



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555
September 23, 1985

MEMORANDUM FOR: J. Ebersole, Chairman
Palo Verde Nuclear Station Subcommittee

FROM: D. Houston, Staff Engineer *D. Houston*

SUBJECT: PALO VERDE UNIT 1 LOSS OF LOAD EVENT

On September 12, 1985, a planned load rejection test was performed at Palo Verde, Unit 1, with the reactor power level at 55%. This test led to the unanticipated sequence of turbine trip, bus failure, reactor trip, safety injection, containment isolation and loss of pressurizer auxiliary spray system. Attached are copies of the morning reports and OR Briefing slides that describe the sequence of events and the NRC concerns about it. The pressurizer did not require the spray system to function for pressure reduction. However, the spray would have been unavailable during the event. The primary spray is fed off the reactor coolant pump discharge and these pumps had tripped on undervoltage. The auxiliary spray is fed from charging pumps and these were unavailable due to the bus failure (autotransfer malfunction).

The Staff is still reviewing many aspects of this event. I am told that Region V has issued a Conformation of Action letter to the Utility which prohibits start-up of Unit 1 until these concerns are satisfactorily resolved. When available, I will provide the Staff's SER on this matter.

Attachments: As Stated

cc: ACRS Members
ACRS Technical Staff
ACRS Fellows

8604030596 860311
PDR FOIA
SCOTT86-45 PDR

B/10

MORNING REPORT - REGION V
DATE: SEPTEMBER 13, 1985

ITEM OR EVENT

REGIONAL ACTION

FOLLOWUP PER MC 2515

AN UNUSUAL EVENT WAS DECLARED AT 10:23 PM THURSDAY, SEPTEMBER 12, 1985, FOLLOWING AN UNPLANNED REACTOR TRIP. AT 10:10 PM AN UNPLANNED MAIN TURBINE TRIP OCCURRED WHEN A PLANNED LOAD REJECTION WAS INITIATED DURING THE CONDUCT OF POWER ASCENSION TESTING AT UNIT 1. WITH THE REACTOR AT 55% FULL POWER, A CONDITION OF THE PLANNED TEST, THE MAIN GENERATOR WAS SUPPLYING APPROXIMATELY 70 MW OF HOUSE LOADS TO THE REACTOR COOLANT PUMPS (RCPS) AND NON VITAL LOADS ON THE 13.8 KV ELECTRICAL BUSES. AFTER THE TURBINE TRIPPED, THE LOADS ON THE MAIN GENERATOR DID NOT AUTOMATICALLY TRANSFER TO THE STARTUP TRANSFORMER AND SEQUENTIALLY DEENERGIZED UNTIL THE RCPS TRIPPED ON LOW VOLTAGE. THE REACTOR TRIPPED WHEN THE CORE PROTECTION CALCULATOR SENSED THAT THE RCPS HAD TRIPPED. FOLLOWING THE REACTOR TRIP, THE PLANT OPERATORS MANUALLY REENERGIZED THE 13.8 KV NONESSENTIAL BUSES. WHEN THE BUSES REENERGIZED, DRAIN VALVES ON THE MAIN STEAM HEADER AND ON THE MAIN TURBINE STOP VALVES, HAD AUTOMATICALLY STARTED TO OPEN WHEN THE MAIN TURBINE TRIPPED AND THEN STOPPED WHEN POWER WAS LOST, AND CONTINUED TO COMPLETE THE OPENING. THE INCREASED COOL DOWN OF THE REACTOR COOLANT SYSTEM (RCS) CAUSED THE PRESSURIZER PRESSURE AND LEVEL TO DECREASE TO THE SAFETY INJECTION SETPOINT. THE SAFETY INJECTION ALSO INITIATED A CONTAINMENT BUILDING ISOLATION. THE STATION EMERGENCY PLAN REQUIRES THAT WITH A REACTOR TRIP, SAFETY INJECTION AND CONTAINMENT ISOLATION, AN UNUSUAL EVENT BE DECLARED. OPERATORS SHUT DOWN THE DRAIN VALVES AT 11:24 PM AND COMMENCED RESTORING THE PLANT TO NORMAL STATUS. AFTER PRESSURIZER PRESSURE AND LEVEL WERE RESTORED AND THE RCPS STARTED, THE UNUSUAL EVENT WAS TERMINATED AT 1:03 AM SEPTEMBER 13, 1985. THE LICENSEE IS MAINTAINING THE PLANT IN MODE 3 WHILE DETERMINING THE CAUSE OF THE TURBINE TRIP, AND MAKING MODIFICATIONS TO THE MAIN STEAM HEADER AND MAIN TURBINE STOP VALVE CONTROL CIRCUITRY TO PREVENT THE VALVES FROM OPENING AUTOMATICALLY AFTER A TURBINE TRIP. ALL ENGINEERED SAFETY FEATURES PERFORMED AS REQUIRED. THE RESIDENT INSPECTOR WAS ON SITE DURING THE RECOVERY FROM THE EVENT. THE NEWS MEDIA WAS NOTIFIED OF THIS EVENT.

Reportable Event number 02066 .

Facility : FALO VERDE

Unit : 1

Region : 5

Vendor : C-E,C-E,C-E

Operations Officer : Chauncey Gould

NRC Notified By : TAYLOR

Rad Release : No

Cause : ELECTRICAL

Component : BUS NANSO1 & SO2

Date Notified : 09/13/85

Time Notified : 01:56

Date of Event : 09/13/85

Time of Event : 00:10

Classification : Unusual Event

Category 1 : SCRAM

Category 2 : ESF Actuation

Category 3 :

Category 4 :

EVENT DESCRIPTION :

PLANT HAD RTR TRIP FROM 54% ON LOW RCS FLOW SIGNAL DUE TO LOSS OF RC PUMPS BECAUSE OF LOSS OF POWER TO NANSO1 & SO2 BUS WHICH OCCURRED DURING A LARGE LOAD REJECTION TEST WHEN THE BUS FAILED TO AUTO TRANSFER FROM THE GENERATOR BACK TO THE STARTUP TRANSFORMER. THEY ALSO LOST THE CIRC WATER PMPS WHICH ARE POWERED BY THE SAME BUS. THE CAUSE OF THE TRANSFER FAILURE IS BEING INVESTIGATED. SI OCCURRED ON LOW PRESSURE IN THE PRIMARY AND THEY ALSO GOT CONTAINMENT ISOLATION. AT THIS TIME THE AMOUNT OF WATER INJECTED HAD NOT BEEN CALCULATED. THE PLANT IS IN HOT S/B AND NATURAL CIRCULATION WITH THE SI PMPS STILL ON. PLANT ALSO HAS THEIR AUX FEED PMPS OPERATING. ***UPDATE*** NOUE TERMINATED AT 0103MT. PLANT HAS 2 RC PMPS RUNNING. SI WAS ALSO SECURED. NOTIFIED RDO CREWS, ED PARTLOW, FEMA GREINER

PALO VERDE UNIT 1 - REACTOR TRIP, SAFETY INJECTION,
LOSS OF PRESSURIZER AUXILIARY SPRAY SYSTEM
SEPTEMBER 12, 1985 (E. A. LICITRA, NRR)

• PROBLEM - DURING LOSS OF LOAD TEST PLANT EXPERIENCED TURBINE TRIP, REACTOR TRIP, SAFETY INJECTION, CONTAINMENT ISOLATION AND LOSS OF PRESSURIZER AUXILIARY SPRAY SYSTEM

• SAFETY SIGNIFICANCE - THE PRESSURIZER AUXILIARY SPRAY SYSTEM WAS NOT AVAILABLE, IF REQUIRED, FOR RAPID COOLDOWN AND DEPRESSURIZATION OF REACTOR COOLANT SYSTEM (PLANT DOES NOT HAVE PORVs)

• DISCUSSION

- PLANT AT 55% POWER FOR LOSS OF LOAD TEST WITH GENERATOR SUPPLYING ONSITE LOADS, INCLUDING RCP'S
- ON LOSS OF LOAD, GENERATOR FAILED TO PROVIDE POWER TO ONSITE LOADS; RCP TRIPPED ON UNDERVOLTAGE
- REACTOR TRIPPED ON PROJECTED LOW DNBR
- AUTOMATIC TRANSFER TO OFFSITE POWER FOR NON-ESSENTIAL LOADS DID NOT OCCUR
- AUXILIARY FEEDWATER SYSTEM WAS MANUALLY ACTUATED
- LOW RCS PRESSURE CAUSED SI INITIATION
- PLANT STABILIZED IN HOT STANDBY; RCPs RESTORED IN ABOUT ONE HOUR
- TEST WAS RE-RUN WITHOUT INCIDENT ON SEPTEMBER 16, 1985, WITH A MODIFIED TEST PROCEDURE

- NRC FOLLOWUP ACTION

- (1) CONFERENCE CALL WITH LICENSEE ON SEPTEMBER 16, 1985
- (2) EVALUATING SINGLE FAILURE VULNERABILITY OF AUXILIARY SPRAY SYSTEM FOR PRESSURIZER

- PROBLEMS BEING EVALUATED

- A. DOES PRESSURIZER AUXILIARY SPRAY SYSTEM MEET SINGLE FAILURE CRITERION?
- B. IN RESTARTING THE PLANT, DID THEY VIOLATE TECHNICAL SPECIFICATIONS?
- C. WHY DID TURBINE TRIP ON LOSS OF LOAD AT 55% POWER?
(SUPPOSED TO STAY ON TO HANDLE HOUSE LOADS)
- D. WHY WAS TEST INITIALLY RUN BEFORE CHECKING WHETHER AUTOMATIC TRANSFER TO OFFSITE POWER FOR THE NONESSENTIAL LOADS COULD TAKE PLACE? (AUTO TRANSFER DID NOT OCCUR)
- E. REPORTING OF INCIDENT WAS INCOMPLETE AND INACCURATE

AGENDA

PRESSURIZER AUXILIARY SPRAY
DESIGN REVIEW

OCTOBER 8, 1985

INTRODUCTION

R.M. BUTLER
DIRECTOR OF TECHNICAL SERVICES, ANPP

DESIGN HISTORY

G.A. DAVIS
MANAGER, STANDARD PLANT LICENSING, CE

SGTR USE OF AUX SPRAY

G.W. SOWERS
SUPERVISOR OF SAFETY ANALYSIS, ANPP

EXISTING DESIGN

B.K. MCQUOID
SYSTEM ENGINEER, CE

DESIGN MODIFICATIONS

M.A. RADSPINNER
MECHANICAL ENGINEER, ANPP

SUMMARY

T.F. QUAN
LICENSING SUPERVISOR, ANPP

B/11

DEFINITION OF SYSTEMS THAT ARE SAFETY RELATED

FROM 10CFR100, APPENDIX A:

"CERTAIN STRUCTURES, SYSTEMS, AND COMPONENTS ARE DESIGNED TO REMAIN FUNCTIONAL [AFTER A SAFE SHUTDOWN EARTHQUAKE]. THESE STRUCTURES, SYSTEMS, AND COMPONENTS ARE THOSE NECESSARY TO ASSURE:

- (1) THE INTEGRITY OF THE REACTOR COOLANT PRESSURE BOUNDARY,
- (2) THE CAPABILITY TO SHUT DOWN THE REACTOR AND MAINTAIN IT IN A SAFE SHUTDOWN CONDITION, OR
- (3) THE CAPABILITY TO PREVENT OR MITIGATE THE CONSEQUENCES OF ACCIDENTS WHICH COULD RESULT IN POTENTIAL OFFSITE EXPOSURES COMPARABLE TO THE GUIDELINE EXPOSURES OF THIS PART."

REQUIREMENTS FOR SAFETY RELATED SYSTEMS

- o MINIMUM REQUIREMENTS ARE SPECIFIED IN 10CFR50, APPENDIX A - GENERAL DESIGN CRITERIA FOR NUCLEAR POWER PLANTS
- o GDC'S RECOGNIZE THAT SPECIFIC REQUIREMENTS FOR EACH SYSTEM DEPEND ON FUNCTION PERFORMED
- o ACCEPTABLE METHODS FOR MEETING GDC'S PROVIDED IN:
 - REGULATORY GUIDES
 - STANDARD REVIEW PLANS
 - BRANCH TECHNICAL POSITIONS

COLD VS. HOT SHUTDOWN

- o PRIOR TO 1978, SAFE SHUTDOWN WAS TAKEN TO MEAN HOT SHUTDOWN
- o IN 1978, NRC ISSUED NEW GUIDANCE ON GDC'S WHICH EFFECTIVELY DEFINED SAFE SHUTDOWN AS COLD SHUTDOWN (BRANCH TECHNICAL POSITION RSB 5-1)
- o RSB 5-1 SPECIFIES THAT:
 - "THE DESIGN SHALL BE SUCH THAT THE REACTOR CAN BE TAKEN FROM NORMAL OPERATING CONDITIONS TO COLD SHUTDOWN USING ONLY SAFETY-GRADE SYSTEMS."
- o RSB 5-1 IDENTIFIES THREE CLASSES OF PLANTS FOR IMPLEMENTATION:
 - CLASS 1, (NEW PLANTS) FULL COMPLIANCE
 - CLASS 2, (PLANTS UNDER CONSTRUCTION) PARTIAL IMPLEMENTATION
 - CLASS 3, (OPERATING PLANTS) BACKFIT
- o CESSAR AND PALO VERDE ARE IN CLASS 2

RECOMMENDED IMPLEMENTATION FOR CLASS 2 PLANTS

- o CONCERNING AUXILIARY PRESSURIZER SPRAY,
TABLE 1 OF BTP RSB 5-1 STATES:

POSSIBLE SOLUTION FOR
FULL COMPLIANCE

PROVIDE UPGRADING AND ADDITIONAL VALVES TO ENSURE OPERATION OF AUXILIARY PRESSURIZER SPRAY USING ONLY SAFETY-GRADE SUB-SYSTEM MEETING SINGLE FAILURE. POSSIBLE ALTERNATIVE MAY INVOLVE USING PRESSURIZER POWER-OPERATED RELIEF VALVES WHICH HAVE BEEN UPGRADED. MEET SSE AND SINGLE FAILURE WITHOUT MANUAL OPERATION INSIDE CONTAINMENT.

RECOMMENDED IMPLEMENTATION FOR
CLASS 2 PLANTS

COMPLIANCE WILL NOT BE REQUIRED IF A) DEPENDENCE ON MANUAL ACTIONS INSIDE CONTAINMENT AFTER SSE OR SINGLE FAILURE OR B) REMAINING AT HOT STANDBY UNTIL MANUAL ACTIONS OR REPAIRS ARE COMPLETE ARE FOUND TO BE ACCEPTABLE FOR THE INDIVIDUAL PLANT.

SCOPE OF AUXILIARY PRESSURIZER SPRAY SYSTEM

- o AUXILIARY PRESSURIZER SPRAY SYSTEM BEGINS AT BRANCH FROM CHARGING SYSTEM AND ENDS AT PRESSURIZER SPRAY NOZZLES
- o MECHANICAL COMPONENTS CONSIST OF:
 - PIPING
 - TWO SOLENOID OPERATED VALVES (CH-203 & CH-205)
 - CHECK VALVE
- o SCHEMATIC OF AUXILIARY PRESSURIZER SPRAY SYSTEM AND SOURCES OF BORATED WATER (VIA CHARGING SYSTEM) SHOWN IN:
 - FIGURE 2.1-4 OF CEN-239, AND
 - FIGURES 5 & 6 OF APPENDIX B IN NUREG-1044

FIGURE 2.1-4

SIMPLIFIED SCHEMATIC OF PALO VERDE CVCS SHOWING AUXILIARY
SPRAY PORTION AND SOURCES OF BORATED WATER

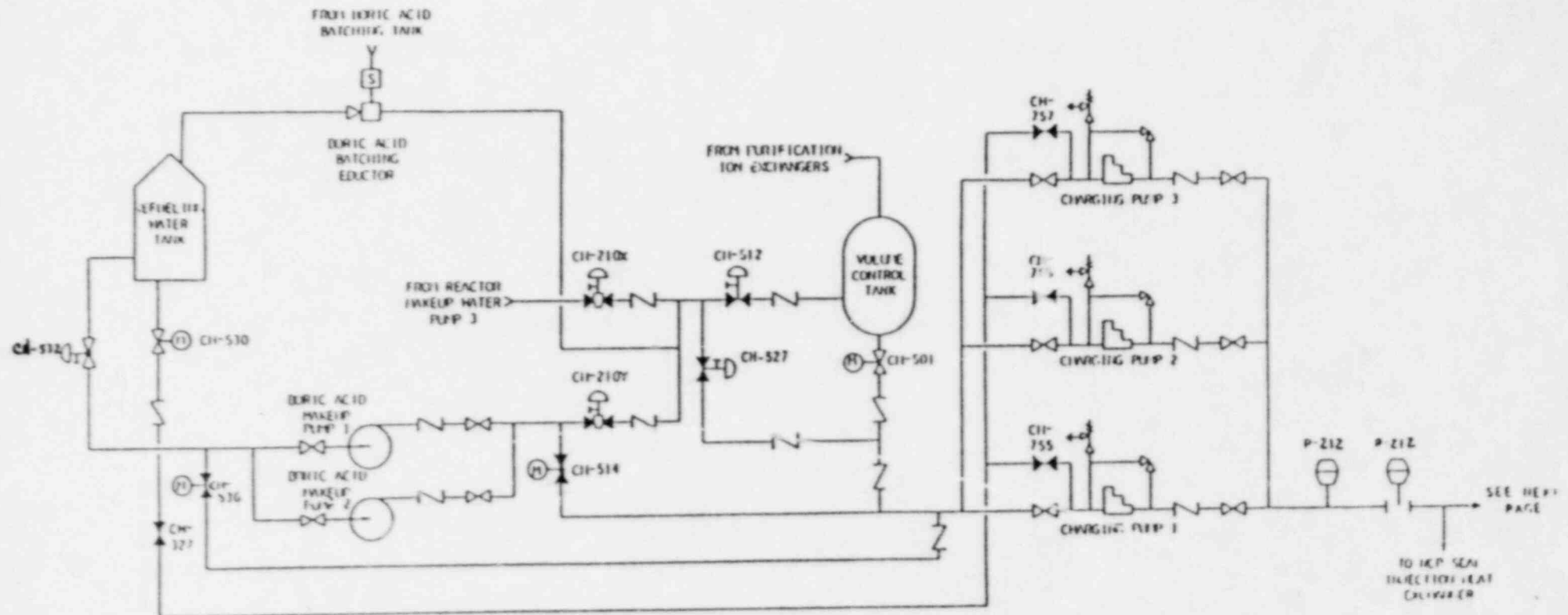
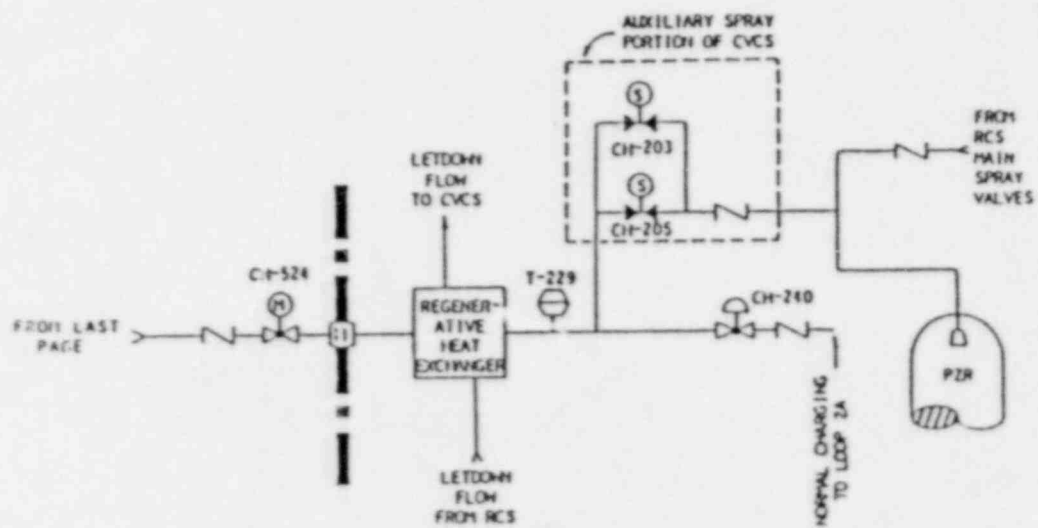


FIGURE 2.1-4 (CONT.)

SIMPLIFIED SCHEMATIC OF PALO VERDE CVCS SHOWING AUXILIARY
PORTION AND SOURCES OF BORATED WATER



HISTORY OF AUXILIARY PRESSURIZER SPRAY SYSTEM

- o PRIOR TO BTP RSB 5-1 (1978), NO SAFETY RELATED FUNCTION
- o QUESTION 440.6 (ISSUED AND ANSWERED IN 1981), ADDRESSED SYSTEM 80 CONFORMANCE WITH BTP RSB 5-1
- o COMBUSTION ENGINEERING'S RESPONSE TO QUESTION 440.6 DESCRIBES OPERATION OF SPRAY SYSTEM AND THE PORTION OF CHARGING SYSTEM WHICH PROVIDES WATER TO SPRAY SYSTEM
- o REQUIREMENT TO CONFORM TO BTP RSB 5-1 MADE THE AUXILIARY PRESURIZER SPRAY SYSTEM (AND A PORTION OF THE CHARGING SYSTEM) SAFETY RELATED
- o AFTER REVIEWING C-E'S RESPONSE TO QUESTION 440.6, RSB TOOK POSITION THAT OPERATOR ACTIONS OUTSIDE OF CONTROL ROOM COULD ONLY BE USED TO MITIGATE SINGLE FAILURES
- o FOLLOWING APPEAL MEETING WITH DIRECTOR OF SYSTEMS INTEGRATION ON SEPTEMBER 17, 1981, SYSTEM 80 DESIGN WAS MODIFIED TO PROVIDE A MOTOR OPERATOR ON VALVE CH-141 (LATER RENUMBERED TO CH-536) AND TO PROVIDE EMERGENCY POWER TO CH-536 AND CH-501 FOLLOWING A LOP EVENT

HISTORY (CONT.)

- o SUPPLEMENT NO.1 OF THE CESSAR SAFETY EVALUATION REPORT (ISSUED MARCH 1983) CONCLUDED THAT "THE GUIDELINES OF BTP RSB 5-1 HAVE, THEREFORE, BEEN SATISFIED AND THIS ISSUE IS RESOLVED."
- o IN CEN-239, COMBUSTION ENGINEERING AND ARIZONA PUBLIC SERVICE RESPONDED TO NRC REQUEST FOR ADDITIONAL INFORMATION ON THE DESIGN AND OPERATION OF THE AUXILIARY PRESSURIZER SPRAY SYSTEM
- o CEN-239 STATED THAT "AUXILIARY SPRAY PROVIDES THE SAFETY-RELATED METHOD FOR RELATIVELY RAPID AND CONTROLLED DEPRESSURIZATION OF THE RCS TO COLD SHUTDOWN CONDITIONS. AS SUCH THE SYSTEM HAS A DEGREE OF PERFORMANCE CONSISTENT WITH THE NRC BRANCH TECHNICAL POSITION RSB 5-1."
- o IN NUREG-1044, NRC STAFF EXPRESSED CONCERN ABOUT SINGLE FAILURE VULNERABILITY OF VALVE CH-240. CONCERN WAS RESOLVED BY ADDING VALVE CH-239, IN SERIES WITH CH-240

STEAM GENERATOR TUBE RUPTURE (SGTR) ANALYSES

- o ORIGINAL ANALYSIS INCLUDED IN CESSAR-F (TENDERED IN 1978):
 - BASED ON CATEGORIZATION MATRIX OF CHAPTER 15 (IN ACCORDANCE WITH REG. GUIDE 1.70, REV.2)
 - TUBE RUPTURE ONLY
 - AUXILIARY PRESSURIZER SPRAY WAS NOT CREDITED FOR ANALYSIS TO CALCULATE OFFSITE DOSES
- o ANALYSIS REVISED TO BE CONSISTENT WITH STANDARD REVIEW PLANS (1981/1982):
 - SGTR WITH AND WITHOUT LOSS OF OFFSITE POWER
 - AUXILIARY PRESSURIZER SPRAY WAS NOT CREDITED FOR ANALYSIS TO CALCULATE OFFSITE DOSES
 - CREDIT WAS TAKEN FOR THREE SECOND TIME DELAY BETWEEN REACTOR TRIP AND LOSS OF OFFSITE POWER
- o NRC STAFF REQUIRED RE-ANALYSIS WITH ADDED SINGLE FAILURE AND RECOGNITION OF EMERGENCY OPERATING PROCEDURES PER CEN-152 (APRIL 1983)
- o SEPARATE ANALYSES WERE PERFORMED FOR CESSAR AND PALO VERDE (1984). BOTH ANALYSES RECOGNIZED USE OF AUXILIARY PRESSURIZER SPRAY (AS AN OPERATOR ACTION)
- o NEW PALO VERDE ANALYSIS IS BEING PERFORMED, WHICH DOES NOT USE AUXILIARY PRESSURIZER SPRAY IN THE FIRST TWO HOURS

SUMMARY

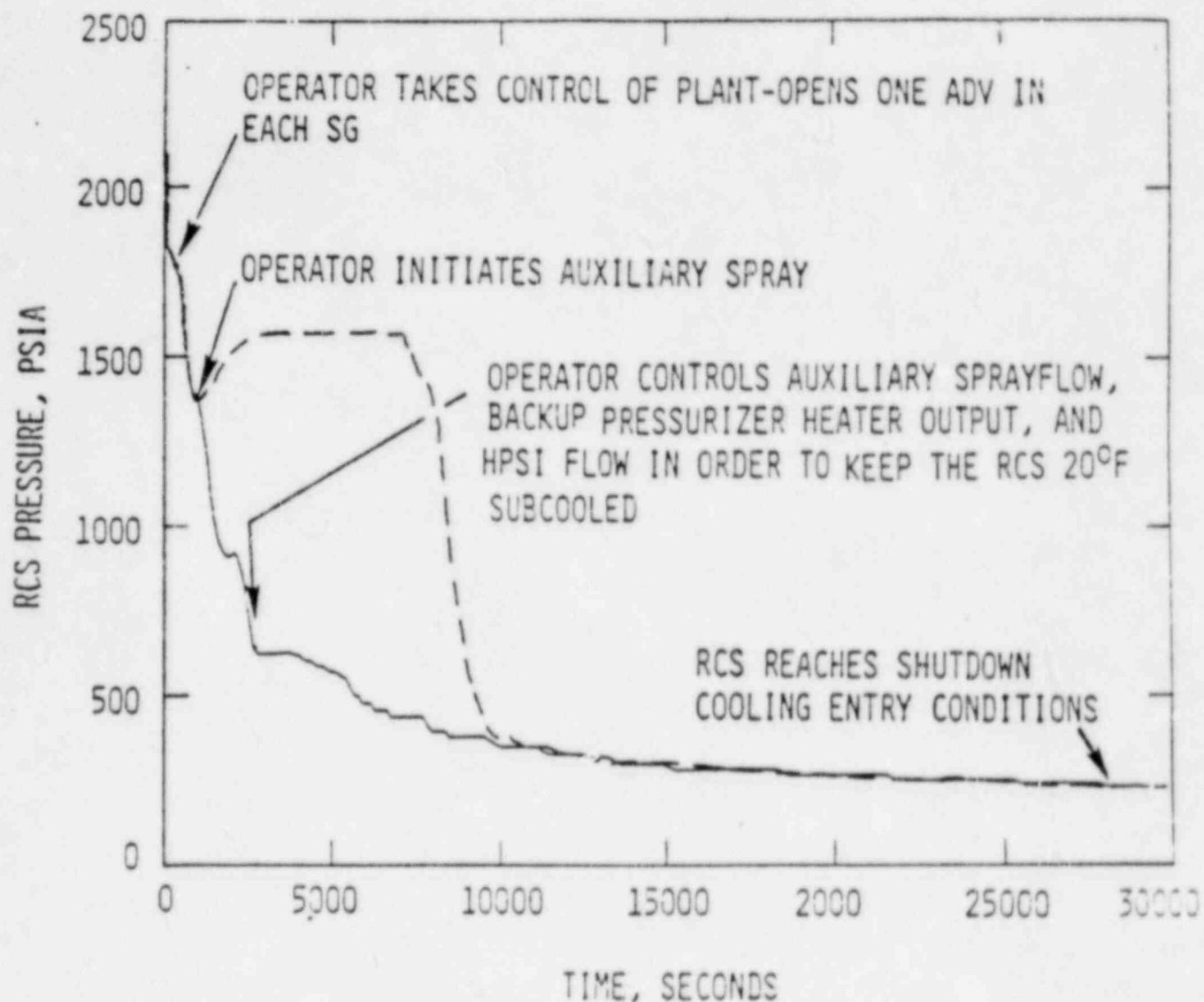
- o AUXILIARY PRESSURIZER SPRAY SYSTEM AND PORTION OF CHARGING SYSTEM ARE SAFETY GRADE, AS REQUIRED BY NRC TO MEET BTP RSB 5-1


PVNGS-FSAR (APPENDIX 15A)

SGTR ANALYSIS RESULTS

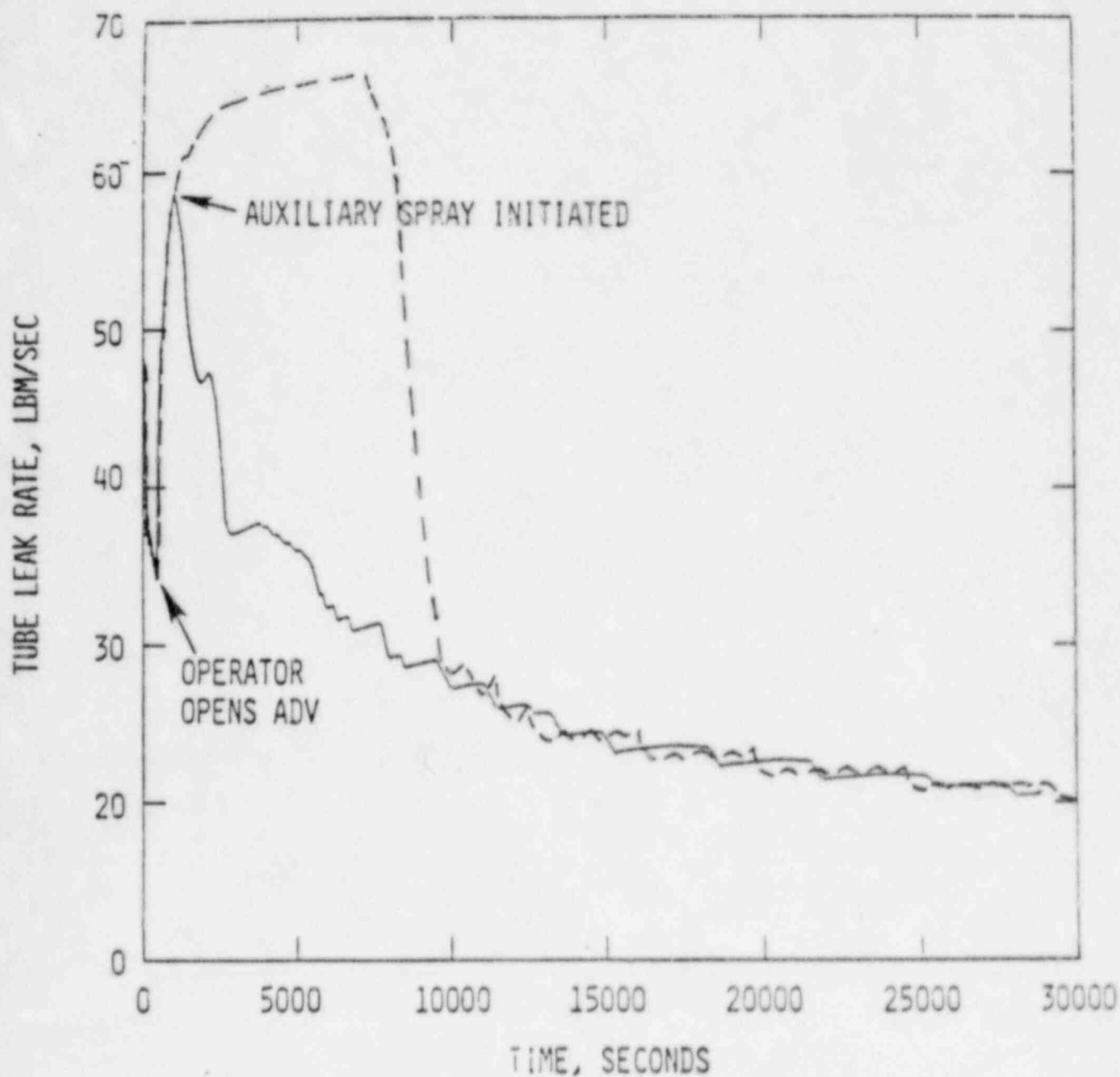
<u>EVENT</u>	<u>TIME</u> (SECONDS)	FSAR * <u>THYROID DOSE</u> (REM)	REVISED ANALYSIS* <u>THYROID DOSE</u> (REM)
SGTR & STUCK OPEN ADV	0	0	0
LOP	51	0	0
AFAS	132	0	0
ADV OPENS	460	0	0
MSIS	513		
SIAS	581		
AFW OVERPIPE	655		
ALLX SPRAY	1015/7200	115	115
TUBES RECOVERED	1385/1347	182	186
2 HP DOSE @ EAB	7200	200	208


* REGULATORY DOSE LIMIT IS 300 REM



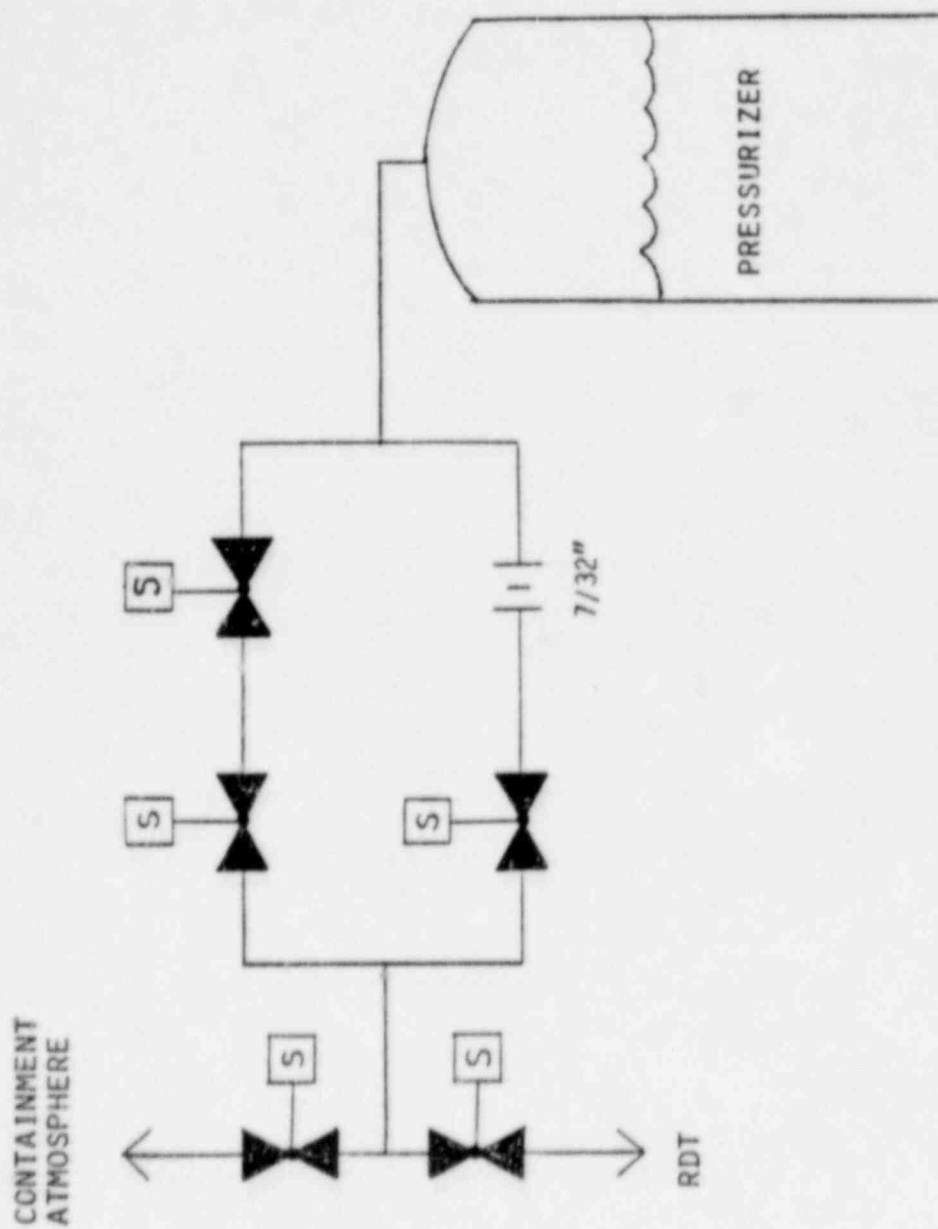
 Palo Verde Nuclear Generating Station
FSAR

STEAM GENERATOR TUBE RUPTURE WITH LOSS
OF OFFSITE POWER AND A FULLY STUCK
OPEN ATMOSPHERIC DUMP VALVE
RCS PRESSURE VS TIME
Figure 15A-3 (Sheet 2 of 2)



 Palo Verde Nuclear Generating Station
FSAR

STEAM GENERATOR TUBE RUPTURE WITH LOSS
OF OFFSITE POWER AND A FULLY STUCK
OPEN ATMOSPHERIC DUMP VALVE
TUBE LEAK RATE VS TIME
Figure 15A-11 (Sheet 2 of 2)



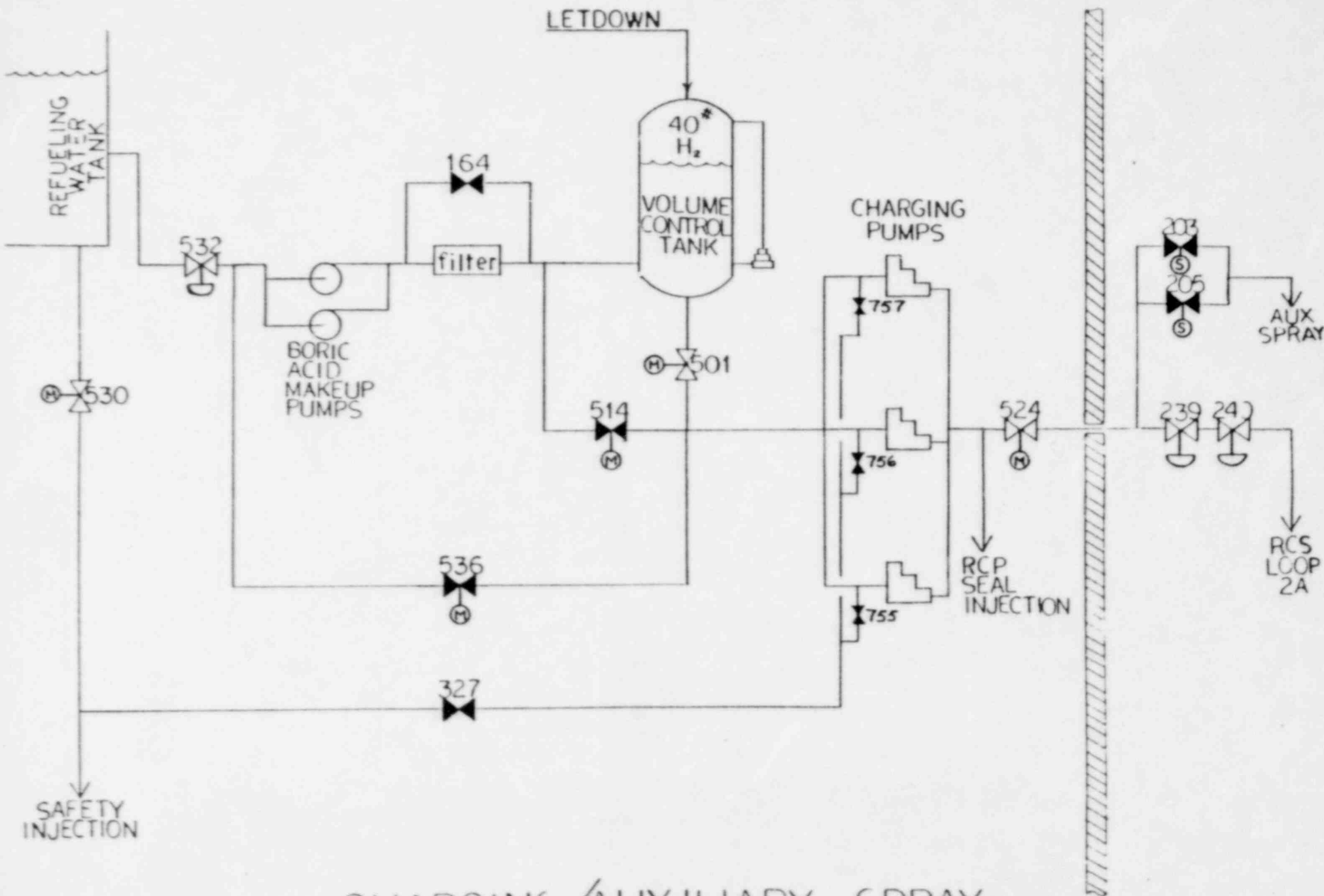
PRESSURIZER VENT PATHS

PRESSURIZER VENT SYSTEM
DEPRESSURIZATION DURING SGTR

- REDUNDANT CLASS 1E QUALIFIED VENT PATHS
- LIMITING PATH (7/32 INCH ORIFICE)
 - DEPRESSURIZATION RATE OF 3 PSI/MIN (vs 18 PSI/MIN WITH AUXILIARY PRESSURIZER SPRAY)
 - PROVIDES ACCEPTABLE DEPRESSURIZATION PERFORMANCE
- EMERGENCY OPERATING PROCEDURES ADVISE OPERATOR OF AVAILABILITY OF VENT TO BACKUP PRESSURIZER AUXILIARY SPRAY

EXISTING DESIGN

- o PRIMARY PATH FOR SAFE SHUTDOWN
- o VALVE BY VALVE FAILURE IN PRIMARY PATH
- o SUMMARY - MANUAL ACTIONS OUTSIDE CONTROL ROOM



CHARGING/AUXILIARY SPRAY

OPERATOR ACTION

SUMMARY

FAILURE

V536 IN CLOSED POSITION

V501 TO CLOSE

MANUAL ACTION

MANUALLY OPEN V327 AND V757,
V756 OR V755

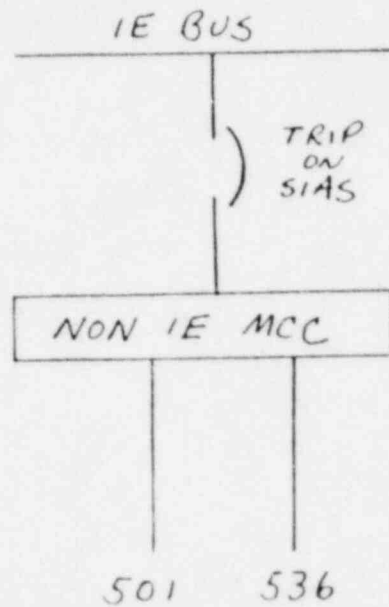
MANUALLY DEPRESSURIZE VCT,
MANUALLY VENT THE CHARGING
PUMPS

CVCS ENHANCEMENT

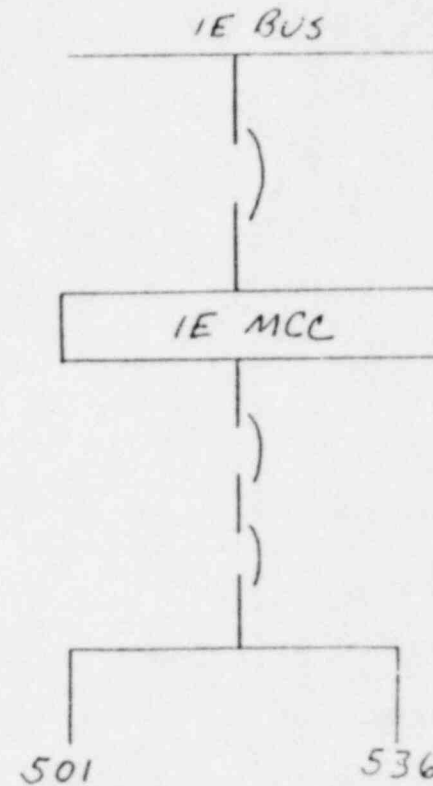
- o REPORT OF ACTIONS UNDERTAKEN TO ADDRESS SEPTEMBER 12, 1985
EVENT (PER SEPTEMBER 20, 1985 MEETING)
- o THREE MODIFICATIONS PLANNED
 - ENSURE CONTINUED CONTROL OF V501 AND V536
FOLLOWING LOP AND SIAS
 - ADD SECOND, DIVERSE REFERENCE LEG FOR VCT
LEVEL MONITORING WITH ALARM
 - AUTOMATIC REALIGNMENT OF V501 AND V536

VALVE POWER SUPPLY CHANGE

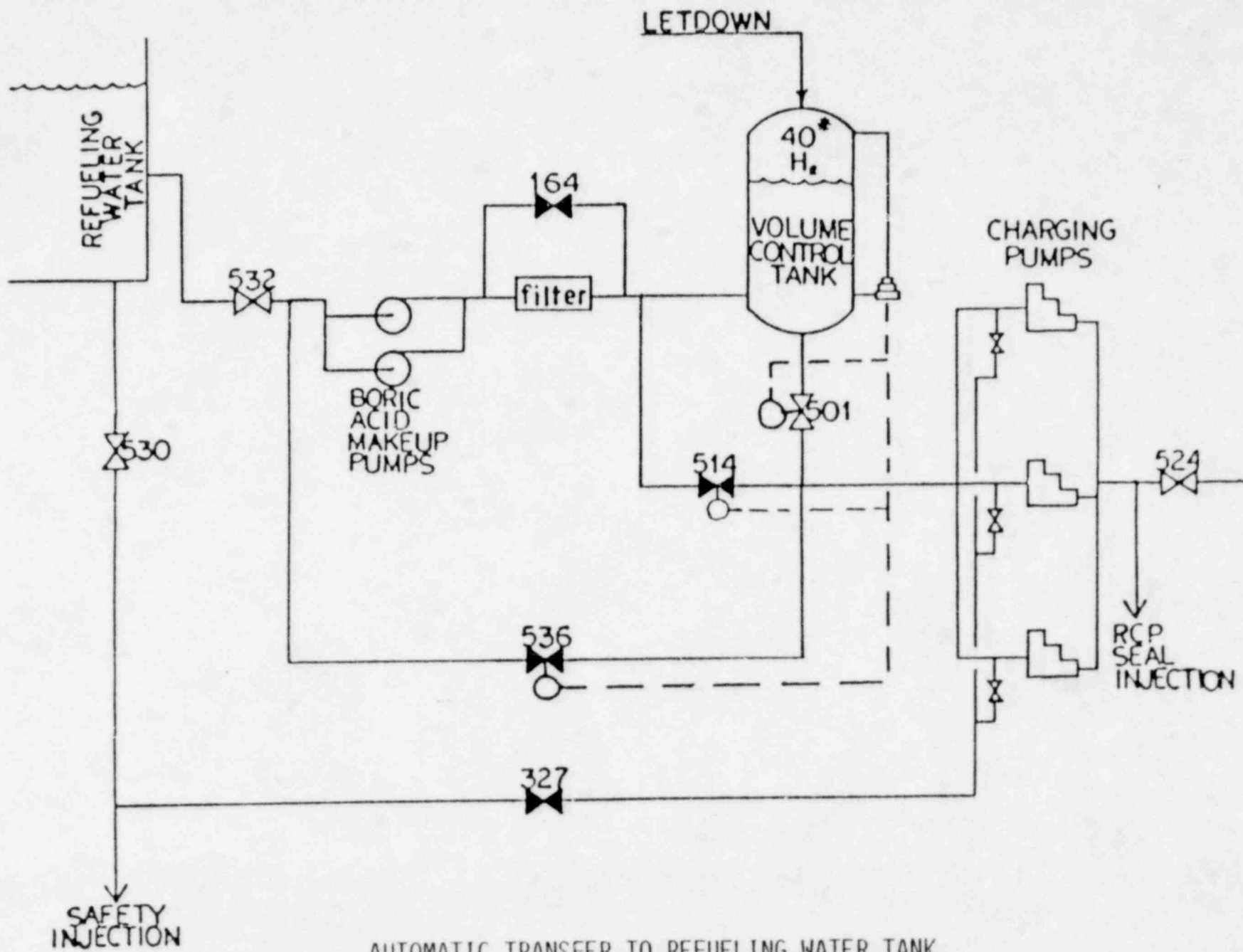
-EXISTING-



-MODIFIED-



CHANGE ENSURES OPERABILITY FROM CONTROL ROOM AFTER SIAS AND LOP SUCH THAT SUCTION COULD BE ALIGNED TO RWT FROM VCI.



AUTOMATIC TRANSFER TO REFUELING WATER TANK

ENHANCEMENT EVALUATION

- o BORATED WATER SOURCE REMAINS AVAILABLE TO CONTROL ROOM OPERATOR FOLLOWING LOP AND SIAS
- o INACCURATE VCT LEVEL IS ALARMED IN CONTROL ROOM
- o OPERATOR WORK LOAD REDUCED BY AUTO TRANSFER OF V501 AND V536