U.S. NUCLEAR REGULATORY COMMISSION REGION I

Meeting No.

50-354/88-021; 50-272/88-15; 50-311/88-15

License No. NPF-57; DPR-70; DPR-75

Licensee:

Public Service Electric and Gas Company P. O. Box 236 Hancocks Bridge, New Jersey 08038

Facility Name: Artificial Island (Hope Creek Nuclear Generating Station and Salem Generating Stations)

Meeting At: USNRC, Region I, King of Prussia, Pennsylvania

Meeting Conducted: May 26, 1988

Approved By:

P. D. Swetland, Chief Reactor Projects Section 2B

<u>Meeting Summary:</u> Meeting at NRC Region I on May 26, 1988 with Public Service Electric and Gas Company to discuss the licensee's Safety System Funtional Review Program including program goals, scope of completed SSFRs, and results achieved.

DETAILS

1.0 Participants

1.1 Public Service Electric and Gas (PSE&G)

- R. Burricelli, General Manager, Engineering and Plant Betterment
- C. Johnson, General Manager of Quality Assurance
- J. Gueller, Operations Manager Salem
- B. Preston, Manager, Licensing and Regulation
- R. Skwarek, Project Manager Special Projects
- D. Cooley, Onsite Safety Review Engineer Hope Creek
- J. Fest, Onsite Safety Review Engineer Salem
- F. Thomson, Principle Engineer, Nuclear Licensing
- L. Willen, Manager, Nuclear Engineering Services
- V. Polizzi, Manager, Electrical Engineering J. Myers, Electrical Supervisor, Engineering and Plant Betterment
- I. Nag, Electrical Engineer, Engineering and Plant Betterment

1.2 U.S. Nuclear Regulatory Commission (NRC)

- W. Kane, Director, Division of Reactor Projects (DRP)
- E. Wenzinger, Chief, Projects Branch No. 2, DRP
- J. Durr, Chief, Engineering Branch, Division of Reactor Safety
- P. Swetland, Chief, Reactor Projects Section 2B, DRP
- W. Butler, Project Director, PDI-2, Nuclear Reactor Regulation

2.0 Purpose

The meeting was held at the request of NRC Region I. to discuss the licensee's Safety System Functional Review Program.

3.0 Presentation and Discussion

Public Service Electric and Gas Company described their Safety System Functional Reviews (SSFR) which have been conducted at Hope Creek and Salem. The following systems have been inspected:

Salem

Auxiliary Feedwater System (1986) Heating Ventilation and Air Condition System (1987) Componenent Cooling Water System (1987)

Hope Creek

Service Water System (1987)

The inspections were modeled after the NRC's Safety System Functional Inspection (SSFI) and utilized both licensee personnel and contractors.

The major findings and conclusions reached by the team were presented. The licensee plans to perform their next SSFR in the fall of 1988 and then continue these possibly at the rate of one or two per year.

As licensee expertise increases, contractor support will be reduced. Copies of handouts provided by the licensee is attached to this report.

4.0 Concluding Statements

The Director of the Division of Reactor Projects thanked the licensee for their presentation.

SAFETY SYSTEM FUNCTIONAL REVIEWS (SSFR'S) SALEM AND HOPE CREEK

ATTACHMENT 1

AGENDA

0	BACKGROUND	
0	REVIEW DISCUSSIONS	
0	FUTURE PLANS	

NUCLEAR SAFETY REVIEW DEPARTMENT

SALEM ONSITE	HOPE CREEK ONSITE	OFFSITE SAFETY
SAFETY REVIEW GROUP	SAFETY REVIEW GROUP	REVIEW .

- O PRINCIPAL ENGINEER O PRINCIPAL ENGINEER
- o 3 SENIOR ENGINEERS o 3 SENIOR ENGINEERS

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- o MANAGER
- O PWR & BWR PRINCIPAL ENGINEERS
- EACH WITH 3 PRINCIPAL STAFF ENGINEERS

SSFR PROGRAM

- SELF-INITIATED/IMPLEMENTED BY NUCLEAR SAFETY REVIEW DEPARTMENT
- O INITIAL MOTIVATION
 - COMMITMENT FOLLOWING INTERNAL REVIEW OF DAVIS-BESSE EVENT
 - INTERACTIONS AT OCTOBER 1985 INPO PLANT MANAGERS WORKSHOP
 - APPARENT COMPATIBILITY WITH ON SITE SAFETY REVIEW ROLE
- O INITIALLY MODELED AFTER TURKEY POINT SSFI REPORT
- HAS BECOME A CONTINUING PROGRAM

SSFRS COMPLETED

- o SALEM
 - AUXILIARY FEEDWATER SYSTEM (1986)
 - HVAC SYSTEMS (1987)
 - COMPONENT COOLING WATER SYSTEM (1987)
- o HOPE CREEK
 - SERVICE WATER SYSTEM (1987)

REVIEW PROCESS INFLUENCES:

- NRC SSFI REPORTS
- APPENDIX C TO SECTION 2515 OF NRC I&E MANUAL
- **o INTERNAL PHILOSPHY**
- o "LESSONS LEARNED"
- NRC PRESENTATIONS TO INDUSTRY GROUPS
- O INTERACTION WITH A CONSULTANT

• FEEDBACK FROM WITHIN THE NUCLEAR DEPARTMENT

GENERAL AREAS IDENTIFIED FOR IMPROVEMENT

- o DOCUMENTATION
- O DESIGN CHANGE PROCESS
- **o VENDOR MANUALS**
- **o EQUIPMENT HISTORY**
- **o** SPARE PARTS
- ROOT CAUSE DETERMINATION
- STRESS ANALYSIS METHODS/DOCUMENTATION/INTERFACES

SALEN AUXILIARY FEEDWATER SSFR

- O SALEM ON-SITE SAFETY REVIEW GROUP
 - NOA FOR WALKDOWN
 - SPECIALISTS
- FOUR REPORTS
 - OPERATIONS AND SURVEILLANCES
 - MAINTENANCE AND EQUIPMENT
 - DESIGN CHANGES AND MODIFICATIONS
 - **HISCELLANEOUS ITEMS**
- INCORPORATED RECENT SAFETY REVIEW GROUP STUDIES
- **REVIEW PROCESS**
 - PLAN BASED ON DAVIS-BESSE REPORT AND TURKEY POINT SSFI
 - INCORPORATED OUR PAST EXPERIENCE
 - FLEXIBLE
- EXTENT OF THE EFFORT
 - 3200 MANHOURS

AUXILIARY FEEDWATER REVIEW PROCESS

o INVESTIGATIVE PLAN

- WRITTEN FOR OVERALL GUIDANCE
- DYNAMIC
- AREAS OF EMPHASIS EVOLVED
 - DIFFERENCES FROM WESTINGHOUSE STANDARD DESIGN
 - POTENTIAL PROBLEM AREAS
 - *** TURBINE DRIVEN PUMP**
 - * BACKLEAKAGE
 - AS-BUILT VS DOCUMENTATION
 - PROCEDURES
 - GENERIC AREAS
 - *** PLANNING**
 - *** SPARE PARTS**
 - *** VENDOR MANUALS**
 - *** EQUIPMENT HISTORY**
 - ***** STRESS ANALYSIS
 - *** DESIGN BASIS DOCUMENTATION**

SAMPLE OBSERVATIONS AUXILIARY FEEDWATER SSFR

- **o INCONSISTENT OPERATING PROCEDURES**
- TRAINING/PROCEDURES INCONSISTENT WITH REQUIREMENT
- O NEED FOR ADDITIONAL TRAINING/PROCEDURES
- O ABNORMAL PUMP PERFORMANCE DURING MONTHLY SURVEILLANCE NOT ADDRESSED
- O QUALITY/AVAILABILITY OF VENDOR INFORMATION
- SETPOINT DISCREPANCIES (CALCULATIONS, DOCUMENTATION)
- **o DESIGN CHANGE PROCESS CONCERNS**
- DESIGN DOCUMENTATION PROBLEMS (AVAILABILITY, UPDATING, ERRORS)
- PROGRAMMATIC/SPECIFIC STRESS ANALYSIS ISSUES
- LUBRICATION INCONSISTENCIES
- **o WORK PLANNING ISSUES**

MANPOWER BREAKDOWN AUXILIARY FEEDWATER STUDY

ORGANIZATION	MANHOURS*
ON-SITE SAFETY REVIEW	1920
QUALITY ASSURANCE	580
METHODS & SYSTEMS	360
CONTRACTOR	280
OFF-SITE SAFETY REVIEW	200
E&PB	220
TECHNICAL EFFORT, PLUS CLERICAL SUPPORT	3200 360

***NOT INCLUDED ARE:**

- A) SECRETARIAL SUPPORT
- B) INTERACTION TIME (E.G. THE TIME OF THOSE INTERVIEWED)
- C) TIME SPENT FOLLOWING THE STATUS OF REPORT RECOMMENDATIONS
- D) TIME SPENT RESPONDING TO REPORT RECOMMENDATIONS

SALEM HVAC SSFR

• SALEM ON-SITE SAFETY REVIEW GROUP

- NOA FOR WALKDOWN

- OFF-SITE SAFETY REVIEW GROUP FOR DESIGN CHANGES AND MODIFICATIONS

o FOUR REPORTS

- SINGLE FAILURE ANALYSIS
- OPERATIONS AND SURVEILLANCES
- MAINTENANCE AND EQUIPMENT

DESIGN CHANGES AND MODIFICATIONS

- o **REVIEW PROCESS**
 - PLAN EXPANDED FROM PREVIOUS SSFR
 - ADDED NRC I & E MANUAL GUIDANCE -
 - INCORPORATED "LESSONS LEARNED"
- EXTENT OF THE EFFORT - 3800 MANHOURS

HVAC SYSTEMS ADDRESSED

- CONTROL AREA AIR CONDITIONING SYSTEM (CAACS), INCLUDING THE EMERGENCY AIR CONDITIONING SYSTEM (EACS);
- AUXILIARY BUILDING VENTILATION SYSTEM (ABVS), INCLUDING PUMP ROOM COOLERS;
- SWITCHGEAR AND PENETRATION AREA VENTILATION SYSTEM (SPAVS);
- O DIESEL GENERATOR AREA VENTILATION SYSTEM (DGAVS); AND
- CHILLED WATER SYSTEM (CWS).

SINGLE FAILURE ANALYSIS AREAS OF EMPHASIS

- O SWITCH POSITION IN EACS FAN START CIRCUIT
- O REDUNDANT EACS FANS WITH CH 1A VITAL POWER
- VIB FAILURE AND MANUAL ACTION FOR CHILLERS
- O POTENTIAL FOR EXPLOSIVE MIXTURES IN BATTERY ROOMS
- AUXILIARY BUILDING CHARCOAL FILTERS
- O REQUIRED MANUAL ACTIONS IF SIGNAL-TRANSMITTER FAILS
- **o FIRE DAMPERS WHICH ISOLATE KEY AREAS**
- **o CHILLED WATER COOLING LOADS**

SAMPLE OBSERVATIONS HVAC SSFR

- O CHILLED WATER SYSTEM CONCERNS
- O OUESTIONABLE SURVEILLANCE TEST METHODS AND ACCEPTANCE CRITERIA
- O NEED TO IMPROVE/ADD TRAINING
- **o** MAINTENANCE ISSUES
- SOME POST ACCIDENT SITUATIONS NEED CLARIFIED/PROCEDURALIZED
- O QUESTIONABLE INSTRUMENT SETPOINTS, CALIBRATION AND APPLICATION
- O DESIGN BASES AVAILABILITY
- O DESIGN CONTROL/CHANGE CONTROL CONCERNS

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O VARIOUS SYSTEM PERFORMANCE ISSUES

MANPOWER BREAKDOWN HVAC STUDY

ORGANIZATION	MANHOURS*
ON-SITE SAFETY REVIEW	2240
QUALITY ASSURANCE	575
METHODS & SYSTEMS	200
CONTRACTOR	385
OFF-SITE SAFETY REVIEW	600
TECHNICAL EFFORT, PLUS CLERICAL SUPPORT	3800 200

***NOT INCLUDED ARE:**

- A) SECRETARIAL SUPPORT
- B) INTERACTION TIME (E.G. THE TIME OF THOSE INTERVIEWED)
- C) TIME SPENT FOLLOWING THE STATUS OF REPORT RECOMMENDATIONS
- D) TIME SPENT RESPONDING TO REPORT RECOMMENDATIONS

SALEM COMPONENT COOLING WATER SSFR

O CONSULTANT (7-MEMBER TEAM) WITH OFF-SITE SAFETY REVIEW OVERSIGHT

- **o TECHNICAL REVIEW PLANS**
 - OPERATIONS
 - MAINTENANCE
 - DESIGN CHANGE PROCESS
 - QUALITY ASSURANCE
- **o SINGLE REPORT**
- O EXTENT OF THE EFFORT
 - 1350 MANHOURS (CONSULTANT 1200 HOURS, OFF-SITE SAFETY REVIEW 150 HOURS)

SAMPLE OBSERVATIONS COMPONENT COOLING WATER SSFR

- O RECURRING/LONG-STANDING SYSTEM OPERATIONAL PROBLEMS
- O INCONSISTENT SETPOINT DOCUMENTATION AND CALCULATIONS/BASES NOT CONTROLLED
- O MOTOR OPERATOR REMOVED FROM ISOLATION VALVE
- O COMBINATION OF DEFEATED/DISABLED ALARMS COULD HAVE LED TO CONTAMINATED FLUID INLEAKAGE
- NEED FOR HANDS-ON TRAINING
- O DESIGN BASES AVAILABILITY PROBLEMS
- DESIGN CHANGE PROCESS CONCERNS (ANALYSES, CALCULATIONS, CLOSEOUT)
- O POOR REFERENCING OF VENDOR INFORMATION
- LACK OF TRENDING FOR DEFICIENCIES/NON-CONFORMANCES

HOPE CREEK SERVICE WATER SSFR

O CONSULTANT (6-MEMBER TEAM) WITH HOPE CREEK ON-SITE SAFETY REVIEW GROUP ASSISTANCE

• TECHNICAL REVIEW PLANS

- OPERATIONS
- MAINTENANCE
- DESIGN CHANGE PROCESS
- QUALITY ASSURANCE
- HUMAN FACTORS/TRAINING
- **o SINGLE REPORT**
- O EXTENT OF THE EFFORT
 - 1400 MANHOURS (CONSULTANT 800 HOURS, ON-SITE SAFETY REVIEW 600 HOURS)

SAMPLE OBSERVATIONS SERVICE WATER SSFR

- NO PERIODIC INSPECTION TO DETECT EXCESSIVE PIPE WALL EROSION/CORROSION
- NO INSPECTION OF YARD VALVE PITS -FOUND FLOODING
- **o INCONSISTENT SETPOINT DOCUMENTATION**
- **o** SYSTEM DESIGN FLOW CONCERNS
- O OPERATORS RECOVER FROM PARTIAL SYSTEM ISOLATION WITHOUT PROCEDURE
- **o DESIGN BASES AVAILABILITY PROBLEMS**^{...}
- DESIGN CHANGE PROCESS CONCERNS (ANALYSES, CALCULATIONS, CLOSEOUT)

FOLLOWUP OF FINDINGS

COMMITMENT TRACKING SYSTEM (CTS)
OFF-SITE SAFETY REVIEW FOLLOWUP

GENERAL FUTURE STRATEGY

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- FOLLOW CONFIGURATION BASELINE RECOVERY
- UNDER DIRECTION OF ONSITE SAFETY REVIEW
- **O EXPANDED INVOLVEMENT**
- NEAR TERM CONTRACTOR ASSISTANCE (IDEAS, EXPERTISE, TRAINING)
- **o EVENTUALLY IN-HOUSE**
- O DEAL WITH TRAINING ISSUES

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SPECIFIC FUTURE INTENTIONS

0	SINGLE REPORT
0	THREE MONTH SPAN
0	2500 MANHOURS
0	FULL TIME DEDICATED TEAMS
0	PRIORITIZED RECOMMENDATIONS

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NEXT SSFRs

SALEM 0

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- CONTROL/SERVICE AIR AC ELECTRICAL DISTRIBUTION SYSTEMS

HOPE CREEK

INSTRUMENT AIR OTHER PNEUMATIC