GE Nuclear Energy

ABWR

Date 3/18/94

To Chet Poslusny Fax No. —

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Subject Revised response to DSER(SECY-91-235) outstanding Issue 31

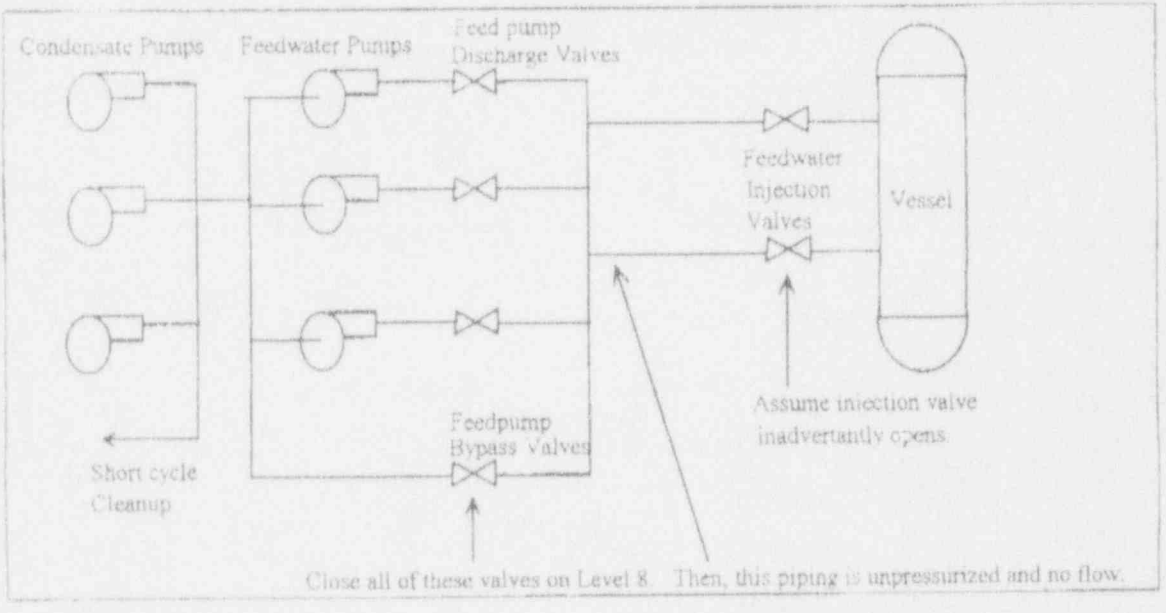
Message Chet, please run this by George Thomas. Note, this subject appears on FSER page 5-33 and 5-34

Jack

This is a revised response to DSER Open Item 2.31.

It was previously stated that the resolution to this issue was to trip the condensate pumps in the event of Level 8. In the SSAR this was further restricted to occur only if it was coincident with indication that the feedpump discharge valves were not fully closed. This solution imposes unreasonable restrictions on plant operation. From an operational standpoint, it is desirable to maximize the availability of the condensate pumps (short cycle cleanup mode to keep condensate in hotwell clean), even during shutdown periods, when reactor water level could be expected to be above Level 8.

The preferable solution is to close all feedpump discharge and bypass valves in the event of Level 8. This solution isolates the condensate pumps from the vessel, but allows them to remain available and operating for short cycle cleanup mode. It resolves the concern about vessel overpressurization by isolating the condensate pump from the feedwater piping sections in between the feedpump discharge valves and the feedwater injection valves. Therefore, even if the feedwater injection valves inadvertantly open, the closed feedwater pump discharge and bypass valves prevent condensate flow to the vessel.



The attached markups show the changes to SSAR chapter 7.7.1.4 (9) (Interlocks) and Figures 7.7-8 and 7.7-9 to adopt this improvement. We plan to include these changes in Ammendment 34.

flow control valve signal through a linearizing function generator and then to the feedpump flow control actuator.

In the single-element control mode, which is employed at lower feedwater flow rates, only a conditioned level error is used to determine the feedpump demand. The master level controller (proportional + integral) conditions the level error and sends it directly to the feedpump actuator linearizing function generator and then to the feedpump flow control actuator itself. When the reactor water inventory must be decreased, during very low steam flow rate conditions, the CUW System dump valve is controlled by the FWCS in single element control. Reactor water is dumped through the CUW System to the condenser.

Each feedpump flow control actuator can be controlled "manually" from the main control panel by selecting the manual mode for that feedpump. In manual mode, the operator may increase or decrease the demand that is sent directly to the linearizing function generator of the chosen feedpump flow control actuator.

(9) Interlocks

The level control system also provides interlocks and control functions to other systems. When the reactor water level reaches the Level 8 trip setpoint, the FWCS simultaneously annunciates a control room alarm, sends a trip signal to the Turbine Control System to trip the turbine generator, and sends trip signals to the Condensate, Feedwater and Condensate Air Extraction (CF&CAE) System to trip all feed pumps and to close the main feedwater discharge valves. This interlock is enacted to protect the turbine from damage from high moisture content in the steam caused by excessive carryover while preventing water level from rising any higher. This interlock also prevents overpressurization of the vessel by isolating the condesate pumps from the vessel.

In the event that the feedwater pump discharge valves fail to close following the Level 8 trip signal, the FWCS automatically issues another signal to the CF&CAE System to trip all condensate pumps in order to avoid overpressurization of the vessel.

Upon detection of a loss of feedwater heating, the FWCS will send a signal to the Recirculation Flow Control System which will signal the Rod Control and Information System (RCIS) for initiation of automatic selected control rod run-in (SCRRI). This is done to minimize reactivity transient resulting from introduction of cold feedwater in such an event.

NOTES:

1. LOCAL CONTROL ALLOWS THE OPERATOR TO EITHER MANUALLY MANIPULATE DEMAND SIGNALS OR PLACE THEM IN AUTOMATIC CONTROL AT MANUAL/AUTO STATIONS. POWER GENERATION CONTROL SYSTEM (PGC) CONTROL ALLOWS THE COMPUTER TO DIRECTLY MANIPULATE DEMAND SIGNALS AT THE M/A STATION OR PLACE THEM IN AUTOMATIC CONTROL.

2. MULTIPLE TRANSMITTER SIGNAL INPUTS FOR SIMILAR PROCESS SIGNALS ARE, IN GENERAL, COMBINED INTO SINGLE SIGNALS WITHIN EACH DMC CHANNEL BY THE SIGNAL VALIDATION ALGORITHMS. IN THE CASE OF FLOW RATES IN PARALLEL FLOW PATHS (SUCH AS INDIVIDUAL STEAM LINE FLOWS), THIS INVOLVES SUMMING THE FLOWS TO OBTAIN TOTAL FLOW. IN THE CASE OF REDUNDANT TRANSMITTER SIGNALS (SUCH AS REACTOR WATER LEVEL), THIS INVOLVES DETERMINATION OF A SINGLE VALID VALUE FOR THE PARAMETER. IN THIS DOCUMENT, THE COMBINED SINGLE VALIDATED SIGNAL IS SHOWN IN GENERAL. ONE EXCEPTION IS THE REACTOR WATER LEVEL SIGNALS USED FOR ATWS MITIGATION LEVEL 3 SIGNAL ISSUED TO THE RFCS SYSTEM (RPT). IN THIS CASE, ALL THREE LEVEL TRIP SIGNALS MUST BE SENT TO RFCS, AND RFCS COMBINES THE TRIP SIGNALS FOR THE ATWS RPT LOGIC. THEREFORE, ALL THREE LEVEL TRANSMITTER SIGNALS ARE SHOWN IN THE LOGIC DEPICTION.

3. THE PUSH BUTTON SWITCH (PBS) SENDS A HIGH SIGNAL FOR AT LEAST ONE COMPLETE SAMPLING PERIOD.

4. THE STATUS INDICATOR (⊛) IS DISPLAYED ON FDWC DEDICATED SOFTWARE FACED DISPLAY.

5. LOGIC OF ONE DMC, TYPICAL OF ALL THREE DMCs, IS SHOWN FOR REFERENCE PURPOSES ONLY. ANNUNCIATORS AND COMPUTER POINT SYMBOLS ARE SHOWN HERE. THESE OUTPUTS ARE ACTUALLY IMPLEMENTED BY VOTERS AS SHOWN IN REFERENCE C31-1010.

6. DELTA T TIME DELAY SET TO ALLOW FOR VALVE STROKE TIME OF RFP DISCHARGE VALVES. ALL CONDENSATE PUMPS TRIP IF ANY RFP DISCHARGE VALVE FAILS TO CLOSE WITHIN DELTA T TIME DELAY AFTER REACTOR WATER LEVEL EXCEEDS LEVEL 8.

7. TRIP FUNCTION SHOWN WITHIN DASH LINES ARE PERFORMED BY INDEPENDENT MICROPROCESSOR NUMBER 2. ALL FUNCTIONS ARE PPERFORMED BY MICROPROCESSOR NUMBER 1.

8. LOGIC FOR ATWS FEEDWATER RUNBACK SHOWN WITHIN DASHED LINES IS PERFORMED BY SAFETY SYSTEM LOGIC AND CONTROL (SSLC) LOGIC IS FOR SSLC DIV I AND TYPICAL FOR DIVISIONS II, III AND IV.

TABLE OF CONTENTS

SUPPLEMENTAL DOCUMENTS UNDER THE FOLLOWING IDENTITIES ARE TO BE USED IN CONJUNCTION WITH THIS DRAWING.

		REFERENCE DESIGNATOR
1	FEEDWATER CONTROL SYSTEM, IED	C31-1010
2	RECIRCULATION FLOW CONTROL SYSTEM, IED	C81-1010
3	CONDENSATE, FEEDWATER & CONDENSATE AIR EXTRACTION SYSTEM, P&ID	N21-1010
4	CONDENSATE, FEEDWATER & CONDENSATE AIR EXTRACTION SYSTEM, IBD	N21-1030
5	REACTOR WATER CLEANUP SYSTEM, P&ID	G31-1010
6	REACTOR WATER CLEANUP SYSTEM, IBD	G31-1030
7	NUCLEAR BOILER SYSTEM, P&ID	B21-1010
8	NUCLEAR BOILER SYSTEM, IBD	B21-1030
9	PROCESS COMPUTER, IED	C91-1010
10	RECIRCULATION FLOW CONTROL SYSTEM, IBD	C81-1030
11	MAIN CONTROL ROOM PANEL, ARGNT	H11-4050
[illegible]	TURBINE CONTROL SYSTEM, IED	N32-1010
13	TURBINE CONTROL SYSTEM, IBD	N32-1030
14	NEUTRON MONITORING SYSTEM, IED	C51-1010

MPL NO. C31-1030

REV STATUS		REVISIONS
SH NO	REV	
1-14	1	1 JUL 2 6 1993 MB TORRES RJA — GENERAL DOCUMENT CHANGE NR02028 ADDED NOTES 6,7&8, RX DOME PRESS & OPRM DNSC INPUTS 5 CONTROL LOGIC, LOSS OF FW HEATING LOGIC. CHK BY: WB TORRES, JW HOWARD

EQUIPMENT CLASS CODE

SAFETY RELATED: THIS ITEM IS OR CONTAINS A SAFETY RELATED ITEM ☐ YES ☐ NO

FEEL CLASS 1A: NUCLEAR SAFETY RELATED ☐ YES ☐ NO

SIGNATURES	DAY	MO	YR
DRAWN WB TORRES	16	9	91
CHECKED WB TORRES	5	5	93
RJ AHMANN	5	5	93
J HOWARD	5	5	93

APPLIED PRACTICES ✓

UNLESS OTHERWISE SPECIFIED TOLERANCES ON: 2 PLACE DECIMALS ± FRACTIONS ± 3 PLACE DECIMALS ± ANGLES ±

GENERAL ELECTRIC — NEGD DEPT LOC SAN JOSE

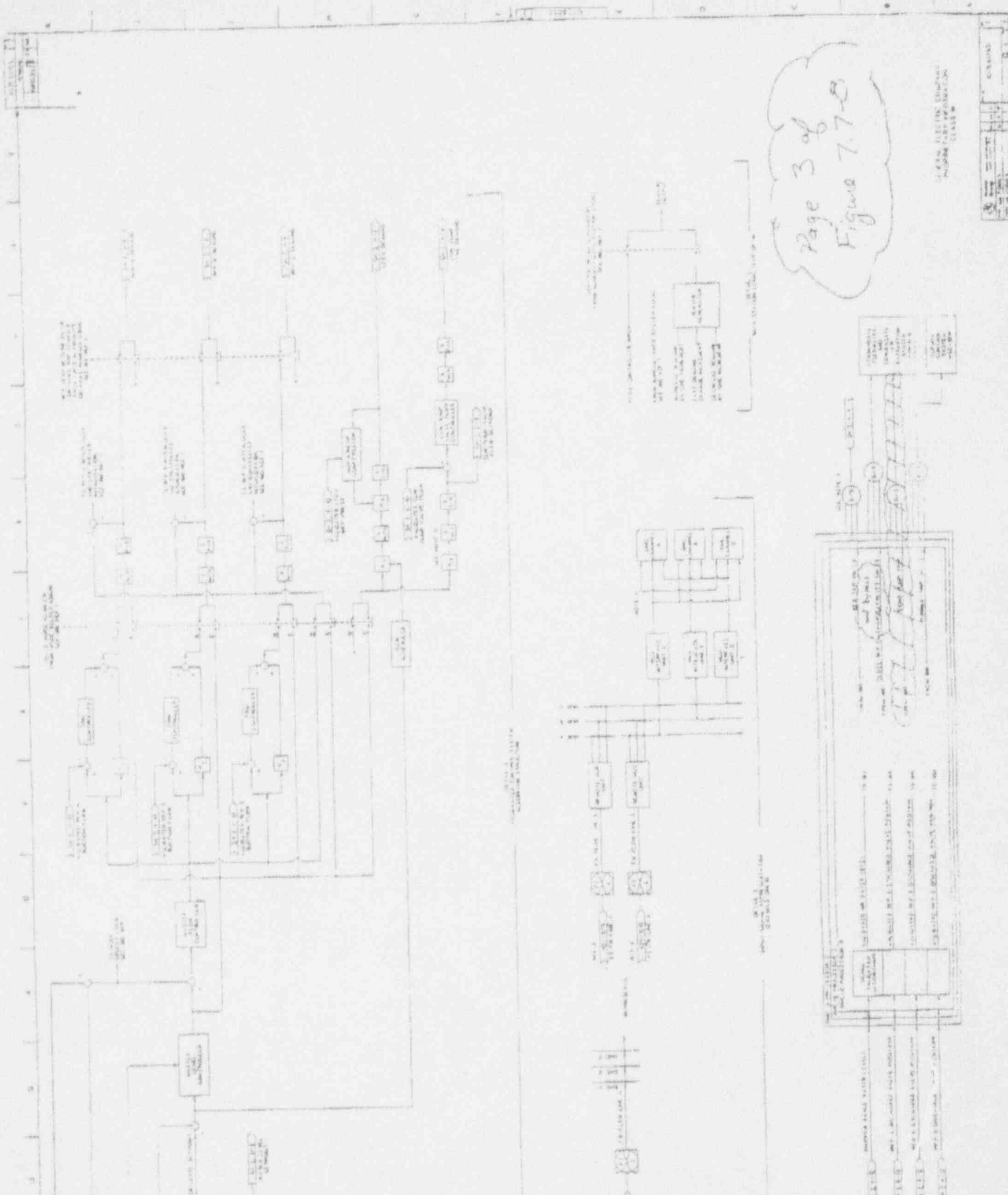
DOC TYPE: IBD

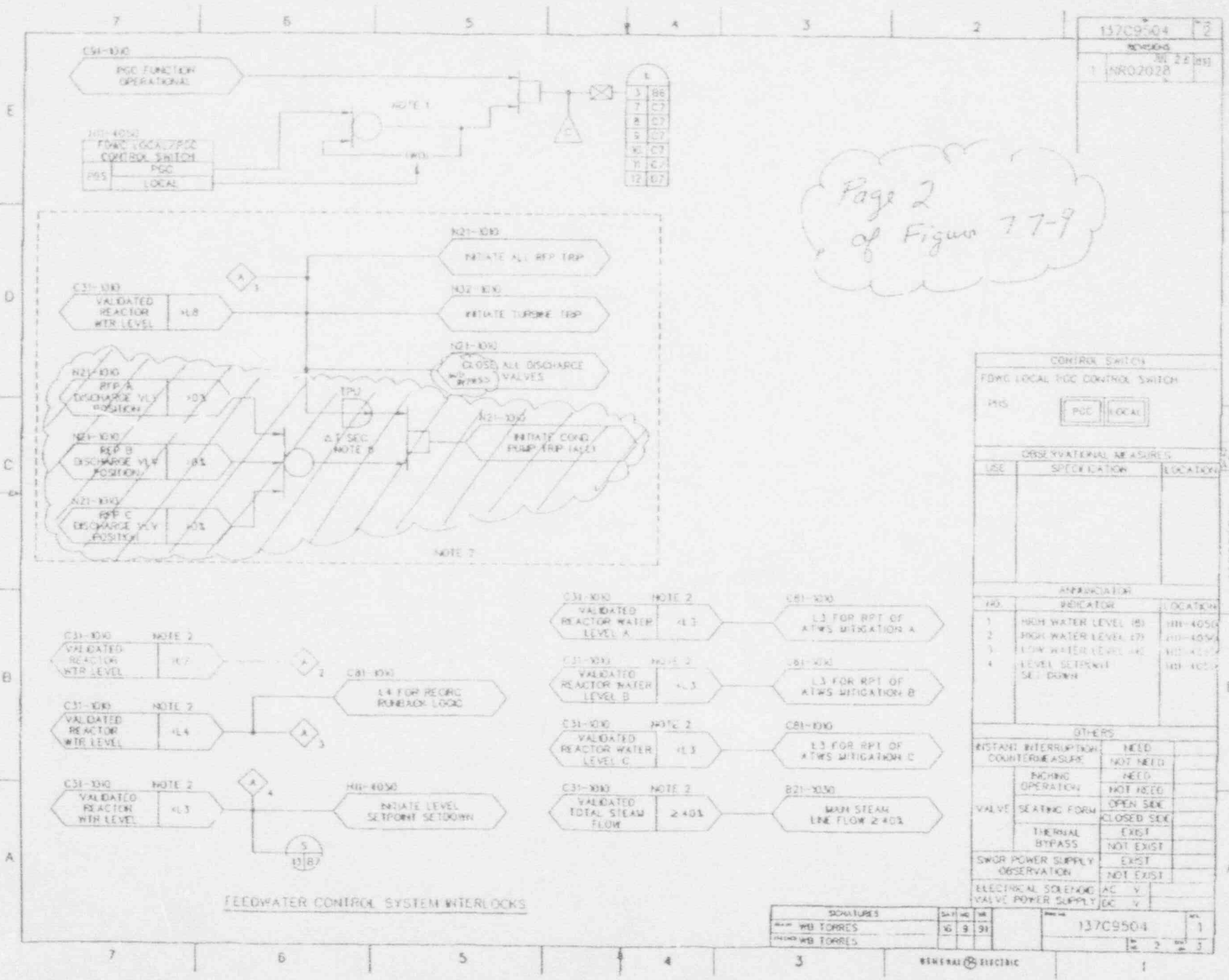
FEEDWATER CONTROL SYSTEM

1st CERT PROG: 5 MAY 1993 — DWG NO 137C9504 — SH 1 — DWH 5248 — SIZE C — SH 1 CONT ON 2

F3S 1

Page 1 of Fig. 7.7-8


Page 3 of
Figure 7.7-8



Page 2 of Figure 7.7-9

< TRANSACTION REPORT >

03-18-1994(FRI) 10:31

[RECEIVE]

NO.	DATE	TIME	DESTINATION STATION	PG.	DURATION	MODE	RESULT
935	3-18	10:27	408 925 1687	6	0°03'10"	NORM.E	OK
				6	0°03'10"		