UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

MEMORANDUM FOR: RECORD

FROM: James M. Taylor
Executive Director for Operations

SUBJECT: DROP-IN VISIT -- PUBLIC SERVICE ELECTRIC AND GAS COMPANY (PSE&G)

On June 2, 1994, at 1 p.m., PSE&G representatives Mr. Steven Miltenberger, VP and Chief Nuclear Officer, Mr. Joseph Hagan, VP - Nuclear Operations and Acting General Manager - Salem Operations, Mr. Stanley LaBruna, VP - Nuclear Engineering, and Mr. Robert Dougherty, Jr., Senior VP - Electric Business Unit, met with Mr. J. Taylor, Mr. J. Milhoan, Mr. W. Russell (NRR), Mr. L. Reyes (NRR), Mr. L. Chandler (OGC), and Mr. W. Dean (OEDO) to discuss items of mutual interest. The following topics were discussed:

- Hope Creek Station & Salem Generating Station Performance
- 4/7/94 Salem Unit 1 Event
- PSE&G's Performance Improvement Plan
- Unitization Plans for Salem

Mr. Miltenberger and Mr. Hagan discussed recent performance at both PSE&G sites, with the focus being on the continued poor performance at Salem. They provided a briefing package which indicated areas (e.g., LERs, maintenance backlog, overdue preventive maintenance) in which the station continually improved over the last 4 years.

The licensee's Comprehensive Performance Assessment Team's (CPAT), which was conducted last year in light of continuing performance problems at Salem, was discussed. They identified 15 problem statements and prioritized them, with supervisory practices, work practices, and dealing with risk correctly as key areas requiring improvement. Their action plan has recently been incorporated into their overall business plan, which they stated will continue to evolve. A CPAT status book was provided which was a detailed plan and schedule for implementing corrective actions.

Actions have been initiated to unitize the two Salem units. It is hoped this will be successful in dealing with the challenges they face in operations, maintenance, station planning, and outage planning. They are increasing staff size by over 100 during the next year or so, and are rebidding supervisor and

manager positions to get the appropriate people in the right jobs. Mr. Hagan noted that their managers have not been as proactive in getting out into the field as they would like, and that this expectation has been strongly conveyed in the past few months.

It was noted by the EDO that it is up to PSE&G to improve performance, and that it can only be achieved if they go after it in a dedicated and determined fashion. Mr. Miltenberger stated that they are committed to continually improve and to do a better job of self-assessment.

The meeting adjourned at 2:20 p.m.. No regulatory decisions were requested nor made.

James M. Taylor
Executive Director
for Operations

PSE&G SALEM UNIT 1, UNIT 2, AND HOPE CREEK CHRONOLOGY

MAR/AUG | SEP | OCT | NOV | DEC | JAN '96 | FEB | MAR | APR | MAY | JUN | JUL | AUG

SIGNIFICANT EVENTS OR MILESTONES

SALEM

SALEM SPS
ATV/EA
UNIT 1 & 2
SHUT DOWN
NRC
CONFIRMATORY
LETTER
SALEM SPS
PROBATION
SALEM/HOPE CREEK
NEW CAF'S

ENG RE-ORG
UNDER DR VP

PROBATION
EXTENSION
GRANTED

SALEM PLAN
APPROVED

INITIAL S/U
PROJECTION
1ST UNIT

RECURRING
PERFORMANCE
WATCH LIST

RETURN TO
ACC INSERT

UNIT 1 S.G.
EXCEED PLUG LIMIT

SALEM OPERATIONS
ACCREDITATION RENEWAL
BOARD

UNIT 2 LEAD UNIT

REPLACE UNIT 1 S.G.

UNIT 2 PROJECTED
4TH QUARTER
START UP DATE

HOPE CREEK

BYPASS EVENT

RAD RELEASE EVENT

REACTIVITY EVENT

SPS I - S

FINES $130,000
DPS INTERVENTION

REFUEL OUTAGE

RECURRING
PERFORMANCE LIST

REFUELING OUTAGE (EVENT FREE)

ENG. INTERVENTION

EVENTLESS RESTART

BOARD EXT. GRANTED

EARLY RESULTS ARE
ENCOURAGING

NEW MANAGEMENT TEAM ARRIVES

DIRECTOR-TRAINING
JERRY McMANNON

ENGINEERING
3 DIRECTORS
- DESIGN
- PROJECT
- SYSTEM

DPS TRAINING MGR

HIRED
NEW MANAGERS
NEW STAFF
9 SRO's NEW HIRE (6 MO)
7 STA's NEW HIRE (6 MO)

SIMULATOR SUPPORT SUPV
JIM STAVELY

MANAGER TECH TRNG
CHRIS McCLAIN

MANAGER
NC TECHNICAL

24 SRO'S
NEW HIRE (18 MO)

ENG TRNG SUPV
JAY BAXTER

NEW SALEM GM

NEW NC GM

NEW MAINT.
MGMT. TEAM
SITE SUPT.-NL TRUM
NC-S CRUNCH
SALEM-M KERWIN

OPERATIONS / TRAINING ASSESSMENTS

SALEM/HOPE CREEK
RP/CHEM/EP

SALEM/HOPE CREEK
MECH, ELECT, I&C
MAINT SUP
RESTRUCTURED TRG
(ESP)

INCUMBENT BASELINE
QUALS (ESP)

STAFF PERFORMANCE
RATING & RANKING

SALEM INSPIR
COMPREHENSIVE
EXAMS

ES
SELF ASSESSMENT

REQUAL EXAM
LICENSED/
NON-LICENSED
OPERATIONS

NC-ES/NO/BRD COMPREHENSIVE EXAMS

SALEM INTEGRATED
READINESS
ASSESSMENT

ACTION PLANS SALEM AND HOPE CREEK

RECOVERY IMPACT
PLANS
(DEVELOPED BY
CONTRACTOR)

BUDGET 96
11 MILLION

TRAINING
ACTION PLAN

8 OTHER RESTART
ACTION PLANS

CULTURE
YOU ARE THE DIFFERENCE

KEYS TO SUCCESS

1996 BUDGET
14 MILLION APPROVED

ESP JOB ANALYSIS

SALEM RESTART
AFFIRMATIONS

SALEM ASSESSMENT

PLANT S/U

IMPLEMENTED
JOC'S (ESP)

>80%/COMPLETE
ACTION

NC IMP. PLAN → NC (REVISED) → NC PURSUIT OF EXCELLENCE

INPO REVIEW VISITS

SELF EVALUATION

DPS REVIEW #1

CSE MAINT PROGRAMS

REVIEW #2

REVIEW #3

MAINT/TECH ASSR

REVIEW #4

REVIEW #5
5 OF 8 DPS PROGRAMS
RENEWED

REVIEW #5B
LAST DPS PROGRAM
RENEWED

MAINT/TECH PRE ATV

MAINT/TECH ORG. BOARD
MAINT/TECH ATV

MAINT/TECH
RESCHEDULED BOARD

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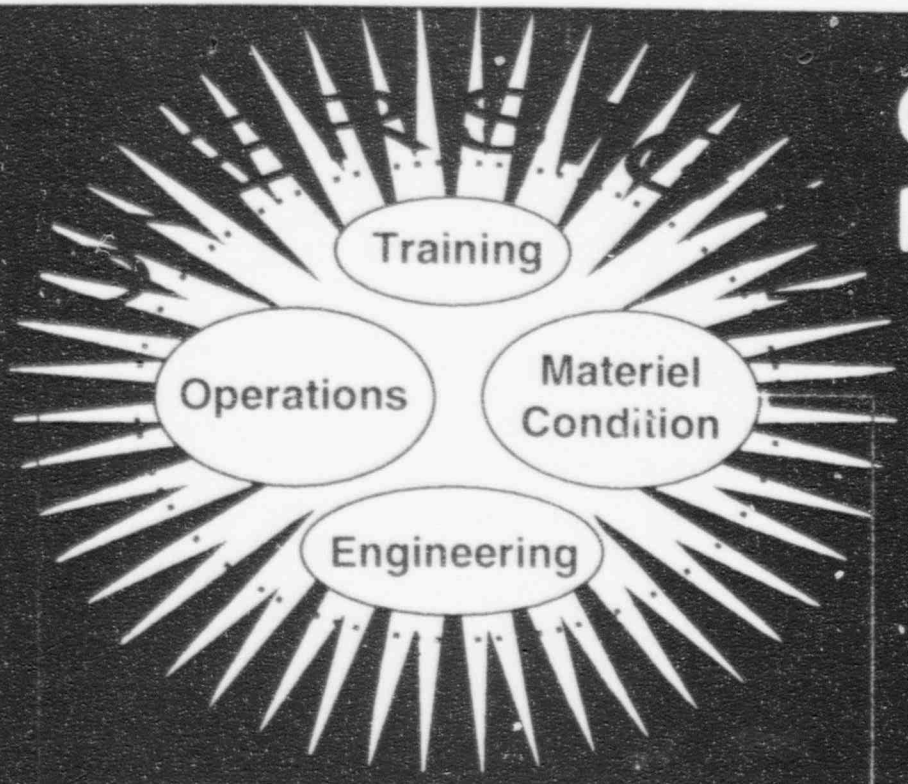
11/12



OPERATIONS VS. MATERIEL CONDITION

PERFORMANCE

= Excellent

= Good (Mixed +)

= Poor (Mixed -)

= Bad

The Power of Commitment

PSE&G

PUBLIC SERVICE ELECTRIC & GAS COMPANY

OVERVIEW OF NUCLEAR OPERATIONS
AUGUST 26, 1996

The Power of Commitment

PSE&G

OVERVIEW OF NUCLEAR OPERATIONS
INTRODUCTION

- Corporate support for ensuring safe and reliable operation of nuclear facilities.
- Developed strong corporate oversight of Nuclear Operations.
- CEO personal commitment to having the best available management team on site.

PSE&G is committed to the long term safe and reliable operations of its nuclear facilities

The Power of Commitment

PSE&G

OVERVIEW OF NUCLEAR OPERATIONS
NUCLEAR BUSINESS UNIT

- Establishing long term safe, reliable and cost effective operations
- New management team assembled
- Instilling an operations led organization
- On-going assessments of managers, supervisors and workforce
- Organizational performance interventions underway

NBU focused on operational excellence

The Power of Commitment

PSE&G

OVERVIEW OF NUCLEAR OPERATIONS SALEM

- Units will remain shutdown until plant, program and people issues are addressed
- Comprehensive restart program established
- Self-assessment integrated into restart program
- Successful restructuring of training programs
- Challenges remain in maintenance quality, procedure compliance and effective corrective actions

Salem will restart when equipment and organizational performance supports safe, reliable operation

The Power of Commitment

PSEG

OVERVIEW OF NUCLEAR OPERATIONS
HOPE CREEK

- Self determined intervention in 1995
- New management team in place
- Long term performance improvement plan established
- Recent refueling outage addressed long term equipment concerns
- Deliberate, event free return to service
- Stable operation since restart

Hope Creek focused on achieving high organizational performance with a strong plant

The Power of Commitment

PSE&G

OVERVIEW OF NUCLEAR OPERATION SUMMARY

- PSE&G is committing the necessary resources to address long-standing performance problems
- New Leadership is driving fundamental change in operational performance
- Continued safe, reliable operation of Hope Creek is number one priority
- Company will not seek restart of Salem until units are ready for safe, sustained operation

PSE&G SALEM UNIT 1, UNIT

MAR/AUG	SEP	OCT	NOV	DEC	JAN
SIGNIFICANT E					
SALEM OPS ATV/EA UNIT 1 & 2 SHUT DOWN SRXC CONFIRMATORY LETTER SALEM OPS PROBATION SALEM/HOPE CREEK NEW SNI'S	ENG RE-ORG UNDER SR VP	PROBATION EXTENDED GRANTED		SALEM PLAN APPROVED	INITIAL SAI PROJECTION 1ST UNIT DECLINING PERFORMAN WATCH LIST
BYPASS EVENT RAB RELEASE EVENT	REACTIVITY EVENT	SSPS 1 - SI	FINES $100,000 OPS INTERVENTION	REFUEL OUTAGE	DECLINING PERFORMAN REFUELIN ENG. INTERV
NEW MANAGEMEN					
	DIRECTOR-TRAINING JERRY McMAHON ENGINEERING 3 DIRECTORS - DESIGN - PROJECT - SYSTEM		OPS TRAINING MGR HIRES NEW MANAGERS NEW STAFF 8 SRO's NEW HIRE (6 MO) 7 STA's NEW HIRE (6 MO)	SIMULATOR SUPPORT SUPV JIM STAVELY MANAGER TECH TRNG CHRIS McCLAIN MANAGER NC TECHNICAL	24 SRO'S NEW HIRE (1
OPERATIONS / T					
SALEM/HOPE CREEK RP/CHEM/ESP SALEM/HOPE CREEK MECH, ELECT, I&C MAINT SUP RESTRUCTURED TRG (ESP)	INCUMBENT BASELINE QUALS (ESP)	STAFF PERFORMANCE RATING & RANKING		SALEM RO/SRO COMPREHENSIVE EXAMS	
ACTION PL					
RECOVERY IMPACT PLANS (DEVELOPED BY CONTRACTOR) BUDGET 96 11 MILLION TRAINING ACTION PLAN	8 OTHER RESTART ACTION PLANS		NC IMP. PLAN	CULTURE YOU ARE THE DIFFERENCE KEYS TO SUCCESS 1996 BUDGET 14 MILLION APPROVED ESP JOB ANALYSIS	
INPO					
SELF EVALUATION	OPS REVIEW #1 CSE MAINT PROGRAMS		REVIEW #2	REVIEW #3 MAINT/TECH ASSM	REVIEW #4

, AND HOPE CREEK CHRONOLOGY

6 FEB | MAR | APR | MAY | JUN | JUL | AUG

NTS OR MILESTONES

SALEM

- RETURN TO ACC BOARD
- UNIT 1 S.G. EXCEED PLUG LIMIT
- SALEM OPERATIONS ACCREDITATION RENEWAL BOARD
- UNIT 2 LEAK UNIT
- REPLACE UNIT 1 S.G.
- UNIT 2 PROJECTED 4TH QUARTER START UP DATE

HOPE CREEK

- EVENTLESS RESTART
- BOARD EXT. GRANTED
- EARLY RESULTS ARE ENCOURAGING

AGE (EVENT FREE)

AM ARRIVES

- ENG TWNG SUPV JAY BAXTER
- NEW SALEM GM
- NEW HC GM
- NEW MAINT. MGMT. TEAM
- SITE SUPT.-NL TRUM
- HC-B CROUCH
- SALEM-M KIRWIN

NING ASSESSMENTS

- EB
- SELF ASSESSMENT
- SALEM INTEGRATED READINESS ASSESSMENT
- REGIVAL EXAM LICENSED/ NON-LICENSED OPERATORS

ERO COMPREHENSIVE EXAMS

SALEM AND HOPE CREEK

- SALEM RESTART AFFIRMATIONS
- SALEM ASSESSMENTS
- PLANT S/U
- IMPLEMENTED JOG'S (ESP)
- >80%/COMPLETE ACTION
- HC (REVISED)
- HC PURSUIT OF EXCELLENCE

EW VISITS

- REVIEW #5 5 OF 6 OPS PROGRAMS RENEWED
- REVIEW #58 LAST OPS PROGRAM RENEWED
- MAINT/TECH PRE ATV
- MAINT/TECH ORIG. BOARD
- MAINT/TECH ATV
- MAINT/TECH RESCHEDULED BOARD

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MAR/AUG	SEP	OCT	NOV	DEC	JAN
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AND HOPE CREEK CHRONOLOGY

FEB MAR APR MAY JUN JUL AUG

ITS OR MILESTONES

SALEM

RETURN TO ACC BOARD

S.G.

9 PLUG LIMIT

SALEM OPERATIONS ACCREDITATION RENEWAL BOARD

UNIT 2 LEAD UNIT

REPLACE UNIT 1 S.G.

UNIT 2 PROJECTED 4TH QUARTER START UP DATE

HOPE CREEK

EVENTLESS RESTART

BOARD EXT. GRANTED

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NEW NUC GM

NEW MAINT. MGMT. TEAM
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HC-B CROUGH
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ED
SELF ASSESSMENT

REQUAL EXAM LICENSED/ NON-LICENSED OPERATORS

SALEM INTEGRATED REARMERS ASSESSMENT

ERO COMPREHENSIVE EXAMS

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MAINT/TECH ORIG. BOARD
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MAINT/TECH RESCHEDULED BOARD

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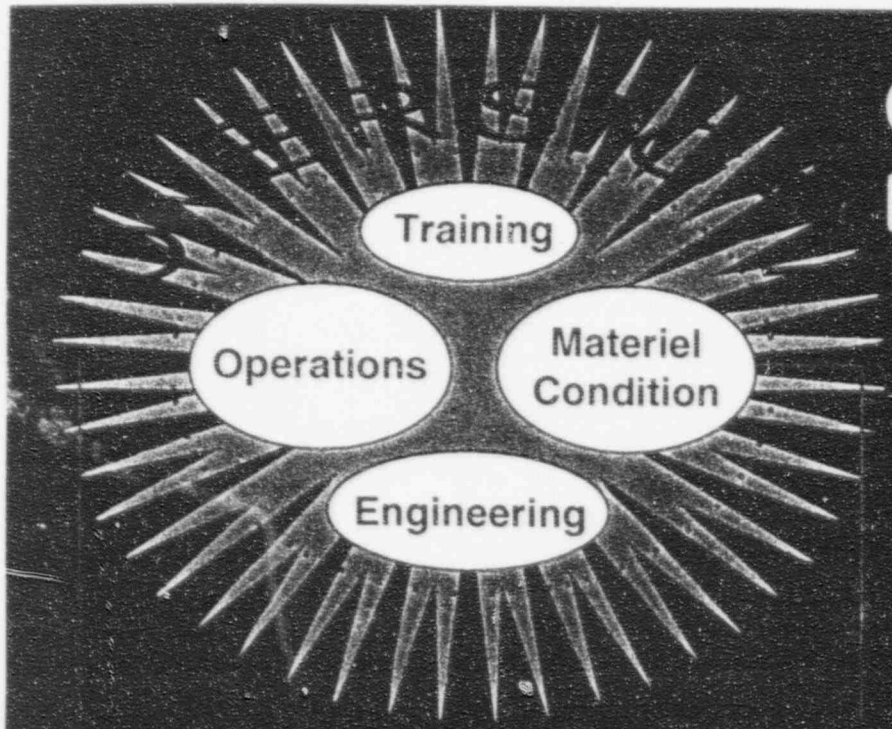

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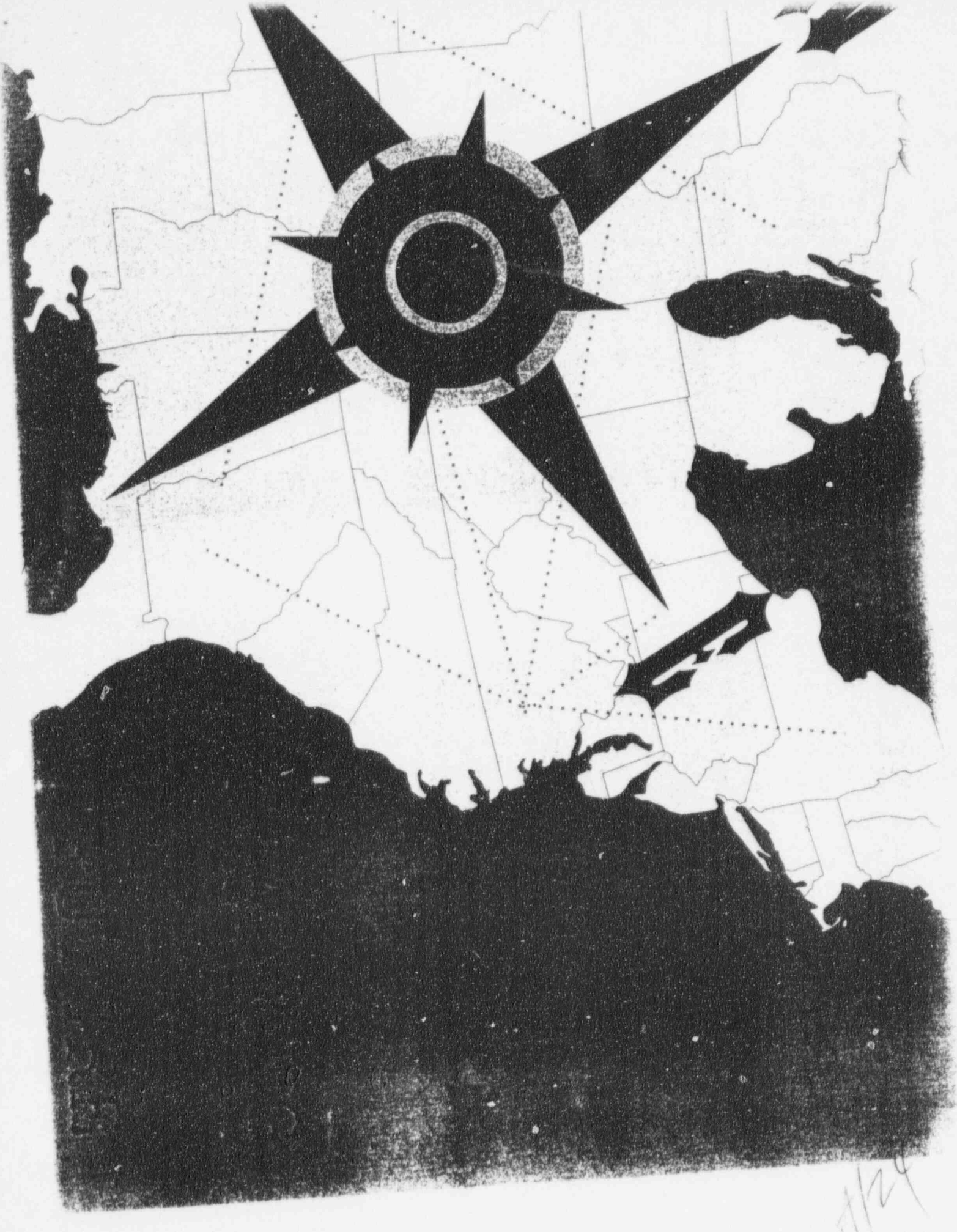


PSE&G

To All Members of the Nuclear Business Unit (NBU) Team:

The publication you hold in your hands is our road map for the next five years. This publication is the NBU 1996-2000 Business Plan which includes a summary of our newly introduced NBU Incentive Compensation Program for MAST associates (non-represented). The goals of our business plan are directly linked with those in the incentive program and also with the strategic initiatives of our parent company - Public Service Enterprise Group. You will find a description of this linkage in the incentive program summary.

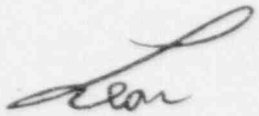
The restart of our Salem Unit 2 and Hope Creek plants along with other activities to stabilize our operating performance is the immediate focus of the business plan. While the Salem Unit 1 steam generators are a major issue, we must demonstrate we are capable of running Salem Unit 2 and Hope Creek reliably and uneventfully for their next fuel cycle. At this time, it would be premature to speculate on the NBU's course of action with Salem Unit 1 without adequate technical and economic analysis. Therefore, our business plan does not include the planned July 1996 to December 1997 operating cycle for Salem Unit 1.

We must not lose sight of our long-term objective: to be the chosen provider of safe, reliable electricity for our customers. Representing over 40 percent of PSE&G's assets, our performance is a key factor in the success of Public Service Enterprise Group. Future objectives and goals in the business plan for 1997-2000 will prepare the NBU for streamlining the way we do business. In 1998 we will begin the final phase of our improvement efforts to ensure we become a competitive producer for the duration of our plant licenses.

You are receiving this plan because ***you are the difference***. You will make it happen. To reach our NBU vision to "Safely generate competitive electricity with nuclear power" will require the following :

- Safe/Reliable Operation
- Cost Management
- People; Culture and Skills
- Stakeholder Relationship

Please read the business plan and incentive program summary thoroughly and take note of specific areas where you can make a contribution. It will take teamwork and determination to make our goals a reality. As the utility industry changes, we must change with it to competitively meet the needs of our customers. The business plan is our road map to excellence and *we will reach* our destination.



CNO and President - Nuclear Business Unit

BUSINESS PLAN

I. VISION, MISSION, CORE VALUES

II. COMPETITIVE PRODUCER

III BUSINESS PLAN OBJECTIVES, CRITICAL SUCCESS FACTORS, CRITICAL SUCCESS FACTOR GOALS

- Safe/Reliable Operation
- Cost Management
- People; Culture and Skills
- Stakeholder Relationship

IV. ADDITIONAL PERFORMANCE INDICATORS

V. SUMMARY

NBU VISION AND MISSION

The vision of the Nuclear Business Unit is the picture of our desired future state.

VISION

Safely generate competitive electricity with nuclear power.

The mission of the Nuclear Business Unit describes why we are in business, who we serve and how we intend to achieve our vision.

NBU MISSION

Safe, reliable and efficient operation of the company's nuclear facilities to produce competitive cost electricity for our customers and to realize the long-term value of our generating assets.

We will achieve this mission for our stakeholders and employees through the implementation of this business plan while maintaining a commitment to the Nuclear Business Unit Core Values.

CORE VALUES

Values determine how we make decisions, perform our work and treat others. By understanding and living these values, we make decisions that support our vision and mission.

SAFETY

Safety, both industrial and nuclear, is the overriding value of all aspects of our business.

PEOPLE

Our people are the single most important element of our success.

RELIABILITY

The reliability of our generating facilities affects both our cost competitiveness and the confidence we maintain with our customers and stakeholders.

FINANCIAL DISCIPLINE

Through disciplined cost management, we must reduce our production costs while balancing operating risks.

ENVIRONMENT

Our continued leadership in environmental management and support of PSE&G's environmental compliance program is important to our business success.

CULTURE

Teamwork, efficiency, aggressive problem solving, and a sense of urgency in achieving our mission are the cornerstones of our culture.

COMMUNITY

We are committed to be a socially responsible business leader by performing an integral role in the well being our local communities.

INTEGRITY

We must conduct our business with the highest ethical standards.

COMPETITIVE PRODUCER

We will move toward becoming a competitive producer in three phases:

STABILIZE

We will improve and *STABILIZE* NBU performance to insure future sustained highly reliable operation through the Salem Restart and Hope Creek improvement plans. This phase is expected to run through the start up of Hope Creek and Salem Unit 2 and into 1997.

STREAMLINE

We will *STREAMLINE* the way we do business. This phase is expected to begin during 1996 (overlapping with the stabilization phase) and continue into early 1998.

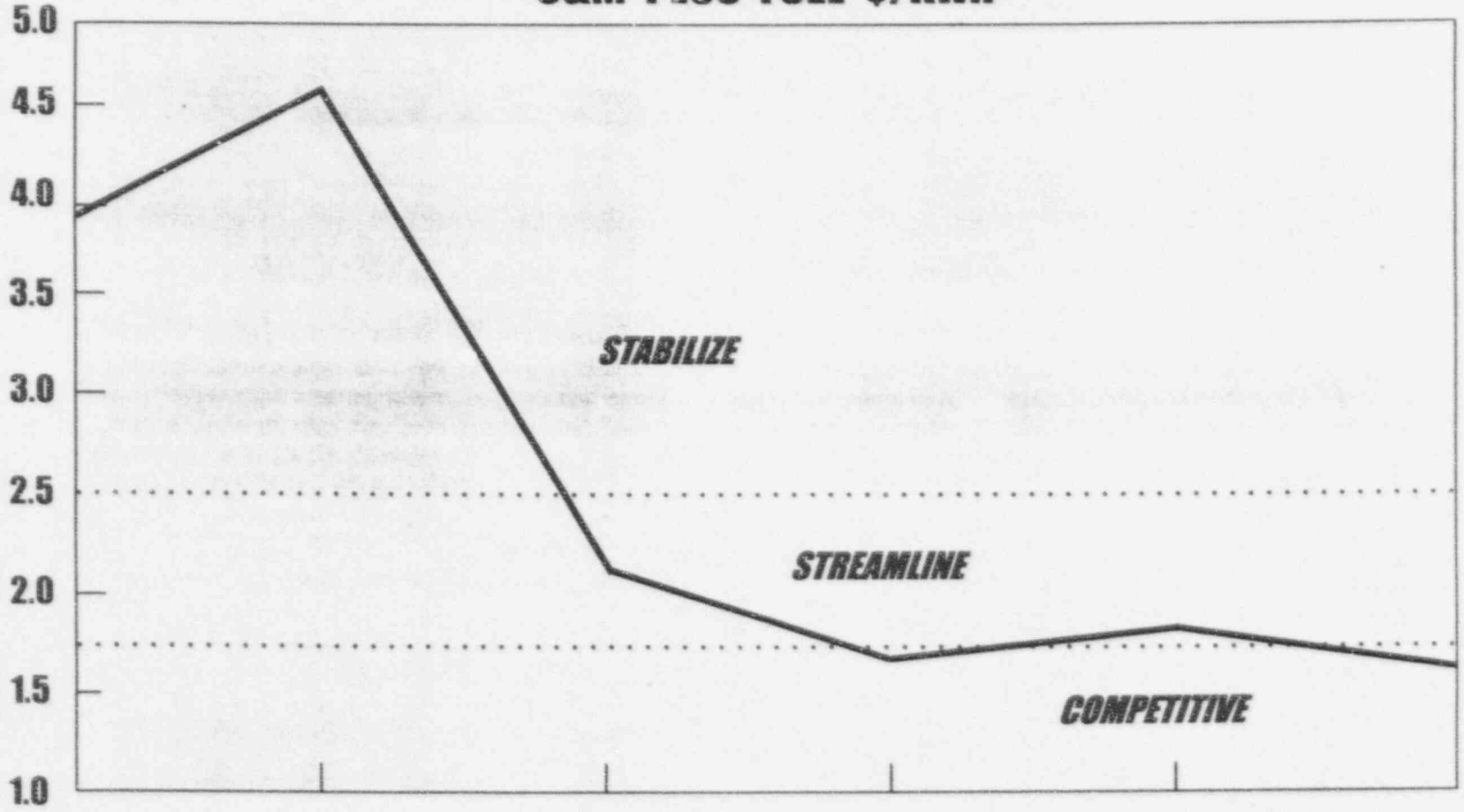
COMPETITIVE

We will become a *COMPETITIVE* energy producer through sustained plant performance and continuous improvement in overall management and operation of the business. This phase will begin during 1998 and run continuously through the end of plant life at our Salem and Hope Creek generating units.

The following chart represents how we expect to position the NBU as a competitive energy producer over the next five years. Although electric production (capacity factor) for Salem Unit 1 is not included for 1996 and 1997, our competitive goal is to produce low cost electricity through safe, reliable and efficient operation of our nuclear facilities.

SALEM AND HOPE CREEK PRODUCTION COSTS

O&M PLUS FUEL ¢/Kwh



1995	1996*	1997*	1998	1999	2000
3.97 ¢/Kwh	4.54 ¢/Kwh	2.26 ¢/Kwh	1.74 ¢/Kwh	1.77 ¢/Kwh	1.65 ¢/Kwh

* 1996 and 1997 include Salem 2 and Hope Creek only

NBU BUSINESS PLAN OBJECTIVES

The four NBU business plan objectives are the framework from which we will measure our performance. These objectives are directly linked to the strategic initiatives of the Public Service Enterprise Group:

PUBLIC SERVICE ENTERPRISE GROUP STRATEGIC INITIATIVES

Generation Strategy

Cost Management

Human Resource Redesign

Regulatory, Public Policy Leadership

NUCLEAR BUSINESS UNIT BUSINESS UNIT OBJECTIVES

Safe/Reliable Operations

Cost Management

People; Culture and Skills

Stakeholder Relationship

Critical success factors have been established for each business plan objective. Critical success factors are those areas of performance that contribute to each of the business plan objectives. Critical success factor goals have also been established for the period 1996-2000 is a means of measuring our performance and progress. The 1996 focus of the business plan is to return Hope Creek and Salem Unit 2 to service, complete the analysis and recommend a course of action to deal with the Salem Unit 1 steam generators, and the development of action plans for streamlining the NBU operation.

A competitive market analysis was performed to benchmark current NBU performance and future goals against the future market. The results of this analysis are incorporated in the business plan objectives and were used in the establishment of critical success factor goals.

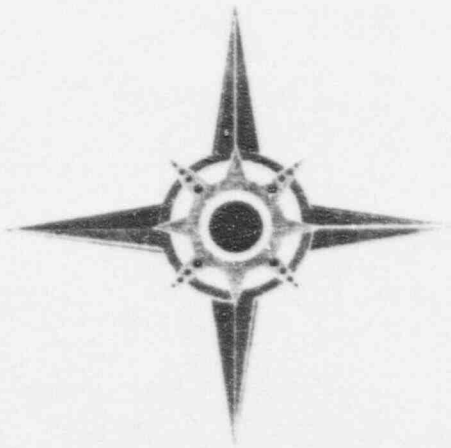
NBU BUSINESS PLAN OBJECTIVES

SAFE/RELIABLE OPERATION

A key element to immediate improvement in safety standards is human performance. Nuclear safety comes first; it is the foundation of everything we do. A safety consciousness must be maintained. "Safety First" means conservative decision making in a nuclear plant. Procedures must be adhered to and safety issues raised when they are experienced or observed. Employees must effectively demonstrate those supervisory, leadership and technical skills that consistently achieve high safety performance through aggressive, timely and effective self-assessment, root cause determination and corrective actions.

Our competitive market analysis indicates that safe plants are also those that are reliable and low cost producers. Top performing nuclear plants operate at capacity factors above 80% with top quartile safety performance measured by the INPO Performance Index.

Our objective is to establish ongoing levels of safety confidence and credibility through the successful implementation of the Salem Restart Plan and Hope Creek Improvement Plan.



CRITICAL SUCCESS FACTORS AND GOALS

SAFE/RELIABLE OPERATION

Critical Success Factors

INPO Performance Index ($)
A weighted index prepared by INPO based on the ten industry indicators: capability factor; unplanned capability loss factor; unplanned automatic scrams; safety system performance; thermal performance; fuel reliability; chemistry indicator; collective radiation exposure; low level radioactive waste generated; and industrial safety accident rate.

Unplanned Automatic Scrams
The scram (automatic shutdown) rate for approximately one year (7,000 hours) of operation.

Safety System Performance
The availability of three important safety systems at each plant. (BWR - high pressure injection, residual heat removal, emergency AC power system. PWR - high pressure safety injection system, auxiliary feedwater system, emergency AC power system).

($) Denotes 1996 NBU Incentive Plan Goal

Critical Success Factor Goals

		1996	1997	1998	1999	2000
INPO Performance Index	Salem	64*	70*	76	85	86
	HC	81	81	87	90	90
Unplanned Automatic Scrams (number per unit)		1	1	1	1	1
Safety System Performance (rate per plant)	Salem	0.015	0.015	0.015	0.015	0.015
	HC	0.018	0.018	0.015	0.015	0.015

**** Salem Unit 2 only***

CRITICAL SUCCESS FACTORS AND GOALS

SAFE/RELIABLE OPERATION

Critical Success Factors

Fuel Reliability
The monitoring of the progress in preventing defects in the metal cladding that surrounds the fuel.

Collective Radiation Exposure
The monitoring of the effectiveness of personnel radiation exposure controls for PWRs and BWRs. The sum of internal and external dose, Total Effective Dose Equivalent (TEDE), received by all personnel, including contractors and visitors.

Industrial Safety Accident Rate ($)
The number of accidents that result in lost work time, restricted work or fatalities per 200,000 work-hours.

Salem Restart Plan Overall Schedule Performance
Adherence to planned work activity schedule on a monthly basis against the Salem Restart Plan schedule.

($) Denotes 1996 NBU Incentive Plan Goal

Critical Success Factor Goals

		1996	1997	1998	1999	2000
Fuel Reliability (µc/gm)	Salem	.0004*	.0004*	.0004	.0004	.0004
(µc/sec)	HC	200	200	200	200	200
Collective Radiation	Salem	130*	5*	105	245	98
Exposure (rem)	HC	152	310	230	62	226
Industrial Safety Accident (rate per plant)		0.40	0.30	0.30	0.30	0.30
Salem Restart Plan Overall Schedule Performance		100%*	N/A	N/A	N/A	N/A

Salem Unit 2 only

CRITICAL SUCCESS FACTORS AND GOALS

SAFE/RELIABLE OPERATION

Critical Success Factors

Hope Creek Improvement Plan Overall Schedule Performance
Adherence to planned work activity schedule on a monthly basis against the Hope Creek Improvement Plan schedule.

Capability Factor ($)
The percentage of maximum energy generation that a plant is capable of supplying to the electrical grid, limited only by factors within the control of plant management. For planning purposes, although not technically supported, Salem 1 capacity factor for years 1998 through 2000 has been limited to 75% in a non-outage year..

($) Denotes 1996 NBU Incentive Plan Goal

Critical Success Factor Goals

		1996	1997	1998	1999	2000
Hope Creek Improvement Plan Overall Schedule Performance		100%	N/A	N/A	N/A	N/A
Capability Factor (percentage)	Salem	20*	96*	79	71	77
	HC	72	80	86	96	85

**** Salem Unit 2 only***

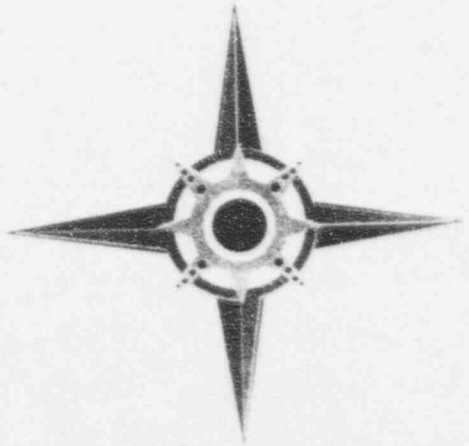
NBU BUSINESS PLAN OBJECTIVES

SALEM UNIT 1 STEAM GENERATORS

On February 23, 1996 the restart of Salem Unit 1 was delayed for an indefinite period while the condition of the unit's four steam generators is being assessed. The delay in Unit 1's restart stems from the results of inspections which revealed indications of microscopic cracks in a number of steam generator tubes.

At this time, the analysis is far from completed and it would be premature to speculate on a course of action. Ultimately, there are several options, including but not limited to repairing, replacing the steam generators or retiring the unit, or some other, yet-to-be determined option.

Our 1996-2000 Business Plan does not include the next planned operating cycle for Salem Unit 1. This operating cycle was expected to run from June of 1996 to December 1997. Therefore, the goals contained in the plan do not include Salem Unit 1 for 1996 and 1997. Specific Salem Unit 1 goals have been established for that period and are identified on the following page.



CRITICAL SUCCESS FACTORS AND GOALS

SALEM UNIT 1 GOALS

Critical Success Factors

INPO Performance Index
A weighted index prepared by INPO based on the ten industry indicators: capability factor; unplanned capability loss factor; unplanned automatic scrams; safety system performance; thermal performance; fuel reliability; chemistry indicator; collective radiation exposure; low level radioactive waste generated; and industrial safety accident rate.

Emergency AC Power Supply System ($)
The availability of the emergency AC power system (diesel generators) at Salem Unit 1.

Steam Generator Project Performance
Adherence to established milestones in the Steam Generator Project schedule.

Unit 1 Plant Lay Up Plan Performance
Plan development and milestone performance to protect our current investment and minimize the deterioration of equipment and systems while the unit is out of service.

Collective Radiation Exposure ($)
The monitoring of the effectiveness of personnel radiation exposure controls for PWR's and BWR's. The Effective Dose Equivalent (TEDE), received by all personnel, including contractors and visitors.

Industrial Safety Accident Rate ($)
The number of accidents that result in lost work time, restricted work or fatalities per 200,000 work-hours.

($) Denotes 1996 NBU Incentive Plan Goal

Critical Success Factor Goals

	1996	1997
INPO Performance Index	60	64
Emergency AC Power System	0.015	0.015
Steam Generator Project Performance	100%	100%
Unit 1 Plant Lay Up Plan Performance	100%	100%
Collective Radiation Exposure (rem)	78	100
Industrial Safety Accident Rate	0.40	0.40

Additional Performance Indicators Under Development

Service Water System and Spent Fuel Cooling System Performance
These indicators will measure the availability of these safety systems at Salem Unit 1.

NBU BUSINESS PLAN OBJECTIVES

COST MANAGEMENT

In order to be competitive, we must improve our operations and megawatt production while anchoring a cost management culture within the NBU that is focused on reducing our O&M, Capital and Fuel expenditures. Fundamental to this culture is a focus on minimizing future capital investment. We must contain and reduce, where possible, our PSE&G resources and continue to rely less on contractor services.

Our competitive market analysis indicates that PSE&G's position is somewhat below that of the regional utilities which operate in one of the higher-cost sections of the country. In 1994, PSE&G's average residential rate was 11.22 ¢/Kwh versus the industry average of about 8.85 cents. Likewise, PSE&G's 9.41 cent commercial rate and 7.51 cent industrial rate were about 19% and 53% higher than the industry averages, respectively. Regionally, the discrepancies are smaller, although still significant. The average residential, commercial, and industrial rates for the Pennsylvania-New Jersey-Maryland Interconnection (PJM) companies in 1994 were about 9.8 cents, 8.5 cents, and 6.25 cents respectively. PSE&G's rates reflect, in part, high fixed costs, which in 1993 were twice the industry average and 58% greater than the regional average, in large measure the result of the high sunk costs of the Hope Creek nuclear plant. The state's high tax rates also impact the company's competitive position. New Jersey imposes a gross receipts franchise tax of 13% on every dollar of revenue that is generated. *(Source: Standard & Poors - Utility Credit Report - Public Service Electric & Gas Co. - August 1995).*

Our cost management objective will require an increasing level of teamwork and individual commitment if we are to achieve significantly more challenging performance and cost goals than in the past. We must challenge ourselves with resulting production cost performance as the measure of our success.

CRITICAL SUCCESS FACTORS AND GOALS

COST MANAGEMENT

Critical Success Goals

Total O&M Expenditures ($)
Operating and Maintenance expenditures including labor, material, contractor and other costs.

Fuel
Cost of fuel burned represented in ¢/Kwh.

Capital Expenditures ($)
Total dollars spent on capital replacements and new capital equipment including capital modifications.

Production Cost ($)
Includes O&M and fuel cost for a time period, divided by net energy produced during the period for Salem 1, Salem 2 and Hope Creek. Expressed in terms of ¢/Kwh.

NBU Staffing Level ($)
Total approved NBU staffing level. PSE&G personnel only.

($) Denotes 1996 NBU Incentive Plan Goal

Critical Success Factor Goals

	1996	1997	1998	1999	2000
O&M Expenditures ($M)	324	258	265	265	246
Fuel (¢/Kwh)	0.62	0.61	0.54	0.54	0.53
Capital Expenditures ($M)	135	87	55	58	45
Production Cost (¢/Kwh)	4.54	2.26	1.74	1.77	1.65
NBU Staffing Level (year-end)	2300	2240	2060	1880	1800

NBU BUSINESS PLAN OBJECTIVES

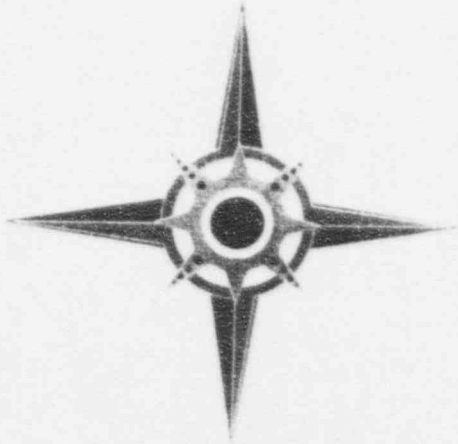
PEOPLE: CULTURE AND SKILLS

NBU success will be achieved only when we have gained employee commitment and involvement as we move from stabilizing our operating performance to streamlining the way we do business.

Our competitive market analysis indicates that successful businesses have streamlined their approach to each facet of their operation. This includes eliminating low value work and employees assuming roles that are broader and have greater responsibilities. Strengthening the skills and knowledge base of our work force will allow us to improve our performance and develop more innovative ways to perform our work. Communication is an essential element at all levels of the organization. Communication barriers must be eliminated. We must also improve our work/business partnership with our represented work force to realize the needs and goals of the business, as well as the needs of our employees.

Enhancing the competitive culture of the NBU organization together with innovation and creativity is essential. We must continuously strive to build professionalism at all levels of the organization.

We cannot succeed without the support and ownership of every NBU employee.



CRITICAL SUCCESS FACTORS AND GOALS

PEOPLE: CULTURE AND SKILLS

Critical Success Factors

Culture Survey
A survey that measures how well the NBU is living up to our vision, mission and values. (FPI - safety culture index)

Employee Concerns Issues Resolution
The time required to resolve employee issues reported through the Employee Concerns program, measured in the number of days.

Performance Ranking ($)
A process to validate the performance evaluation of NBU employees. The process is a key element to improve the reliability at Salem and Hope Creek and to effect a step change improvement in the entire NBU organization.

($) Denotes 1996 NBU Incentive Plan Goal

Critical Success Factor Goals

	1996	1997	1998	1999	2000
Culture Survey	12	13	>14	>14	>14
Employee Concerns Issues Resolution (days)	30	30	30	30	30
Performance Ranking (percent)	100	N/A	N/A	N/A	N/A

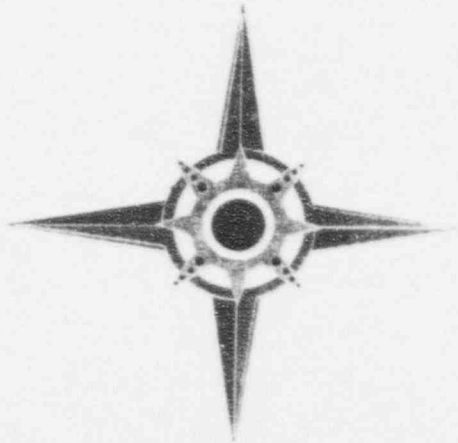
NBU BUSINESS PLAN OBJECTIVES

STAKEHOLDER RELATIONSHIP

The relationship the NBU develops and maintains with internal and external stakeholders will affect the business environment as competition emerges. The ability to engage the entire work force, our internal stakeholders, is essential. Only then will we achieve the required efficiency gains and competitive posture for the NBU. This will be done through a combination of internal communication initiatives, increased employee involvement in business matters and those initiatives detailed in the People; Culture and Skills section of this plan.

Our competitive market analysis indicates that external stakeholders, especially those in the financial community, are sensitive to the performance of a utility's nuclear assets. The long range success of the Public Service Enterprise Group will be largely dependent on the performance and utilization of its nuclear assets and the level of confidence that is maintained with our stakeholders.

Our stakeholders include regulators, industry groups, the media, state and local neighbors and the ultimate customer. The relationship we maintain with these stakeholders will reflect the confidence we promote through the quality of our plant operations, communications and commitment compliance. The NBU will take a more proactive role in ensuring that external stakeholders are provided with timely and accurate information for ongoing initiatives, as well as emergent issues.



CRITICAL SUCCESS FACTORS AND GOALS

STAKEHOLDER RELATIONSHIP

Critical Success Factors

INPO Significant Events (S)
Events identified as significant by INPO at Salem 1, Salem 2 and Hope Creek caused by human error.

Commitment Compliance
A measure of the ability of the NBU to meet regulatory commitments.

NRC Violations
Violations received from the NRC (Total NBU). Level 1 violations are the most significant and level 4 are the least significant. (Level 1 through 3 target is zero, level 4 targets listed)

(S) Denotes 1996 NBU Incentive Plan Goal

Critical Success Factor Goals

	1996	1997	1998	1999	2000
INPO Significant Events	0	0	0	0	0
Commitment Compliance (percent)	100	100	100	100	100
NRC Violations (level 4)	15	12	9	5	5

ADDITIONAL PERFORMANCE INDICATORS

Additional performance indicators are currently under development. After they are fully developed and we have both baselined and trended the data for these indicators, we will consider adding them to our critical success factors in the 1997-2001 NBU Business Plan. These additional performance indicators and their definitions are provided for your information.

PERFORMANCE IMPROVEMENT INDEX

A weighted index to measure human performance that would include the percentage of performance ranking improvements, employee availability rate, training and days of event free operation.

LEADERSHIP SCORE

An indicator focused on a specific section of the culture survey that would measure how well NBU managers and supervisors are perceived to be living up to the NBU vision, mission and core values.

EMPLOYEE CONFIDENCE IN COMMUNICATIONS & INVOLVEMENT

An indicator to measure the effectiveness of employee confidence in communications and involvement as measured through survey and interviews.

ENVIRONMENTAL INDEX

A weighted index that measures the effectiveness of our environmental compliance with New Jersey Permit Discharge Elimination System (NJPDES), the provisions of the Clean Air Act, and the Discharge Containment and Countermeasure/Discharge Cleanup and Removal Plan.

IMPLEMENTATION OF INTERNAL/EXTERNAL COMMUNICATIONS PLANS

An indicator that measures our adherence to established schedules for the implementation of internal and external NBU communications plans.

SUMMARY

The 1996-2000 NBU Business Plan provides the focus on those actions and improvements that will produce long-term sustained performance at our nuclear generating facilities. During 1995, a Salem Restart Plan and a Hope Creek Improvement Plan were put into place to produce a step change in the performance and long term plant reliability of the Salem nuclear units, and return Hope Creek to top quartile performance. These improvement plans are focused on the identification and resolution of equipment problems, and improvements in programs, process, and human performance.

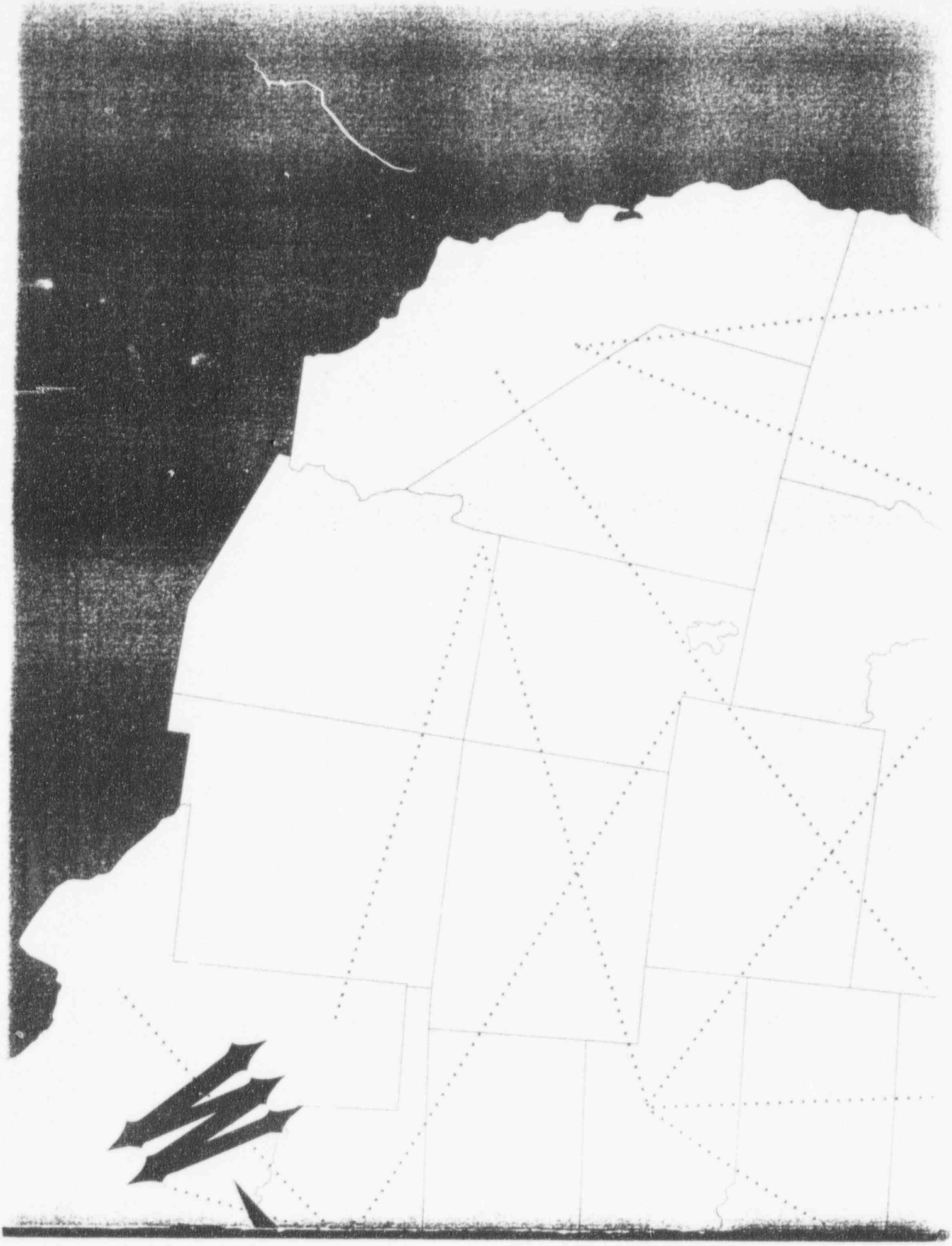
During 1996 we will:

- return Salem Unit 2 and Hope Creek to service;
- complete the economic and technical analysis of Salem 1 steam generators;
- update our competitive and market position with Corporate Strategic Planning;
- expand our competitive analysis through end of plant life; and
- begin the development of our 1996-2000 action plans to prepare for streamlining the way we do business.

These actions will be focused on select critical success factors goals that must be achieved as we stabilize plant performance. These include improvements in human performance and measures to reduce costs.

While a business plan is a necessary and reliable road map, it alone is not sufficient to ensure success. The ultimate success of the NBU depends on each individual employees' commitment to perform in a professional manner consistent with our core values. Effective communications and the commitment to the highest standards in our relations with regulators, stakeholders and fellow employees is essential. ***You are the difference!***

NOTES



LINKING PERFORMANCE AND PAY

The goals of the NBU incentive plan are directly linked to the strategic initiatives of Public Service Enterprise Group and the 1996-2000 NBU Business Plan. These goals focus on employee actions, results and teamwork.

NBU GOALS (MICP)	PLANT/DEPARTMENT GOALS (MICP)
Stabilize plant operating performance	Specific business plan goal
Improve cost management	Improve cost management
Improve human performance	Improve human performance
Improve safety	Improve safety

VERVIEW

goals. These goals are identified in the 1996 NBU Business Plan with a ($). They are the same goals used to determine Management Incentive Plan awards for NBU company officers. 60% of your total award will be based on achieving these goals.

Plant/Department Component - The third component is based on the achievement of specific NBU department goals. Goals have been developed at the direct report to SVP and CNO levels. This represents 40% of your total award. Details will be provided by your department head.

PSEG

THE 1996 COMPENSATION PROGRAM

A number of changes have been made to our previous compensation program.

Job Evaluation - During 1995, a job evaluation process was implemented throughout PSE&G that focused on the external competitive value of jobs. This is called "market pricing." NBU will be implementing "market pricing" this year. As this occurs, some job values will increase, some will decrease and many will remain the same. You should be aware that it is Company policy that if a job value decreases as a result of market pricing, the affected associate's pay will not change.

1996 Merit Budgets - Another action that we are taking is to reduce our 1996 merit increase budget for associates who will become incentive plan participants for the first time. This is necessary to shift our compensation opportunity to be more market competitive and to focus on results achieved.

Common Performance Appraisal and Salary Increase Date - All MAST associate salary increase dates will be adjusted to the first pay period beginning in April of each year. This change is being implemented across PSE&G. NBU associates will receive this increase in May plus any retroactive amounts.

YOUR 1996 TOTAL COMPENSATION OPPORTUNITY

As indicated in this summary, your potential total compensation opportunity is equal to or greater than it was in the past. Incentives will be awarded ONLY when specific goals are met. Award amounts will be based on the award percentage and job values. **The amount of the total incentive award will be reduced by fines we receive from the NRC.** Your actual total compensation will be based on your individual performance and the performance of Public Service Enterprise Group, NBU and your department.

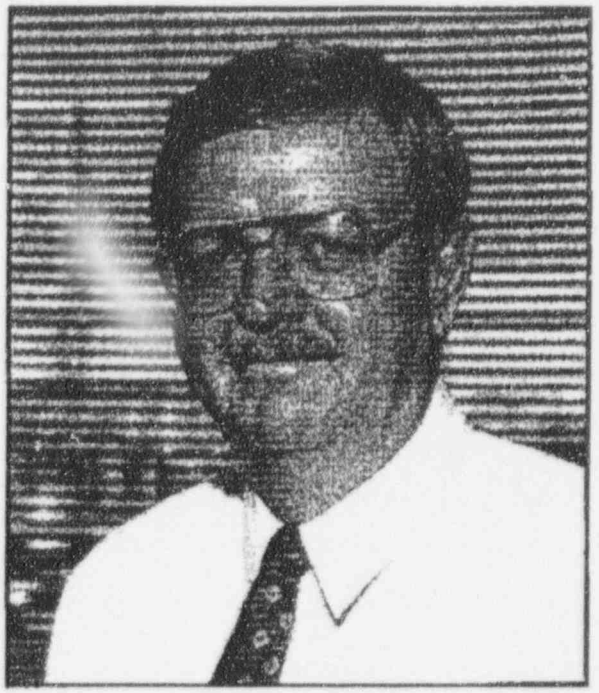
	Average Merit Increase	+ Incentive Opportunity	= Total Opportunity
Grades 1 - 8	2.0%	1.0% — 3.0%	3.0% — 5.0%
Grades 9 - 13	2.0%	2.0% — 6.0%	4.0% — 8.0%
Grades 14 - 17	2.0%	3.5% — 10.5%	5.5% — 12.5%
Grades 18 - above	4.0%	5.0% — 15.0%	9.0% — 19.0%

PSE&G

Nuclear Business Unit

Leon R. Eliason

Chief Nuclear Officer & President---Nuclear Business Unit



Leon R. Eliason was named chief nuclear officer and president of the Nuclear Business Unit in October 1994. He is responsible for all operational and support activities for the two-unit Salem Generating Station and Hope Creek Generating Station. As CNO and president, Eliason reports to Public Service Enterprise Group CEO E. James Ferland.

Eliason came to PSE&G's Nuclear Business Unit after serving as president—generation for Northern States Power (NSP) in Minnesota, where he oversaw the operation of fossil and nuclear power generating plants and related activities. He previously served at NSP as vice president—nuclear generation, general manager—nuclear plants, Monticello plant manager and as a radiation protection engineer. He has been involved in the nuclear industry for more than 25 years.

Eliason holds a bachelor of science degree in mechanical engineering from the South Dakota School of Mines and Technology, and is a graduate of the University of Minnesota Management Institute.

He is currently active in the following professional groups:

- Association of Edison Electric Illuminating Companies' Power Generation Committee
- Institute of Nuclear Power Operations' National Nuclear Accrediting Board

He was chairman of the New York Power Authority Advisory Group, and was a member of the following industry organizations:

- Washington Public Power Supply Corporate Safety Review Board
- NRG Energy, Inc.
- American Nuclear Society

Eliason also served on the Board of Directors of the St. Croix (Minn.) Catholic Consolidated Schools, and is a member of the Stillwater (Minn.) Knights of Columbus and the Metropolitan Economic Development Board.

rev 10/94

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

Culture Changes
Personnel Changes
Operations - Improvement

1. Operator Expertise
2. Training
3. Pipe Lining

Other Points
- Accountability
- ranking & rating of personnel
- improved corrective action process. better identification of problems

Salem II by the end of the year.

Salem I ~~X~~ next year

PM – Tomorrow

2nd Comm

John White SC / Ed Weinzierer

12/13 last night 5:26 alarm typer went off – no alarm on CRT

Ops found CPU logic malfunction on 1 secondary

↓ didn't pick up

1½ hr before found out computer malfunctioned

Rad SAT = Bob – Bill Ruhlau

Lenard ~~Shaw~~ Chung

entered "Alert" – Loss of annun > 15 min

CRT's select check

all annun blind – normally in but no new annun

only on alarm printer

time indicator on CRT only indication

found no valid alarms from process computer

12/14/92

Bill Hale – Martin briefed – AIT ! Go

N.I. – 1 participant / observer

Bill Ruhland

Jose Ibarra

Bob Spence

Keller

Pelletier – PM NRC

Ko

Daily call 5 – PM

Vendor on site tomorrow

EXECUTIVE SUMMARY

TABLE OF CONTENTS

DETAILS

1.1 Event Overview

Pelletier

1.2 AIT Formation

On December 14, 1992, senior NRC managers determined that an AIT was warranted to gather information on

Ruland

1.3 AIT Charter

Ruland

A charter was formulated for the AIT and transmitted from _____ _____ to _____ ___ on _____, (Enclosure ___) with copies to appropriate EDO, NRR, AEOD, and RI personnel. The AIT's objectives were to: (1) conduct a timely, thorough, and systematic inspection related to the event, (2) assess the safety significance of the event and communicate to Regional and Headquarters management the facts and safety concerns related to the event such that appropriate followup actions are taken, and (3) collect, analyze, and document factual information and evidence sufficient to determine the cause(s), conditions, and circumstances pertaining to the event.

The AIT completed its charter and was terminated on _____, _____, 1992.

2.0 Event Details

2.1 Annunciator System Description

2.2 Software (internal)

Calvert

2.3 Hardware (interface)

Ibarra

2.3.1 Interface With Other Systems

Ibarra

2.4 Initial Plant Conditions

Pelletier

2.5 General Sequence of Events

Pelletier

2.6 Next Day Past-Event Actions

Cheung

2.7 Subsequent Licensee Actions

Cheung/Pelletier

2.7.1 Justification for Continued Operation

2.7.2 Fifteen Minute Functional

2.7.3 Call to Bill Ruland December 19, 1992

3.0 Evaluation of Staff Response

3.1 Operator Response

Spence

3.2 Technical Evaluation

Ibarra

3.3 Managerial Performance

Cheung

3.3.1 Shift Supervision

Spence

3.3.2 Station Management

Spence/Cheung

3.4 Human Performance Issues

Spence

3.4.1 Teamwork and Communications

Spence/Ibarra

3.4.2 Command and Control

Spence

3.4.3 Procedures

Ibarra

3.4.4 Training

Ibarra

3.4.4.1 Classroom Training

Operations - Spence
Technical Staff - Ibarra

3.4.4.2 Simulator Scenario

Spence

3.4.5 Human Performance Investigation

Spence Delete DCRDR detailed CD

3.4.6 Man-Machine Interface

Spence

4.0 Overhead Annunciator System Failures

Calvert/Ibarra

4.1 Modification Review

Calvert/Ibarra

4.1.1 Design

Calvert/Ibarra/Cheung

4.1.2 Installation

Calvert/Ibarra/Cheung

4.1.3 Testing

Ibarra/Cheung

4.1.4 Safety Evaluations

Ibarra/Cheung

4.2 Historical Problems and Licensee Actions

Pelletier

The AIT determined the root cause of the equipment failures as follows:

4.2.1 Salem Unit 2

Pelletier

4.2.2 Salem Unit 1

Pelletier

4.2.3 Hope Creek

Pelletier

4.3 Failure During Event

Calvert/Ibarra

4.4 Cause(s)

Calvert/Ibarra

4.5 Corrective Actions

4.5.1 Texas Plan

Calvert

4.5.2 Troubleshooting

Cheung

5.0 Overhead Annunciator System Surveillance Testing (I&C)

Ibarra/Calvert

5.1 Routine

5.2 Preventive Maintenance

5.3 Informal Surveillance

6.0 Event Classification and Reporting

Gordon/Spence/Ruland

7.0 Safety Significance

Spence/Ibarra

Everybody provides a paragraph on safety significance

8.0 Overall Conclusions

Ruland

8.1 Cause of Equipment Failures

Calvert/Ibarra

8.2 Staff Response

8.2.1 Operation

Spence

8.2.2 Technical

Calvert/Ibarra

8.2.3 Emergency Preparedness

Spence/Gordon

8.2.4 Management

Ruland

9.0 Additional Information

Pelletier

9.1 Use at Other Plants

Pelletier

LIST OF ATTACHMENTS

Attachment No.	Title
1	Persons Contacted Ruland/Cheung/Spence/Ibarra/Calvert/Pelletier/Gordon
2	Acronyms and Initialisms Ruland/Cheung/Spence/Ibarra/Calvert/Pelletier/Gordon
3	Detailed Sequence of Events Pelletier
4	Block Diagrams Hardware/Ibarra Software/Calvert
5	
6	
7	

AB	STEP/CONDITION	OHA	OTHER INDICATIONS
AB.CA-0001	NONE		
AB.CC-0001	3.1/RCP BRG CLG WTR FLO LO	D-20,21,22,23	CCW PUMP RUN/VALVE POSITION
	3.2/LOW SRVC WTR HDR PRESS	B-13,14	CC1 BEZEL INDICATIONS
	3.48/CONT SUMP PUMP RUN	C-1	AUX ALARM PRINTER
AB.CHEM-0001	NONE		
AB.CN-0001	NONE		
AB.COND-0001	NONE		
AB.CONT-0001	NONE		
AB.CR-0001	NONE		
AB.CR-0002	NONE		
AB.CR-0003	NONE		
AB.CW-0001	NONE		
AB.FUEL-0001	NONE		
AB.FUEL-0002	NONE		
AB.GRID-0001	NONE		

AB	STEP/CONDITION	OHA	OTHER INDICATIONS
AB.LOOP-0001	3.2/4KV BUS VERIFICATION	J-17,18,19	LOCAL INDICATION ON BKRS CC3 MIMIC BUS/BEZELS
	3.7/SW AVAILABLE; HDR PRESS LO	B-13,14	CC1 BEZEL INDICATIONS
	3.15 & 3.20 13KV FAULT	K-3,4,11,12,19 K-20	LOCAL BKR INDICATIONS CC3 BEZEL INDICATIONS
	500KV BKR FAILURE	K-14,22,30,38	"
	SPT PROTECTION	H-8,16	"
	4KV BKR FAILURE	J-25,26,27,33 J-34,35,41,42 J-43	"
AB.LOOP-0002	3.1/4KV BUS VERIFICATION	J-17,18,19	LOCAL INDICATION ON BKRS CC3 MIMIC BUS/BEZELS
	3.11/13KV FAULT	K-3,4,11,12,19 ,20	CC3 BEZEL INDICATIONS
	500KV BKR FAILURE	K-14,22,30,38	"
	SPT PROTECTION	H-8,16	"
	4KV BKR FAILURE	J-25,26,27,33 ,34,35,41,42 ,43	"
AB.NIS-0001	3.3/PR FAILURE	E-7,15,23,31 ,39,47,38,46	MONITOR NI RACKS/CC2 BEZELS
	3.4/SR FAILURE	E-5,13	MONITOR NI RACKS/CC2 BEZELS
	3.5/IR FAILURE	E-6,14,22,30	MONITOR NI RACKS/CC2 BEZELS
	3.16B/SR TRIP BYPASS	E-29	MONITOR NI RACKS
	3.16D/SR HI FLUX @ SD	E-21	NO OTHER INDICATION

AB	STEP/CONDITION	OHA	OTHER INDICATIONS
AB.PZR-0001	NONE		
AB.RAD-0001	NONE		
AB.RC-0001	NONE		
AB.RC-0002	NONE		
AB.RC-0004	NONE		
AB.RCP-0001	3.1/RCP CCW LO FLOW 3.14/STOP RCP IF OIL LVL LO	D-20,21,22,23 D-12,13,14,15	CCW/VALVE INDICATION ~~NO OTHER INDICATIONS~~ P-250 INDICATIONS Bearing TEMP
AB.RHR-0001	3.33/RCS LEAKAGE	C-26,34 D-28,30	LOCAL AT RHR SUMPS RVLIS
AB.RHR-0002	3.31/RCS LEAKAGE	C-26,34 D-28,30	LOCAL AT RHR SUMPS RVLIS
AB.ROD-0001	3.5/URGENT FAILURE CLR	E-40	CC2 URGENT FAILURE ALARM
	3.9,19,34/RODS MISALIGNED >12 STEPS	E-24	CC2 IRPI
AB.ROD-0002	3.14/POS CONF ROD DROP	E-48	ROD BOTTOM LIGHT/AFD/QPTR T_{AVE}-T_{REF} DEV/RX POWER
AB.ROD-0003	NONE		

AB	STEP/CONDITION	OHA	OTHER INDICATIONS
AB.ROD-0004	NONE		
AB.SG-0001	3.23/2R40 IN ALARM	G-36 A-5	NO ALT INDICATION RMS/R40 INDICATION
AB.STM-0001	3.19/STM LEAK IN CONT.	C-2,30,38	CC1 INDICATIONS/AUX PRINTER
AB.SW-0001	3.2/LEAK IN SW BAY 3.4/LEAK IN TURB BLDG	B-29,30 G-43 B-48	CC1(SW HDR PRESS)/AUX PRINTER LOCAL DETECTION
AB.SW-0002	3.16/ MONITOR PARAMETERS ON P-250 3.18/ TAC ALARMS	P-250 H-44 G-24	LOCAL LOCAL
AB.SW-0003	NONE		
AB.TL-0001	NONE		
AB.TRB-0001	3.2/ TURB BRG OIL LO	F-8	CC3 BEZEL IND/ALARMS
AB.ZZ-0001	NONE		
AB.ZZ-0002	NONE		
AB.4KV-0001	3.16/SW PRESS LO 3.18/CCW FLOW LO	B-13,14,15 D-21,22,23,24	CC1 BEZEL/LOCAL INDICATION
AB.4KV-0002	3.6C/ATTCH 5 TURB TRENDS	3.17,18(SEE 4KV-0001)	G-24 LOCAL TAC TSI

LOCAL TAC
TEMPS
TSI PANEL

AB	STEP/CONDITION	OHA	OTHER INDICATIONS
4K1-0002	3.5 3.6 (SEE AB 4K1-0001)		

& NEO

SUPPLEMENTARY REQUIREMENTS FOR LOSS OF OHA'S

A) CONTROL ROOM: BOARD OPERATOR - NORMAL COMPLIMENT, CONTROL OF CONSOLE, ASSISTED BY EXTRA NCO.
DESK OPERATOR - NORMAL COMPLIMENT, INITIATE AND OBSERVE TURBINE TREND, NOTE ALL AUX TW ALARMS AND P-250 ALARMS.
NCO - EXTRA BOARD OBSERVER FOR CHANGING PARAMETERS AND ALARMS, ASSISTS BOARD OPERATOR.
NEO - DEDICATED TO OBSERVING RP4 PANEL, REPORTS ALL CHANGES IN LAMP STATUS TO BOARD NCO.
NEO - BACK PANEL AND RACK ROOM OBSERVER. ROVE AND REPORT ALL INDICATION CHANGES, SPECIFICALLY ON THE FOLLOWING PANELS: RMS, RCP VIBRATION FLANGE AND SHAFT, CW SCREEN INDICATION, RP6, MIMS, NI'S, SSPS, AND AMSAC.

B) SECONDARY: DUTY OPERATOR - ROVE SECONDARY
NEO - ASSIST DUTY OPERATOR, ROVE AND MONITOR THE FOLLOWING SPECIFIC AREAS: MPT'S, APT'S, GEN EXCITATION PANELS, STATOR/SEAL OIL ALARM PANEL, SGFP ALARM PANELS, TAC TEMP/LEVEL, GEN LIQUID DETECTORS.

C) SWITCHYARD: NEO - MONITOR TRANSFORMERS AND LOCAL BREAKER ALARMS PANELS.

D) CIRC WATER: DUTY OPERATOR - CONTINUOUS ROVE.

E) SERVICE WATER: NEO - MONITOR BAYS, SCREENS, AND CONTROL ROOMS.

more Ops around
no addition ST, Maint

EDG -

SFP 1/shift

No RCP flow - bot temp

EDGs not checked normally 2/shift

4kV - 230V TURB AUX TRFMR BUS - NT SECT

Rev 1

VERIFICATION OF OHA'S

1. EXTRA PERSONNEL WILL BE STATIONED AT THE FOLLOWING AREAS TO PROVIDE VERIFICATION OF CORRECT OVERHEAD ANNUNCIATOR OPERATION:

   CONTROL ROOM: 1 EXTRA NCO EACH CONTROL ROOM
   SECONDARY: 1 EXTRA OPERATOR EACH SECONDARY
   SERVICE WATER: 1 EXTRA WATCHSTANDER

2. NORMAL SHIFT COMPLIMENT, IN THE PERFORMANCE OF THEIR NORMAL DUTIES, SHALL BE EXTRA AWARE OF ENSURING ANY OBSERVED ALARM IN THE FIELD IS COMMUNICATED TO THE CONTROL ROOM SO THAT THEY CAN ENSURE ANY APPROPRIATE OHA HAS FUNCTIONED CORRECTLY. CONTROL ROOM OPERATORS SHALL BE EXTRA AWARE THAT ANY CONSOLE ALARMS HAS THE CORRESPONDING OHA FUNCTION CORRECTLY.

3. IF A LOSS OF THE OHA SYSTEM OCCURS AND THE DURATION IS LESS THAN 15 MINUTES, A ONE HOUR REPORT WILL BE MADE PER ECG SECTION 10D.

MONITORING REQUIREMENTS: CONTROL ROOM

1. THE PURPOSE OF THIS POSITION IS TO CONTINUOUSLY MONITOR THE CONTROL ROOM BACK PANELS AND RACK AREAS TO PROVIDE VERIFICATION OF PROPER OPERATION OF EACH UNITS OVERHEAD ANNUNCIATOR SYSTEM.

2. CONSTANT SURVEILLANCE OF THIS AREA IS REQUIRED. THIS POSITION WILL BE CONTINUOUSLY MANNED. LEAVING THIS AREA REQUIRES A RELIEF WHO WILL ASSUME ALL RESPONSIBILITIES OF THIS POSITION. THE SNSS OR NSS SHALL BE INFORMED OF WHO IS MANNING THIS POSITION AT ALL TIMES.

3. ANY ALARMS OR ABNORMAL CONDITIONS SHALL BE REPORTED TO THE BOARD OPERATOR AS SOON AS THE CONDITION IS OBSERVED. THIS WILL ALLOW THE BOARD OPERATOR TO VERIFY THAT THE OHA SYSTEM IS RESPONDING AS REQUIRED.

4. RELIEF TO THE NEXT SHIFT WILL BE ON STATION, THIS POSITION SHALL REMAIN ON STATION AT ALL TIMES.

5. THE FOLLOWING INDICATIONS SHALL BE CONTINUALLY MONITORED:

AUX TYPEWRITER
P-250 TYPEWRITER
RMS COMPUTER
RCP VIBRATION
RP4
FIRE PROTECTION
CW SCREENS
RP6
MIMS
NI'S
SSPS
AMSAC

6. THE FOLLOWING ADDITIONAL ACTIONS WILL BE TAKEN:

A) VERIFY BETA OHA CRT IS UPDATING THE CORRECT TIME
B) OPEN RX PROT. CABINET DOOR AND VERIFY OHA COMES IN.
C) PERFORM A FUNCTIONAL TEST OF THE BETA SYSTEM BY DEPRESSING THE FUNCT. TEST PUSHBUTTON AND THEN THE ENTER BUTTON. A SATISFACTORY TEST WILL RESPOND WITH "FUNCTIONAL TEST COMPLETE".
D) PERFORM AN ALARM SUMMARY TEST BY DEPRESSING THE ALARM SUMMARY PUSHBUTTON AND THEN THE ENTER BUTTON. A SAT TEST IS VERIFICATION THAT THE ALARMS AGREE WITH THE CRT POINTS AND "PORT STATUS, SCANNER STATUS COMPLETE" PRINTS OUT.
E) VERIFY THE PRIMARY RED LED'S ARE LIT ABOVE THE OHA COMPUTER.

MONITORING REQUIREMENTS: SECONDARY PLANT

1. THE PURPOSE OF THIS POSITION IS TO MONITOR SPECIFIC SECONDARY ALARM STATIONS TO PROVIDE VERIFICATION OF PROPER OPERATION OF EACH UNITS OVERHEAD ANNUNCIATOR SYSTEM.

2. CONSTANT SURVEILLANCE OF THIS AREA IS REQUIRED. THIS POSITION WILL BE CONTINUOUSLY MANNED. LEAVING THIS AREA REQUIRES A RELIEF WHO WILL ASSUME ALL RESPONSIBILITIES OF THIS POSITION. THE SNSS OR NSS SHALL BE INFORMED OF WHO IS MANNING THIS POSITION AT ALL TIMES.

3. ANY ALARMS OR ABNORMAL CONDITION ON ANY OF THE MONITORED PANELS SHALL BE REPORTED TO THE CONTROL ROOM AS SOON AS THE CONDITION IS OBSERVED. THIS WILL ALLOW THE CONTROL ROOM TO VERIFY THAT THE OHA ALARMS AND CLEARS AS REQUIRED.

4. ONCE EACH SHIFT CONTACT THE CONTROL ROOM AND INITIATE AN ALARM FROM EACH UNITS GENERATOR LEADS PANEL AND UNIT 2'S ISOPHASE PANEL, ENSURE THAT THIS ALARM IS RECEIVED AND THEN CLEARED LOCALLY AND IN THE CONTROL ROOM.

5. REMAIN IN COMMUNICATION WITH THE CONTROL ROOM VIE THE PAGE AND TELEPHONE AND LISTEN FOR PAGE ANNOUNCEMENTS FROM THE CONTROL ROOM.

6. RELIEF TO THE NEXT SHIFT WILL BE ON STATION, THIS POSITION SHALL REMAIN ON STATION AT ALL TIMES.

7. THE FOLLOWING ALARM PANELS WILL BE CONTINUALLY MONITORED:

TSI PANEL
ISOPHASE PANEL (U2 ONLY)
STATOR WATER/SEAL OIL PANEL
GENERATOR LEADS ANNUNCIATOR
GLAND SEAL PANEL
SGFP PANELS

MONITORING REQUIREMENTS: SERVICE WATER

1. THE PURPOSE OF THIS POSITION IS TO CONTINUOUSLY MONITOR THE SERVICE WATER STRUCTURE FOR ANY SIGNS OF FLOODING OR ABNORMAL EQUIPMENT OPERATION. THIS POSITION IS BEING ESTABLISHED TO PROVIDE A VERIFICATION OF PROPER OPERATION OF EACH UNITS OVERHEAD ANNUNCIATOR SYSTEM.

2. CONSTANT SURVEILLANCE OF THE SERVICE WATER STRUCTURE IS REQUIRED. THIS POSITION WILL BE CONTINUOUSLY MANNED. LEAVING THIS AREA REQUIRES A RELIEF WHO WILL ASSUME ALL RESPONSIBILITIES OF THIS POSITION. THE SNSS OR NSS SHALL REMAIN INFORMED OF WHO IS MANNING THIS POSITION AT ALL TIMES.

3. ANY ABNORMAL INDICATION SHALL BE REPORTED TO THE CONTROL ROOM IMMEDIATELY.

4. EACH SERVICE WATER BAY, EACH CONTROL ROOM AND THE SERVICE WATER SCREEN AREA SHALL BE MONITORED EACH HOUR. THE SERVICE WATER BAYS SHALL BE MONITORED BY A COMPLETE TOUR OF THE AREA INCLUDING THE OBSERVATION OF THE WATER LEVEL IN EACH SUMP.

5. REMAIN IN COMMUNICATION WITH THE CONTROL ROOM VIA THE PAGE AND TELEPHONE AND LISTEN FOR PAGE ANNOUNCEMENTS FROM THE CONTROL ROOM.

6. RELIEF TO THE NEXT SHIFT WILL BE ON STATION, THIS POSITION SHALL REMAIN ON STATION AT ALL TIMES.

SUPPLEMENTARY REQUIREMENTS FOR LOSS OF OHA'S

A) CONTROL ROOM:
- BOARD OPERATOR - NORMAL COMPLIMENT, CONTROL OF CONSOLE, ASSISTED BY EXTRA NCO.
- DESK OPERATOR - NORMAL COMPLIMENT, INITIATE AND OBSERVE TURBINE TREND, NOTE ALL AUX TW ALARMS AND P-250 ALARMS.
- NCO - EXTRA BOARD OBSERVER FOR CHANGING PARAMETERS AND ALARMS, ASSISTS BOARD OPERATOR.
- NEO - DEDICATED TO OBSERVING RP4 PANEL, REPORTS ALL CHANGES IN LAMP STATUS TO BOARD NCO.
- NEO - BACK PANEL AND RACK ROOM OBSERVER. ROVE AND REPORT ALL INDICATION CHANGES, SPECIFICALLY ON THE FOLLOWING PANELS: RMS, RCP VIBRATION FLANGE AND SHAFT, CW SCREEN INDICATION, RP6, MIMS, NI'S, SSPS, AND AMSAC.

B) SECONDARY.
- DUTY OPERATOR - ROVE SECONDARY
- NEO - ASSIST DUTY OPERATOR, ROVE AND MONITOR THE FOLLOWING SPECIFIC AREAS: MPT'S, APT'S, GEN EXCITATION PANELS, STATOR/SEAL OIL ALARM PANEL, SGFP ALARM PANELS, TAC TEMP/LEVEL, GEN LIQUID DETECTORS.

C) SWITCHYARD:
- NEO - MONITOR TRANSFORMERS AND LOCAL BREAKER ALARMS PANELS.

D) CIRC WATER:
- DUTY OPERATOR - CONTINUOUS ROVE.

E) SERVICE WATER:
- NEO - MONITOR BAYS, SCREENS, AND CONTROL ROOMS.

F) AUX BUILDING:
- NEO - SPENT FUEL PIT LEVEL AND TEMP, DIESEL GENERATORS.

The **RWST Low Level OHA** on **Unit 1** is the only audible alarm indication that the RWST is at **15.24 ft.** If we should lose the OHA System the Operators in the Control Room must recognize the importance of monitoring RWST console level indication. If an EOP entry is needed all Operators are required to recall at 15.24 ft we must entry **EOP-LOCA 3.** Unit 2 has console alarm indication which will provide an audible indication.

The following 2 OHA have no other Control Room Indications.

OHA-C 35 SFP Low Level EOP- LOPA 1

Operator Actions: Operator monitoring Spent Fuel Pit Level and Temperature should notify Control Room Immediately of any level change. Control Room operators should be sensitive to auxiliary typewriter alarm associated with the SFP Sump Level and increases in WHUT's.

OHA-A 46 F.P. Wtr. flow Cont. EOP- FRCE 2

We should verify if Hope Creeks Fire Pump is running and notify Site Protection to check our Fire Pump for status.

MONITORING REQUIREMENTS: CONTROL ROOM

1. THE PURPOSE OF THIS POSITION IS TO CONTINUOUSLY MONITOR THE CONTROL ROOM BACK PANELS AND RACK AREAS TO PROVIDE VERIFICATION OF PROPER OPERATION OF EACH UNITS OVERHEAD ANNUNCIATOR SYSTEM.

2. CONSTANT SURVEILLANCE OF THIS AREA IS REQUIRED. THIS POSITION WILL BE CONTINUOUSLY MANNED. LEAVING THIS AREA REQUIRES A RELIEF WHO WILL ASSUME ALL RESPONSIBILITIES OF THIS POSITION. THE SNSS OR NSS SHALL BE INFORMED OF WHO IS MANNING THIS POSITION AT ALL TIMES.

3. ANY ALARMS OR ABNORMAL CONDITIONS SHALL BE REPORTED TO THE BOARD OPERATOR AS SOON AS THE CONDITION IS OBSERVED. THIS WILL ALLOW THE BOARD OPERATOR TO VERIFY THAT THE OHA SYSTEM IS RESPONDING AS REQUIRED.

4. RELIEF TO THE NEXT SHIFT WILL BE ON STATION, THIS POSITION SHALL REMAIN ON STATION AT ALL TIMES.

5. THE FOLLOWING INDICATIONS SHALL BE CONTINUALLY MONITORED:

AUX TYPEWRITER
P-250 TYPEWRITER
RMS COMPUTER
RCP VIBRATION
RP4
FIRE PROTECTION
CW SCREENS
RP6
MIMS
NI'S
SSPS
AMSAC

6. THE FOLLOWING ADDITIONAL ACTIONS WILL BE TAKEN:

A) VERIFY BETA OHA CRT IS UPDATING THE CORRECT TIME
B) OPEN RX PROT. CABINET DOOR AND VERIFY OHA COMES IN.
C) PERFORM A FUNCTIONAL TEST OF THE BETA SYSTEM BY DEPRESSING THE FUNCT. TEST PUSHBUTTON AND THEN THE ENTER BUTTON. A SATISFACTORY TEST WILL RESPOND WITH "FUNCTIONAL TEST COMPLETE".
D) PERFORM AN ALARM SUMMARY TEST BY DEPRESSING THE ALARM SUMMARY PUSHBUTTON AND THEN THE ENTER BUTTON. A SAT TEST IS VERIFICATION THAT THE ALARMS AGREE WITH THE CRT POINTS AND "PORT STATUS, SCANNER STATUS COMPLETE" PRINTS OUT.
E) VERIFY THE PRIMARY RED LED'S ARE LIT ABOVE THE OHA COMPUTER.

Unit 2 OHA Windows with no alternate indication in the CR or CR Equipment Room

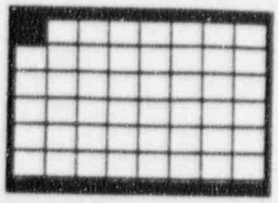
Window	Nomenclature
OHA A:	
A-15	Fire Pump 1/2 Run
A-21	213 Panel Door Open
A-23	Fire Pump 1/2 Trouble
A-31	Fire Prot Wtr Press Lo
A-32	Fire Prot 28VDC Loss
A-39	Fire Prot CO_2 Press Hi or Lo
OHA B:	
B-1	Fresh Water System Trouble
B-3, 11, 19, 27	2A, B, C, D Vtl Instr Bus Invert Fail
B-7, 15	Turb Area SW Hdr Press Hi, Lo
B-8, 16	21-23, 24-26 SW Strainer Trouble
B-9	Htg Wtr Stm Sys Trouble
B-17	Aux Boiler Trouble
B-21, 22	21-23, 24-26 SW Screenwash Trouble
B-23, 24	21-23, 24-26 SW Pmp Brg Wtr Press Lo
B-29, 30	21-23, 24-26 SW Pmp Sump Area Level Hi
B-31, 32	21-23, 24-26 SW Pmp Room Temp Hi or Lo
B-37, 38	21, 22 CC Hx SW Flow Hi

Window	Nomenclature
OHA-C:	
C-1	Gas Analyzer Trouble
C-9	104 Panel Trouble
C-17	21-23 CVCS HUT Level Hi — RP2
C-18	Rx Sump Overflow
C-19	SFP Temp Hi
C-25	BA Evap Trouble
C-26, 34	21, 22 RHR Sump Overflow
C-27, 35	SFP Level Hi, Lo
C-33	RWST/PWST Overflow
C-46	Personnel Access Door Open
OHA-D:	
D-4 thru 7	21 thru 24 RCP Brg Oil Lvl Hi
D-12 thru 15	21 thru 24 RCP Brg Oil Lvl Lo
D-20 thru 23	21 thru 24 RCP Brg Clg Wtr Flo Lo (backed up by Seal Water Out Temps on the P-250)
? D-36	RCP Vib Hi — RP3
D-37	RCP Brg Clg Hdr Temp Hi
D-38	Therm Barrier Temp Hi
D-39	RCP Seal Wtr Byp Flo Lo

Window	Nomenclature
OFA-E:	
E-1, 9	21, 22 Seal Wtr Inj Fltr ~~d/p Hi~~ Local Reading
E-17	~~BA Batch Tk Lvl Lo~~
E-25	~~BA Batch Tk Temp Hi or~~ Lo
E-32	Rod Drive Pwr Sply Gnd Fault
OHA-G:	
G-8	TAC Expansion Tank Level Hi or Lo
G-16	TAC Exp Tk N_2 Press Hi
G-24	TAC Temp Hi or Lo
G-32	TAC Pmp Disch Press Hi or Lo
G-23	CW Scrnwash Strainer d/p Hi
G-31	CW Scrnwash Press Lo
G-39	1 & 3 CW Brg Lube Presss Lo
G-47	NaClO Trouble
G-29	~~Prime~~ Tank Vac ~~Lo~~
G-37	Prime Tank Level ~~Hi~~
G-35	TSI Trouble - Secondary Chemistry
G-36	Cond Pol Byp Alert
G-44	Cond Pol Trouble
G-43	~~Turb Area Lvl Hi Pmp Start~~
G-45	~~Cond Ret Tank Level Hi or Lo~~

Window	Nomenclature
OHA-H:	
H-1	Gen Liq Dets Lvl Hi
H-2	Seal Oil Skid Mtrs Trbl
H-9	Seal Oil Stor Tk Lvl Hi or Lo
H-10	Main Seal Oil Pmp Emer Bkr Clsd
H-26	Emer Seal Oil Press Lo
H-34	Seal Oil d/p Lo
H-15, 23, 31	MPT Phase 1, 2, 3 Trouble (no lockout actuations)
H-16	APT Trouble (no lockout actuations)
H-28	Gen/Exc Fld Gnd
H-29	VReg Mismatch
H-44	Gen Stat Coil in/out Temp Hi
H-45	Gen Stat Clg Sys Trbl
H-46	Gen Stat Wtr Flow/Press Lo
H-48	Transient Data Recorder Trouble
OHA-J:	
J-28	FO Day Tank Level Trouble
OHA-K:	
K-11, 19	21, 22 Sta Xfmr Trouble (no lockout actuations)
K-21	2 Sta Xfmr Trouble (no lockout actuations)
K-22	500KV Breaker Trouble (no Breaker trips)

ALARM



1

ANNUN
PWR
FAIL

DEVICES: N/A

SETPOINT: N/A

1.0 CAUSE(S):

1.1 Either of the following:

A. Loss of one or both of the Annunciator AC power supplies

B. Annunciator Internal Power Supply Failure

2.0 AUTOMATIC ACTION:

NOTE

- **The RCW Computer, Printer, Operator panel, and Annunciator CRT receive power from 21 MAC only. The rest of the System either has a redundant circuit or automatically transfers to a redundant power source.**
- **A SER transfer from the Main to the Aux Controller, or back again, (such as would occur on a loss or regaining of the 21MAC power supply), will cause all currently alarming OHA Windows to undergo a FLASHING/OFF/REFLASH evolution. This is normal and will not affect operability.**

2.1 None

3.0 OPERATOR ACTIONS:

3.1 **IF AT ANY TIME** it is determined that any annunciators or annunciator peripherals have lost power, **THEN** MAINTAIN Plant Conditions stable as directed by the SNSS/NSS.

(Continued)

Page 1 of 3 A-1

3.2 NOTIFY the SNSS/NSS to REFER to the ECG.

3.3 IF the Annunciator CRT is deenergized, THEN perform either or both of the following to restore Computer Point monitoring:

A. RESTORE the CRT by unplugging the CRT (inside 2CC1), and plugging it into any available 120VAC outlet.

OR

B. RESTORE the printer as follows:

1. PLACE the Printer Switch in Position B (BACKUP).

2. UNPLUG the printer from its normal location and plug the printer into any available 120VAC outlet.

3. MONITOR the printer (instead of the CRT), to determine CRT points when any alarm is received.

3.4 DETERMINE the source of the alarm as follows:

CRT Point	Description
1	Annunciator Main AC Power Feed Failure
9	Annunciator Internal Power Failure

3.5 IF CRT Point 1 is in alarm, THEN SEND an operator to check the status of 21 MAC, Bkr # 17 (Normal Source) and 24 MAC, Bkr # 1 (Backup Source).

A. IF either of the above sources are lost and cannot be restored, THEN INITIATE a Work Order Request to correct the cause of the alarm.

B. IF 21MAC is lost and cannot be restored, THEN PLACE the "Black Box" switch, (in Cab 72-2), in the SER-B position.

3.6 IF CRT Point 9 is in alarm, THEN perform the following at Cabinet 116-2 in the Rack Room to attempt to determine the cause and the affected equipment:

A. CHECK the status of the four +5VDC, the two +12VDC, and the two -12VDC red lights for the SER Logic Power Supply cards at the front panel.

(Continued)

B. IF any of the Logic Power Supply lights are off, THEN VERIFY the PS toggle switch for the affected card, (in the back of the cabinet) is ON.

CAUTION

Loss of any two of the Logic Power Supplies listed below will result in inoperable Windows.

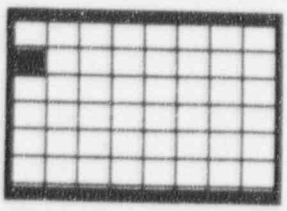
- **If the +5VDC power supplies for both PS1 and PS2 are deenergized, Scanners 9 through 11 will be inoperable.**
- **If the +5VDC power supplies for both PS7 and PS8 are deenergized, Scanners 1 through 8 will be inoperable.**
- **If both +12VDC power supplies are deenergized, all OHA Windows will be inoperable. (The historical Buffer will still process data)**
- **If both -12VDC power supplies are deenergized, all OHA Windows will be inoperable. (The historical Buffer will still process data)**

C. IF any of the conditions of the caution above exist, THEN perform the following steps:

1. DETERMINE which OHA Windows are affected IAW Attachment 3 of S2.OP-SO.ANN-0001(Q), Annunciator System Operations.
2. NOTIFY the SNSS/NSS to refer to the ECG.
3. MAINTAIN Plant Conditions stable.

3.7 INITIATE a Work Order Request to determine and correct the cause of the power failure alarm. (The Power Distribution list in Attachment 4 of S2.OP-SO.ANN-0001(Q), Annunciator System Operations may aid I&C)

References: Dwg. 232976

ALARM	9	
	ANNUN LOGIC FAIL	

DEVICES: N/A

SETPOINT: N/A

1.0 CAUSE(S):

1.1 Logic Failure in one or more of the ten Logic A Cards or the ten redundant Logic Cards of the Annunciator System

2.0 AUTOMATIC ACTION:

2.1	Logic A Card(s) only:	Initiates a SER transfer which causes a FLASHING/OFF/REFLASH of all alarming OHA Windows (Does not affect System operability)
2.2	Logic B Card(s) only:	None
2.3	Logic A **and** B Cards:	Loss of multiple Overhead Alarms (exactly which depends on the specific Cards lost)

3.0 OPERATOR ACTIONS:

3.1 **IF** Window A-1 is alarming, **THEN GO TO** to that alarm.

3.2 PERFORM an OHA Test (at the Consoles) on all five groups to confirm all Windows operable.

A. **IF** any Windows fail to light, **THEN** perform the following:

1. MAINTAIN Plant Conditions stable.

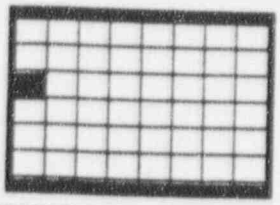
2. NOTIFY the SNSS/NSS to refer to the ECG.

3.3 NOTIFY Maintenance to determine and correct the cause of the alarm.

Page 1 of 1 A-9

References: Dwg. 232976

ALARM



17

ANNUN
GND
DET

DEVICES: N/A

SETPOINT: N/A

1.0 CAUSE(S):

1.1 A ground on wiring from either of the following:

A. Any of the DC field inputs to the Overhead Annunciator System

B. Any of the inputs to the Console Group Annunciator System (Bezel alarms)

2.0 AUTOMATIC ACTION:

NOTE

One ground detector monitors the DC Field Inputs to the Overhead Annunciator alarms and another detector monitors the inputs to the Console Group Alarm System (Bezel alarms). A single ground on either system should not have any effect on the affected alarms. If a second ground occurs on the same system, it may cause erronious alarms, prevent a valid input from causing an alarm, or even blow a fuse and remove power from the field inputs. (The Field inputs to the Bezel alarms come from Alarm Relay contacts in the Bailey Cabinets)

2.1 None

(Continued)

3.0 OPERATOR ACTIONS:

3.1 DETERMINE the source of the alarm as follows:

CRT Point	Description
17	Annunciator Ground Detector - Overhead Annun System
412	Annunciator Ground Detector - Console Group Alarm Sys

3.2 **IF AT ANY TIME**, any annunciators or annunciator auxiliary circuits are inoperable, **THEN** perform the following:

A. MAINTAIN Plant Conditions stable.

B. NOTIFY the SNSS/NSS to refer to the ECG.

3.3 **IF** the source of the alarm is CRT Point 17, **THEN GO TO** S2.OP-SO.ANN-0002(Q), Overhead Annunciators Ground Detection.

3.4 **IF** the source of the alarm is CRT Point 412, **THEN** INITIATE a Work Order Request to determine and correct the cause of the alarm.

References: Dwg. 232977

A

	ANNUN	TEST TROUBLE ALARMS				MISC	FIRE PROTECTION		
1	1 ANNUN PWR FAIL	2 SPRT COMPR CH I UNSAFE	3 SPRT COMPR CH I ON TEST	4 RX PROT CH I ON TEST	5 BIS CH ON TEST	6 IMS TRBL	7 FIRE PROT FIRE	8 FIRE PROT CO_2/HALON DISCH	8
9	9 ANNUN LOGIC FAIL	10 SPRT COMPR CH II UNSAFE	11 SPRT COMPR CH II ON TEST	12 RX PROT CH II ON TEST	13 RPI ON TEST	14 ELEC PEN AREA AMB TEMP HI	15 FIRE PMP 1/2 RUN	16 FIRE PROT WTRFLO IN CNTMT	16
17	17 ANNUN GND DET	18 SPRT COMPR CH III UNSAFE	19 SPRT COMPR CH III ON TEST	20 RX PROT CH III ON TEST	21 [illegible] DOOR OPEN	22 [illegible] AREA AMB TEMP HI	23 FIRE PMP 1/2 TRBL	24 FIRE PROT WTRFLO IN 1/2 AUX BLDG	24
25	25 AUX ALM SYS PWR FAILURE	26 SPRT COMPR CH IV UNSAFE	27 SPRT COMPR CH IV ON TEST	28 RX PROT CH IV ON TEST	29 SEC 2A SC TEST OR TRBL	30	31 FIRE PROT WTR PRESS LO	32 FIRE PROT 28VDC LOSS	32
33	33 AUX ALM SYS GND DET	34 SSPS TRN A TRBL	35 SSPS TRN A ON TEST	36 AMSAC BYPASSED	37	38 MMS IMPACT	39 FIRE PROT CO_2 PRESS HI OR LO	40	40
41	41 AUX ALM SYS PRINTER	42 SSPS TRN B TRBL	43 SSPS TRN B ON TEST	44 AMSAC TEST OR TRBL	45	46 [illegible] FAIL	47 FIRE PROT TRBL	48	48

A/53

B

	MISC WTR SYS	VITAL DC	VITAL INVRT	MISC ELEC	SERVICE WATER				
1	1 ● FRESH WTR SYS TRBL	2 2A 125VDC CNTRL BUS VOLT LO	3 2A VTL INSTR BUS INVRT FAIL	4 ● 250VDC BUS VOLT HI OR LO	5 21 SW HDR PRESS HI	6 22 SW HDR PRESS HI	7 TURB AREA SW HDR PRESS HI	8 21-23 SW STRAIN TRBL	8
9	9 HTG WTR STM SYS TRBL	10 2B 125VDC CNTRL BUS VOLT LO	11 2B VTL INSTR BUS INVRT FAIL	12 VTL FREEZE PROT TRBL	13 21 SW HDR PRESS LO	14 22 SW HDR PRESS LO	15 TURB AREA SW HDR PRESS LO	16 24-26 SW STRAIN TRBL	16
17	17 AUX BOIL TRBL	18 2C 125VDC CNTRL BUS VOLT LO	19 2C VTL INSTR BUS INVRT FAIL	20 CMPTR INVRT TRBL	21 21-23 SW SCRNWSH TRBL	22 24-26 SW SCRNWSH TRBL	23 21-23 SW PMP BRG WTR PRESS LO	24 24-26 SW PMP BRG WTR PRESS LO	24
25	25	26 2A 28VDC CNTRL BUS VOLT LO	27 2D VTL INSTR BUS INVRT FAIL	28	29 21-23 SW PMP SUMP AREA LVL HI	30 24-26 SW PMP SUMP AREA LVL HI	31 21-23 SW PMP ROOM TEMP HI OR LO	32 24-26 SW PMP ROOM TEMP HI OR LO	32
33	33	34 2B 28VDC CNTRL BUS VOLT LO	35 21 ESS CONTROLS INVRT FAIL	36	37 21 CC HX SW FLO HI	38 22 CC HX SW FLO HI	39	40	40
41	41	42	43 22 ESS CONTROLS INVRT FAIL	44	45	46	47 SW BYP VLV OPER	48 SW VLV RM FLOODED	48

C

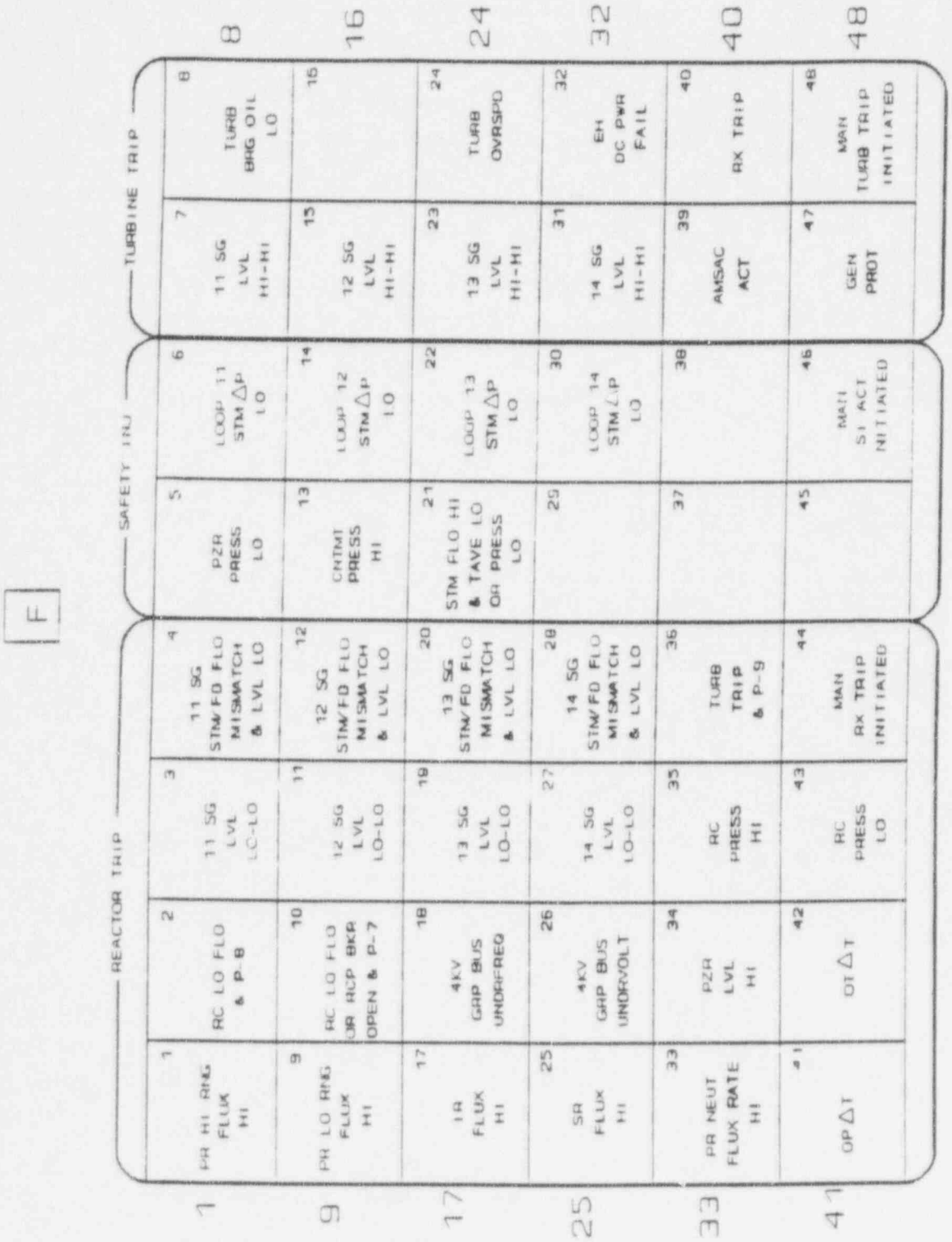
	WASTE DISPOSAL	LEAK DETECT	AUX COOLING	CONTAINMENT					
1	1 GAS ANLT TRBL	2 CNTMT SUMP PMP START	3 21 CC HX IN TEMP HI	4 21 CFCU AIRFLO TRBL	5 21 CFCU WTRFLO TRBL	6 CNTMT PRESS HI-HI	7 21 H_2 RECOMB TRBL	8 Ø A CNTMT ISOL ACT	8
9	9 104 PNL TRBL	10 CNTMT SUMP OVRFLO	11 22 CC HX IN TEMP HI	12 22 CFCU AIRFLO TRBL	13 22 CFCU WTRFLO TRBL	14 CNTMT PRESS HI	15 22 H_2 RECOMB TRBL	16 Ø B CNTMT ISOL ACT	16
17	17 21-23 CVCS HUT LVL HI •	18 RX SUMP OVRFLO	19 SFP TEMP HI	20 23 CFCU AIRFLO TRBL	21 23 CFCU WTRFLO TRBL	22 CNTMT SPRY ACT	23 CNTMT H_2 LVL HI	24 CBV ISOL SIGNAL PRESENT	24
25	25 BA EVAP TRBL	26 21 RHR SUMP OVRFLO	27 SFP LVL HI	28 24 CFCU AIRFLO TRBL	29 24 CFCU WTRFLO TRBL	30 CFCU LK DET HI-HI •	31	32	32
33	33 RWST/PWST OVRFLO	34 22 RHR SUMP OVRFLO	35 SFP LVL LO	36 25 CFCU AIRFLO TRBL	37 25 CFCU WTRFLO TRBL	38 CFCU LK DET HI •	39	40	40
41	41	42	43	44	45	46 PERSONNEL ACCESS DOOR OPEN	47	48	48

D

	ECCS			REACTOR COOLANT SYSTEM					
1	1	2 21/22SJ54 OFF NORM POS	3 2SJ30 OFF NORM POS	4 21 RCP BRG OIL ● LVL HI	5 22 RCP BRG OIL ● LVL HI	6 23 RCP BRG OIL ● LVL HI	7 24 RCP BRG OIL ● LVL HI	8 PR PRESS HI	8
9	9	10 23/24SJ54 OFF NORM POS	11 2SJ69 OFF NORM POS	12 21 RCP BRG OIL ● LVL LO	13 22 RCP BRG OIL ● LVL LO	14 23 RCP BRG OIL ● LVL LO	15 24 RCP BRG OIL ● LVL LO	16 PR PRESS LO	16
17	17	18 21/22SJ40 OFF NORM POS	19 2SJ135 OFF NORM POS	20 21 RCP BRG CLG WTR FLO LO	21 22 RCP BRG CLG WTR FLO LO	22 23 RCP BRG CLG WTR FLO LO	23 24 RCP BRG CLG WTR FLO LO	24 R- TRIP & TAVE LO	24
25	25	26 21/22SJ44 OFF NORM POS	27 2SJ4 OFF NORM POS	28 21 RCP BRK OPEN ● FLO LO	29 22 RCP BKR OPEN/ ● FLO LO	30 23 RCP BKR OPEN/ ● FLO LO	31 24 RCP BKR OPEN/ ● FLO LO	32 TAVE LO	32
33	33	34 2RH26 OFF NORM POS	35 2SJ67/68 OFF NORM POS	36 RCP VIB HI	37 RCP BRG CLG HDR TEMP HI	38 THERM BARR TEMP HI	39 RCP SEAL WTR BYP FLO LO	40 SUBCLG CH A MARGIN LO	40
41	41 BIT DISCH PRESS HI	42 21/22SJ43 OFF NORM POS	43 SPRAY ADD TK LVL LO	44 2RH1 NOT CLSD & RC PRESS HI	2RH2 NOT CLSD & RC PRESS HI	46 RX HEAD VENT VLV NOT CLSD	47 RHR MIDLOOP ● SYS TRBL	48 SUBCLG CH B MARGIN LO	48

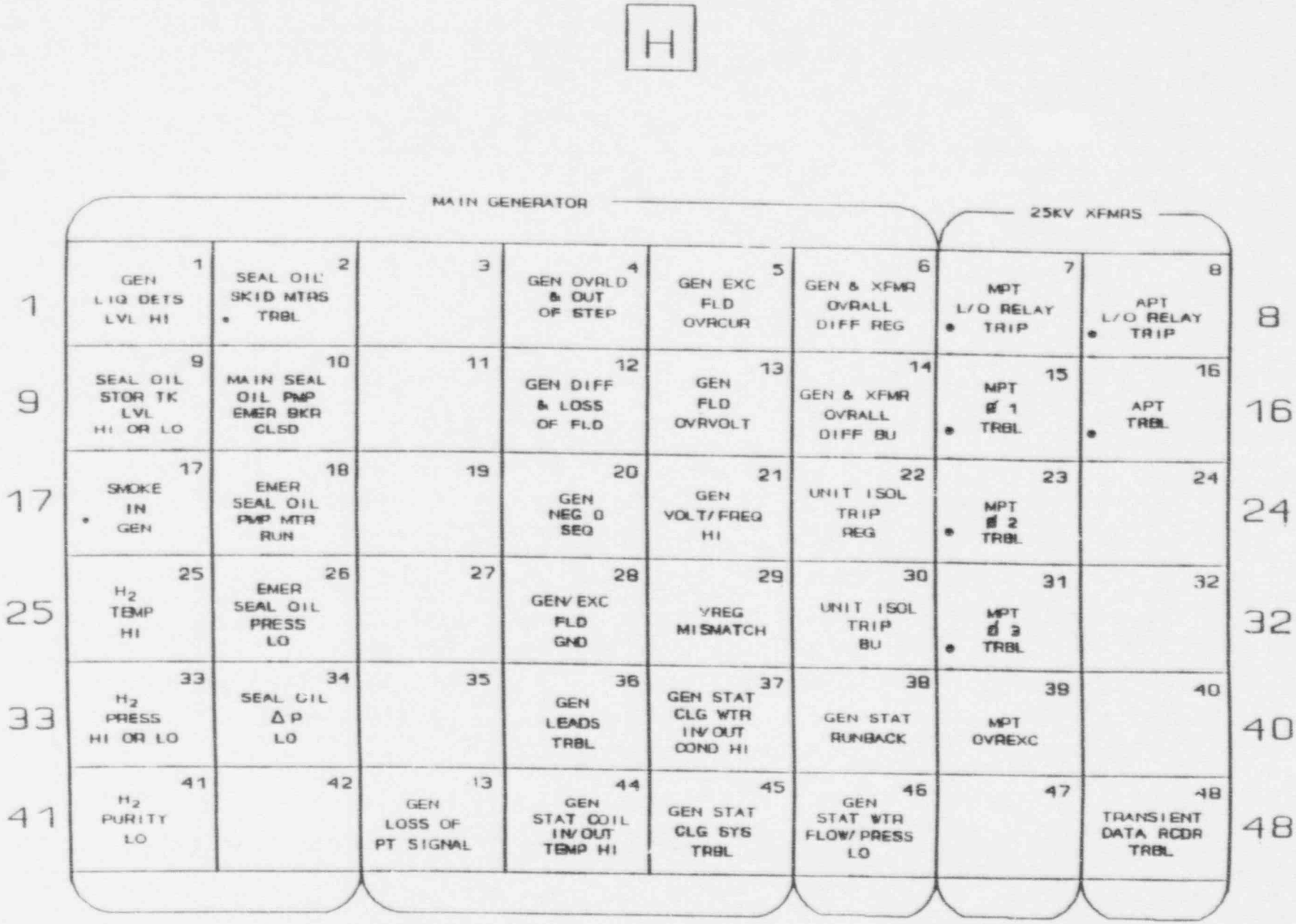
E

	CVCS	PRESSURIZER			RHS			ROD CONTROL	
1	1 21 SEAL WTR INJ FLTR ΔP HI	2 POPS CH I ARM	3 POPS CH II ARM	4 PZR LVL HI	5 SR DET VOLT TRBL	6 IR DET VOLT LOSS	7 PR DET VOLT LOSS	8 ROD INSERT LMT • LO	8
9	9 22 SEAL WTR INJ FLTR ΔP HI	10 PUPS CH I DISARM/ 2PR6 CLSD	11 POPS CH II DISARM/ 2PR7 CLSD	12 PZR PRESS • LO	13 SR HI FLUX AT S/D	14 IR TEMP COMPEN VOLT LOSS	15 PR HI RNG FLUX HI	16 ROD INSERT LMT • LO-LO	16
17	17 BA BATCH TK LVL LO	18 POPS CH I AUX AIR PRESS LO	19 POPS CH II AUX AIR PRESS LO	20 PZR HTR ON LVL HI	21 SR HI FLUX AT S/D BLOCKED	22 IR TEMP COMPEN VOLT LOSS	23 PR LO RNG FLUX HI	24 ROD DEV OR SEQ	24
25	25 BA BATCH TK TEMP HI OR LO	26 2PR1 NOT FULL CLSD	27 2PR2 NOT FULL CLSD	28 PZR HTR ON PRESS LO	29 SR & IR TRIP • BYP	30 IR HI FLUX ROD WDRWL STOP	31 PR OVRPWR ROD STOP	32 ROD DRIVE PWR SPLY GND FAULT	32
33	33	34	35	36 PZR HTR OFF LVL LO	37 CH C SDM DECRNG	38 UPPER SECT DEV ABV 50% PWR	39 PR CH DEV	40 ROD BANK URGENT FAIL	40
41	41 LTDWN HX OUT TEMP HI	42	43	44 PZR SPTY VLV 2PR3-2PR5 NOT CLSD	45 CH D SDM DECRNG	46 LOWER SECT DEV ABV 50% PWR	47 PR NEUT FLUX RATE HI	48 ROD BOTTOM	48


F
REACTOR TRIP
SAFETY INJ
TURBINE TRIP
1 PR HI RNG FLUX HI
2 RC LO FLO & P-8
3 11 SG LVL LO-LO
4 11 SG STM/FD FLO MISMATCH & LVL LO
5 PZR PRESS LO
6 LOOP 11 STM ΔP LO
7 11 SG LVL HI-HI
8 TURB BRG OIL LO
9 PR LO RNG FLUX HI
10 RC LO FLO OR RCP BKR OPEN & P-7
11 12 SG LVL LO-LO
12 12 SG STM/FD FLO MISMATCH & LVL LO
13 CNTMT PRESS HI
14 LOOP 12 STM ΔP LO
15 12 SG LVL HI-HI
16
17 IR FLUX HI
18 4KV GRP BUS UNDERFREQ
19 13 SG LVL LO-LO
20 13 SG STM/FD FLO MISMATCH & LVL LO
21 STM FLO HI & TAVE LO OR PRESS LO
22 LOOP 13 STM ΔP LO
23 13 SG LVL HI-HI
24 TURB OVRSPD
25 SR FLUX HI
26 4KV GRP BUS UNDERVOLT
27 14 SG LVL LO-LO
28 14 SG STM/FD FLO MISMATCH & LVL LO
29
30 LOOP 14 STM ΔP LO
31 14 SG LVL HI-HI
32 EH DC PWR FAIL
33 PR NEUT FLUX RATE HI
34 PZR LVL HI
35 RC PRESS HI
36 TURB TRIP & P-9
37
38
39 AMSAC ACT
40 RX TRIP
41 OP ΔT
42 OT ΔT
43 RC PRESS LO
44 MAN RX TRIP INITIATED
45
46 MAN SI ACT INITIATED
47 GEN PROT
48 MAN TURB TRIP INITIATED

G

	MAIN STEAM		TURBINE & CNDSR			FDWTR	CIRC - WATER	TURBINE AUX CLG	
1	1 LOOP 11 STM LN ΔP LO	2 11 SG STM LN ISOL	3 EH PROT SYS TRBL	4 TURB AUTO STOP OIL PRESS LO	5 CNDSR VAC LO	6 11 AFW DEF RUNOUT PROT	7 11-13 A CW SCRN/SH TRBL	8 TAC EXP TK LVL • HI OR LO	8
9	9 LOOP 12 STM LN ΔP LO	10 12 SG STM LN ISOL	11 EH SPEED OR LOAD CH FAIL	12 TURB STM STOP VLV • CLSD	13 CNDSR VAC LO-LO	14 12 AFW DEF RUNOUT PROT	15 11-13 B CW SCRN/SH TRBL	16 TAC EXP TK N_2 PRESS HI	16
17	17 LOOP 13 STM LN ΔP LO	18 13 SG STM LN ISOL	19 EH RUNBACK OPER	20 SEAL & CYL HTG STM SYS TRBL	21 TURB THRUST BRG FAIL	22	23 CW SCRN/SH STRAINER Δ P HI	24 TAC TEMP • HI OR LO	24
25	25 LOOP 14 STM LN ΔP LO	26 14 SG STM LN ISOL	27 LO PRESS EXH HOOD TEMP HI	28	29 PRIME TK VAC LO	30 11 SGFP VIB HI-ALERT	31 CW SCRN/SH PRESS LO	32 TAC PMP DISCH PRESS • HI OR LO	32
33	33 STM LN PRESS • LO	34	35 TSI TRBL	36 COND POL BYP ALERT	37 PRIME TK VTR LVL HI	38 12 SGFP VIB HI-ALERT	39 1 AND 3 CW BRG LUBE PRESS LO	40	40
41	41	42	43 TURB AREA LVL HI PMP START	44 COND POL • TRBL	45 COND RTN TK LVL HI OR LO	46 FW HTR IN VLV TRIP & LVL HI	47 NaClO TRBL	48	48


H
MAIN GENERATOR
25KV XFMRS
1
GEN LIQ DETS LVL HI
2
SEAL OIL SKID MTRS • TRBL
3
4
GEN OVRLD & OUT OF STEP
5
GEN EXC FLD OVRCUR
6
GEN & XFMR OVRALL DIFF REG
7
MPT L/O RELAY • TRIP
8
APT L/O RELAY • TRIP
9
SEAL OIL STOR TK LVL HI OR LO
10
MAIN SEAL OIL PMP EMER BKR CLSD
11
12
GEN DIFF & LOSS OF FLD
13
GEN FLD OVRVOLT
14
GEN & XFMR OVRALL DIFF BU
15
MPT Ø 1 • TRBL
16
APT • TRBL
17
SMOKE IN • GEN
18
EMER SEAL OIL PMP MTR RUN
19
20
GEN NEG Ø SEQ
21
GEN VOLT/FREQ HI
22
UNIT ISOL TRIP REG
23
MPT Ø 2 • TRBL
24
25
H_2 TEMP HI
26
EMER SEAL OIL PRESS LO
27
28
GEN/EXC FLD GND
29
VREG MISMATCH
30
UNIT ISOL TRIP BU
31
MPT Ø 3 • TRBL
32
33
H_2 PRESS HI OR LO
34
SEAL OIL ΔP LO
35
36
GEN LEADS TRBL
37
GEN STAT CLG WTR IN/OUT COND HI
38
GEN STAT RUNBACK
39
MPT OVREXC
40
41
H_2 PURITY LO
42
43
GEN LOSS OF PT SIGNAL
44
GEN STAT COIL IN/OUT TEMP HI
45
GEN STAT CLG SYS TRBL
46
GEN STAT WTR FLOW/PRESS LO
47
48
TRANSIENT DATA RCDR TRBL
1
8
9
16
17
24
25
32
33
40
41
48

J

	VITAL AC			DIESEL GENS	GROUP BUSES				
1	1 2A 4KV VTL BUS DIFF PROT	2 2B 4KV VTL BUS DIFF PROT	3 2C 4KV VTL BUS DIFF PROT	4 2A DG URGENT TRBL	5 2H 4KV GRP BUS DIFF/OVRLD	6 2E 4KV GRP BUS DIFF/OVRLD	7 2F 4KV GRP BUS DIFF/OVRLD	8 2G 4KV GRP BUS DIFF/OVRLD	8
9	9 2A 4KV VTL BUS OVRLD	10 2B 4KV VTL BUS OVRLD	11 2C 4KV VTL BUS OVRLD	12 2B DG URGENT TRBL	13 21HSD BKR FAIL	14 21ESD BKR FAIL	15 22FSD BKR FAIL	16 22GSD BKR FAIL	16
17	17 2A 4KV VTL BUS UNDRVOLT	18 2B 4KV VTL BUS UNDRVOLT	19 2C 4KV VTL BUS UNDRVOLT	20 2C DG URGENT TRBL	21 2AHGD BKR FAIL	22 2AEGD BKR FAIL	23 2BFGD BKR FAIL	24 2BGGD BKR FAIL	24
25	25 21ASD BKR FAIL	26 21BSD BKR FAIL	27 21CSD BKR FAIL	28 FO DAY TK LVL TRBL	29	30	31	32	32
33	33 22ASD BKR FAIL	34 22BSD BKR FAIL	35 22CSD BKR FAIL	36	37 4KV GRP BUS UNDRFREQ	38 4KV GRP BUS UNDRVOLT	39 4KV GRP BUS XFER FAIL	40	40
41	41 2ADD BKR FAIL	42 2BDD BKR FAIL	43 2CDD BKR FAIL	44	45 TURB BLDG 480-208V BUS HOT SPOT	46 AUX BLDG 480-230V BUS HOT SPOT	47	48	48

	13KV				500KV			
1	1	2	3 13/4KV STA XFMR L/O RELAY • TRIP	4 13KV L/O RELAY • TRIP	5 500/13KV STA XFMR L/O RELAY • TRIP	6 500KV RING L/O RELAY • TRIP	7 500KV LN 31X REG/BU PILOT WIRE • XFER TRIP	8
9	9	10	11 21 STA XFMR • TRBL	12 13KV GND • FAULT	13	14 500KV BKR • FAIL	15 500KV LN 31X REG/BU PDT FAIL	16
17	17	18	19 22 STA XFMR • TRBL	20 13KV BKR • FAIL	21 2 STA XFMR • TRBL	22 500KV BKR • TRBL	23	24
25	25	26	27	28	29	30	31	32
33	33	34	35	36 12 STA XFMR L/O RELAY • TRIP	37	38 BS 1-9/9-10 500KV BRK FLASHOVER	39	40
41	41	42	43	44	45	46	47	48

To: Cal Vondra
General Manager - Salem Station

From: Michael Morroni
Manager - Salem Technical Department

Subject: Overhead Annunciator

Our investigation into the lockup of the overhead annunciator on December 13, 1992 and the discrete annunciator window problems known to date is at a point that the compensatory actions identified in the justification for continued operation should be re-evaluated.

It has been determined that the Unit #2 overhead annunciator operates in accordance with its present design based on the troubleshooting which was performed via TS2.IC-ZZ.OHA-0001(Q) REV. 0 on December 18, 1992. The SER A main controller card which was removed during the troubleshooting procedure was extensively tested at Hathaway/Beta and found not to be at fault for the lockup condition. It has been concluded that the overhead annunciator locked up due to manipulations on the keyboard of the RCW workstation when the "Black Box" switch was in the RCW A position. This event was duplicated at the factory of Hathaway/Beta. This conclusion is also concurred with by our engineering department. (See attachment "A")

All of the discrete overhead annunciator window malfunctions have been investigated. The details of the troubleshooting, the causes identified and engineering judgements are included in attachment "B". Although specific root causes have not been identified for each malfunction, it can be concluded that each of these malfunctions was a discrete window problem. These problems were readily identified by the operators who initiated corrective actions. Since these failures did not represent a complete annunciator failure, we conclude that the failures are random and overall annunciator functionality was maintained.

The overhead annunciator system has been evaluated for viruses by our Methods and Systems Department and found to be free of viruses. (See Attachment "C")

The keyboard for the engineering workstation has been disconnected from the RCW workstation and RED TAGGED for the Nuclear Shift Supervisor with instructions from the Technical Department to prevent people other than the System Engineer from operating this keyboard.

Based upon the above information it is concluded that the overhead annunciator system is fully functional and the immediate corrective action to disconnect the PC keyboard will prevent the lockup failure from reccuring. It is also

concluded that the compensatory actions put in place by the Justification for Continued Operation are no longer required. Therefore we recommend that the compensatory actions be terminated.

Michael Marconi

c.c. Vince Polizzi - Operations Manager

PSE&G

ATTACHMENT A

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

Nuclear Department

ELE-92-0693

TO: D. W. Lyons
Technical Liaison to NRC Augmented
Inspection Team Regarding Overhead
Annunciator Lockup

FROM: M. L. Bursztein
Nuclear Electrical Engineering Manager

SUBJECT: ENGINEERING POSITION REGARDING SYSTEM LOCKUP

DATE: December 21, 1992

Attached you will find two letters regarding the Nuclear Electrical Engineering Department's position on the Overhead Annunciator System. The first letter addresses the functional of the system and includes two support letters from the vendor, Hathaway/Beta. The second letter discusses our preliminary review of the system's ability to indicate and annunciate failures.

I concur with the position presented in the attached letters and expect that they will be of assistance to you in the development of your engineering evaluation regarding Overhead Annunciator Lockup issue. If you have questions regarding the information provided herein, please do not hesitate to call myself at extension 1875 or Jack Carey at extension 5080.

JDC:srj

C General Manager - Engineering & Plant Betterment
Technical Manager - Salem

ATTACHMENT A

TO: Moises L. Bursztein
Manager Nuclear Electrical Engineering

FROM: John D. Carey, Jr. John D. Carey Jr.
Salem I&C Supervisor

SUBJECT: Functional Status of the Salem Overhead Annunciator System

DATE: Dec. 21, 1992

In a letter to myself from Mr. Michael van der Helm of Hathway/Beta (ref attached), Mr van der Helm informs me that through testing at the factory in Carrollton, Tx., Beta has been able to repeat the lockup failure of our OHA through commands from the RCW while using "Procom Plus". Beta personnel have been on site for a week troubleshooting the system with station technical department and have investigated what they believe are all reasonable potential software and hardware problems. As a result of their efforts to date, they have not identified any hardware or equipment problems with the system. It is now their opinion, based upon the repeatability of the forced lockup at the factory, and the statements from the station operations personnel regarding their interfaces with the system just prior to the event, that the transmission of the "Control L's" from the computer was the cause of the system lockup.

Mr. Rossi McDade, Systems Engineering Manager for Beta, has stated to me that this is not a random failure (ref attached letter from BETA dated 12-21-92), but rather an inadvertently induced failure via keyboard operation that was corrected by resetting the SERs. It is his opinion regarding the lockup concern that the system is fully functional at this time, and the system's normal functional tests adequately demonstrate the performance on an hourly basis. He further believes that the system is not subject to additional lockups as long as the computer access is appropriately controlled.

Based on the above explanation, the expert opinion of Mr. van der Helm and Mr. McDade, and on the information I am aware of regarding the design of the system and the events surrounding the occurrence, I believe that the OHA system is fully functional, regarding the potential for a lockup situation, and I do not see a need to continue the compensatory actions implemented by the station. I do recommend that strict controls be placed upon the use of the computer to interface with the OHA. In addition, I recommend that a system functional test be performed after any use of the computer keyboard and that test should be followed up with the initiation of an actual valid input such as opening a cabinet door in the relay room. With these precautions, I am confident that the operator will have adequately verified the

ATTACHMENT "A"

operation of the system. I have discussed these recommendations with Mr. McDade of BETA and Dave Herrell of the computer group and they concur with these recommendations.

ATTACHMENT "A"

TO: J. D. Carey
Salem I&C Supervisor

FROM: R. L. McDade
Engineering Manager Hathaway/Beta

SUBJECT: FUNCTIONAL STATUS OF THE HATHAWAY/BETA SER 4100R AND 1500 DISTRIBUTED ANNUNCIATOR

DATE: December 21, 1992

The question posed to Hathaway/Beta concerning the operational status of the above referenced equipment is as follows:

Hathaway/Beta has demonstrated at the factory that the site anomaly experienced by PSE&G with the sequential events recorder and associated distributed lamp boxes is not a random failure, nor an intermittent failure. We feel it is an inadvertent problem introduced by human intervention that caused the Main Controller to go into a command mode and wait for additional instructions. While waiting for the additional instructions, the Main Controller was not outputting to the annunciator port.

Hathaway/Beta has explained the theory of operation to PSE&G personnel and can say at this point, we fully declare the events recording system is fully operable and will perform its published capabilities and its design function. The statement is made conditionally upon the belief that strict and adequate controls will be implemented governing the access and use of the computer interface to the events recording system and related hardware.

Hathaway/Beta is also prepared to suggest and help determine ways to best utilize the additional hardware and software diagnostic capabilities designed into the 4100R Events Recording System and 1500 Distributed Annunciator System.

RLM:ngh

Kassie L. McDade

ATTACHMENT "A"

Hathaway

To: Jack Carey PSE&G

CC: Dave Lyons PSE&G

From: Michael van der Helm Hathaway/Beta

Date: 12/20/92

On 12/19/92, Hathaway/Beta demonstrated that sending two Control L's in a row from a PC attached to the system (in PSE&G's configuration) to the RCWA port of the SER/ Annunciator system could cause an anomaly similar to the one of 12/13/92 at Salem. Hathaway/Beta was asked whether the annunciator system could be affected by the transmission of Control characters to other ports of the SER system, whether Control characters other than Control L would affect the RCWA (or RCWB) port, and whether Control characters sent to other PC accessible ports would affect the SER/Annunciator system.

The first question can be answered by reviewing the system wiring diagram (PSE&G drawing no. 232977 B 4051-4). The anomaly is believed to have been caused by the transmission of Control L's from the computer while it was running the program "Procomm Plus". The system wiring diagram will show that the configuration port of the overhead annunciators, and four ports of the SER can be addressed by the computer. All other ports of the SER/Annunciator system can not be addressed by the computer.

The first of the five mentioned above, the annunciator configuration port (Config.), will only accept two Control characters which it considers valid: Control M (which is Carriage Return) and Control C (which is used to abort from a configuration list). All other Control characters are ignored by the configuration port of the overhead annunciators.

The four SER ports which can be addressed by the computer are SERA, SERB, RCWA, and RCWB. The ports, SERA and SERB, are on different controllers but are the same type of port, and therefore will be discussed together. The same is true of the ports RCWA and RCWB, and so they will also be discussed together. The typical response of the SER to

BETA PRODUCTS DIVISION
3029 McKenzie Drive #150, P.O. Box 115004, Carrollton, TX 75011-5004 • Telephone: 214 241-2200 • Fax: 214 241-6752

ATTACHMENT "A"

Control characters sent from Procomm Plus to the SERA/SERB port is as follows:

```
>.
PUBLIC SERVICE ELECTRIC & GAS UNIT 2 ANNUNCIATOR SYSTEM
Station number 2
19 Dec 1992 17:08:25 m
Improper entry

 complete
>
```

The greater than sign (>) is the prompt the SER issues to indicate that a command may be entered. The period (.) following the first prompt is the typical response of the SER when it receives a Control character. The remainder of the text in the above example (Station Name, Station Number, Time, Improper Entry, and Complete) is typical for any input to this port, although if a valid entry has been entered, the "Improper Entry" would be replaced by the command name and the "Complete" message would have the command name in front of it.

The SERA/SERB port is intended to accept and respond to four Control characters: H (Backspace), M (Carriage Return), Q (X-On), and S (X-Off). Of the remaining Control characters, thirteen will generate a response like the one shown above, seven will generate a variation of the response shown above, and two will not generate any response. In all cases where an illegal Control character is sent to the SERA/SERB port, it does not cause the SER to lock up.

When Procomm Plus is connected to the RCWA/RCWB port, and two of the following Control characters: J, K, L, O, P, T, and V, are sent, the SER is affected. Characters J, P, and V will cause the SER to stop displaying events on the Color CRT and Annunciator Windows for two to five minutes, but in all cases the SER times out and resets itself. The result of this reset is that the overhead annunciator windows will be cleared and then re-alarmed, and the Color CRT screen will be re-painted with all the current alarms. The end result of sending two Control K's to the RCWA port is the same as above, but in this case the control of the overhead annunciator windows and the Color CRT will be transferred to the backup main controller (Main Controller "B"). Then two to five minutes later, when the SER times out, the control of the overhead annunciators and color CRT will be re-assumed by the primary main controller (Main Controller "A"). Sending two Control K's to the port RCWB, will cause the Main Controller "B" to stop displaying events (provided it is connected to a display device) for two to five minutes, before it times out and resets.

Transmitting two Control O's to the RCWA/RCWB port will cause that Main Controller (A or B) to reset. A reset of Main Controller "A" will result in the clearing and then re-alarming of the overhead annunciators, and a re-painting of the Color CRT screen. The transmission of two Control T's to the RCWA/RCWB port will clear the 6000 point historical buffer resident on the Main Controller (A or B).

None of the results of the above six Control characters will result in the indefinite lock up of the SER, as is the case when two Control L's are sent to the RCWA/RCWB port. When two Control L's are sent to the RCWA/RCWB port, the Main Controller will stop sending events to any display devices that are connected, and wait indefinitely for a response to data it has sent. In the case of the primary Main Controller ("A"), this will result in an anomaly like the one seen on 12/13/92. Sending two of any other Control character to the RCWA/RCWB port will not cause the SER to stop displaying events.

ATTACHMENT "B"

There were several individual problems that occurred recently on the OHA System which caused the NRC to question the overall functionality of the OHA system. It has been determined that these were discrete problems and had no affect on the overall functionality of the system.

A45 & G45 WINDOWS ILLUMINATED

Over the weekend of December 12 & 13, 1992, a spare window, A45, lit up, also, the G45 window alarmed with no printout on the computer and no indication on the Control Room CRT. These windows were cleared during the event later Sunday night. The System Engineer and the vendor's representative have reviewed all the available information from the memories of the OHA System. They have confirmed there is no SER point number assigned to the A45 window, therefore the SER can not generate an alarm to the window. The printouts do not show any signals generated from the SER's to illuminate the G45 window at the time of occurrence. Between the SER, the brains of the system, and the lampboxes are the distributor boards. The vendor's rep has stated that the illumination of a spare window without an SER signal could be a problem with noise in the system or with the distributor boards.

Troubleshooting of these windows on Sunday, December 20, 1992 and Monday, December 21, 1992, revealed a higher than desired level of noise on the cables and an increase in level whenever the light test was initiated. This level of noise, 265 millivolts, could produce spurious actuations when a noise spike occurs. Rearranging of cables within the cabinet has reduced the background noise level to approximately 236 millivolts and eliminated the level shift. Accordance to the vendor, it would be desirable to reduce the noise level further, therfore E&PB will be directed to add additional shielding or reroute of cables. The problem does not exist on Unit 1 because the cable routings are different.

Since this was a discrete problem that occurred downstream of the SER's, it is not a problem with overall functionality of the OHA system.

LAMP BOXES DID NOT SIMULTANEOUSLY LIGHT DURING TEST

On December 17, 1992, the operators reported that several lampboxes were delayed in lighting when the lamp test was initiated. Each of the lampboxes has two separate microprocessors. Each microprocessor receives its own signal when a lamp test is initiated. Usually all the lampboxes process the signals close enough together to give the operator the impression of lighting simultaneously. The System Engineer and Vendor Rep initiated twelve tests of the lamp test circuits and once observed a slight lag in lighting of the A lampbox, not to the extent described in the IR but observable. It is felt the heightened awareness of the operators toward the functionality of the OHA system caused them to notice this delay.

This is normal for the OHA system.

FAILURE OF A10 & A11 TO RESET

When restoring the containment pressure bistable, the associated windows A10 & A11, did not clear. This problem could not be duplicated during troubleshooting on Saturday, December 19, 1992. The alarm was cycled three times and cleared each time. Testing involved cycling the bistable and manually initiating a functional test simultaneously to duplicate the conditions.

When the incident occurred, the SER had received the signal that the bistable was restored and issued the command to the OHA system to clear the alarm. This command was received by the CRT in the control room and transmitted through the RCW to the printer. We have been unable to determine why the message was not received by the lampbox. The theory that the signal was disrupted because it was generated during the 500 microsecond (.0005 second) functional test can not be supported.

This is a discrete problem on the circuits for this window and does not affect the overall functionality of the OHA system. If the problem recurs, it will be investigated.

PROBLEMS WITH ACKNOWLEDGE AND SILENCE PUSHBUTTONS

Operators have recently had repeated problems with the ability to acknowledge, reset and silence alarms on Unit 2. The computer memories do not record the operation of the pushbuttons. Investigation revealed problems with three pushbuttons not a problem with the electronic portions of the OHA system. On Sunday, December 20, 1992, the operators on Unit 2 again experienced a failure to acknowledge. The System Engineer and Vendor Rep began immediate troubleshooting and identified a malfunctioning pushbutton. The problem was several loose set screws, these were tightened. On Monday, December 21, 1992, testing of all the pushbuttons on Unit 2 was conducted, this testing identified the two "kick buttons" in the center of the control console failed to make contact greater than 20% of the time. A Work Request has been issued to Maintenance to replace them.

All pushbuttons on Unit 2 were Loc-tited on Monday, December 21, 1992. All pushbuttons on Unit 1 were Loc-tited as part of the initial installation.

Since this was a physical problem with peripherals to the OHA system and not integral to it, there was no affect on the overall functionality of the system. All incoming and clearing alarms would have been received.

PSE&G ATTACHMENT "C"

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

Nuclear Department

To: David Lyons - Technical Engineer, Salem

From: David Silver - Lead Systems Analyst, Methods & Systems

Date: December 21, 1992

Subject: Overhead Enunciator Workstation Virus Scan Outcome

On Sunday morning, December 21st, I performed a Virus scan on both unit 1 & 2's Compuadd 80286 IBM compatible personal computers which control the overhead enunciator panel as requested. The following procedures were performed:

- Reboot on Workstation(s) to check CMOS and RAM validity.
- Command.com for MS-DOS 5.0 file size check.
- CHKDSK command issued to check for hard drive errors.
- Virus scan of the hard drive(s) and RAM memory for viruses with a program called SCAN/CLEAN by McAfee Associates version 8.4B89

After completing the above, I found that both machines were virus free.

If you have any questions, please feel free to call me at 339-1056.

David Silver

David Silver

cc: R. Gehret
C.W. Bogert

PROCOMM PLUS Ready!

PROCOMM PLUS COMMAND MENU

COMMUNICATIONS

BEFORE	AFTER	SET UP
Dialing Directory Alt-D	Hang Up ..... Alt-H	Setup Facility .. Alt-S
	Exit ..... Alt-X	Line/Port Setup . Alt-P
		Translate Table . Alt-W
		Key Mapping Alt-F8

DURING		OTHER FUNCTIONS
Script Files ... Alt-F5	Send Files ..... PgUp	File Directory .. Alt-F
Meta Keys ..... Alt-M	Receive Files .... PgDn	Change Directory Alt-F7
Redisplay Alt-F6	Log File On/Off Alt-F1	View a File ..... Alt-V
Clear Screen .... Alt-C	Log File Pause . Alt-F2	Editor ..... Alt-A
Break Key ..... Alt-B	Screen Snapshot . Alt-G	DOS Gateway Alt-F4
Elapsed Time .... Alt-T	Printer On/Off .. Alt-L	Program Info .... Alt-I

OTHER		
Chat Mode ..... Alt-O	Record Mode ..... Alt-R	Clipboard ..... Alt-=
Host Mode ..... Alt-[	Capture Toggle ... Alt-E	Monitor Mode .. Ctrl-[
Host Forward ..... Alt-]	Printer Toggle ... Alt-P	Toggle Status .. Ctrl-]
Exit Modem ..... Alt-Z	Terminal Emulation Alt-T	Toggle Lines ... Ctrl-\
Reset Terminal .. Alt-U	Screen Pause .... Alt-Y	Pulldown Menu Key ...

Press Alt-? for On-Line Help

PROCOMM PLUS Ready!

RECORD MODE

Enter script filename: r

ALT-Z FOR HELP | ANSI 80 | FDX | 9600 N81 | LOG CLOSED | PRINT OFF | OFF-LINE