

February 20, 1992

Docket No. 50-261

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FACILITY: H.B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2

SUBJECT: MEETING SUMMARY: SAFETY INJECTION (SI) SYSTEM ISSUES

The subject meeting was held on January 31, 1992, at the request of CP&L to provide an overall review of the issues related to the SI system. These issues include the SI pump "C" casing, the electrical loading capacities of the Emergency Diesel Generators, LOCA analysis and core margins and the recent changes in emergency operating procedures. The discussions followed closely to the topics outlined in the viewgraphs CP&L presented (Enclosure 1).

Enclosure 2 is a list of the attendees.

Original signed by:

Ronnie Lo, Senior Project Manager
Project Directorate II-1
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:

1. Meeting handout
2. List of Attendees

cc w/enclosure:

See next page

OFFICE	LA:PDII-1	PM:PDII-1	D:PDII-1		
NAME	Anderson	RLo:dt	EAdensan		
DATE	02/18/92	02/18/92	02/18/92	/ /	/ /

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DISTRIBUTION LIST FOR ROBINSON MEETING SUMMARY

DATED: January 31, 1992

Docket File
NRC & Local PDRs
PDII-1 RDG
T. Murley/F. Miraglia
J. Partlow
S. Varga
G. Lainas
E. Adensam
R. Lo
P. Anderson
OGC
E. Jordan
P.J. Kang
R. Jones
L.W. Garner, RII
ACRS(10)
J. Wechselberger, EDO 17-G-21
L. Reyes, RII

260006

**CAROLINA POWER AND LIGHT COMPANY
ROBINSON NUCLEAR PROJECT
TECHNICAL MEETING WITH USNRC**

**REVIEW OF TECHNICAL AND MANAGEMENT
ISSUES ASSOCIATED WITH THE
SAFETY INJECTION SYSTEM**

JANUARY 31, 1992

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

OBJECTIVES

- TO PROVIDE AN INTEGRATED REVIEW OF TECHNICAL ISSUES AND MANAGEMENT ACTIONS ASSOCIATED WITH THE SI SYSTEM, INCLUDING:
 - LOCA ANALYSIS AND CORE MARGINS
 - SI PUMP "C" CASING
 - ELECTRICAL SYSTEM AND EMERGENCY DIESEL GENERATORS

- TO IDENTIFY CURRENT ISSUES AND FUTURE CONSIDERATIONS REGARDING:
 - THE CONTINUED OPERABILITY AND RELIABILITY OF THE SI SYSTEM
 - THE MAINTENANCE OR IMPROVEMENT OF EXISTING MARGINS
 - THE CONTINUED ABILITY OF THE SI SYSTEM TO MITIGATE ANALYZED OR POSTULATED EVENTS

- TO PROMOTE A MUTUAL UNDERSTANDING OF PAST AND CURRENT SI SYSTEM ISSUES

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

AGENDA

- OPENING REMARKS C. R. DIETZ



- OVERVIEW OF SI SYSTEM R. H. CHAMBERS

- REVIEW OF SI SYSTEM
TIME LINE R. H. CHAMBERS

- CURRENT ISSUES AND
FUTURE CONSIDERATIONS
 - LOCA ANALYSIS T. B. CLEMENTS
 - ELECTRICAL/EDGs G. E. ATTARIAN
 - SI PUMP "C" R. H. CHAMBERS

- CONCLUDING REMARKS C. R. DIETZ

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

OVERVIEW OF SI SYSTEM

- ORIGINAL DESIGN CONCEPTS
 - INSTALLATION OF THREE SI PUMPS; THIRD PUMP CONSIDERED AN INSTALLED SPARE
 - PSAR/SAR SHOW ONE PUMP CAPABLE OF SATISFYING ECCS REQUIREMENTS
 - LOCA CALCULATIONS SHOW ACCEPTABLE PEAK CLAD TEMPERATURES FOR THIS CONFIGURATION

2280° PCT
1969

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

OVERVIEW OF SI SYSTEM (CONTINUED)

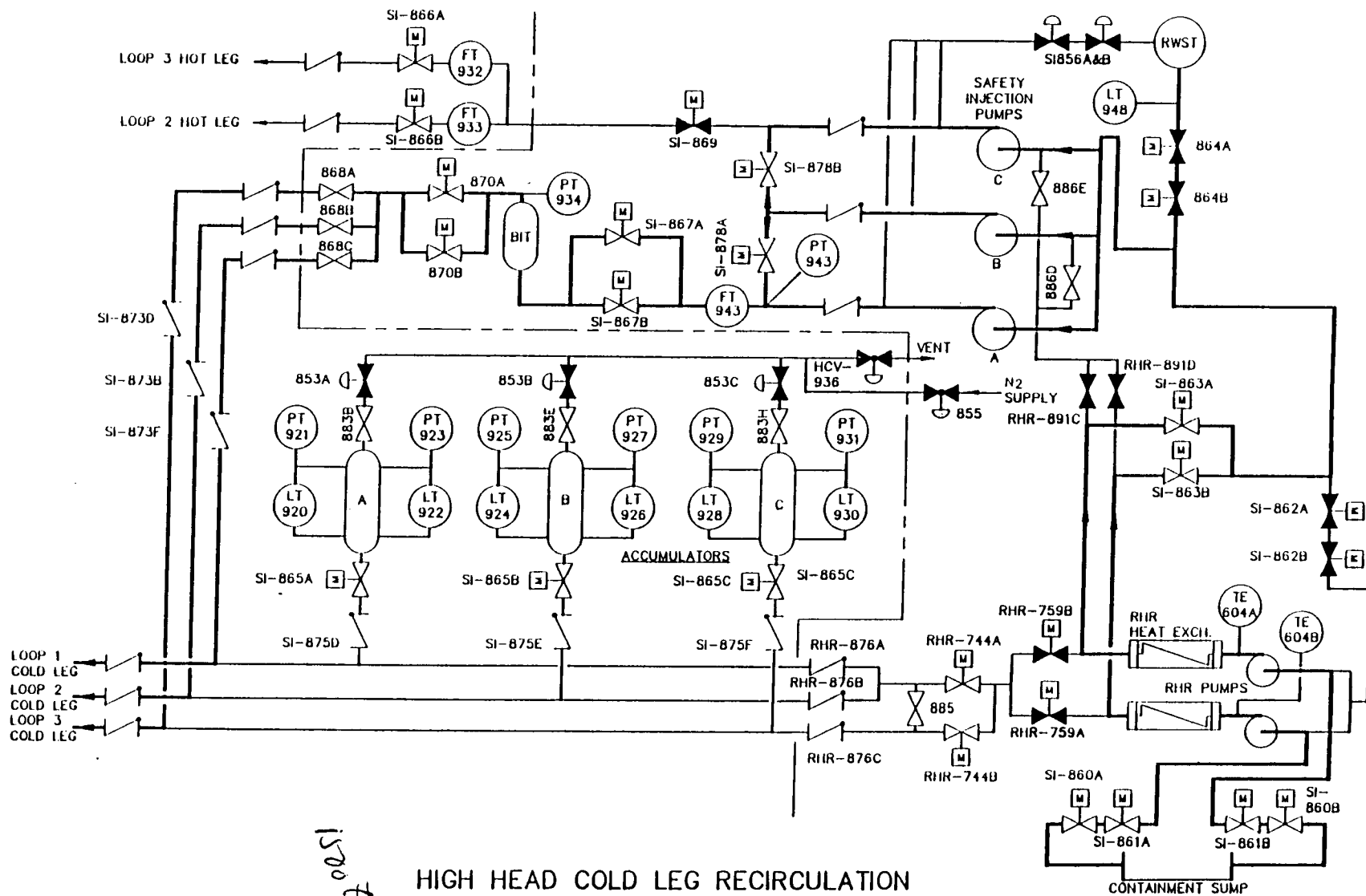
- EVOLUTION OF DESIGN
 - CHANGES IN LICENSING AND ANALYSIS REQUIREMENTS ADDRESSED BY ADDITION OF AUTO START FEATURE TO SPARE SI PUMP
 - ADDITION OF AUTO START FEATURE REQUIRES COMPLICATED ELECTRICAL SWITCHING
 - PREVAILING SEPARATION AND INDEPENDENCE CRITERIA LESS RIGOROUS THAN CURRENT STANDARDS
 - CERTAIN SCENARIOS NOT CONSIDERED CREDIBLE
 - EVIDENCED BY DIFFERENCES BETWEEN LICENSED CONFIGURATIONS OF HBR2, GINNA, TURKEY POINT, INDIAN POINT

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

OVERVIEW OF SI SYSTEM (CONTINUED)

- RECENT SYSTEM HISTORY (1987 TO PRESENT)
 - ECCS SWITCHOVER
 - SINGLE FAILURE SCENARIOS
 - EDGs AND ELECTRICAL DISTRIBUTION SYSTEM
 - LOCA ANALYSIS AND CORE MARGINS
 - SI PUMP "C" CASING CRACK

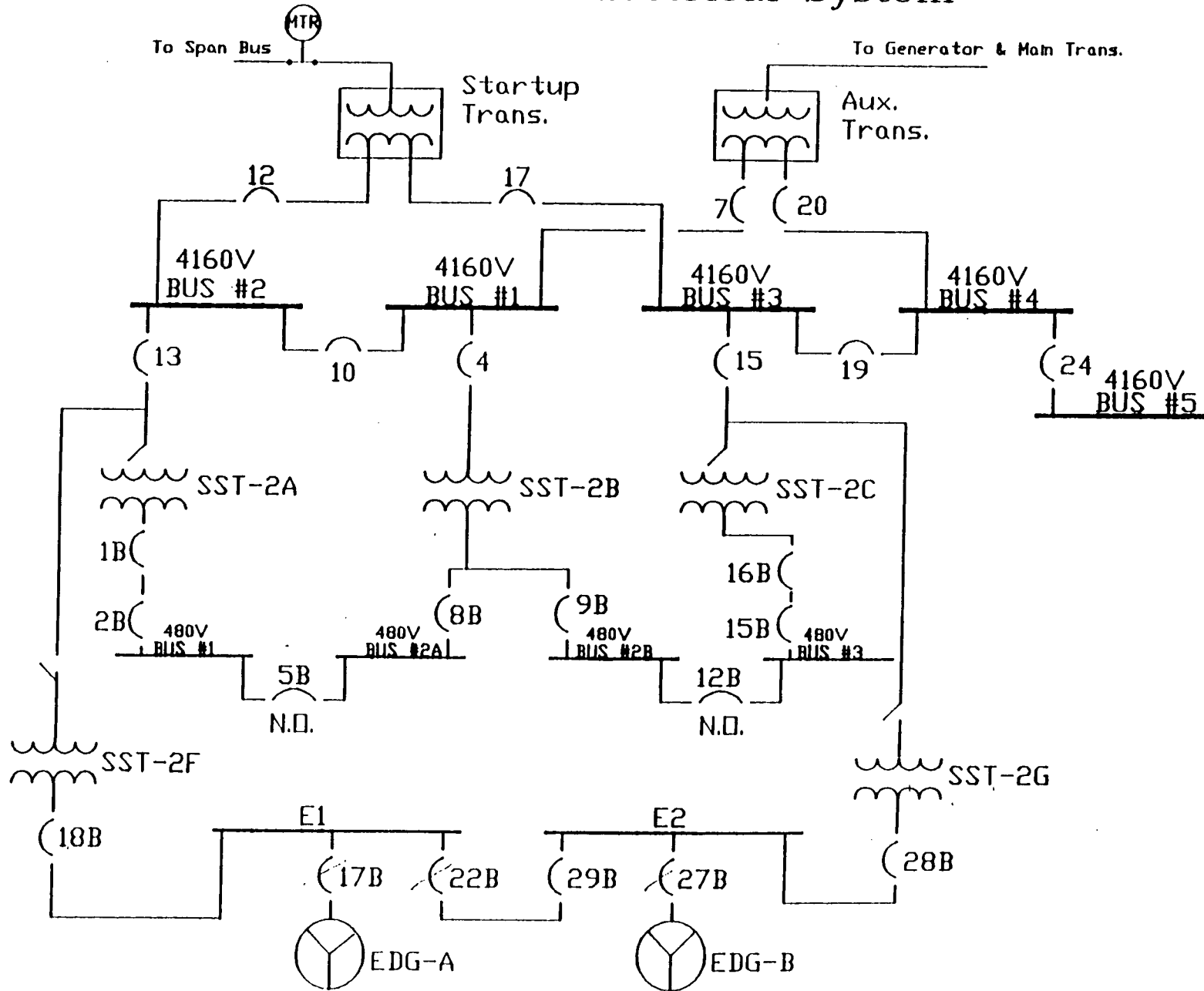
- CURRENT SYSTEM STATUS AND CONFIGURATION



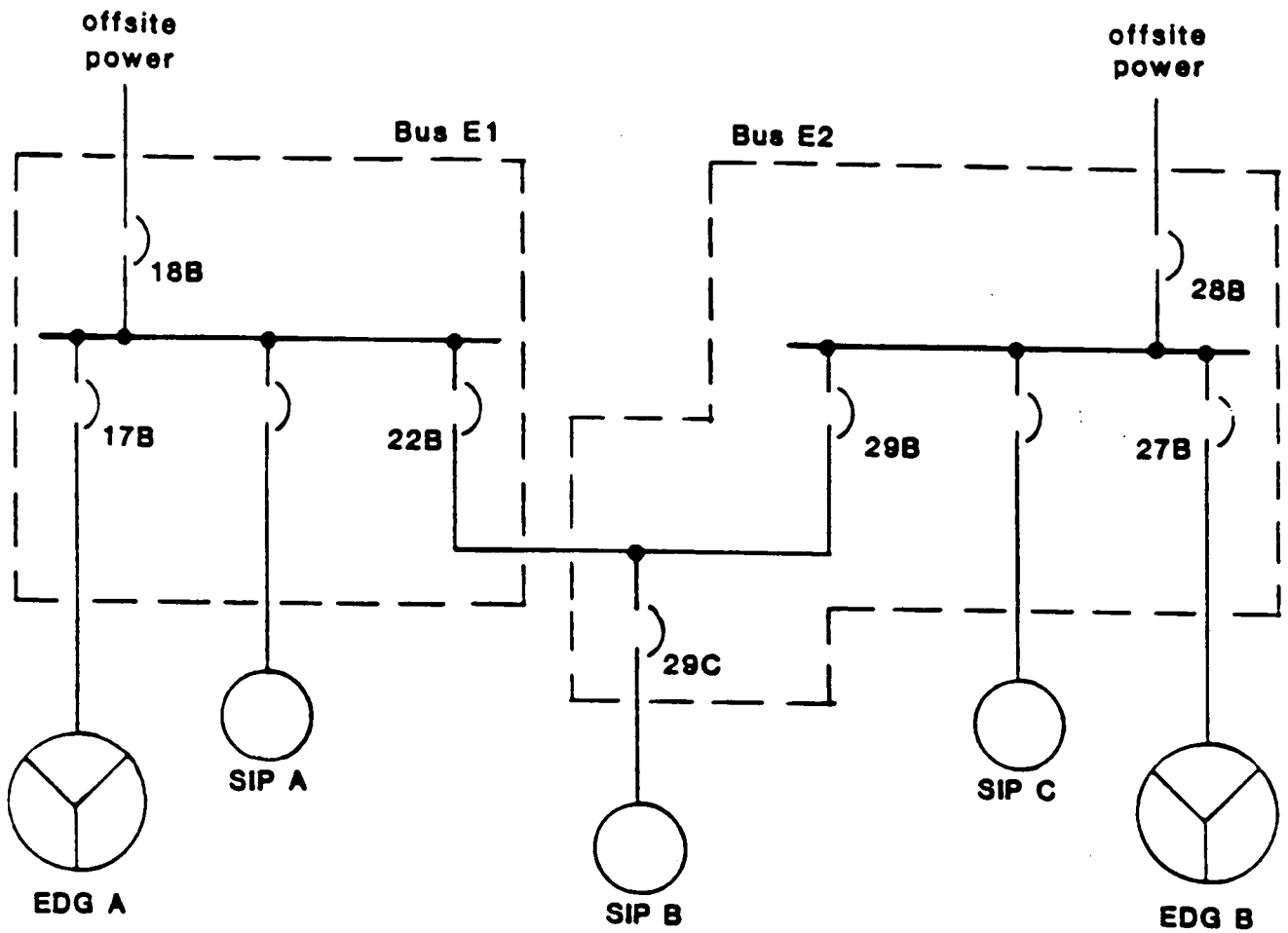
1500# SI

HIGH HEAD COLD LEG RECIRCULATION

480 VAC Electrical System



Emergency Bus Layout For Safety Injection Pumps




TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

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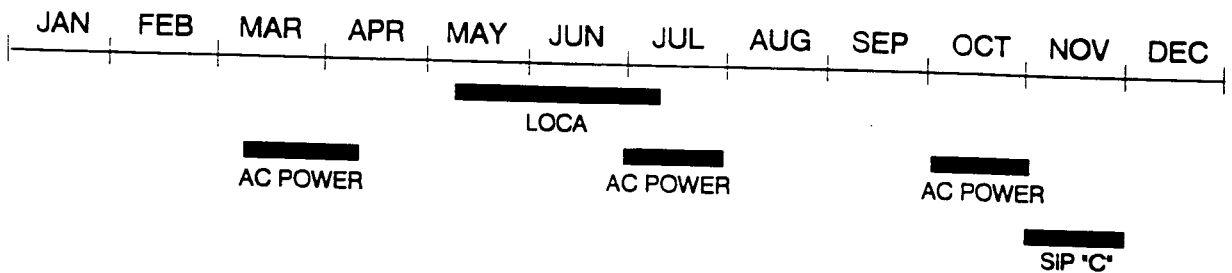
- OVERVIEW OF SI SYSTEM R. H. CHAMBERS

-  REVIEW OF SI SYSTEM
TIME LINE R. H. CHAMBERS

- CURRENT ISSUES AND
FUTURE CONSIDERATIONS
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 - ELECTRICAL/EDGs G. E. ATTARIAN
 - SI PUMP "C" R. H. CHAMBERS

- CONCLUDING REMARKS C. R. DIETZ

SI SYSTEM TIME LINE 1987



MARCH - APRIL

- SAFETY SYSTEM FUNCTIONAL INSPECTION

*handy issue
of EDG*

MAY - JULY

- ECCS SWITCHOVER CHANGES

JULY

- CONSULTANT IDENTIFIED FOR PERFORMANCE OF FORMAL EDG LOADING CALCULATION

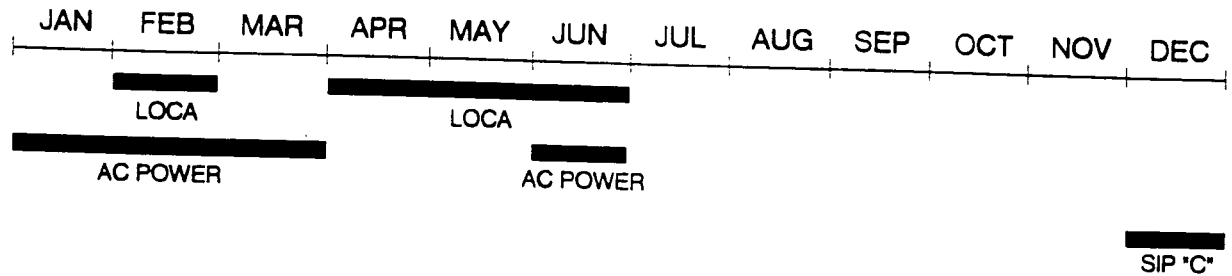
OCTOBER

- DETAILED ANALYSIS BEGINS ON EDG LOADING CALCULATION

NOVEMBER

- BORIC ACID NOTED ON SIP "C" FLANGE BOLTS

SI SYSTEM TIME LINE 1988



JANUARY

- IDENTIFICATION OF SIP "B" SINGLE FAILURES
- EOP'S INTEGRATED WITH EDG LOADING CALCULATION

FEBRUARY

- MOD-947 IMPLEMENTED
- ANALYSIS PERFORMED FOR OPERATION WITH ONE SI PUMP

MARCH

- MOD-951 IMPLEMENTED; SIP "B" LEFT AS MANUAL START PUMP

APRIL - MAY

- REVISED LB AND SB LOCA ANALYSES COMPLETED FOR 100% POWER

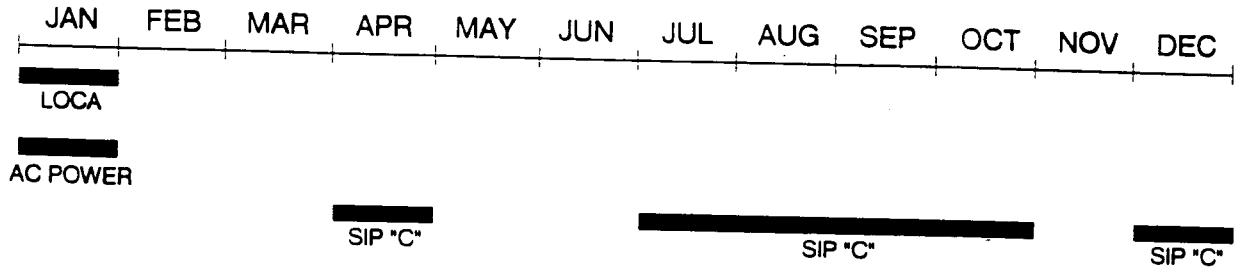
JUNE

- TS AMENDMENT ISSUED; POWER INCREASED TO 100%
- SECOND SI PUMP DELETED FROM EDG LOADING CALCULATION

DECEMBER

- LEAKAGE NOTED AT SIP "C" GASKET

SI SYSTEM TIME LINE 1989



JANUARY

- NFS DESIGN ACTIVITY 89-001 ISSUED TO SUPPORT EPP-009
- MOD-958 IMPLEMENTED

APRIL

- FLANGE LEAK NOTED ON SIP "C"

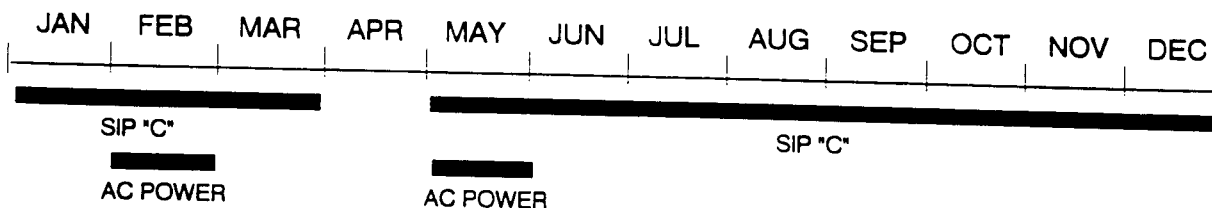
JULY - OCTOBER

- ON-GOING INVESTIGATION OF SIP "C" FLANGE LEAK
 - METALLURGICAL ANALYSIS INDICATES CASTING FLAWS
 - DECON INITIATED

DECEMBER

- SIP "C" SHIPPED TO BRUNSWICK FOR DECON

SI SYSTEM TIME LINE 1990



JANUARY

- DRESSER IDENTIFIED FOR REPAIRS TO SIP "C"

FEBRUARY

- SIP "C" DECON CONTINUES IN WASHINGTON STATE
- REV. 0 OF EDG LOADING CALCULATION ISSUED

MARCH

- SIP "C" DECON COMPLETED; CASING SHIPPED TO DRESSER FOR REPAIRS

MAY

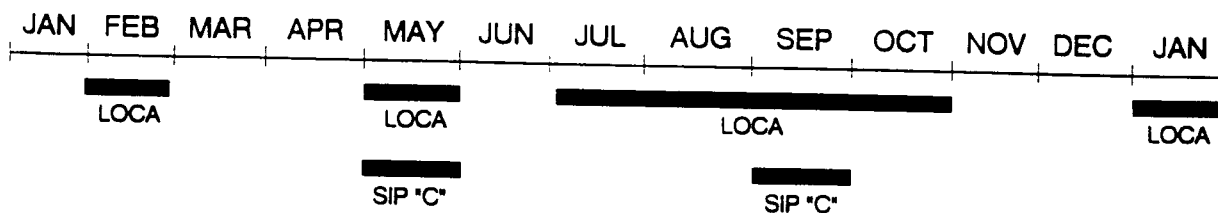
- SIP "C" REPAIR QUOTE RECEIVED
- REV. 1 OF EDG LOADING CALCULATION ISSUED

JUNE - DECEMBER

- SIP "C" REPAIR ABANDONED; TWO NEW CASINGS TO BE PURCHASED
- SPECIFICATION DEVELOPMENT AND BUDGETING ON-GOING FOR PURCHASE OF NEW SI PUMP CASINGS

SI SYSTEM TIME LINE

1991/1992



FEBRUARY

- ANF REPORTS ERROR IN LB LOCA ANALYSIS

MAY

- ERROR IDENTIFIED IN NFS DESIGN ACTIVITY 89-001; POWER REDUCTION TO 60% INITIATED
- ANALYSIS FOR 100% POWER COMPLETED; UNIT RETURNED TO 100% POWER
- SPECIFICATIONS FOR SIP "C" RELEASED TO PURCHASING DEPARTMENT

JULY - OCTOBER

- SB LOCA ANALYSIS PERFORMED; "SECOND PEAK" IDENTIFIED DURING ECCS SWITCHOVER

SEPTEMBER

- PURCHASE ORDER ISSUED FOR TWO NEW SI PUMP CASINGS

JANUARY, 1992

- REVISIONS TO EPP-009 AND EPP-010 APPROVED

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

AGENDA

- OPENING REMARKS C. R. DIETZ

- OVERVIEW OF SI SYSTEM R. H. CHAMBERS

- REVIEW OF SI SYSTEM
TIME LINE R. H. CHAMBERS



CURRENT ISSUES AND
FUTURE CONSIDERATIONS

- LOCA ANALYSIS T. B. CLEMENTS
- ELECTRICAL/EDGs G. E. ATTARIAN
- SI PUMP "C" R. H. CHAMBERS

- CONCLUDING REMARKS C. R. DIETZ

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS

LOCA ANALYSIS

- SECOND AND THIRD PCT PEAKS ADDRESSED BY EOP CHANGES

- HISTORICAL PCT DATA AND USE OF MARGINS

- EXTENDING CORE BURN/FUEL CYCLE
 - HIGH PERFORMANCE FUEL DESIGN
 - INCREASES TO ALLOWABLE PEAKING FACTORS
 - REQUIREMENTS FOR ADDITIONAL SI FLOW; VARIOUS OPTIONS BEING CONSIDERED AND PLANNED

H.B. ROBINSON UNIT 2

1 HHSI SWITCHOVER ANALYSIS

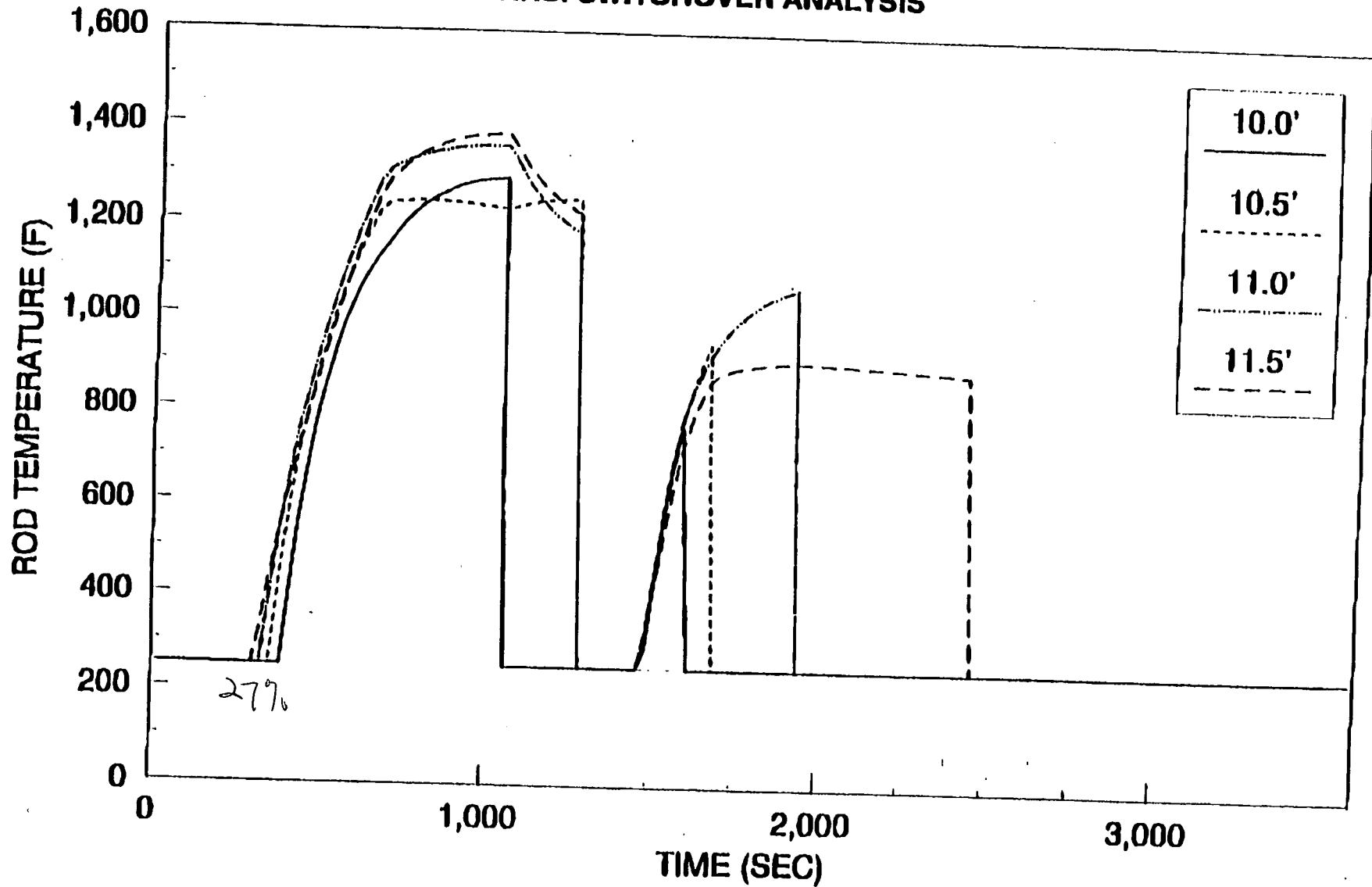
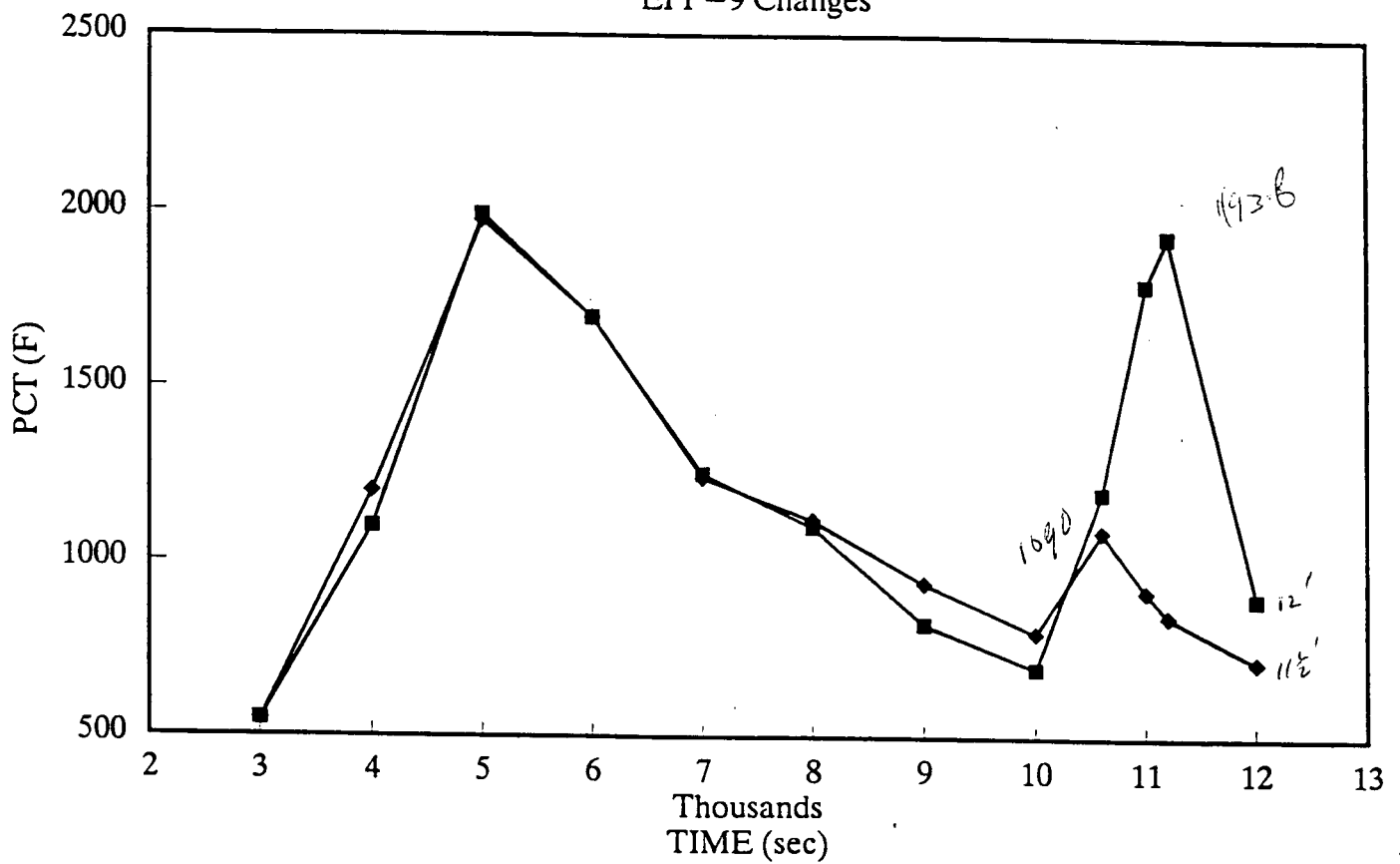


FIGURE 8-ROD TEMPERATURE VS. TIME

SBLOCA Switchover Changes

EPP-9 Changes



■ Ten minute switchover ◆ Three minute switchover

$1\frac{1}{2}$ "
limit is
break.

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

LOCA ANALYSIS (CONTINUED)

• HISTORICAL FULL POWER PCT DATA

-	NOV. 4, 1984	LB PCT	2197°F
-	NOV. 8, 1985	LB PCT	2199°F
-	OCT. 2, 1986	LB PCT	2127°F
-	MAR. 11, 1987	SB PCT	1398°F
-	MAY 7, 1988	LB PCT	1982°F
		SB PCT	2004°F
-	JAN. 16, 1991	LB PCT	2178°F
-	JULY 26, 1991	SB PCT	2096°F
-	CYCLE 15 (DRAFT)	LB PCT	2146°F

*Out of SG
replacement*

*2 pump 3"
one pump 1 1/2"*

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

ELECTRICAL/EDGs

SI
↓

• OBJECTIVES

- DEMONSTRATE THE TECHNICAL ADEQUACY OF THE HBR2 ELECTRICAL DISTRIBUTION SYSTEM
- ENSURE THE LIMITATIONS OF THE SYSTEM ARE UNDERSTOOD
- DISCUSS APPROPRIATE RECOMMENDATIONS FOR SYSTEM MODIFICATIONS OR ENHANCEMENTS
- DISCUSS THE REQUIRED INFRASTRUCTURE TO MAINTAIN AND CONTROL SYSTEM CHANGES

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

ELECTRICAL/EDGs (CONTINUED)

• PLAN

BASELINE THE ELECTRICAL DISTRIBUTION SYSTEM

- ESTABLISH SYSTEM LEVEL DESIGN BASIS
- DEVELOP MATRIX OF REQUIRED CALCULATIONS
 - CAPACITY
 - VOLTAGE
 - SHORT CIRCUIT
 - PROTECTION/COORDINATION
- DEVELOP DESIGN METHODOLOGY
 - DESIGN GUIDES
- IDENTIFY LIMITATIONS AND MARGINS

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

ELECTRICAL/EDGs (CONTINUED)

- **PLAN (CONTINUED)**

**RECOMMEND AND IMPLEMENT REQUIRED PROJECTS TO
MAINTAIN DESIGN BASIS AND TO INCREASE MARGINS**

**RECOMMEND POTENTIAL LONG TERM ENHANCEMENTS
THAT CONSIDER THE LIMITATIONS OF THE EXISTING
SYSTEM**

**IMPLEMENT PLAN WHEN DEALING WITH EMERGENT
ISSUES**

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

ELECTRICAL/EDGs (CONTINUED)

• CAPACITY

DETERMINE THAT ONSITE AND OFFSITE SOURCES AND EQUIPMENT HAVE ADEQUATE CAPACITY TO PERFORM THEIR INTENDED FUNCTION

- DEVELOPMENT OF LOAD FACTORS

INDIVIDUAL LOAD

EOP'S

DISCUSSION WITH PLANT OPERATORS

FUNCTIONAL REVIEW

- DEVELOPMENT OF TIME LINE

ONSITE

OFFSITE

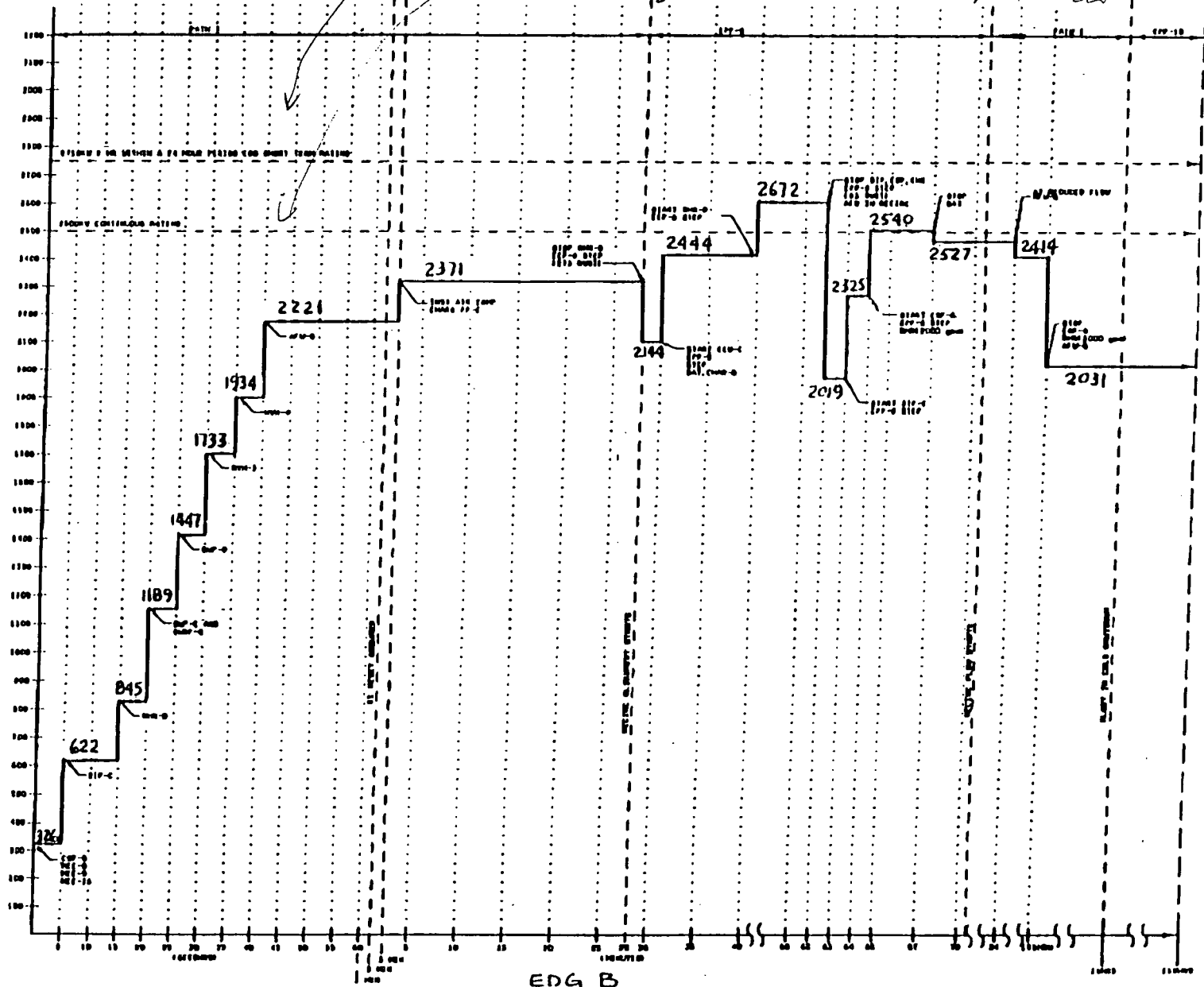
- IDENTIFICATION OF MARGINS

EDG "B" LOADING TIME LINE

PRELIMINARY RESULTS

*Accin
flow start
75 + min*

18 hrs



TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

ELECTRICAL/EDGs (CONTINUED)

• FUTURE CONSIDERATIONS

MANAGEMENT OF MARGINS

- INCREASE SYSTEM FLEXIBILITY
- INCREASE SYSTEM RESPONSIVENESS
- ANTICIPATION OF FUTURE LOAD GROWTH
- MAINTAIN THE DISTRIBUTION SYSTEM WITHIN DESIGN MARGINS

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

ELECTRICAL/EDGs (CONTINUED)

• FUTURE CONSIDERATIONS (CONTINUED)

METHODOLOGY

- ANALYZE EXISTING COMPONENTS INDIVIDUALLY VS LIMITATIONS FOR POTENTIAL IMPROVEMENTS

DIESEL GENERATORS
EMERGENCY BUSES

*increase capacity
Component*

- ANALYZE POTENTIAL OPERATIONAL AND FUNCTIONAL CHANGES

- ANALYZE THE EXISTING SYSTEM IN ITS ENTIRETY

SYSTEM VOLTAGE CHANGES
ADDITIONAL BUSES

480 → 816?

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

ELECTRICAL/EDGs (CONTINUED)

- FUTURE CONSIDERATIONS (CONTINUED)

THROUGH THE CONTINUATION OF THE ELECTRICAL RECONSTITUTION PLAN, HBR2 IS OPTIMIZING THE UNDERSTANDING, CONTROL, AND MANAGEMENT OF THE LIMITATIONS AND MARGINS OF THE ELECTRICAL DISTRIBUTION SYSTEM AND IDENTIFYING POTENTIAL ENHANCEMENTS TO INCREASE THE FLEXIBILITY OF THE SYSTEM

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CURRENT ISSUES AND FUTURE CONSIDERATIONS (CONTINUED)

SI PUMP "C"

- DELIVERY ANTICIPATED LATE THIS YEAR
- INSTALLATION NO LATER THAN REFUELING OUTAGE 15 (1993)
- FOLLOWING RETURN TO SERVICE, SI PUMP "B" WILL REMAIN A MAINTENANCE SPARE PUMP THAT MAY BE SUBSTITUTED FOR EITHER SI PUMP "A" OR "C"

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992


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TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CONCLUDING REMARKS

- SUMMARY OF PAST ISSUES
 - TECHNICALLY COMPLEX
 - INHERENT TO ORIGINAL DESIGN/ANALYSIS OF SI SYSTEM
 - APPROPRIATE AND CONSERVATIVE CORRECTIVE ACTIONS TAKEN

- CURRENT ISSUES AND FUTURE CHALLENGES
 - SEVERITY LEVEL III VIOLATION; EMPHASIS ON DESIGN AND ENGINEERING FUNCTIONS
 - MANAGEMENT OF MARGINS
 - INDUSTRY COMPETITIVENESS

TECHNICAL MEETING
SAFETY INJECTION SYSTEM
JANUARY 31, 1992

CONCLUDING REMARKS (CONTINUED)

- MANAGEMENT INITIATIVES
 - TASK TEAM ACTIVELY INVOLVED WITH ASSESSMENT AND MANAGEMENT OF MARGINS
 - OPEN, ON-GOING DIALOGUE WITH NRC; "COMMUNICATION IS ESSENTIAL"

- COMMITMENT TO THE SAFE, CONTINUED OPERATION OF H. B. ROBINSON UNIT NO. 2

MEETING WITH CAROLINA POWER & LIGHT COMPANY

H. B. ROBINSON 2

January 31, 1992

LIST OF ATTENDEES

<u>NAME</u>	<u>ORGANIZATION</u>
R. H. Lo	NRR/PDII-1
C. R. Dietz	CP&L
P. J. Kang	NRR/DST/SELB
G. C. Lainas	NRR/DRP
R. Jones	NRC/SRXB
E. G. Adensam	NRC/NRR/PDII-1
L. W. Garner	RII
C. T. Baucom	CP&L
R. H. Chambers	CP&L
R. W. Prunty, Jr.	CP&L
G. Attarian	CP&L
T. Clements	CP&L
V. San Angelo	Bechtel