# U.S. NUCLEAR REGULATORY COMMISSION REGION I

Conference Report No. 50-388/84-34

Docket No. 50-388

License No. NPF-22

Licensee: <u>Pennsylvania Power and Light Company</u> <u>2 North Ninth Street</u> <u>Allentown, Pennsylvania 18101</u>

Facility Name: <u>Susquehanna Steam Electric Station</u>, Unit 2

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

Meeting Conducted: October 9, 1984 Prepared By: 💋 Florek, Lead Reactor Engineer

Approved by: 2

4 Setter Sense L. H. Béttenhausen, Chief Test Programs Section

Meeting Summary:

Enforcement conference at NRC Region I on October 9, 1984, to discuss the findings identified in Inspection Report 50-388/84-34 which reviewed the loss of all AC power event at the Susquehanna Unit 2 facility on July 26, 1984.

Four violations were discussed: inadequate corrective action for previously experienced problems with plant operator manipulation of DC auxiliary relay and bus control knife switches in 4.16KV ESS breaker cubicles; inadequate independent verification of adequacy of rack out activities associated with the 4.16KV ESS bus feeder breakers; inadequate procedures for establishing initial test conditions and inadequate training of plant operators in the rack out of 4.16KV ESS breakers, reset of emergency diesel generator alarms and trips, meaning of breaker indicating lights and the restoration of suppression pool temperature monitoring equipment.

The licensee presented the event description, the event review, corrective actions, management systems and improvements, and independent event evaluation.

The meeting was attended by NRC Region I, NRC Inspection and Enforcement, NRC Nuclear Reactor Regulation and Pennsylvania Power and Light management, and lasted approximately three hours.

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#### DETAILS

#### 1. Participants

#### Pennsylvania Power and Light Company (PP&L)

- J. Calhoun, Senior Vice President, Nuclear
- B. Kenyon, Vice President, Nuclear Operations H. Keiser, Superintendent of Plant
- W. Barberich, Manager, Nuclear Licensing
- T. Crimmins, Manager, Nuclear Plant Engineering
- J. Miltenberger, Manager, Nuclear Safety Assessment
- A. Male, Manager, Nuclear Design
- J. Blakeslee, Operations Supervisor
- J. Graham, Senior Compliance Engineer
- R. Paley, Technical Staff
- R. Peal, Nuclear Operations Training Supervisor

#### Nuclear Regulatory Commission

- T. Murley, Regional Administrator
- J. Allan, Deputy Regional Administrator
- J. Gutierrez, Regional Counsel
- D. Holody, Enforcement Specialist
- T. Martin, Director, Division of Engineering and Technical Programs
- R. Starostecki, Director, Division of Project and Resident Programs
- E. Greenman, Chief, Project Branch No. 1
- L. Bettenhausen, Chief, Test Programs Section
- J. Strosnider, Chief, Section 1C
- R. Jacobs, Senior Resident Inspector
- L. Plisco, Resident Inspector
- J. Chung, Lead Reactor Engineer
- D. Florek, Lead Reactor Engineer
- G. Klingler, Inspection and Enforcement
- R. Perch, Licensing Project Manager
- E. Kelly, Project Engineer

#### 2. Purpose

The enforcement was held at NRC Region I's request to discuss the four violations identified as a result of the NRC investigation of the July 26, 1984 loss of all AC power event as described in inspection report 50-388/84-34.

The four violations identified were: (1) inadequate corrective action for previously experienced problems with plant operator manipulation of DC auxiliary relay and bus control knife switches in 4.16KV ESS breaker cubicles; (2) inadequate independent verification of adequacy of rack out activities associated with the 4.16KV ESS bus feeder breakers; (3) inadequate procedures for establishing initial test conditions; and (4) inadequate training of plant operators in the rack out of 4.16KV ESS breakers, reset of emergency diesel generator alarms and trips, meaning of breaker indicating lights and the restoration of suppression pool temperature monitoring equipment.

#### Presentation and Discussion

NRC (T. Martin) opened the conference and reiterated its purpose. The licensee was also requested to discuss the status of the corrective actions taken as a result of the event.

The licensee presentation was begun by H. Keiser by providing an overview of the Susquehanna site. The licensee discussed ST-31.1 "Loss of Turbine Generator and Loss of Offsite Power" by discussing its purpose and acceptance criteria and the extensive planning and review that went into the conduct of ST-31.1. The licensee reviewed the plant electrical design, including the knife switch utilized for DC auxiliary relay and bus control logic power. The licensee presented the event description including the pretest electrical lineup and the sequence of events. Major points in the sequence of events presented were: 0105 - electrical lineup for ST-31.1 complete; 0137 - initiate ST-31.1 test; 0138 - emergency diesel generators (EDG) did not auto start; 0139 - manually started all EDGs; 0148 - recovered bus 2B; 0150 - recovered bus 2D; 0153 - recovered bus 2C; 0154 - recovered bus 2A.

H. Keiser then presented a description of administrative procedure AD-QA-415 "Post Transient Reactor Scram Evaluation" and described the post-event reviews conducted. In addition to the NRC investigation, five other event reviews were conducted including the plant scram review, nuclear safety assessment group review, INPO review, nuclear plant engineering review and a corporate management review. There were 137 individual action items identified from the event reviews; 108 are complete, 4 are closed with additional work identified and 25 are in progress.

H. Keiser described the root causes for the event: ineffective corrective action system including evaluation and implementation; procedure deficiency; and inadequate verification including the process and type of individual. These root causes allowed inadequate training, poor labelling, deficient procedures, ineffective corrective action and inadequate independent verification all to be the contributing factors in the improper operation of the DC auxiliary relay and bus control logic knife switch. The improvements made to correct the root causes were summarized and discussed in detail in later presentations. Specific management actions were taken in the operator training program, design considerations, operations enhancement program, corrective action system and station policies.

R. Peal described the operator training program. Improvement is planned for non-licensed operator training in operating practices and self evaluation. Follow-up improvements needed in technical training and principles training in communications and shift conduct following the ST-31.1 event were also identified.



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A. Male presented the assessment of Regulatory Guide 1.47 compliance and the assessment of available instrumentation following a loss of all AC power. The licensee concluded that the knife switch supplying DC auxiliary relay and bus control logic power did not fall under Regulatory Guide 1.47 criteria. However, the licensee concluded that bypass indication should be provided for monitoring test switches utilized for monthly degraded voltage scheme testing. The licensee indicated a method of solution may be to design a circuit to eliminate the requirement for the surveillance method. The NRC (T. Martin) questioned the advisability of not providing indication of the energization of the DC auxiliary relay and bus control logic circuiting due to its significance for emergency diesel generator and low pressure ECCS operation. The licensee (B. Kenyon) indicated they would further assess this area. The licensee indicated that the instrumentation available in the control room was adequate during a complete loss of AC power which is beyond the design basis. Following discussions, the licensee agreed to reassess the conclusion that the installed instrumentation was adequate, especially in the area of control rod position. reactor water level and suppression pool temperatures.

J. Blakeslee described the operations enhancement program. The licensee described the audits of the Operations Department performed by INPO, MPR Associates, IMPELL and Nuclear Safety Assessment Group, summarized the recommendations, and described the method and schedule to respond and implement the recommendations. He also described the utilization of a roster to be maintained to verify that, prior to assuming shift duties, personnel will have received the required training.

The Corrective Action System and improvements made to the system was discussed by H. Keiser. The improvements include training of evaluators, using more experienced personnel, implementing human performance evaluation system techniques, utilizing a simple occurrence report system and improving assessments of personnel-error-related occurrences. H. Keiser then described station policies on procedures, special briefings, control and verification of operating actions and station non-routine training. The policies were issued to standardize practices, define responsibilities and controls and serve as interim measures pending revision of station administrative procedures.

The Manager, Nuclear Safety Assessment Group (NSAG) (J. Miltenberger) presented the results of the independent review of the event performed under his direction. NSAG concluded that: the safety of the public was not jeopardized, the ESS bus control circuiting functioned correctly given that the circuit had been disabled, operator response was excellent, reasonable precautions had been taken to ensure success of the test, the incident was caused by personnel error with the contributing causes of poorly labeled switches and imprecise procedures, and performance of the emergency diesel generators was unsatisfactory.

H. Keiser then summarized the presentation. He indicated that the loss of all AC power was a significant event occurring during the intentional, mandated testing which defeated two of the three ESS power sources. The

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root causes of the event were inadequate corrective action system evaluation, inadequate corrective action system implementation, procedure deficiency and inadequate independent verification. Lack of training, inadequate independent verification, poor switch labelling, deficient procedures and ineffective corrective action were collective contributors to the improper knife switch operation on July 26, 1984. The licensee indicated that he has made improvements in training, independent verification practices, corrective action system, procedures, and design considerations to correct the deficiencies identified. The licensee included the presentation by indicating that Susquehanna has a fundamentally strong overall system of management controls and involvement, personnel experience and training, administrative and technical procedures, and unit design and performance. Proper preparations and precautions were taken for the test. The integrated system of management controls, personnel, procedures, and training resulted in a positive, proper and timely response to the event such that the health and safety of the public were protected. The event demonstrated where improvements can be made and these improvements have been implemented or are planned and scheduled for implementation.

#### 3. <u>Concluding Statements</u>

B. Kenyon indicated that the presentation involved far more than the corrective actions identified from the event. This was purposely done to convey that the underlying management system at Susquehanna is fundamentally strong and that the test preparations and event response was extensively pursued. The licensee acknowledged the violations and reiterated that the root cause of the event is in management systems and should not be characterized as an operator error. The corrective actions have been extensive and are implemented or are scheduled to be implemented. The licensee also indicated that some of the weaknesses identified as the root cause of the event are also demonstrated as strengths in the station personnel recovery of the event.

Dr. Murley ended the conference by indicating that PP&L would be notified with regard to the enforcement action which would result from the violations. In addition, he acknowledged the comprehensive presentation and informative dialogue which took place during the conference.



# SUSQUEHANNA STEAM ELECTRIC STATION UNIT 2

# LOSS OF OFF SITE POWER TEST (ST31.1)

# 7/26/84 - UNUSUAL EVENT

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PRESENTATION FORMAT

- **o** EVENT DESCRIPTION
- **o** EVENT REVIEW
- **o** SCRAM ACTION ITEMS/STATUS
- **o PP&L MANAGEMENT ACTIONS** 
  - OPERATOR TRAINING PROGRAM
  - DESIGN CONSIDERATIONS
  - OPERATIONS ENHANCEMENT PROGRAM
  - CORRECTIVE ACTION SYSTEM
  - STATION POLICIES
- **o** NSAG REPORT
- o SUMMARY

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# INTRODUCTION

# • GENERAL SITE INFORMATION

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#### GENERAL SITE INFORMATION SUSQUEHANNA, STEAM ELECTRIC STATION

- O TWO BWR 4 UNITS, 3293 MWT EACH
- O LICENSEE PENNSYLVANIA POWER AND LIGHT COMPANY
- o MARK II CONTAINMENT
- O UNIT 2 FULL POWER LICENSE ISSUED 6/23/84
- UNIT 2 PRESENTLY IN STARTUP. TEST PROGRAM TEST CONDITION 6
- o ADVANCED CONTROL ROOM (ACR)
- O CONTROL ROOM COMMON TO BOTH UNITS



# PURPOSE REQUIREMENTS FOR

### LOSS OF OFF SITE POWER TEST

- REGULATORY GUIDE 1.68
- **o TEST ACCEPTANCE CRITERIA**
- TEST CONDITIONS
- o STARTUP TEST PROGRAM POWER/FLOW DIAGRAM
- **o TEST DEVELOPMENT AND PREPARATION**
- **o PRETEST BRIEFINGS**

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#### REGULATORY GUIDE 1.68, INITIAL TEST PROGRAMS FOR WATER-COOLED REACTOR POWER PLANTS

TESTS SHOULD BE CONDUCTED TO VERIFY, TO THE EXTENT PRACTICABLE, THAT THESE SYSTEMS WILL OPERATE IN ACCORDANCE WITH DESIGN.

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TESTS SHOULD DEMONSTRATE THAT THE INTEGRATED SYSTEM WILL PERFORM AS DESIGNED TO A SIMULATED. . . . FULL LOSS OF OFFSITE POWER. TESTS SHOULD ALSO DEMONSTRATE THE DESIGN CAPABILITY TO TRANSFER FROM ONSITE TO OFFSITE POWER SOURCES.

DEMONSTRATE THAT THE DYNAMIC RESPONSE OF THE PLANT IS IN ACCORDANCE WITH PREDICTIONS FOR A SIMULATED CONDITION OF LOSS OF TURBINE-GENERATOR COINCIDENT WITH LOSS OF OFFSITE POWER

#### FSAR 14.2.12.2 TEST CRITERIA

.....DEMONSTRATE THAT THE REQUIRED SAFETY SYSTEMS WILL INITIATE AND FUNCTION PROPERLY WITHOUT MANUAL ASSISTANCE. THE ELECTRICAL DISTRIBUTION AND DIESEL GENERATOR SYSTEMS WILL FUNCTION PROPERLY AND THE HPCI AND/OR RCIC SYSTEMS WILL MAINTAIN WATER LEVEL IF. NECESSARY DURING A COINCIDENTAL LOSS OF THE UNIT 2 MAIN TURBINE-GENERATOR AND OFFSITE POWER TO UNIT 2.

#### UNIT 2 ST 31.1 TEST DEVELOPMENT AND PREPARATION

o BASED UPON SIMILAR, COMPREHENSIVE, SUCCESSFUL UNIT I TESTING

o REVIEWS

STARTUP GROUP PERSONNEL DISCIPLINES PLANT STAFF DISCIPLINES NUCLEAR PLANT ENGINEERING DISCIPLINES NUCLEAR REGULATORY COMMISSION TEST REVIEW COMMITTEE (TRC) PLANT OPERATIONS REVIEW COMMITTEE (PORC)

O PRESENTATIONS

TECHNICAL SECTION GROUP LEADERS OPERATIONS SUPERVISORY PERSONNEL STATION MANAGEMENT/SECTION HEADS

ADDITIONAL REVIEWS/ANALYSIS/BRIEFINGS SHIFT TEST ENGINEERS TECHNICAL STAFF OPERATIONS PERSONNEL NPE ENGINEERING ANALYSIS GROUP NPE SPECIAL TASK FORCE

#### TEST CONDITIONS

- 0 INITIAL PLANT STATUS
  - REACTOR AT APPROXIMATELY 30% POWER (1ST STAGE PRESSURE - CV/SV SCRAM)
  - UNIT 2 ELECTRICAL SYSTEM ISOLATED FROM THE UNIT 1 ELECTRICAL SYSTEM
  - COMMON ELECTRICAL LOADS SUPPLIED FROM UNIT 1

TEST METHOD

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OPEN THE TURBINE GENERATOR OUTPUT BREAKER AND SIMULTANEOUSLY OPEN THE UNIT 2 OUTPUT BREAKER FROM THE STARTUP TRANSFORMER. MAINTAIN THIS CONDITION FOR 30 MINUTES WITH THE EMERGENCY SAFEGUARD BUSSES BEING SUPPLIED AC POWER BY THE ONSITE SOURCES.

#### SSES UNIT 2

#### STARTUP TEST

#### PROGRAM



#### PRETEST BRIEFING

o ALL INVOLVED PERSONNEL

O DETAILED DISCUSSION OF TEST SEQUENCE

o TEST PREDICTIONS/PLANT RESPONSE

• REVIEW OF POTENTIALLY APPLICABLE EMERGENCY OPERATING PROCEDURES

o "WHAT IF" SESSION - (WHAT COULD GO WRONG?)

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# PLANT ELECTRICAL DESIGN

- NORMAL PLANT LINEUP
- KNIFE SWITCH AUXILIARY RELAYING AND CONTROL DESIGN
- KNIFE SWITCH PRE-EVENT LABELLING

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SSES UNITS 1&2 KEY ONE-LINE DIAGRAM



SCRAM NO. 2-84-04

NORMAL LINEUP

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#### PHOTO OF KNIFE SWITCHES

#### (POST-SCRAM)

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CUBICLE

4.16KV SWITCHGEAR

# EVENT DESCRIPTION

- PRETEST ELECTRICAL LINEUP
- EVENT TIME LINE
- ELECTRICAL SEQUENCE OF EVENTS
- INTEGRATED SEQUENCE OF EVENTS
- SUMMARY OF EVENT

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SSES UNITS 1&2 KEY ONE-LINE DIAGRAM PRETEST LINEUP (0105)



#### SSES UNITS 1 & 2

#### ELECTRICAL DISTRIBUTION

#### SYSTEM



SCRAM 02-84-04

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#### SSES UNITS 1 & 2

#### ELECTRICAL DISTRIBUTION

#### SYSTEM



SCRAM 02-84-04
SSES UNITS 1 & 2

#### ELECTRICAL DISTRIBUTION

#### SYSTEM



D/G MANUAL START 0139

SCRAM 02-84-04

SSES UNITS 1 & 2

ELECTRICAL DISTRIBUTION

#### SYSTEM



#### BUS 20 REENERGIZED 0142

SCRAM 02-84-04

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#### SSES UNITS 1 & 2

#### ELECTRICAL DISTRIBUTION

#### SYSTEM





TIME LINE

Attachment A Rev. O Page 1 of 4

#### UNIT 2 SCRAM NO. 2-84-04 SEQUENCE OF EVENTS

TIME	τ <b>τ</b>	EVENT DESCRIPTION		
2230	(7/25/84)	Reactor Lineup complete except for Bus 10 2A-2D AND U1 & U2 Tie Bkr.		
2230	£	RX. Press 920 PSIG.		
2230		Level 39"		
0105	(7/26/84)	4KV Bus 10 Bkrs. to Busses 2A-2D and U1 & U2 Tie Bkr complete		
0105		Rx Pressure 910 PSIG, Rx Level 37"		
0137		U2 Loop and U2 Load Reject		
0137		Opened 500KV Bkrs. 2T and 4T and T20 to Bus 20 Bkr.		
0137		Scram 1:37:33:834		
0137		Unit Primary LOR 1:37:33:648		
0137		Rx Level Trip "A"		
0137		MSIV Isolation 1:37:43		
0138		D/G's did not start		
0138	·	OPS Noted:		
	8	<ol> <li>Feed Bkrs from ESS Xfrms 201 &amp; 211 to 4KV Busses (no power) 2A, 2B, 2C &amp; 2D closed.</li> </ol>		
0138		OPS manually opened those feed bkrs from CR		
G138		D/G's still did not start		
0139	•	Start A,B,C, & D D/G's manually.		
0139	*	B D/G crip on over-voltage and under frequency		
0139	•	D D/G Trip on Overvoltage		
0139	•	A & C D/G idled but did not close in on bus		

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Attachment A Rev. O Page 2 of 4

TIME	EVENT DESCRIPTION
0139	OPS manually tripped "A" due to frequency oscillations observed in Control Room
0142	Reenergized
· .	1) Bus 20 (Closed OA10401) 2) ESS Xfmrs 201 and 211 (energized)
0142	4KV Bkrs from ESS Xfmrs 201 and 211 to ESS Busses would not close.
0142 ·	J SRV activated
ò146	J SRV Activated
0148	Racked in Bkr 20201 (T-10 Source) from U1 ESS , Xfmrs to 4KV ESS Bus 2B
0148	When D/G Knife Switch closed, Bkr 20209 closed, energizing Bus 2B from Unit 2 T-20 feed (preferred)
0148	D/G B Auto Start
0148	Rx Narrow Range Pressure:
	NFPD1 - 917 PSIG NFPD2 - 925 PSIG
0148 *	Reactor Level A - 35" (HRPD) Reactor Level B - 35" (HRPD) Reactor Level C - 8" (HRPD) Reactor Upset Level - 37" (HRPD)
0150	Racked in Bkr 20401 T-10 feed to Bus 2D
0150	J SRV activated
0150	When D.C. Knife Switch closed, Bkr. 20408 closed, energizing Bus 2D from T-20 Feed (preferred)
0150 .	D/G D Auto Start
0150	Declared Unusual Event - TSC activated
0153	Racked in Bkr 20301 to feed to Bus 2C

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TIME	EVENT DESCRIPTION
0153	When DC Knife Switch closed, Bkr 20301 closed, energizing Bus 2C from T-10 Unit 1 Feed preferred
0154 -	Racked in Bkr 20101 T-10 to Bus 2A.
0154	J SRV actuated
0154	When DC Knife Switch closed, Bkr 20109 closed, energizing Bus 2A preferred source from T-10
0154	D/C A Auto Start
Q155	Busses 2A & 2C were transferred to be fed from ESS Xfmrs 201 and 211 CR operator
0155	D/G's A, B, & D - Hi Priority Alarm
0155 .	D/G's A, B, & D shut down
0155 .	A Hi-Priority Alarm Reset, B & D would not
0158	J SRV actuated
0203	J SRV actuated
0209	J SRV actuated
0217	J SRV actuated .
0218	RCIC manually initiated
0218	Rx level - 27" (SPDS)
0220	LCO Entry on B & D D/G's
0228	Rx Level +14" (SPDS) ,
0228	Rx Level 29" (GETARS)
0230	End Unusual Event
0230	B & D trips cleared, clearing Hi-Priority Alarms
0240	Reactor Level at 52" (GETARS)
0240	Operator manually tripped RCIC

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TIME	EVENT DESCRIPTION
0445	LCO Cleared
0445	SO completed
0720	Swapped A & C to normal supply ESS 101 and 111 from alternate supply (from PCO Log)
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## EVENT SUMMARY.

- DEMONSTRATED ABILITY TO USE AND EVALUATE AVAILABLE INFORMATION
- O DEMONSTRATED INDIVIDUAL CAPABILITY TO RESPOND
- O DEMONSTRATED ABILITY TO RESPOND AS A TEAM
- MET TECHNICAL SPECIFICATION REQUIREMENTS -OBSERVED LIMITING CONDITIONS FOR OPERATIONS
- DEMONSTRATED GOOD KNOWLEDGE OF PLANT EQUIPMENT AND PROCEDURES
- DEMONSTRATED THAT SPECIFIC ASPECTS OF TRAINING AND PROCEDURES REQUIRE IMPROVEMENT

# POST EVENT REVIEW

# • ANY EVENT - AD-QA-415

O THIS EVENT - SCRAM NO. 02-84-04

# - EVENT REVIEW TEAMS

# - SCOPE OF EVENT REVIEW

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POST TRANSIENT / REACTOR SCRAM EVALUATION

#### STATION ADMINISTRATIVE PROCEDURE

- AD-QA-415 REV. 0

. POST TRANSIENT REACTOR SCRAM EVALUATION ISSUED 10/27/83

o <u>PURPOSE</u>

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- THOROUGH, SYSTEMATIC EVALUATION OF EVENT
- IDENTIFICATION/PROPER DISPOSITION OF EVENT-RELATED ANOMALIES

#### 0 PROGRAM ATTRIBUTES

 POST EVENT TEAM FORMED WITH MAJOR DISCIPLINES REPRESENTED; HEADED BY SUPERVISOR - SCRAM INVESTIGATIONS

- COMPREHENSIVE DATA RECOVERY/ANALYSIS

- SHIFT DEBRIEFING

- COMPREHENSIVE IDENTIFICATION OF ABNOMALIES AND FOLLOW-UP ACTION ITEMS AND RESPONSIBILITY IDENTIFIED
- PLANT OPERATIONS REVIEW COMMITTEE (PORC) REVIEW OF EVENT PRIOR TO RESTART

- COMPREHENSIVE SCRAM/TRANSIE

#### POST-EVENT REVIEW/EVALUATION

0	SSES SCRAM INVESTIGATION TEAM
0	NRC SPECIAL INVESTIGATION TEAM (7)
	PL NUCLEAR SAFETY ASSESSMENT GROUP INVESTIGATION
. <sup>0</sup>	INPO ANALYSIS & ENGINEERING GROUP REVIEW
0	PL NUCLEAR PLANT ENGINEERING (NPE) EVALUATIONS
0	PL CORPORATE MANAGEMENT REVIEW

#### SCOPE OF PP&L REVIEW / EVALUATION

0	NUCLEAR - SAFETY / UNIT PERFORMANCE	
0	NSSS EQUIPMENT / SYSTEM PERFORMANCE	
0	BOP EQUIPMENT / SYSTEM PERFORMANCE	
0	ELECTRICAL DISTRIBUTION SYSTEM	
Ó	INSTRUMENTATION SYSTEMS	
0	ADMINISTRATIVE AND TECHNICAL PROCEDURES	
0	TRAINING	
0	COMMUNICATION	
0	OPERATOR PERFORMANCE / RESPONSE	
0	CONDUCT OF TESTING	
0	CONDUCT OF OPERATIONS	;.
0	UNIT I - UNIT II COMPARISONS	•
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SCRAM NO. 02-84-04

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# ACTION ITEMS/STATUS

- SUMMARY OF SCRAM REPORT -8/13/84
- CURRENT STATUS/PROGRESS OF ACTION ITEMS
- STATUS OF INDIVIDUAL ACTION ITEMS

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# SUMMARY SCRAM REPORT OF 8-13-84 TO NRC

# ACTION ITEM CATEGORY

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NRC

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<u>ITEMS</u> 21 10

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# ACTION ITEM STATUS

# AS OF 10/08/84

### **137 INDIVIDUAL ITEMS IDENTIFIED**

108 COMPLETE

4 CLOSED WITH ADDITIONAL WORK IDENTIFIED

# 25 ACTION PLANS ESTABLISHED AND/OR WORK IN PROGRESS

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SCRAM ACTION ITEMS · BY COMPLETION DATE





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SCRAM ACTION ITEMS BY PRIORITY



SCRAM ACTION ITEMS BY ASSIGNED GROUP

SCRAM NO. 02-84-04



Legend EZE WORK ADDED CSI OPEN EZE COMPLETE

Appendix A Rev. 1 Page 6 of 43

#### UNIT 2 SCRAM NO. 02-84-04 ACTION ITEMS OF 07/30/84

ACTION ITEM NO. 2-84-04-02

#### DESCRIPTION:

#### Why did the "J" SRV lift first?

ACTION .			RESPONSIBLE <u> </u>	PRIORITY	<u>STATUS</u>
1.	Provide discussion.		Tech	1	. C
2.	Check <u>all</u> SRV Setpoints.	•	I&C	1	C
3.	Recalibrate as required.		I&C	1	C

### TYPICAL ACTION ITEM SHEET

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# ROOT CAUSES

# o CORRECTIVE ACTION SYSTEM

- CORRECTIVE ACTION EVALUATION

- CORRECTIVE ACTION IMPLEMENTATION

**o PROCEDURE DEFICIENCY** 

VERIFICATION

- PROCESS UTILIZED

- INDIVIDUAL

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SPECIFIC IMPROVEMENTS

- **o** CORRECTIVE ACTION SYSTEM
  - HPES PROGRAM
  - REVIEW OF SIMILAR PREVIOUS EVENTS
  - OPERATIONS NON-ROUTINE EVENTS
     REVIEW PROGRAM
- **o PROCEDURE DEFICIENCY** 
  - MEMO ISSUED
- o VERIFICATION
  - POLICY ISSUED

# EVENT ISSUES

#### ISSUES

O TRAINING

THEORETICAL / PRACTICAL

- O INSTRUMENTATION DURING BLACKOUT
- **o** VERIFICATION PRACTICES
- O STANDARD OPERATING PRACTICES
- O LABELLING OF COMPONENTS
- O DIESEL GENERATOR PERFORMANCE
- o ANNUNCIATION
- 'O SCOPE' OF TECHNICAL PROCEDURES
- O CORRECTIVE ACTION SYSTEMS / HUMAN FACTORS
- o PERSONNEL INDUCED SINGLE MODE FAILURES
- O CONDUCT OF NON-ROUTINE EVOLUTIONS
- o COMMUNICATIONS

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# **PP&L MANAGEMENT ACTIONS**

**o** OPERATOR TRAINING PROGRAM

**o DESIGN CONSIDERATIONS** 

**o** OPERATIONS ENHANCEMENT PROGRAM

**o** CORRECTIVE ACTION SYSTEM

**o** STATION POLICIES



# **OPERATOR TRAINING PROGRAM**
# OPERATOR TRAINING PROGRAM

- **o** TRAINING ORGANIZATION
- **o** TRAINING DEVELOPMENT
- **o** TRAINING PROGRAM EVALUATION
- **o** OPERATOR TRAINING PROGRAMS
- **o** IMPROVEMENTS IDENTIFIED BY EVALUATION
- **o** IMPROVEMENTS IDENTIFIED BY ST 31.1





TRAINING PROGRAM EVALUATION

- 1) STUDENT COURSE CRITIQUES
- 2) FOLLOW-UP COURSE EVALUATIONS

a. BY STUDENTS

**b.** BY SUPERVISORS OF THE STUDENTS

3) OUTSIDE CONSULTANT EVALUATION DONE

4) INPO SELF EVALUATION PROCESS

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5) CURRICULUM COMMITTEES

## OPERATOR TRAINING



SELF EVALUATION

UNITS 1&2 PERFORMANCE

NRC EXAMS

THE RESPONSE OF CONTROL ROOM OPERATORS DURING THIS EVENT NON LICENSED OPERATOR TRAINING

SELF EVALUATION

UNITS 1&2

PERFORMANCE TO

DATE

COMPARISON WITH

AVAILABLE

STANDARDS

OUR CONCLUSION IS OUR OPERATOR TRAINING IS GOOD

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# NON LICENSED OPERATOR TRAINING CONTENT

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S.S.E.S.	ANSI	· INPO	
NPO SCIENCE, ASO IN PLANT (ESW RHRSW), SYSTEMS INTRO.	1. GENERIC EQUIP. OR COMPONENT DESIGN AND APPLICATIONS HEAT EXCHANGERS		
ASO SCIENCE, ASO IN PLANT, NPO SYS.(COND. DEMIN., RWCU)		ION EXCHANGERS	
ASO SCIENCE		PUMPS	
ASO SCIENCE	4	VALVES ,	
NPO SYS., NPO IN PLANT		DIESELS	
NPO IN PLANT, NPO SYS.,ASO IN PLANT (INTAKE)	·	AIR COMPRESSORS	
NPO SCIENCE	•	STEAM TURBINES /	
	•	MOTORS AND GENERATORS	
ASO SCIENCE, NPO SCI.		INSTRUMENTATION AND CONTROL	
ASD SCIENCE		LUBRICATION	
ASO SYS., NPO SYS.	2. SPECIFIC EQUIP. AND SYS.	SYS. AND COMPONENTS	
NPO IN PLANT QUALIFICATION ASO IN PLANT QUALIFICATION	OPERATION AND OPERATIONAL REQUIREMENTS	POSITION TRAINING	
ASO SYS. NPO SYS.	3. SPECIFIC EQUIP. AND SYS. OPERATING PROCEDURES	SYS. AND COMPONENTS	
ASO IN PLANT QUALIFICATION NPO IN PLANT QUALIFICATION		POSITION TRAINING	
	•	SCRAM NO. 02-84-04	



SCRAM NO. 02-84-04

## NON LICENSED OPERATOR TRAINING CONTENT

S.S.E.S.	ANSI	INPO
ASO SYSTEMS NPO SYSTEMS	4. SPECIFIC EQUIPMENT AND SYS. FUNCTION DURING A TRANSIENT	SYSTEMS AND COMPONENTS
ASO IN PLANT QUALIFICATION NPO IN PLANT QUALIFICATION	•	POSITION TRAINING
ASO SCIENCE, NPO SYSTEMS NPO SCIENCE, ASO IN PLANT ASO SYSTEMS, NPO IN PLANT		REACTOR SAFETY
ASO SYSTEMS NPO SYSTEMS ASO IN PLANT QUALIFICATION NPO IN PLANT QUALIFICATION	5. RELATIONSHIP OF SPECIFIC EQUIPMENT AND SYSTEM TO PLANT SAFETY AND TECHNICAL SPECIFICATION	SYSTEMS AND COMPONENTS POSITION TRAINING REACTOR SAFETY
ASO IN PLANT QUALIFICATION NPO IN PLANT QUALIFICATION	6. RESPONSIBILITIES DURING TRANSIENTS, MALFUNCTIONS, AND EMERGENCY PROCEDURE RESPONSE.	ORIENTATION SYSTEMS AND COMPONENTS POSITION TRAINING
ASO SCIENCE, (WORK PRACTICES)	7. IDENTIFICATION AND REPORTING OF EQUIPMENT OR SYSTEM DEFICIENCIES.	
ASO IN PLANT QUALIFICATION NPO IN PLANT QUALIFICATION	8. SPECIFIC TASKS INVOLVED IN OPERATION OF SYSTEM OR EQUIPMENT.	POSITION TRAINING
OPERATING PRACTICES		COMMUNICATIONS
ASO SCIENCE		POWER PLANT FUNDAMENTALS
ASD SCIENCE NPO SCIENCE		МАТН
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## NON LICENSED OPERATOR TRAINING CONTENT

S.S.E.S.	ANSI	INPO	
NPO SCIENCE		PHYSICS	
NPO SCIENCE		ATOMIC AND NUCLEAR PHYSICS	
ASO SCIENCE		ELECTRICAL SCIENCE	
NPO SCIENCE ASO SCIENCE		CHEMISTRY	
NPO SCIENCE		THERMODYNAMICS	
NPO SCIENCE ASO SCIENCE		HEAT TRANSFER	
NPO SCIENCE		. FLUID FLOW	
		METALLURGY	
NPO SCIENCE ASO SCIENCE	-	RADIATION DETECTION AND PROTECTION	
NPO SCIENCE	-	REACTOR THEORY	

PERMIT & TAG WORK PRACTICES PRINT READING (P&ID) ELEC. DISTR. &PROTECTION PIPING SYSTEMS

J SERIES DRAWINGS (LOGICS) ELECTRICAL PRINT READING GE PRINTS

INTENTIONALLY NOT INCLUDI

IMPROVEMENTS IDENTIFIED

BY INTERNAL EVALUATION

CORRECTIVE ACTION IN

**PROGRESS**:

SCRAM NO. 02-84-04.

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## TRAINING IMPROVEMENT PLANS

- 1) INCORPORATION OF THE ITEMS FOUND IN THE DETAILED TASK LISTING
- 2) NON LICENSED OPERATOR TRAINING SELF EVALUATION
- 3) PLANNED OPERATING PRACTICES TRAINING

## TRAINING IMPROVEMENTS IDENTIFIED BY ST 31.1 INCIDENT

\*1) Immediate Technical Training-Prior to Restart.

2) Follow-up Technical Training:

a. Re-Do the immediate.

- b. Review electrical disconnects and policies on their operation.
- c. Core Spray and RHR breaker operation.
  - d. Switchgear Review.
- 3) Principles Training:
  - a. Communication.
  - b. Conduct of the Shift.
- \* COMPLETE.

PP&L MANAGEMENT ACTION

## OPERATOR TRAINING PROGRAM

## SUMMARY

- **o** WE HAVE GOOD OPERATOR TRAINING PROGRAMS
- **o** WE HAVE ESTABLISHED EVALUATION PROCEDURES
- **o WE CONTINUOUSLY IMPROVE OUR PROGRAMS**
- WE WOULD HAVE MADE THE IMPROVEMENTS IDENTIFIED BY ST 31.1, AS A RESULT OF OUR INTERNAL EVALUATIONS



# PP&L MANAGEMENT ACTION

**DESIGN CONSIDERATIONS** 

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DESIGN CONSIDERATIONS

# • REGULATORY GUIDE 1.47 COMPLIANCE

## **o** INSTRUMENTATION

### BYPASSED AND INOPERABLE STATUS INDICATION-REG. GUIDE 1.47

REG, GUIDE 1,47 DEFINES AN ACCEPTABLE METHOD FOR INDICATING INOPERABLE STATUS OF THE PROTECTION SYSTEM AND SUPPORTING SYSTEMS THAT ARE REQUIRED FOR THE PRO-TECTION SYSTEM TO FUNCTION.

AUTOMATIC INDICATION SHOULD BE PROVIDED IN THE CONTROL ROOM FOR EACH BYPASS OR DELIBERATELY INDUCED INOPERABLE STATUS THAT MEETS ALL THE FOLLOWING CONDITIONS:

 RENDERS INOPERABLE ANY REDUNDANT PORTION OF THE PROTECTION SYSTEM, SYSTEMS ACTUATED OR CONTROLLED BY THE PROTECTION SYSTEM, AND AUXILIARY OR SUPPORTING SYSTEMS THAT MUST BE OPERABLE FOR THE PROTECTION SYSTEM AND SYSTEMS IT ACTUATES TO PERFORM THEIR SAFETY FUNCTIONS

" IS EXPECTED TO OCCUR MORE FREQUENTLY THAN ONCE PER YEAR, AND

' IS EXPECTED TO OCCUR WHEN THE AFFECTED SYSTEM IS NORMALLY REQUIRED TO BE OPERABLE .

## ASSESSIVENT OF SCRAM 02-84-04

- OPERATION OF KNIFE SWITCH SUPPLYING POWER TO THE 4 KV SWITCHGEAR PROTECTIVE RELAYING AND CONTROL LOGIC WAS NOT INTENDED FOR THE LOSS OF OFFSITE POWER ASCENTION TEST.
- OPERATION OF THE KNIFE SWITCH SUPPLYING POWER TO THE 4KV SWITCHGEAR
  PROTECTIVE RELAYING AND CONTROL LOGIC IS NOT EXPECTED TO OCCUR MORE FREQUENTLY THAN ONCE PER YEAR.

BYPASS INDICATION OF KNIFE SWITCH POSITION IS NOT REQUIRED.

### ASSESSMENT OF ESS BUS SURVEILLANCE PROCEDURES

- SURVEILLANCE PROCEDURE FOR FUNCTIONAL TESTING OF 4KV BUS DEGRADED VOLTAGE SCHEME DISABLES CONTROL RELAYING THAT TRANSFERS THE 4KV BUS TO THE DIESEL GENERATOR FOR THE LOOP/LOCA DESIGN BASE.
- SURVEILLANCE PROCEDURE IS PERFORMED ON A MONTHLY BASIS AND DISABLES A SUPPORTING SYSTEM FOR THE PROTECTION SYSTEM.
- CONCLUDE THAT BYPASS INDICATION SHOULD BE PROVIDED FOR MONITORING TEST SWITCHES UTILIZED FOR DEGRADED VOLTAGE SCHEME TESTING.
- OTHER ESS BUS SURVEILLANCE PROCEDURES MEET BYPASS INDICATION REQUIREMENTS.

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ESS 4KV BUS/DIESEL GEN AUX RELAYING AND CONTROL





• THE MONTHLY SURVEILLANCE PRIOR TO SCRAM 2-84-04 REQUIRED INDEPENDENT VERIFICATION OF SLIDING LINK TERMINAL RESTORATION TO THE CLOSED POSITION BY VISUAL VERIFICATION AND A SCREW TIGHTNESS CHECK.

 PROCEDURE CHANGE AUTHORIZATIONS WERE ISSUED IMMEDIATELY AFTER SCRAM 2-84-04 WHICH REQUIRED AN INDEPENDENT VERIFICATION OF SLIDING LINK TERMINAL RESTORATION TO THE CLOSED POSITION BY CONTINUITY TESTING.



KEY INSTRUMENTATION AVAILABLE DURING STATION BLACKOUT

PARAMETER	INDICATOR	RANGE	LOCATION	POWER SUPPLY
REACTOR PRESSURE	P1-E51-2R602	0-1500psig	20601	2D61407
	P1-E41-R602	0-1500psig	20601	2D62406
REACTOR VESSEL LEVEL	L1-C32-2R60GB N	0-60 INCHES	2C652	2D64503
	L1-C32-2R606C N	0-60 INCHES	20652	2063505
SUPPRESSION CHAM PRESS	P1-25702 (HSS)	1 to 0 to +3psig	2C601	2162925
DRYWELL PRESS	P1-25702 (HSS) ,	1 to 0 to +3psig	20601	2Y62925
HPCI PUMP SUCT PRESS	P1-E41-2R60G	30" Hg - 85psig	20601	2062406
HPCI STH SUPPLY PRESS	P1-E41-2R602	0-1500ps1g	2C601	2062406
HPCI TURB EXH PRESS	P1-E41-2R603	0-200ps1g	2C601	2D62406
HPCI PUMP DSCH PRESS	P1-E41-2R601	0-1800psig	2C601	2D62406
HPCI FLOW	F1C-E41-2R600	0-60000рн	20601	2D62406
HPCI TURBINE SPEED	S1-E41-2R604	<b>Э-6000</b> грн	20601	2062406
HPCI FLOW	F1-E41-2R600-1	0-6000gpm	20601	2D62406
RCIC FLOW	F1-E51-2R600-1	0-700gpm	20601	2D61407
RCIC TURB EXH PRESS	P1-E51-2R603	0-200ps1g	20601	2D61407
RCIC TURB INLET PRESS	P1-E51-2R602	0-1500ps1g	2C601	2D61407
RCIC PUMP SUCT FRESS	P1-E51-2R604	30" lig - 85ps1g	20601	2D61407
RCIC PUMP DISCH PRESS	P1-E51-2R601	0-1500pstg	2C601	2D61407
RCIC FLOW	F1C-E51-2R600	0-700gpm	2C601	2D61407
RCIC TURBINE SPEED	S1-E51-2R604	0-6000RPM	20601	2061407
CST A LEVEL	L1-00812A	0-100%	OCB518A	1Y629 BKR 27
CST B LEVEL	L1-00812B	0-100X	OCB518B	1Y629 BKR 27
REFUEL WATER TANK LEVEL	L1-00802	0-100 <b>x</b>	OCB517	1Y629 BKR 27

# PP&L MANAGEMENT ACTION

# DESIGN CONSIDERATIONS

## SUMMARY

- REG GUIDE 1.47 COMPLIANCE WILL BE ASSURED BY MODIFICATION
- INSTRUMENTATION AS INSTALLED IS
  ADEQUATE

SCRAM NO. 02-84-04

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# PP&L MANAGEMENT ACTION

## **OPERATIONS ENHANCEMENT PROGRAM**

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## **OPERATIONS ENHANCEMENT PROGRAM**

- **o DEVELOPMENT**
- **o** ANALYSIS OF ENHANCEMENT CATEGORIES
- **o PRIORITY DEFINITIONS**
- o **RESPONSIBILITY MATRIX**
- **o** ACTION PLANS
- **o RESOURCE COMMITMENTS**



### INPO

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#### RECOMMENDATIONS

INSTRUCT ALL PLANT PERSONNEL IN A COMMONALITY OF WORDS AND TERMS TO CLEAR UP AMBIGUITIES.

RESIST BURDENING THE LICENSED OPERATORS WITH LENGTHY AND TIME CONSUMING READINGS OR TASKS.

O ENSURE THAT OPERATOR TIME IS DEVOTED TO OPERATING THE UNIT AND MAINTAINING A CONSTANT AWARENESS OF UNIT CONDITIONS AND CONTROL OF EVENTS.

DISPLAY THE MWE METER MORE PROMINENTLY,

NOISE CONTROL MEASURES IN THE CONTROL ROOM SHOULD BE IMPLEMENTED.

IMPORTANT ITEMS SHOULD BE IMMEDIATELY ENTERED IN THE OPERATIONS LOG BY THE KNOWLEDGEABLE OPERATOR.

O PERFORM PERIODIC SUPERVISORY REVIEWS OF THE LOG AND REQUIRE CORRECTION OF DEFICIENCIES.

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### <u>INPO</u>

### RECOMMENDATIONS (CONT.)

0.	INSTRUCT INEXPERIENCED OPERATORS IN REAL TIME HEAT
	UP AND COOLDOWNS ON THE SIMULATOR.
0	REVIEW THE PROTECTIVE PERMIT AND TAG SYSTEM
0	REVIEW THE REQUIREMENTS OF ADMINISTRATIVE PROCEDURE,
	'SHIFT ROUTINE,' WITH PLANT CONTROL OPERATORS.

#### <u>MPR</u>

#### SUMMARY/RECOMMENDATIONS

O SUMMARY

CONCLUDED THAT THE PROCEDURES USED TO CONTROL SYSTEM AND EQUIPMENT STATUS AT SSES ARE WORKABLE AND CAN PROVIDE SATISFACTORY CONTROL.

0 A RECOMMENDATIONS

- REVISE WORK INVESTIGATION PROCESS TO BETTER CONTROL EQUIPMENT STATUS.
- REQUESTS FOR EQUIPMENT RELEASE SHOULD HAVE EFFECTS ON SYSTEM OPERABILITY ASSESSED FOR THE CURRENT PLANT CONDITION AND PLANT CONDITIONS WHICH COULD BE ENTERED.
- TRAINING SHOULD BE CONDUCTED FOR ALL WORK GROUP PERSONNEL IN ASSESSING SYSTEM OPERABILITY EFFECTS OF EQUIPMENT RELEASE.
- A STRUCTURED METHOD FOR ASSESSING WHETHER EQUIPMENT MAY BE RELEASED FROM SERVICE SHOULD BE ADOPTED.

## SUMMARY/RECOMMENDATIONS (CONT.)

<u>MPR</u>

WORK GROUP PERSONNEL SHOULD BE PROVIDED
 WITH READY ACCESS TO THE CURRENT PLANT STATUS.
 WE CONSIDER THAT OR SEVERAL SPECIFIC CHANGES
 TO EQUIPMENT STATUS CONTROL FORMS AND RECORD
 KEEPING ARE RECOMMENDED.

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IMPELL

• OPS SECTION/CONDUCT OF OPS

### <u>NSAG</u>

### RECOMMENDATIONS

0 PRIORITY 1

- REDUCE THE NOISE LEVEL IN THE CONTROL ROOM

- REMOVE GENERAL SERVICE TELEPHONES

- REDUCE NON-OPERATIONAL USE OF PLANT PAGE

- SEPARATE RADIO FREQUENCIES

- SPING SYSTEM TO BE MODIFIED TO ELIMINATE SPURIOUS ALARMS

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CAREFUL PANEL REVIEWS BY SHIFT SUPERVISOR SHOULD BE CONTINUED

### NSAG RECOMMENDATIONS

0 PRIORITY 2

- ELIMINATE REMAINING NUISANCE ALARMS

- REVIEW PCO SHIFT TURNOVER PRACTICES

SPING ALARMS MUST BE FAITHFULLY INVESTIGATED

- WATCHSTANDERS SHOULD RECORD ACTUAL TIMES ACTIONS WERE TAKEN

- ROUNDS SHEETS SHOULD BE MODIFIED TO INCLUDE ALLOWABLE PARAMETERS AND OUT OF SPECIFICATION CONDITIONS.

- BACKLOG PCAF'S SHOULD BE INCORPORATED AS SOON AS POSSIBLE

- REDUCE VENTILATION NOISE IN THE CONTROL ROOM
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### OPERATIONS ENHANCEMENT\_PROGRAM ANALYSIS OF ENHANCEMENT CATEGORIES

O REVIEW OF THE 17 ENHANCEMENT CATEGORIES

- o REDUCTION TO 4 MAJOR CATEGORIES
  - SHIFT MANAGEMENT
  - ADMINISTRATION

- PERSONNEL & TRAINING ISSUES

- CONTROL ROOM ENVIRONMENT

O ITEM BY ITEM REVIEW OF AUDIT RECOMMENDATIONS

o FORMAL REPORT ISSUED IN RESPONSE TO AUDITS

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Page 2 of 24

	F IND ING/RECOMMENDATION	· RESPON	SE
		AGREEMENT	CATEGORY ITEN
4. Evaluate	the System Status File with the purpose of .		-
streamlin could be should be should be	ging the control room involvement. Any paperwork that sandled in another location or by another group subject to change, and redundant reviews/signoffs eliminated. The first step in this process could be	YES	11.3
audit wil blank or be determ operator a be to ensi	indicate which areas/blocks are routinely left nappropriately filled in. In most cases, it will ned that these areas provide little "value added" to the ind, therefore, can be eliminated. The next step could bre that the qualification level (i.e., SRQ_RQ_etc.)		ť
of the inc surate with be taken to tasked.	lividual filling in data, reviewing and signing is commen- h the activity being performed. If not, steps should to ensure the applicable level individual is properly		•.
5. Modify all This will equipment condense for considered causal are	turnover status sheets to be condition dependent. eliminate the necessity to document the status of not required in certain conditions. It will also he turnover sheets to list only those items important, a key element discussed under aseparate a.	NO Impell Exception 1	•
6. Relieve th administra can be eff System Sta office adj number of the SSF is	e Unit Supervisor from the responsibility of tively maintaining the System Status File. If this ectively accomplished, it is recommended that the tus File be moved from its present location to an oining the Control Room in order to reduce the people in the control. The actual administration of judged to be a clerical function.	· YES Also see Impell Exception 2	

### OPERATIONS ENHANCEMENT PROGRAM

#### PRIORITY DEFINITIONS

PRIORITY 1	23 ITEMS	ECD	12/31/84
PRIORITY 2	11 ITEMS	ECD	7/1/85
PRIORITY 3	11 ITEMS	ECD	12/31/85
	45 ITEMS		•

	OPERATIONS ENHANCEMENT PROGRAM RESPONSIBILITY MATRIX PRIORITY 1 ITEMS	100	TYPICAL OF E
1.	Establish Shift Operating Philosophy.	x	
2.	Ensure Accountability for Day to Day Shift Performance.	X	
3.	Reduce Holse Level in Control Room Areas.	X	
4.	Revise Control Room Layout		
5.	Incorporate Backlog of PCAFs into Operating Procedures	1	
6.	Establish PCAF Page Placement Practice for Operating Procedures	1	
7.	Review and Revise System Status and Control.	1	
<u>8.</u>	Review and Revise T/O Sheets, Rounds, S, D. & X Surv. to Establish Trending	1	•
9.	Review General Operating Procedures (CO)	1	
10.	Establish Condensate Demineralizer Operational Guidelines		
11.	Independent Verification -		
12.	Inadequate Labeling of Equipment and Drawings	1	
13.	Control Room Indications		
14.	Communications	X	
15.	Develop Emergency Operating Procedure Program		
16.	Raise RADVASTE Station Awareness.	1	
17.	Improve investigation of Operating Incidents.		
18.	Personnel Development.		
19.	Establish Internal Review of Operations Paperwork.		
20	Strengthen the Control and Understanding of Non-Routine Evolutions.	X	4
<u>21.</u> 22.	Revise Program for Timely Incorporation of Non-Routine Training of Operations Establish Policy on Operation of Electrical Isolation Devices.		
23.	Operator Training Improvements.		

#### ACTION PLAN WORKSHEET

SCRAM NO. 02-84-04

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PRIORITY/ITEN NO: 1/1 RESPONSIBILITY: Blakeslee/Markowski

ITEN: 1. Establish Shift Operating Philosophy

	ACTION PLAN	RESP.	STATUS	ECD	CONNENTS
٥.	Define shift structure and responsibilities/accountabilities for each position.	Harkowski			· · ·
	<ol> <li>Define and commit simulator staff personnel for investigation process.</li> </ol>	Harkowski/ Ward	×	9/14/84	Requesting R. Stitt, STC
	2. Interview Shift Supervision for baseline.	. Stitt	ł	10/15/84	
•	3. Review AD-300 series to compare with baseline.	Stitt		11/01/84	
	<ol> <li>Change Ad 300 series to reflect requirements and input from investigation.</li> </ol>	Stitt		11/16/84	
	5. Train OPS personnel on changes	Stitt -		01/12/85	
ь.	Establish standard contacts/practices with other sections.				
	1. Hember of work practices Task Force	Harkowski	Complete		
	2. Hember of Permit and Tag Task Force	Harkowski	Complete		
	3. Establish 8:30 meeting with SS and work group foreman	Harkowski	Complete		
	<ol> <li>Prioritize Operations operating concerns to provide consistency with work groups.</li> </ol>	Harkowsk i	¥	12/3184	Start 9/14/84
-	5. Review and Revise On Call Procedure # AD-0A-131	Blakeslee		11/01/84	Hore access for Foreman level and workers on shift during off bours.
ų	<ol> <li>Have work Group Planning Supervisor attend Shift Supervisor meeting to discuss purpose of planning.</li> </ol>	Markonski		9/26/84	Identify when OPS on call individual is to be contacted. GJK will attend 9/26 SS Mtg.
с.	Establish log and log keeping standards.				
	1. Review past logs for baseline.	Bogetti		10/15/84	
	2. Revise procedures to reflect changes as required.	Bogetti		11/15/84	•

### OPERATIONS ENHANCEMENT PROGRAM RESOURCE COMMITMENT 1984 MANPOWER (9/84 THROUGH 12/84)

6	STAFF	1/2 TIME	12	MAN-MONTHS
8	CONSULTANTS	FULL TIME	32	MAN-MONTHS
3	CONSULTANTS	1/2 TIME	6	MAN-MONTHS
1	NPE	FULL TIME	2	MAN-MONTHS
2	TRAINING STAFF	FULL TIME ·	6	MAN-MONTHS
				<b>_</b>
		-	58	MAN-MONTHS

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## **PP&L MANAGEMENT ACTION**

## OPERATIONS ENHANCEMENT PROGRAM SUMMARY

- **o** IDENTIFIED THE NEED FOR ENHANCEMENTS
- o COMPLETED INDEPENDENT AUDITS, 6/84
- o ANALYZED AUDIT FINDINGS
- PREPARED A COMPREHENSIVE ACTION PLAN
   8/84
- AUGMENTED ACTION PLANS WITH SCRAM RELATED LESSONS LEARNED
- AGGRESSIVE, PRIORITIZED IMPLEMENTATION
   SCHEDULE
- **o** FULL MANAGEMENT SUPPORT



# PP&L MANAGEMENT ACTION

## **CORRECTIVE ACTION SYSTEM**

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# CORRECTIVE ACTION SYSTEM

• MAJOR ASPECTS

### • IMPROVEMENTS/CHANGES

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 HUMAN PERFORMANCE EVALUATION SYSTEM (HPES)

#### CORRECTIVE ACTION SYSTEM

#### MAJOR ASPECTS

DAILY MANAGEMENT REVIEW OF EVENTS Δ LER CRITIQUE REVIEW MEETING 0 EVALUATOR INVESTIGATION/REVIEW 0 GROUP SUPERVISION DETERMINATION OF/IMPLEMENTATION LONG 0 TERM CORRECTIVE ACTION/RESOLUTION PORC REVIEW OF EVENT & IMMEDIATE CORRECTIVE ACTION 0 EVALUATOR REVIEW/IDENTIFY - TRACK ACTION ITEMS REVIEW 0. ASSOCIATED CLOSE - OUT DOCUMENTATION ABSTRACT WRITE - UP 0 PORC REVIEW OF COMPLETE PACKAGE 0

#### CORRECTIVE ACTION SYSTEM

#### IMPROVEMENTS/CHANGES

o TRAINING OF EVALUATORS

3 DAY EG&G EVENT ANALYSIS WORKSHOP (2; 6/84)

1 WEEK INPO HPES SITUATION INVESTIGATION (2; 8/84)

O INCREASING EVALUATOR EXPERIENCES LEVEL WITH FORMER
 STARTUP TEST ENGINEERS (2)

o IMPLEMENTATION HPES TECHNIQUES INITIATED 6/84

O COMBINED INDEPENDENT INCIDENT AND EVENT REPORT SYSTEMS INTO SINGLE OCCURRENCE REPORT SYSTEM (1/84)

o PERSONNEL ERROR RELATED/SIMILAR EVENT REVIEW

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#### HUMAN PERFORMANCE EVALUATION SYSTEM (HPES)

• PURPOSE: <u>IDENTIFY</u> AND CORRECT <u>ROOT CAUSES</u> OF INAPPROPRIATE ACTIONS FOR HUMAN PERFORMANCE SITUATIONS

• PL'MANAGEMENT COMMITMENT TO PURSUE/ACHIEVE EXCELLENCE IN CONDUCT OF OPERATIONS

• FULL - PARTICIPATION IN INPO HPES PROGRAM

o APPLICATION OF HPES TECHNIQUES INITIATED 6/84

o TRAINING OF EVALUATORS (2)

- INPO ORIENTATION (2 DAYS)

- INPO SITUATION INVESTIGATION (5 DAYS)

• INTEGRATION INTO STATION SIGNIFICANT OPERATING OCCURRENCE REPORT/LICENSEE EVENT REPORT SYSTEM

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PP&L MANAGEMENT ACTION

## CORRECTIVE ACTION SYSTEM

## SUMMARY

- o. PROPER SYSTEM ESTABLISHED
- APPROPRIATE MANAGEMENT/SUPERVISORY REVIEWS AND RESPONSIVENESS
- SYSTEM IMPROVEMENTS DEFINED AND PLANNED

PP&L MANAGEMENT ACTION

## STATION POLICIES

## STATION POLICIES

- PROCEDURES
- **o** SPECIAL BRIEFINGS
- OPERATION OF ELECTRICAL ISOLATION DEVICES
- OPERATION OF ELECTRICAL ISOLATION DEVICES FOR PROTECTIVE PERMIT & TAG BLOCKING
- CONTROL AND VERIFICATION OF OPERATING ACTIONS
- **o** STATION NON-ROUTINE TRAINING

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#### POLICY RE PROCEDURES

- ADHERENCE TO PROCEDURE AND/OR APPLICABLE ADMINISTRATIVE CONTROLS
- O PROCEDURAL CONTROLS FOR MULTI-WORK GROUP TASKS
  - VERBAL VERSUS WRITTEN INSTRUCTIONS

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- ROUTINE, SINGLE WORK GROUP, TASKS
- NON-ROUTINE, ABNORMAL, SPECIAL SITUATION, OR INFREQUENT TASKS

### POLICY RE SPECIAL BRIEFINGS - WHAT

o RESPONSIBILITIES

O IDENTIFY LEAD WORK GROUP INDIVIDUALS

O REVIEW TASK

O ANTICIPATED OPERATIONAL IMPACTS

O POTENTIAL PROBLEM AREAS

O . COMMUNICATION METHODILOGIES

O REVIEW PROCEDURAL/ADMINISTRATIVE CONTROLS

O SPECIAL RESTRICTIONS/CONCERN

#### POLICY RE SPECIAL BRIEFINGS - WHEN

- o COMPLEX, INFREQUENT ACTIVITIES
- O COMPLEX TESTING
- O MULTI-LOCATION TASK
- O MULTI-GROUP TASK
- O NEW PROCEDURE
- O ACTIVE EQUIPMENT TROUBLE-SHOOTING
- O MULTI-SHIFT DURATION
- 6 SIGNIFICANT RADIOLOGICAL CONSIDERATIONS
- 0 72 HOUR LCO SHUTDOWN CONDITIONS

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#### POLICY RE OPERATION OF ELECTRICAL ISOLATION DEVICES

0, <u>PURPOSE</u>

ASSIGN <u>RESPONSIBILITY</u> FOR OPERATION DEFINE <u>AUTHORIZING</u> MECHANISMS

0 <u>APPLICABILITY</u>

BREAKERS, FUSES, LINKS, LIFTED LEADS

0 MECHANISMS

WORK AUTHORIZATIONS (WA) INVESTIGATIVE WORK AUTHORIZATIONS PROTECTIVE PERMIT & TAG APPROVED PROCEDURES SHIFT SUPERVISION DIRECTION CONSTRUCTION WORK ORDER (CWO)

### <u>POLICY: ELECTRICAL\_ISOLATION</u> <u>DEVICES/PERMIT & TAG</u>

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OPERATIONS PERSONNEL:

APPLY/REMOVE BLOCKING

APPLY A TAG PER COMPONENT

DIRECTLY SUPERVISE DEVICE MANIPULATION

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### POLICY RE CONTROL AND VERIFICATION

OF OPERATING ACTIONS

0	STANDARDIZATION
0	DEFINITION OF PERSONNEL RESPONSIBILITIES
0	APPROVED METHODS
0	POLICY STATEMENTS/ADMINISTRATIVE CONTROLS

#### STATION NON-ROUTINE TRAINING

#### DEFINITION/VERIFICATION

FORMALIZE PROGRAM WITHIN, SECTION INSTRUCTIONS

PERIODIC SECTION/GROUP MEETINGS

0 AGENDA ITEM EXAMPLES

SOOR'S NCR'S IE BULLETINS/NOTICES AUDIT FINDINGS PROCEDURE CHANGES/REVISIONS STANDARD OPERATING PRACTICES

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CATEGORIZE NON-ROUTINE TRAINING ITEMS REVIEW REQUIRED PRIOR TO RETURN TO ACTIVE DUTY

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PERFORMING SPECIFIC ACTIVITY

O SUPERVISOR REVIEW OF PERSONNEL NON-ROUTINE TRAINING STATUS

0 STATUS TRACKING



## STATION POLICIES

## SUMMARY

- **o** STANDARDIZE PRACTICES
- **o** DEFINE RESPONSIBILITIES AND CONTROLS
- WILL PROCEDURALIZE PREVIOUSLY ACCEPTED STANDARD PRACTICES
- DEVELOPED/ISSUED AS INTERIM
   MEASURE PENDING REVISION OF
   STATION ADMINISTRATIVE PROCEDURES

## PP&L

# NUCLEAR SAFETY

## ASSESSMENT GROUP

# REPORT

### NUCLEAR SAFETY ASSESSMENT GROUP INVESTIGATION

- O CONDUCTED 7/26-7/29 IN PARALLEL WITH PLANT STAFF INVESTIGATION.
- O CONCENTRATED UPON BREAKER CONTROL ISSUE.
  - O ATTEMPTED TO EVALUATE SAFETY AND PROGRAMMATIC ASPECTS OF PROBLEM.

NSAG CONCLUDED THAT:

- 1. THE SAFETY OF THE PUBLIC WAS NOT JEOPARDIZED.
- 2. THE ESS BUS CONTROL CIRCUITRY FUNCTIONED CORRECTLY GIVEN THE FACT THAT THE DC CONTROL POWER HAD BEEN DISABLED.
- 3. OPERATOR RESPONSE WAS EXCELLENT.
- 4. REASONABLE PRECAUTIONS HAD BEEN TAKEN TO ENSURE SUCCESS OF THE TEST.
- 5. THE INCIDENT WAS CAUSED BY PERSONNEL ERROR.
- 6. CONTRIBUTING CAUSES WERE:
  - 0 POORLY LABELED SWITCHES
  - 0 IMPRECISE PROCEDURE
- 7. PERFORMANCE OF THE DIESEL GENERATORS WAS UNSATISFACTORY.

### LOOP EVENT OF 7/26/84 WAS A SERIOUS INCIDENT

- 1. COMMON MODE FAILURE DISABLED ALL FOUR UNIT TWO ESS BUSSES.
- 2, PLANT SAFETY WAS. DEGRADED.

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- O UNIT TWO OPERATED AT ABOUT 30% POWER FOR ABOUT 32 MINUTES WITH NO OPERABLE LOW PRESSURE EMERGENCY CORE COOLING SYSTEMS.
- O FOLLOWING INITIATION OF THE TEST:
  - 1) KEY INDICATIONS WERE LOST.
  - 2) DECAY HEAT COULD NOT BE REMOVED FROM THE SUPPRESSION POOL.
#### SAFETY OF PUBLIC WAS NOT JEOPARDIZED

- O THERE WAS NO LOCA, LP ECCS SYSTEMS WERE NOT NEEDED. (HPCI AND RCIC REMAINED AVAILABLE.)
- O REACTOR SCRAMMED, PRESSURE AND LEVEL WERE CONTROLLED.
- O POWER WAS NOT LOST TO THE STATION.
- O POWER WAS RESTORED TO THE FIRST ESS BUS IN LESS THAN 11 MINUTES.
- O SUPPRESSION POOL HAS SUFFICIENT HEAT CAPACITY TO ABSORB DECAY HEAT FOR OVER 8 HOURS.
- O ONE DIESEL GENERATOR REMAINED IDLING.
- O THE MAIN CONDENSER COULD HAVE BEEN USED AS A HEAT SINK.

#### OPERATION OF CIRCUITRY

- 1. ESS BUS CONTROL CIRCUITRY PERFORMED AS IT SHOULD HAVE GIVEN THE FACT THAT CONTROL POWER TO THE BUSES WAS LOST.
- 2. FAILURE OF 'C' DG TO CLOSE ON TO DEAD BUS WAS PROBABLY DUE TO FAILURE TO PLACE SYNC SWITCH IN PROPER POSITION.
  - O FORMAL TEST ON 7/31/84 DEMONSTRATED THAT THE CIRCUIT FUNCTIONS PROPERLY.

MAY HAVE BEEN A HUMAN FACTORS PROBLEM. D/G LAYOUT A, B, C, D LEFT TO RIGHT. 4KV BUS LAYOUT A, C, B, D LEFT TO RIGHT. WRONG SYNC. SWITCH MAY HAVE BEEN OPERATED DUE TO LAYOUT OF THE PANEL.

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#### OPERATOR RESPONSE WAS EXCELLENT

- 1. PLANT AND PUBLIC WERE PROTECTED.
  - O POWER RESTORED TO FIRST BUS IN 11 MINUTES.
  - O ALL BUSSES ENERGIZED IN 17 MINUTES.
  - O LEVEL AND PRESSURE WERE MAINTAINED.
  - O EMERGENCY PLAN WAS PROPERLY INITIATED.
  - O LCO'S FOR D/G'S.WERE OBSERVED ON U-1.
- 2. PROBLEM WAS CONFOUNDED BY LOSS OF INDICATION.
  - O RODS DID NOT INDICATE IN, IMPLIED ATWS.
  - O LOST WIDE RANGE LEVEL INDICATION. FORCED TO USE LOCAL INDICATION.
- 3. SYMPTOM BASED CASUALTY CONTROL
  - O INCIDENT DID NOT FIT AN ESTABLISHED PATTERN.
  - O PROBLEMS WERE SYSTEMATICALLY PURSUED AND SOLVED.
  - O PROBLEMS WITH DIESELS WERE NOT ALLOWED TO STOP MAIN TASK; RESTORATION OF POWER TO ESS BUSSES.

### REASONS FOR STRONG OPERATOR PERFORMANCE

- O STRONG TRAINING PROGRAM.
- O THOROUGH PREPARATIONS FOR THE TEST.

#### TEST PREPARATIONS WERE SOUND

1. PROPERLY SCHEDULED AND AUTHORIZED.

2. PROPERLY APPROVED PROCEDURE.

- 3. SCHEDULED FOR BACK SHIFT.
- 4. EXTRA PERSONNEL ON HAND INCLUDING SENIOR PLANT MANAGEMENT.

5. BRIEFINGS CONDUCTED WITH PARTICIPANTS.

IN THE OPINION OF NSAG, REASONABLE PRECAUTIONS WERE TAKEN TO ENSURE SUCCESS OF THE TEST AND TO PROTECT THE PLANT.

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#### CAUSES OF INCIDENT

#### DIRECT CAUSE WAS PERSONNEL ERROR

- 1. NUCLEAR PLANT OPERATOR (NPO) OPENED THE WRONG KNIFE SWITCH IN EACH 4KV ESS BUS -- IMPROPER OPERATION.
- 2. START-UP TEST ENGINEER (STE), ACCOMPANYING NPO, DID NOT CATCH ERROR -- <u>UNSATISFACTORY VERIFICATION</u>.
- 3. NO INDICATIONS IN CONTROL ROOM THAT ESS BUS DC CONTROL POWER WAS LOST.
- 4. ONLY INDICATION LOCALLY AT THE BREAKER CUBICLE WAS THAT A NORMALLY LIT AMBER LIGHT WHICH MONITORS THE TRIP COIL OF THE BUS LOCKOUT RELAY SHOULD HAVE GONE OUT. PERSONNEL EITHER DID NOT OBSERVE THAT THE LIGHTS WERE OUT OR DID NOT UNDERSTAND WHAT THEY MEANT.

#### CONTRIBUTING CAUSES

#### POOR LABELING OF COMPONENTS

1. DC CONTROL POWER CIRCUITRY WAS POORLY LABELED INSIDE BREAKER CUBICLE.

IMPRECISE WORDING CONTROL POWER FOR BKR 2A20101: "BREAKER CONTROL SWITCH AND TRIP CIRCUIT FUSES"

BUS 2A CONTROL .. POWER: . "DC CONTROL"

WORDING DOES NOT MATCH SYSTEM CHECKOFF LIST.

- NO CAUTION SIGN ALERTING PERSONNEL OF THE CONSEQUENCES OF OPENING BUS CONTROL POWER KNIFE SWITCH.

BREAKER CONTROL AND BUS CONTROL SWITCHES WERE CONFUSED TWICE BEFORE BY OPERATORS, INCIDENT REPORTS 2-83-22 AND 2-83-56 WERE EVALUATED BY PLANT MANAGEMENT AND OPERATOR TRAINING WAS CONDUCTED AFTER THE SECOND INCIDENT.

#### PROCEDURE INADEQUACIES

- 1. RELIED UPON STANDARD PRACTICE TO ACHIEVE SYSTEM LINE UP. --POSITION OF BREAKER CONTROL SWITCH WAS NOT SPECIFIED.
- 2. POSITION OF KNIFE SWITCHES SUPPLYING DC CONTROL POWER TO THE ESS BUSSES WAS NOT SPECIFIED.

CORRECT LINE-UP IS ESSENTIAL TO TEST SUCCESS. ALIGNMENT OF CRITICAL COMPONENTS SHOULD BE SPECIFIED IN DETAIL.

#### OTHER OBSERVATIONS

1. PROCEDURE COMPLIANCE NOT AN ISSUE.

INTENT OF MANAGEMENT WAS THAT THE BREAKER CONTROL POWER KNIFE SWITCH BE OPENED PER STANDARD PRACTICE.

OPERATOR CHECKED WITH CONTROL ROOM BEFORE OPENING KNIFE SWITCH.

2. COMMUNICATIONS NOT AN ISSUE.

INTENT OF EVERYONE CONCERNED WAS TO OPEN THE BREAKER CONTROL POWER KNIFE SWITCH.

3. PROCEDURE WOULD HAVE WORKED IF FOLLOWED LITERALLY. NO KNIFE SWITCHES WOULD HAVE BEEN OPENED.

#### DIESEL GENERATOR PERFORMANCE UNSATISFACTORY

- 1. ONLY ONE OF FOUR D/G'S OPERATED PROPERLY AFTER A MANUAL START.
- 2. Two HOURS, 51 MINUTES REQUIRED TO RESTORE ALL FOUR D/G'S TO OPERATION. RESETTING OF TRIPS AND PERFORMANCE OF SURVEILLANCE TESTS.
- 3. DIESEL GENERATORS HAVE FUNCTIONED RELIABLY UNDER EMERGENCY START CONDITIONS. DURING THE INCIDENT, THREE OF FOUR D/G'S DID NOT OPERATE RELIABLY AFTER A MANUAL (NON-EMERGENCY) START.
- 4. RELIABILITY OF D/G'S UNDER OTHER THAN POSTULATED LOCA/LOOP SITUATIONS SHOULD BE EXAMINED.

ARE THERE TOO MANY TRIPS UNDER NON-EMERGENCY START CONDITIONS?

DOES OUR CURRENT TESTING PROVIDE REASONABLE ASSURANCE THAT THE D/G'S WILL BE AVAILABLE WHEN NEEDED?

#### RECOMMENDATIONS

#### A. PRIOR TO STARTUP OF UNIT 2

- 1. RESOLVE BY CONCLUSIVE TEST THAT DG BREAKER CONTROLS OPERATE PROPERLY. (TP-24-004 PERFORMED ON 7/31/84 SUCCESSFULLY)
- 2. REVIEW INCIDENTS WITH OPERATORS AND TEST PERSONNEL.

LOCATION AND PURPOSE OF BREAKER CONTROL CIRCUIT

METHODOLOGY FOR CLOSING DIESEL BKR ON DEAD BUS.

METHODOLOGY TO CLEAR LOCAL ALARMS ON DIESEL GENERATORS.

- 3. INSTALL UNAMBIGUOUS LABELS ON ALL 13.8KV AND 4.16KV BREAKER AND BUS DC CONTROL POWER SWITCHES.
- 4. RESOLVE THE DIESEL GENERATOR PROBLEMS OBSERVED DURING THE INCIDENT.
- 5. WARNING SIGNS BE INSTALLED CAUTIONING PERSONNEL THAT OPENING THE BUS CONTROL POWER KNIFE SWITCHES DISABLES THE ESS BUS AND THE ASSOCIATED DIESEL GENERATOR.

#### SCRAM NO. 02-84-04

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#### RECOMMENDATIONS

#### B. AS SOON AS POSSIBLE

- 1. THE LOSS OF TURBINE-GENERATOR AND OFFSITE POWER TEST BE REDONE. (TEST WAS SUCCESSFULLY COMPLETED ON 8/7/84)
- 2. POLICY BE ISSUED THAT PROCEDURES STATE, RATHER THAN IMPLY, THE DESIRED POSITION OF CONTROL CIRCUIT SWITCHES.
- 3. PHILOSOPHY OF PROCEDURE COMPLIANCE BE EXAMINED. CHANGES TO PROCEDURES MUST NOT BE MADE WITHOUT MODIFYING THE PROCEDURE THROUGH THE FORMAL REVIEW PROCESS.
- 4. A STUDY OF DIESEL GENERATOR RELIABILITY BE MADE.
- 5. PROBLEM OF COMMON MODE FAILURE DUE TO PERSONNEL ERROR BE EXAMINED AND APPROPRIATE PREVENTIVE ACTION BE TAKEN.

### SUMMARY

### EVENT OVERVIEW

O UNIT 2 STATUS ...... TEST MODE

# INTENTIONAL, MANDATED TESTING - DEFEAT TWO OF THREE ESS POWER SOURCES

#### **o** SIGNIFICANT OPERATING EVENT

### TEST PROGRAM PRIMARY OBJECTIVES

O VERIFY DESIGN

- VALIDATE PREDICTIONS VS ACTUAL
- PROVIDE ASSURANCE RE EQUIPMENT INSTALLATION
- THOROUGHLY FAMILIARIZE THE PLANT OPERATING AND TECHNICAL STAFF WITH THE OPERATION OF THE FACILITY
- VERIFY, BY TRIAL USE, THAT THE FACILITY OPERATING AND EMERGENCY PROCEDURES ARE ADEQUATE

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## **ROOT CAUSES**

### **o** CORRECTIVE ACTION SYSTEM

CORRECTIVE ACTION EVALUATION

CORRECTIVE ACTION IMPLEMENTATION

o PROCEDURE DEFICIENCY

**o** VERIFICATION

- PROCESS UTILIZED

- INDIVIDUAL

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IMPROVEMENT AREAS

### o TRAINING

### • INDEPENDENT VERIFICATION PRACTICES

- o CORRECTIVE ACTION SYSTEM
- o PROCEDURES
- A o DESIGN CONSIDERATIONS



- THE OVERALL SYSTEM OF MANAGEMENT CONTROLS & INVOLVEMENT, PERSONNEL EXPERIENCE & TRAINING, ADMINISTRATIVE AND TECHNICAL PROCEDURES, UNIT DESIGN/PERFORMANCE IS FUNDAMENTALLY STRONG
- > PERSONNEL RESPONDED PROPERLY, TIMELY, AND IN ACCORDANCE WITH APPROVED PROCEDURES
- PROPER PREPARATIONS AND PRECAUTIONS WERE TAKEN FOR TEST PREPARATION AND IMPLEMENTATION

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### MAJOR CONCLUSIONS (CONT.)

- THE INTEGRATED, SUSQUEHANNA SYSTEM OF
  MANAGEMENT CONTROLS, PERSONNEL, PROCEDURES,
  AND TRAINING, RESULTED IN A POSITIVE, TIMELY
  RESPONSE TO THE EVENT
- THIS SYSTEM PROTECTED THE HEALTH AND SAFETY OF THE PUBLIC
- IMPROVEMENTS HAVE BEEN IMPLEMENTED OR ARE PLANNED AND SCHEDULED FOR IMPLEMENTATION



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