The existing communications systems provide the necessary prioritization and no changes have been initiated.

3. HED-17 (UNITS 1 AND 2)

Description - Demineralized Water make-up is shared by both units. There is no indication of entire system in both units. If Unit 1 has lost one tank, there is no indication in Unit 2.

Recommendation - Duplicate indication in Unit #2.

Resolution - Demineralized Water controls are located in the Unit 1 Control Room. Information is passed verbally from Unit 1 to Unit 2. There is no need for indication in the Unit 2 Control Room. The Unit 1 Alarm Response Procedure requires the Unit 2 Control Room Operator to be notified.

4. HED-52 (UNITS 1 AND 2)

Description - Reactor Protection Status Mimic - Labels are black background with white lettering. RP4 is used during accident identification so labels should be easily read.

Recommendation - Labels should be redone to provide consistency. Change the labels to white labels with black lettering.

Resolution - White lettering on black background provides a unique color scheme that is beneficial under these circumstances. RP4 is a vertical panel, therefore dirt buildup in the labels is not a concern.

5. HED-55 (UNITS 1 AND 2)

Description - Rod Bottom Lights are on RP3 and are separated from the Rod Position Indicators on CC2.

Original Recommendation - Move Rod Bottom Lights to CC2.

Revised Recommendation - No action required.
Ref: Supplement to Technical Evaluation Report of the Detailed Control Room Design Review for the Salem Generating Station, Issued December 2, 1985.

Resolution - Based on the referenced December 2, 1985 document, no action was required. This HED was incorrectly added to the schedule.

6. HED-60 (UNITS 1 AND 2)

Description - Indication on Auxiliary Feedwater Storage Tank Level meter is in percent. Indication in procedures (tech specs) are in gallons.

Recommendation - Put zone markings (banding) on scales for easy interpretation of readings.

Resolution - The Auxiliary Feedwater Storage Tank has high and low level alarms that indicate out of normal conditions. Also, OD-74 (Tank Curves) provides a direct correlation between gallons and percent. No other indication is necessary.

7. HED-72 (UNITS 1 AND 2)

Description - Accumulator tank level tech spec is in gallons but indication is in percent. The operator has to use a table to convert percent to gallons.

Recommendation - Put zone markings (banding) on scales for easy interpretation of readings.

Resolution - The Accumulators are part of the Safety Injection System. During a Safety Injection, it is not necessary to determine actual level, only that level is constant or decreasing. During normal operation, OD-74 (Tank Curves) provides a direct correlation between gallons and percent. No other indication is necessary.

8. HED-127 (UNITS 1 AND 2)

Description - Sometimes the status of more than one valve is indicated on one split indicator light. Steam dump valves have 2 valves to an indicator light. There are 12 valves, 4 in each of 3 groups, represented in 6 indicator lights. So one light may share valves in different groups which is confusing since there is no way to identify the valve or group.

Recommendation - Install indicator lights (open and close) for each valve that operate independently.

Resolution - Indicator lights exist for all valves that operate independently. Also, all valves grouped on a single indicator light, operate as a group and separate indication is not necessary.

9. HED-129 (UNITS 1 AND 2)

Description - Operators would like "environmentally qualified" indicators to somehow be designated so that they would know which indications to rely upon when the containment is filled with steam.

Recommendation - Provide some form of visual coding for safety-related instruments.

Resolution - In accordance with UFSAR Section 7.5.3.1, Identification of Design Basis Differences from Regulatory Guide 1.97, Item 7, Unique Identification, no actions were taken.

10. HED-143 (UNITS 1 AND 2)

Description - The water treatment alarms could be located optimally in the Demineralizer Plant.

Recommendation - The water treatment alarms should be moved to the Demineralizer Plant.

Resolution - The Demineralizer Plant is not manned 24 hours, and alarms might not be noticed. Alarms should be kept in the Control Room to ensure personnel are aware of alarms.

11. HED-151 (UNITS 1 AND 2)

Description - All displays do not indicate values in the form immediately useable by the operators. For example: amperage meters on RP6 have indications which must be multiplied by 15 to yield correct value. Dymo tape is used here to indicate the factor is 15.

Recommendation - Define the scales that have this problem and change as necessary. Amperage meter indications should be multiplied by 10 to avoid complicated mental conversion. Dymo tape should not be used.

Resolution - The meters identified are not required during emergency conditions. There is sufficient time during normal operations to perform the required calculations. Dymo tape labels have been replaced with permanent labels.

12. HED-196 (UNITS 1 AND 2)

Description - Printer speed is approximately 60 lines per minute, less than the guideline recommendation of 300 lines per minute.

Original Recommendation - No changes recommended.

Revised Recommendation - Letter dated November 14, 1986 (ref: NLR-N86146) - Replace printer.

Resolution - The current printer is 60 lines per minute, which is satisfactory for the Auxiliary Alarm System.

13. HED-213 UNITS 1 AND 2)

Description - Remote position is not needed on the Local/Remote switch in the 500 KV Group Bus.

Recommendation - Remove this switch position.

Resolution - Remote position is required to allow Load Dispatcher to control 500KV Breakers. This is current PSE&G practice.

14. HED-350 UNITS 1 AND 2)

Description - Unit Load and Frequency Recorder, This recorder is associated with the equipment on RP6.

Recommendation - Move this recorder to RP6.

Resolution - As described in the HED, this recorder is in close proximity to the associated equipment on RP6. No action is necessary and the recorder was not moved.

15. HED-371 UNITS 1 AND 2)

Description - Operators suggest it would be helpful to demarcate the narrow range on the wide range steam generator level recorder. This would allow the operators to relate that information more easily to the narrow range.

Recommendation - Demarcate the narrow range with a small strip of black or blue tape.

Resolution - Steam Generator level varies with power level. Due to calibration methods, range differences, and temperature response for wide and narrow range level indications, it would not be practicable to mark one specific area.

16. HED-415 UNITS 1 AND 2)

Description - Battery Volt and Amp Meter. Numeral width-to-height ratio on these meters is 1:2 rather than the recommended ratio of 3:5.

Recommendation - No changes recommended.

Resolution - Based on the notes from PSE&G/NRC Meeting, held July 1, 1986 and NRC letter, dated August 22, 1986, no action was required. This HED was incorrectly added to the schedule.

17. HED-507 (UNITS 1 AND 2)

Description - Console Alarms - The flash function on the pushbutton alarm signal is not testable.

Original Recommendation - No changes recommended.

Revised Recommendation - Letter dated November 14, 1986 (ref: NLR-N86146) - Controls for the operator to respond to the overhead annunciator system will include the following four: silence, acknowledge, reset and test.

Resolution - The Console Alarm flashers cannot be tested practically because the system, unlike normal annunciator systems, utilizes individual flashers for each alarm circuit that cannot be effectively collected into common test circuits. The only way to test these circuits would be to individually simulate an alarm condition for each flasher circuit. The Console Alarms are grouped, with a separate horn for each alarm group. Also, all alarm bezels have two bulbs per indicator, thus a lamp test circuit is not required.

18. HED-530 (UNITS 1 AND 2)

Description - The reset point on these alarms is too close to the setpoints. This results in these alarms alarming frequently and becoming a nuisance.

Fan Coil Unit Water Flow Alarm
Air Flow Alarms
Chemistry Alarms
SG Low Suction Alarms

Original Recommendation - The alarms need a wider "dead band" between the setpoint and the reset point.

Revised Recommendation - Letter dated November 14, 1986 (ref: NLR-N86146) - The limits or setpoints for initiating the annunciator warning system will meet the following: 1) alarms will not occur so frequently as to be considered a nuisance by the operators, 2) setpoints will be established to give operators adequate time to respond to the condition before a serious problem or automatic action takes place, 3) the setpoints and reset points will be wide enough "dead band" so as not to become a nuisance alarm.

Resolution - Alarms and resets are adjusted to meet required plant conditions. Nuisance alarms are addressed when identified in the deficiency program and not in the HED program.

19. HED-531 (UNITS 1 AND 2)

Description - The alarms on the digitrend system have setpoints and reset points setpoints which are too close. Because of this, it alarms too frequently, printing too many messages on the typer.

Original Recommendation - Establish a wider "dead band" between setpoints and reset points, or consider providing a separate typer so unimportant alarms are not listed so often with important alarms.

Revised Recommendation - Letter dated November 14, 1986 (ref: NLR-N86146) - The limits or setpoints for initiating the annunciator warning system will meet the following: 1) alarms will not occur so frequently as to be considered a nuisance by the operators, 2) setpoints will be established to give operators adequate time to respond to the condition before a serious problem or automatic action takes place, 3) the setpoints and reset points will be wide enough "dead band" so as not to become a nuisance alarm.

Resolution - Alarms and resets are adjusted to meet required plant conditions. Nuisance alarms are addressed when identified in the deficiency program and not in the HED program.

20. HED-538 (UNITS 1 AND 2)

Description - Except for the reactor and turbine trip alarms in the "F" panel, there is no system for prioritization of alarms. Some console alarms are more important than some overhead alarms.

Original Recommendation - No changes recommended.

Revised Recommendation - Letter dated November 14, 1986 (ref: NLR-N86146) - Logical prioritization will be applied such that operators will be able to differentiate the most important or serious alarms from less important ones.

Resolution - All alarms are acknowledged when received. The upgraded overhead annunciator system has relocated alarms to provide a more logical order. The seriousness of an alarm is dependent on plant conditions at the time and must be evaluated by the operator.

21. HED-561 (UNITS 1 AND 2)

Description - Fire Protected Steam Generator Meters are not labelled so.

Recommendation - Label these meters as fire protected.

Resolution - There is no benefit to marking meters on the Hot Shutdown Panel as fire protected. The Fire Hazards Analysis Books address this instrumentation.