

UNITED STATES NUCLEAR REGULATORY COMMISSION 50-272/311 50-354

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WASHINGTON, D.C. 20555-0001 July 29, 1998

LICENSEE: Public Service Electric and Gas Company

FACILITIES: Hope Creek Generating Station Salem Nuclear Generating Station, Unit Nos. 1 and 2

SUBJECT: SUMMARY OF JUNE 16, 1998, MEETING REGARDING STATUS OF ENGINEERING ISSUES

This summary refers to the meeting with Public Service Electric and Gas Company (PSE&G or the licensee) conducted on June 16, 1998, at the U.S. Nuclear Regulatory Commission (NRC) office in Rockville, Maryland. The meeting was held at the request of PSE&G to discuss the status of engineering issues for the Hope Creek Generating Station and Salem Nuclear Generating Station, Unit Nos. 1 and 2. A list of the attendees at the meeting and a copy of the slides presented by PSE&G are enclosed.

The PSE&G presentation closely followed the material in their slides provided at the meeting (Enclosure 2). The following major topics were discussed:

#### Salem Electrical Raceway Fire Barrier Project

PSE&G discussed their ongoing program for the resolution of the fire barrier issues that first came up in 1993 after an NRC fire protection inspection. PSE&G indicated that it would continue to use compensatory measures, such as fire watches, until full compliance with the fire protection regulations is met. With regard to the program, the licensee has assigned a manager to the project to provide focused attention and oversight. Also, Duke Power Engineering has been contracted to provide technical support because of its experience in dealing with 10 CFR Appendix R with PSE&G retaining overall management and direction of the project.

PSE&G noted that it had committed to complete the necessary fire barrier analysis within 18 months and to implement the modifications within 3 operating cycles based on the 3 system trains. The project is divided into three phases. In phase one, PSE&G is performing configuration walkdowns to verify the as-built installation and will be reperforming the safe shutdown analysis to optimize the actions and equipment needed in order to minimize reliance on fire wraps. In phase two, the licensee is preparing design options such as use of fire-resistant cable, rerouting cables, and conducting qualification tests. In phase three, the selected design will be implemented. The scheduled completion dates are May 2002 for Unit 2 and December 2002 for Unit 1. The actual installation period will begin during the Unit 1 fall 1999 outage. At this time, cable ampacity is the major variable or vulnerability in the schedule.

#### Salem Spent Fuel Pool Cooling Upgrades

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The licensee provided its overview of actions underway to answer the NRC staff's concerns regarding the spent fuel pool liners. The NRC staff had raised questions regarding the integrity of the welds that anchor the liner should the bulk water temperature of the pool exceed 180 °F.

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Although the liner provides no structural role in the spent fuel pool, it does provide a barrier between the pool water and the concrete pool walls. Any leakage past the liner is identified and collected by a leakage collection line that currently has no isolation capability.

It was noted that PSE&G had revised its earlier commitment to verify the integrity of the liner welds at boiling conditions through analysis and testing. In January 1998, PSE&G decided it was more cost effective to seismically upgrade the spent fuel pool cooling system to eliminate the need to consider boiling. The licensee also noted that the current spent fuel loading in the pools will not input sufficient heat to cause boiling during analyzed transient or accidents. The NRC staff stated that a concern still exists in that leakage past the liner cannot be isolated by the collection lines. In this regard, the licensee committed to either install isolation valves or caps to restrict the amount of flow. This action will be completed within the 12-week online work cycle and within the project completion period that ends before the next refueling outage.

#### Ultimate Heat Sink (UHS) Temperature Limits for Hope Creek

PSE&G has recently submitted a license change request to the NRC to raise the Technical Specification (TS) UHS temperature limits. The proposed change would provide increased operational flexibility and reduce the need for required operator actions during summertime periods of elevated river water temperature. PSE&G stated that river water temperatures could potentially exceed the current TS UHS temperature limits by the late July or early August timeframe. PSE&G requested the NRC to accelerate the review cycle of the license change request so that the proposed TS UHS temperature limits could be implemented prior to elevated river water temperatures that could impact plant operations. The NRC staff stated that they were not optimistic that such a short review cycle could be supported.

#### Design/Licensing Bases Review Project Update

PSE&G provided an overview of design and licensing basis activities performed at Salem and Hope Creek. PSE&G stated that they are planning to submit a letter to the NRC detailing changes in commitments with respect to their existing response to the NRC 10 CFR 50.54(f) letter. PSE&G expects to submit the letter in the mid-July timeframe.

#### Hope Creek Emergency Core Cooling System (ECCS) Suction Strainers

PSE&G discussed their commitment to replace eight ECCS pump suction strainers in response to NRC Bulletin 96-03. One strainer was replaced during the 7th refueling outage and the remaining seven strainers will be replaced during the 8th refueling outage in February 1999. The NRC issued a safety evaluation in October of 1997, which evaluated the licensee's criteria for sizing the strainers. The safety evaluation left several technical issues open associated with the design of the strainers pending NRC post-installation inspection. PSE&G expects to issue a letter to the NRC by the end of June that provides information to help resolve some of the open issues.

#### License Change Requests for Hope Creek

PSE&G discussed some of the specific license change requests for which NRC approval is needed prior to the next refueling outage in February 1999 for Hope Creek. The licensee's discussion closely followed the presentation slides.

#### License Change Requests for Salem

The licensee presented a discussion of the license changes requests (LCRs) that are currently being prepared for submission to support the 1999 Salem refueling outages. The licensee's discussion closely followed the presentation slides. The NRC staff stated that the requests need to be submitted with sufficient time for the staff to conduct the necessary reviews.

Following the licensee's presentation, the NRC staff detailed some observations and issues that have arisen during the past year. The staff noted that there have been delays in receiving information in response to review questions. In particular, the staff noted that PSE&G was one of the last utilities to submit a reply to the request for additional information (RAI) on A-46, "Seismic Qualification of Mechanical Equipment." Additionally, the staff noted delays in responding to RAIs to support its review of LCRs concerning electrical power sources during shutdown, switchgear penetration area ventilation system, and the environmental technical specifications. These delays have created difficulties for the NRC staff in conducting timely reviews. In several instances, turnover of licensee personnel have caused the actions to be halted on the responses. The staff also noted that the licensee had to supplement its LCR for emergency diesel generator voltage and frequency surveillance criteria. The licensee's systems engineering and plant operations departments each had independently determined that the changes were needed to clarify the criteria after the LCR had been submitted. This will require a supplemental submission to the LCR.

The NRC staff did note that recent submittals such as the Salem Unit 1 one-time amendment to purge the containment during modes 3 and 4 and the Salem Inservice Testing Program were well prepared.

Richard B. Ennis, Acting Project Manager Project Directorate I-2 Division of Reactor Projects - I/II Office of Nuclear Reactor Regulation

Enclosures: 1. Attendance List 2. PSE&G Slides

Docket Nos. 50-272, 50-311, and 50-354

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#### MEETING ATTENDANCE LIST

Public Service Electric and Gas Company Hope Creek; Salem, Units 1 and 2 Licensee: Plant(s): Subject: Quality Assurance Program Changes

Date: June 16, 1998 Time: <u>9:00 a.m.</u>

Location: NRC Offices, OWFN Room 8-B-11

NRC STAFF R. Capra P. Milano R. Ennis P. Madden S. West W. Ruland G. Hubbard C. Gratton K. Kavanagh S. Magruder J. Linville L. Marsh V. Ordaz S. Newberry J. Tatum	TITLE Project Director Project Manager Project Manager Sr. Fire Protection Engineer Section Chief Branch Chief Reactor Systems Engineer Reactor Systems Engineer Project Manager Branch Chief Branch Chief Reactor Systems Engineer Deputy Director Sr. Reactor Engineer	ORGANIZATION NRR/DRPE/PD1-2 NRR/DRPE/PD1-2 NRR/DRPE/PD1-2 NRR/DSSA/SPLB NRR/DSSA/SPLB NRR/DSSA/SPLB NRR/DSSA/SPLB NRR/DSSA/SPLB NRR/DRPM/PGEB RGN-I/DRP/RPB3 NRR/DSSA/SPLB NRR/DSSA/SPLB NRR/DSSA
J. Tatum R. Elliot	Sr. Reactor Engineer Reactor Systems Engineer	NRR/DSSA/SPLB NRR/DSSA/SCSB

#### PSE&G

G. Salamon	Manager, Hope Creek Licensing
C. Smyth	Manager, Salem Licensing
D. Powell	Director, Licensing/Regulations and Fuels
J. Zudans	Manager, Mechanical Design Engineering
G. Overbeck	Director, Engineering Assurance and Special Projects
A. Moudgil	Manager, Fire Wrap
D. Shumaker	Fire Protection Engineer
S. Mannon	Supervisor, Design Engineering
D. Garchow	Director, Engineering
V. Fregonese	Manager, Design Basis
F. Sullivan	Director, Systems Engineering
R. DeNight	Supervisor, Analysis/Specialty Engineering
M. Mohney	Hope Creek Operations
J. Priest	Licensing Engineer

Enclosure 1



## STATUS OF ENGINEERING ISSUES June 16, 1998





# AGENDA

- Introductions and Opening Remarks
- Technical Issues
  - Salem Fire Wrap/Appendix R Issues
  - Salem Spent Fuel Pool Upgrades
  - Hope Creek Ultimate Heat Sink
- Status Items
  - Design & Licensing Bases Review Project
  - Hope Creek ECCS Suction Strainer
- License Change Requests
  - Hope Creek
  - Salem





### SALEM ELECTRICAL RACEWAY FIRE BARRIER PROJECT

A. Moudgill - Manager D. Shumaker - Fire Protection Engineer Fire Wrap and Engineering Programs Group





## OUTLINE

- Issue Statement
- Licensing Basis
- Design Basis
- Approach
- Current Status
- Conclusions





#### **ISSUE STATEMENT**

#### At Salem Units 1 & 2, qualification status of the installed fire barriers is not resolved





#### LICENSING BASIS

The Salem Units are Licensed to Appendix R (Sections 3.G, J, L and O). – Unit 1 by Regulation – Unit 2 by Commitment





#### **DESIGN BASIS**

Requirements as specified in 10CFR50 Appendix R:

- Separation by a 3 hr. barrier
- Enclosure with 1 hr. barrier with detection and suppression systems
- 20 feet separation (free of combustibles) with Detection and Suppression





#### APPROACH

#### Phase 1

- Safe Shutdown Re-Analysis
- Perform Configuration Walkdowns
- Validate Installations with Tested
  Configurations

#### PHASE 1 ESTABLISHES SCOPE FOR THE REQUIRED FIRE BARRIER PROTECTION





#### **APPROACH** (continued)

#### Phase 2

- Prepare Design Change Packages
- Resolve Design Issues by Alternate Strategies

#### Phase 3

Design Change Implementation

The Power of Commitment



## **INTEGRATED SCHEDULE**







#### **CURRENT STATUS**

- 1998 Milestones Completed:
  - Safe Shutdown System Logics (as scheduled)
  - Safe Shutdown Component Logics (as scheduled)

#### **PROJECT ON SCHEDULE**





#### **CURRENT STATUS** (continued)

- Remaining Milestones for 1998:
  - Complete Circuit Analysis
  - Complete Fire Area Compliance
    Assessments
  - Identify Modifications for 1999





## CONCLUSION

- No Safety Concerns
- Project on Schedule





### SALEM SPENT FUEL POOL COOLING UPGRADES

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#### **CURRENT LICENSING BASIS**

- Non-Safety and Non-Seismic System
- Pool Boiling
- Safety Related Make-Up From RWST
- Full Core Offload
- Maintain Pool Temperature < 180 °F





### **CURRENT DESIGN**

- Non-safety related
- Portions analyzed to Seismic Category 1
- Redundant pumps, 1E powered and diesel backed
- Safety related Heat Exchangers
- Capability to cross connect to the other unit's Heat Exchanger
- 1 safety and 3 non-safety related make-up sources
- No boiling with current SFP load should cooling be lost





#### **ISSUE STATEMENT**

- Pool liner integrity under boiling scenario is in question.
- Pool liner leakoff lines do not have isolation capability.





#### **SOLUTION APPROACH**

- Upgrade fuel pool cooling system to minimize the potential for boiling
  - SQUG for seismic evaluation of components
  - Other design considerations
- Cap or Valve off pool liner leakoff lines





## STATUS

- Upgrade project on schedule
- Validating original design/purchasing documents
- Commitment to upgrade system to seismic by next core offload (4/99)
- Project completion including UFSAR updates scheduled for 12/98
- Design change to cap leakoff lines initiated
- No schedule impacts foreseen





### ULTIMATE HEAT SINK (UHS) TEMPERATURE LIMIT FOR HOPE CREEK





### **DESIGN BASIS**

- The Station Service Water System (SSWS) delivers river water to the safety related Safety Auxiliary Cooling System (SACS) heat exchangers.
- During normal and abnormal operations, the SSWS system cools the intermediate cooling water system, SACS.
- SACS supply temperature less than 95°F.

A simplified sketch of the SSWS system is provided.



### **UHS TEMPERATURE LIMIT**

In an effort to raise the UHS Limit several critical parameters were investigated:

- SACS Heat Loads
- SACS Flow Rates
- SSWS Flow Rates
- SACS Design Temperature



### **CURRENT LICENSING BASIS**

**UHS** temperature limit

- 85°F
- 87°F, if safety related discharge path motor operated valves are opened and all SSWS/EDG/SACS components operable





#### **PROBLEM STATEMENT**

The current UHS temperature limit may not support all plant configurations for summer river water temperatures without creating unnecessary operator burdens.





#### **SOLUTION APPROACH**

- Analyze a higher SACS design temperature.
- Ensure operability of SACS supplied equipment.
- Raise the UHS temperature limits based on higher SACS temperature.



## **ANALYTICAL APPROACH**

- Same modeling and analyses as Amendment 106
- Used benchmarked SSWS and SACS flow models.
- Evaluated equipment operability at higher SACS temperatures and room temperatures.
- Calculated Actual Reactor Building Volumes.
- Determined normal and accident reactor building heat loads.
- Built computer models to perform HVAC analyses for the Reactor Building and Auxiliary building (seven total).
- Evaluated post-accident suppression pool response.
- Re-evaluated Reactor building drawdown analysis.





## BENEFITS

- Simplified post-accident operator response.
- Reconstituted analytical design basis.
- Safely allow continuous operation of HCGS through historical river water temperatures.
- UHS issues resolved.





# DESIGN/LICENSING BASES REVIEW PROJECT UPDATE





### INTRODUCTION

- Previous Design/Licensing Basis Activities
- Project Plan Summary of PSE&G's
- Activities Conducted Over the Last Year
- Lessons Learned
- Conclusions and Schedule





## PREVIOUS DESIGN/LICENSING BASIS ACTIVITIES - SALEM

- 44 Configuration Baseline Documents
- Procedure Upgrade Project
- EOP Upgrade Project
- Technical Specification Surveillance
  Improvement Project
- System Readiness Review Program
- Integrated Test Program
- FSAR Project
- Configuration Walkdown Project



## PREVIOUS DESIGN/LICENSING BASIS ACTIVITIES - HOPE CREEK

- Integrated design verification inspection (1985)
- 29 Configuration baseline documents (1991/1994)
- 6 System functional reviews on 10 systems (1987/1995)
- NRC electrical distribution system functional inspection (1992)
- Technical Specification Surveillance Improvement Project (1995/1996)



## PREVIOUS DESIGN/LICENSING BASIS ACTIVITIES - HOPE CREEK (continued)

- PROCEDURE REVIEWS (1996)
  - Operations/Maintenance
  - Radiation Protection/Chemistry/Fire Protection
  - Safety Review Group Oversight
- NRC READINESS ASSESSMENT TEAM INSPECTION (RFO-6, 1996)
- 2 CONFIGURATION BASELINE DOCUMENT (CBD) VALIDATION REVIEWS (1996)



## **ELEMENTS OF THE PROJECT PLAN**

- Develop System Design Basis Documents (DBDs)
- Review of the UFSAR
- Review of Design Calculations
- Review Operations Procedures
- Review of Preventive Maintenance Procedures
- Review of Vendor Technical Information Control
- Review of adequacy of Surveillance Testing Procedures



## ACTIVITIES CONDUCTED OVER THE LAST YEAR

- Completed System Readiness Review Program Salem
- Completed Integrated Test Program Salem
- Technical Specification Surveillance Improvement Project - Salem
- Completed 3 Pilot Design Basis Documents Hope Creek
- Completed UFSAR Updates
- Improved Design Basis Tools
- Instituted the Safety Evaluation Independent Review Team



## ACTIVITIES CONDUCTED OVER THE LAST YEAR (continued)

- Management Expectations Reinforced by the Safety Oversight Review Committee (SORC)
- Implemented a Modification Review Board
- Benchmarked with Other Utilities
- Quality Assurance Performed an Engineering Audit
- Restart Assessment Team Inspection (RATI) Salem
- NRC Engineering Inspection Hope Creek





#### LESSONS LEARNED

- Hope Creek Pilot DBD Efforts Did Not Find Any Safety Issues
- An Independent Assessment Team Concluded That We Had Not Effectively Used Our Resources and Available Information
- Configuration Baseline Documents Are A Good Road Map To The Design Bases
- Programmatic Standards Provide A Good Source Of The Design And Licensing Basis For Topical Issues





#### LESSONS LEARNED

- Technical Specification Surveillance Improvement Project (TSSIP) Validated That The Design And Licensing Bases Issues Are Captured Within Our Operating Documents
- The Salem System Readiness Review Was Effective In Identifying Design and Licensing Basis Problems and Having Them Resolved
- Need a Design Basis Document for the Accident Analysis



### CONCLUSIONS

- The Design/Licensing Basis Project Will Refocus Our Efforts Around Chapter 15 and Not Individual System Design Basis Documents
- The Redirected Project Will Use System Logic Diagrams (SLDs) and System Function Diagrams (SFDs)
- Combined Diagrams Depict All System And Components
- Necessary For Mitigation Of The Consequences Of FSAR Postulated Accidents
- Will Validate the Remaining Sections of the UFSAR That Support Chapter 15

#### A BETTER RETURN ON SAFETY





### SCHEDULE

•	Shutd	own	Logic	Diagrams
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- System Functional Diagrams
- Chapt. 15 DB/LB Documents
- FSAR Validation

3rd Qtr. 1998 3rd Qtr. 1999 2nd Qtr. 1999 1st Qtr. 1999

**SALEM** 

<u>HOPE CREEK</u> 4th Qtr. 1998 4th Qtr. 1999 4th Qtr. 1999 4th Qtr. 1999





### HOPE CREEK ECCS SUCTION STRAINERS



## BACKGROUND

- Committed To Replace Strainers in Response to Bulletin 96-03
- Selected Large Passive Stacked Disc Type
- ECCS Pump Suction NPSH<sub>A</sub> > NPSH<sub>R</sub> Without Crediting Containment Over Pressure
- SER received October, 1997
- Closure pending NRC Inspection/Review





## **STATUS**

- 1 Strainer on "D" RHR Pump Installed
- 7 Remaining Scheduled for February 1999 RFO
- All Material Onsite
- Bulletin 96-03 SER Issues
  - Industry Generic Information
  - HC and Vendor Design Details
- Obtain HC Final SER





#### HOPE CREEK LICENSE CHANGE REQUESTS



## APPROVALS NEEDED PRIOR TO THE NEXT REFUELING OUTAGE

- FRVS monthly test revision concerning heater status. (H97-16) - submitted August 26, 1997
- 2. Establishment of new +/-3% SRV Tech Spec setpoint tolerance limits (H97-10) submitted April 28, 1998
- 3. Elimination of High Drywell Pressure Trip Function operability requirement during performance of cold hydrostatic test IAW Tech Spec 3.10.98. (H98-01) submitted May 13, 1998
- 4. Revision of Ultimate Heat Sink Temperature Limits. (H98-02) - submitted June 12, 1998





## APPROVALS NEEDED PRIOR TO THE NEXT REFUELING OUTAGE

- 5. Revision to ADS/SRV startup testing. June 26, 1998
- 6. Establishment of new Cycle 9 Safety Limit Minimum Critical Power Ratio (SLMCPR). Requires completion of GE Cycle 9 reload analyses. - August 31, 1998
- Improvements to FRVS Operation condition \* requirements to eliminate Tech Spec 3.0.4 restriction. Allows entry into Operational condition \* with three FRVS recirc units operable. - August 31, 1998
- 8. Response to NRC SER for Bulletin 96-03 concerning ECCS suction strainers. - June 26, 1998





### SALEM LICENSE CHANGE REQUESTS



## APPROVALS NEEDED PRIOR TO THE NEXT REFUELING OUTAGE

- 1. Revised Containment Air Lock Specifications (S98-03) needed ASAP
- Approval for incorporation of the WRB-2 Critical Heat Flux Correlation into the Salem Licensing Basis (Already Submitted- 5/18/98) need by 8/31/98
- Extension of surveillance intervals, impacted by delays in the restart of Salem Unit 2, to the next refuel outage. (S97-30) need by 1/14/99
- 4. Extension of Unit 1 surveillance intervals to the next refuel outage (S98-04) need by 5/99



## APPROVALS NEEDED BY THE NEXT REFUELING OUTAGE

- 1. Revise requirement to establish containment integrity in Modes 5&6. (S95-34)
- 2. Containment Purge Valve Leak Rate. Change applicability for containment purge operability from "Mode 6" to "Core Alterations". (S95-38)
- 3. Control Area Ventilation Revise pressure requirement to 1/8" Delta p relative to atmosphere (S97-07)
- 4. Provide consistency between Degraded -Undervoltage mode applicability in the ESFAS section of TS and the SEC section. (S97-25)



## APPROVALS NEEDED BY THE NEXT REFUELING OUTAGE (continued)

- 5. Revise Containment Closure requirements during Refueling (may be included in S95-34)
- RHR operation in Modes 5 & 6 to allow RHR operation consistent with STS. (Already Submitted 6/22/95 S95-08)
- 7. Electric Power Sources -Shutdown-Clarifies surveillance requirements required in Modes 5 & 6. (Already Submitted 9/28/95- S95-23)
- 8. Rod Drop Time Mode Applicability clarification (Already Submitted 3/26/98- S97-24)