JAN 7 1986

Docket No.: 50-529

APPLICANT: Arizona Public Service Company

FACILITY: Palo Verde Unit 2

SUBJECT: Summary of Meeting to Discuss Auxiliary Pressurizer Spray System

A meeting was held in Bethesda, Maryland on October 8, 1985 with representatives of the applicant to discuss the auxiliary pressurizer spray system (APSS). The applicant requested the meeting to present the status of its evaluation of the APSS for Palo Verde Unit 2 to correct vulnerabilities with the charging pump portion of the system which were demonstrated during at event on Palo Verde Unit 1 on September 12, 1985. A list of attendees is shown on Enclosure 1 and the viewgraphs presented at the meeting are included as Enclosure 2. The meeting is summarized as follows.

Summary

The applicant presented a history relating to the staff's review of the APSS, including the use of the APSS to mitigate the consequences of a postulated steam generator tube rupture (SGTR) accident.

In response to the problems encountered during the September 12, 1985 event, the applicant plans to make the following three modifications to increase the reliability of the APSS:

(1) Provide a second, and diverse, reference leg to the volume control tank level monitoring instrumentation.

(2) Ensure a continued power supply to Valves 501 and 536 (which are on the suction lines to the charging pumps).

(3) Provide for automatic realignment for valves V 501 and V 536.

The applicant also plans on performing a reanalysis of the SGTR accident which does not rely on the APSS.

The applicant stated that the above information would be submitted on the docket shortly. The staff indicated that it would perform its review of the submittal after it is received.

Original signed by:
E. A. Licitra

E. A. Licitra, Project Manager
PWR Project Directorate No. 7
Division of PWR Licensing-B

Enclosures: As stated

cc: See next page

PD7 EAL
EALicitra/es
1/3/86

PD7 for GK
GWKnighton
1/7/86

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Arizona Nuclear Power Project

Palo Verde

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ENCLOSURE 1

MEETING ATTENDEES

PALO VERDE AUXILIARY SPRAY SYSTEM

October 8, 1985

NRC

Marilyn Ley
R.W. Houston
Manny Licitra
G. W. Knighton
Cecil Thomas
Chandu Patel
L. B. Marsh
C. Y. Liang
T. M. Novak
Stephen Sands
Dean Houston
Lee Dewey

APS

Gerald W. Sowers
Mark Radspinner
Terry Quan
Robert M. Butler
Kristin L. McCandless

CE

Mike Barnoski
BK McQuoid
George Davis
C. B. Brinkman
Tim Collier
Fred Carpentino
Dave Bajumpaa
Rick Turk

Bechtel

Steve Shepherd

WPPS

D. W. Coleman

ENCLOSURE 2

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

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

- MINIMUM REQUIREMENTS ARE SPECIFIED IN 10CFR50, APPENDIX A - GENERAL DESIGN CRITERIA FOR NUCLEAR POWER PLANTS

- GDC'S RECOGNIZE THAT SPECIFIC REQUIREMENTS FOR EACH SYSTEM DEPEND ON FUNCTION PERFORMED

- ACCEPTABLE METHODS FOR MEETING GDC'S PROVIDED IN:
  - REGULATORY GUIDES
  - STANDARD REVIEW PLANS
  - BRANCH TECHNICAL POSITIONS

COLD VS. HOT SHUTDOWN

- PRIOR TO 1978, SAFE SHUTDOWN WAS TAKEN TO MEAN HOT SHUTDOWN

- IN 1978, NRC ISSUED NEW GUIDANCE ON GDC'S WHICH EFFECTIVELY DEFINED SAFE SHUTDOWN AS COLD SHUTDOWN (BRANCH TECHNICAL POSITION RSB 5-1)

- 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."

- 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

- CESSAR AND PALO VERDE ARE IN CLASS 2

RECOMMENDED IMPLEMENTATION FOR CLASS 2 PLANTS

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

POSSIBLE SOLUTION FOR FULL COMPLIANCE	RECOMMENDED IMPLEMENTATION FOR CLASS 2 PLANTS
PROVIDE UPGRADING AND ADDITONAL 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 FALURE WITHOUT MANUAL OPERATION INSIDE CONTAINMENT.	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

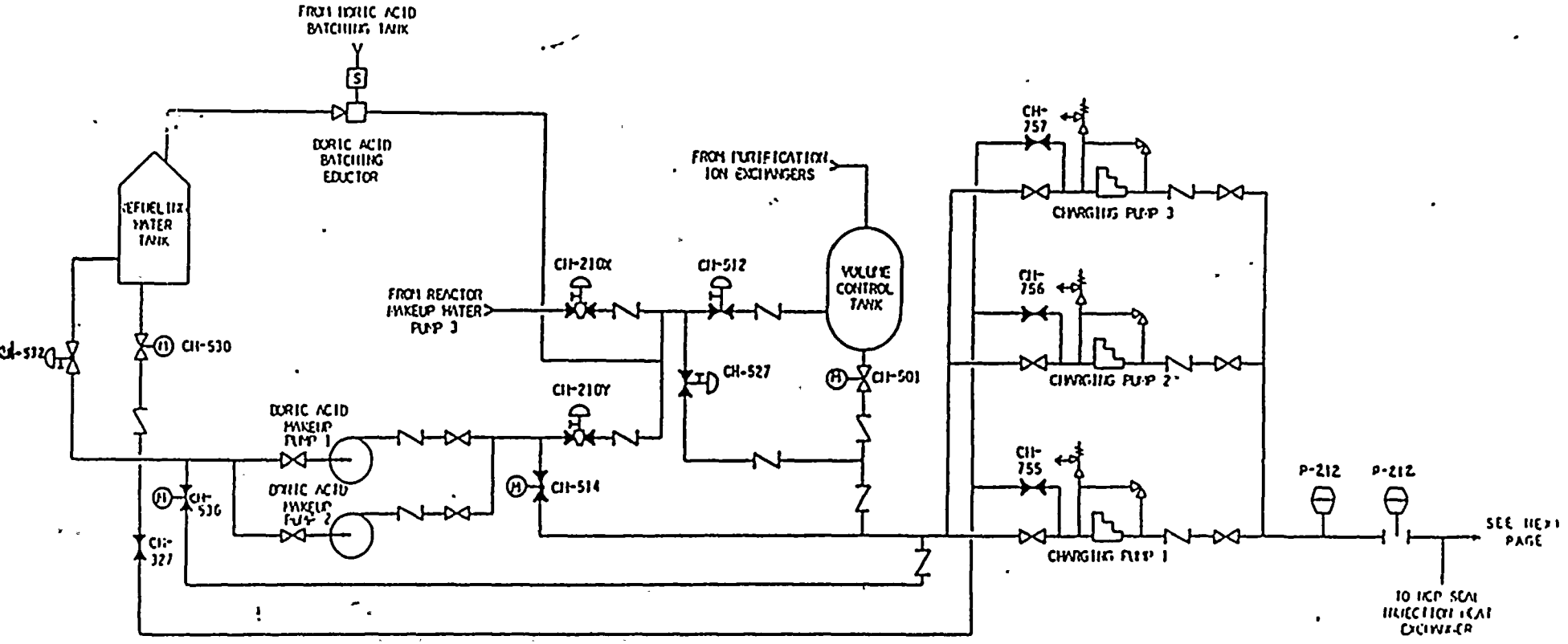
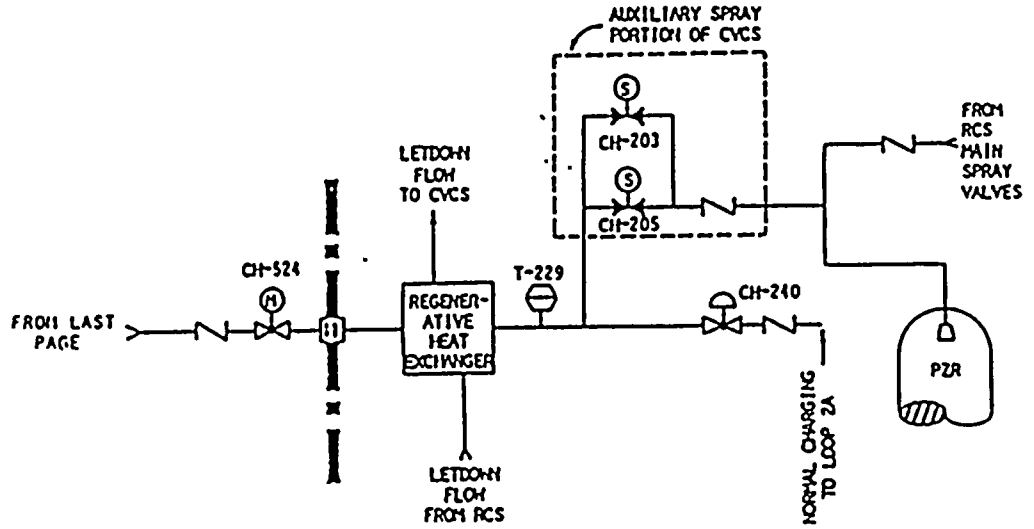


FIGURE 2.1-4 (CONT.)

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



HISTORY OF AUXILIARY PRESSURIZER SPRAY SYSTEM

- PRIOR TO BTP RSB 5-1 (1978), NO SAFETY RELATED FUNCTION
- QUESTION 440.6 (ISSUED AND ANSWERED IN 1981), ADDRESSED SYSTEM 80 CONFORMANCE WITH BTP RSB 5-1
- 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
- REQUIREMENT TO CONFORM TO BTP RSB 5-1 MADE THE AUXILIARY PRESURIZER SPRAY SYSTEM (AND A PORTION OF THE CHARGING SYSTEM) SAFETY RELATED
- 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
- 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.)

- 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."

- 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

- 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."

- 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

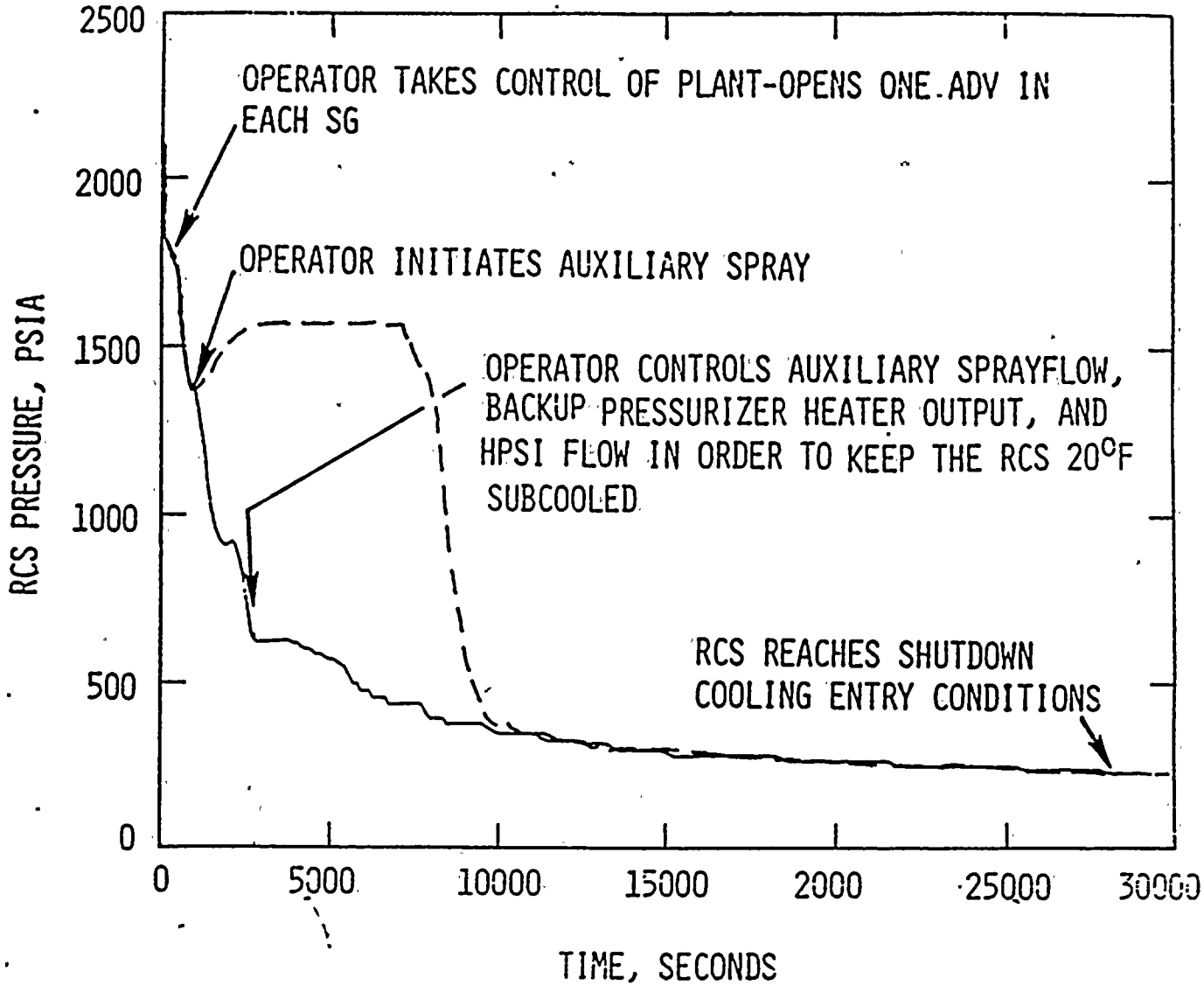
- AUXILIARY PRESSURIZER SPRAY SYSTEM AND PORTION OF CHARGING SYSTEM ARE SAFETY GRADE, AS REQUIRED BY NRC TO MEET BTP RSB 5-1

PVNGS-FSAR (APPENDIX 15A)

SGTR ANALYSIS RESULTS

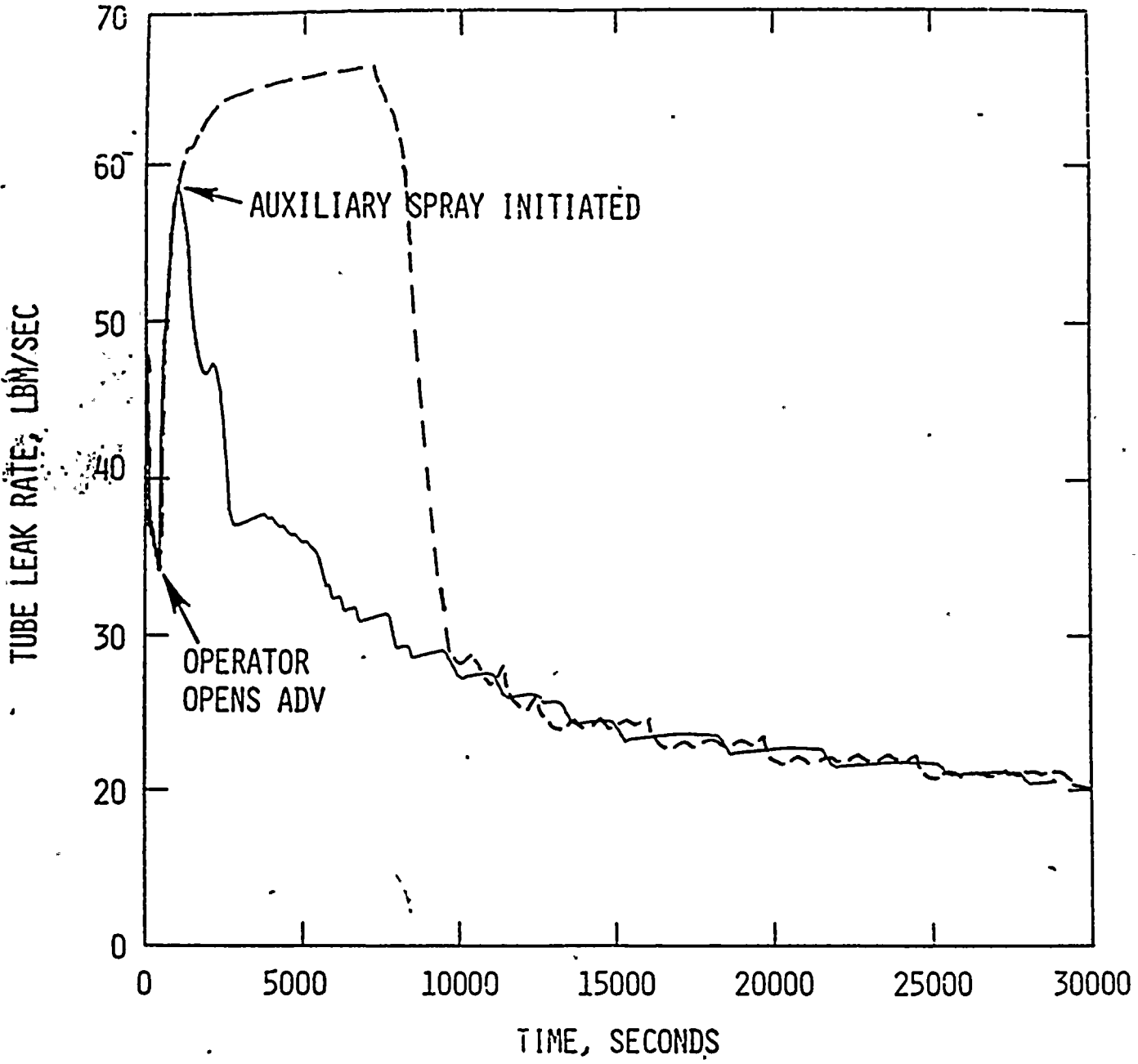
EVENT	TIME (SECONDS)	FSAR * THYROID DOSE (REM)	REVISED ANALYSIS* THYROID DOSE (REM)
SGTR & STUCK OPEN ADV	0	0	0
LOP	51	0	0
AFAS	132	0	0
ADV OPENS	460	0	0
MSIS	513		
SIAS	581		
AFW OVERRIDE	655		
AUX SPRAY	1015/7200	115	115
TUBES RECOVERED	1385/1347	182	186
2 HP. DOSE @ EAB	7200	290	208

* REGULATORY DOSE LIMIT IS 300 REM



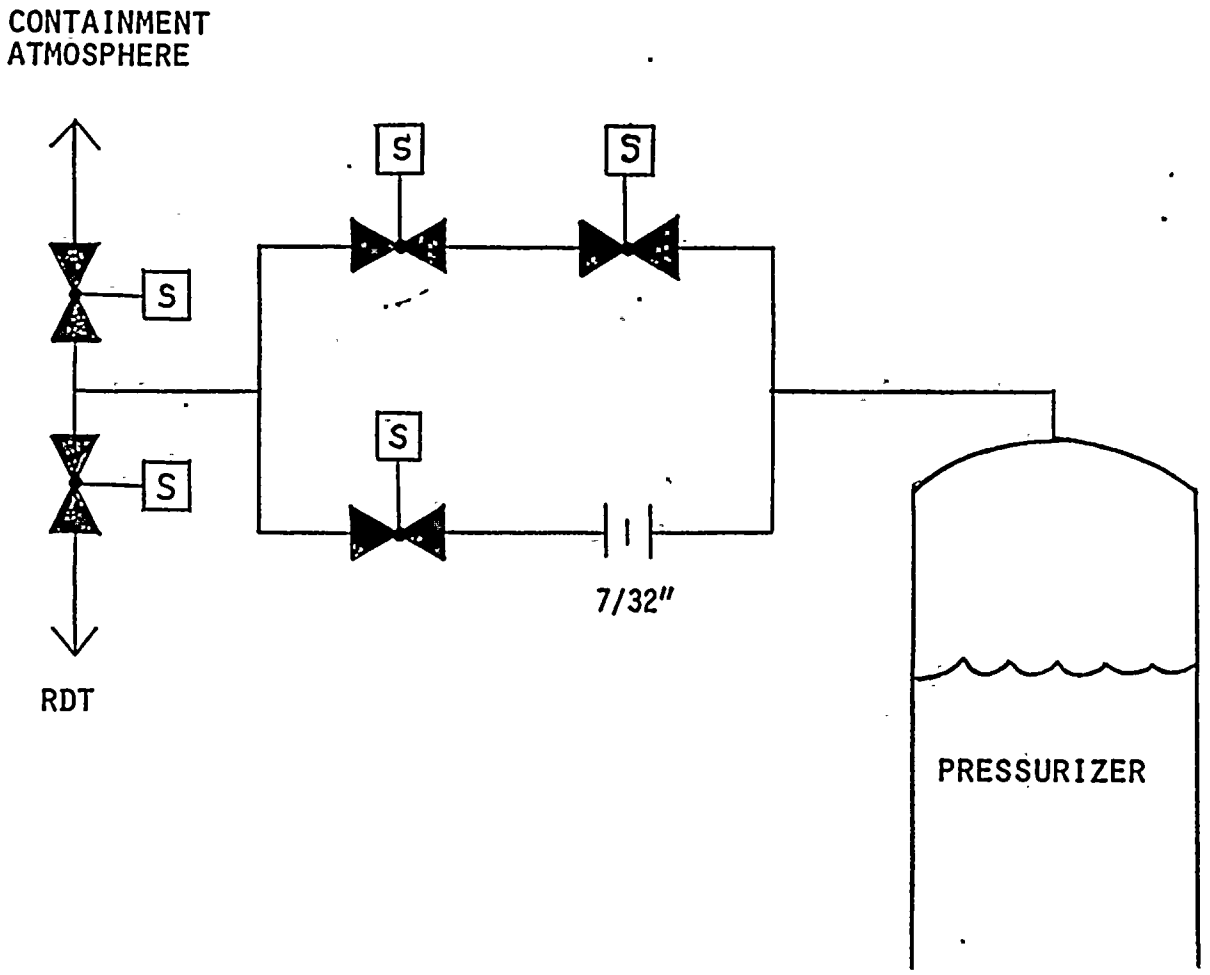
Palo Verde Nuclear Generating Station
FSAR

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)

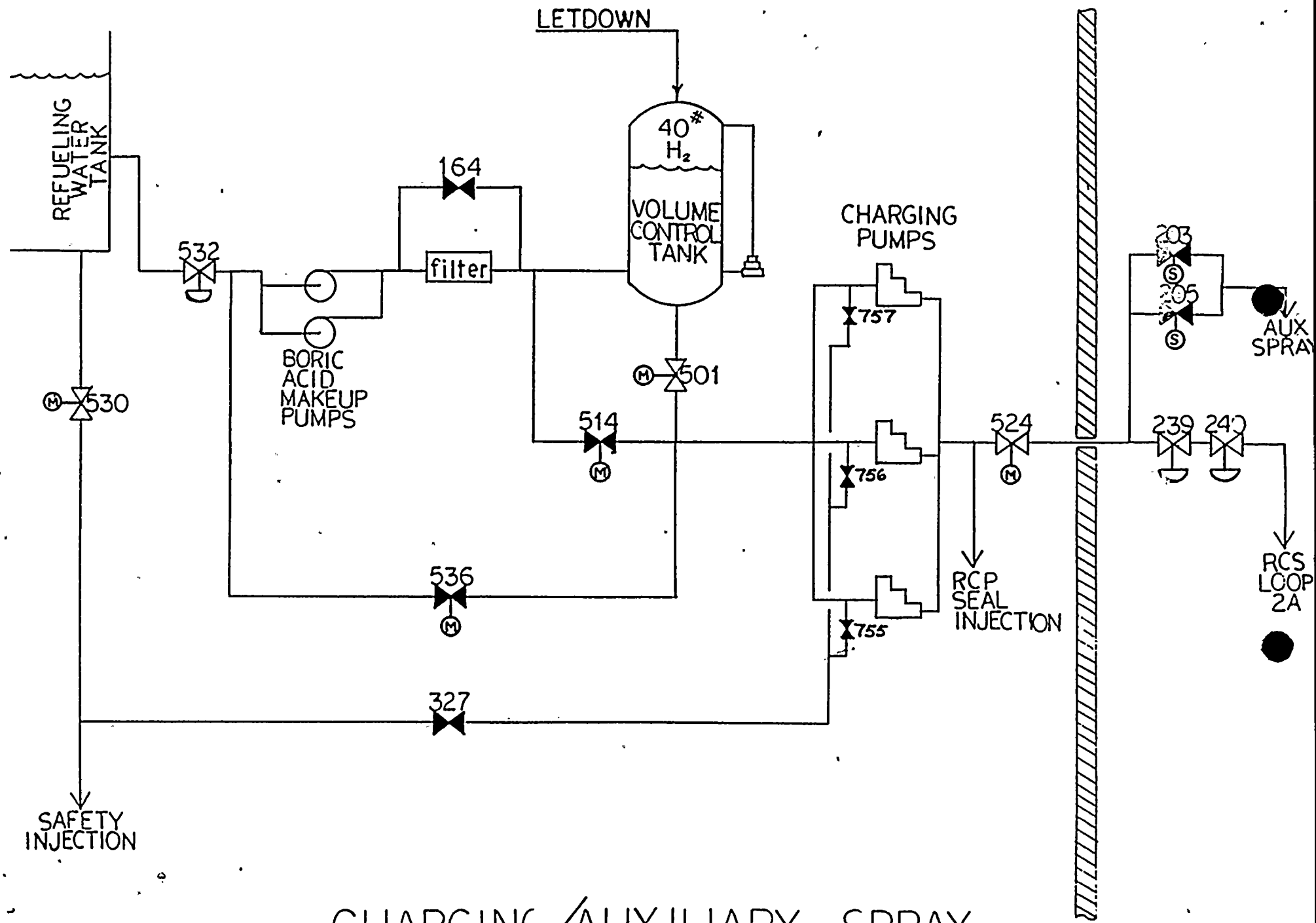
  - DEPRESSURIZATION RATE OF 3 PSI/MIN (vs 18 PSI/MIN WITH AUXILIARY PRESSURIZER SPRAY

  - 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	MANUAL ACTION
V536 IN CLOSED POSITION	MANUALLY OPEN V327 AND V757, V756 OR V755
V501 TO CLOSE	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)

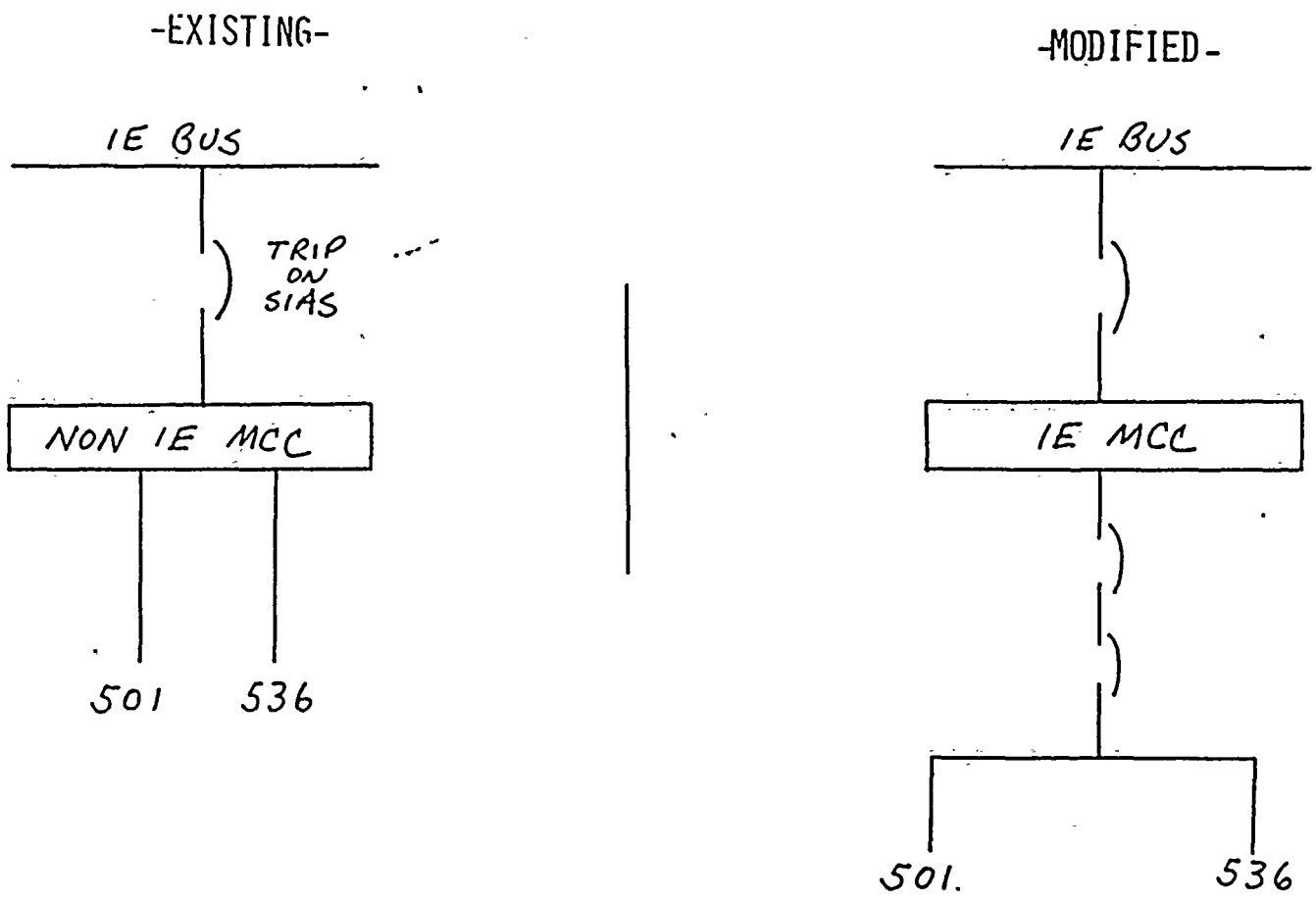
- o THREE MODIFICATIONS PLANNED

  - 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

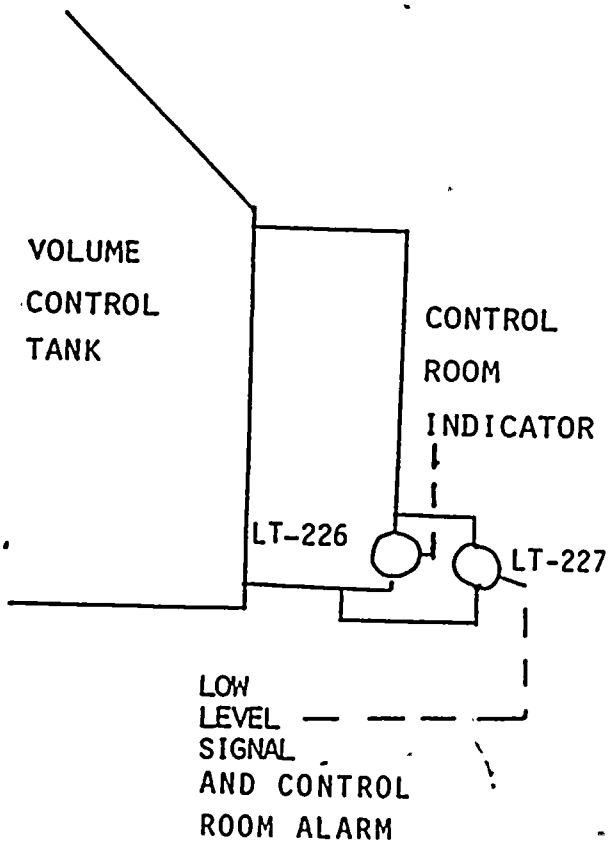
VALVE POWER SUPPLY CHANGE



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

VOLUME CONTROL TANK LEVEL INDICATION

EXISTING



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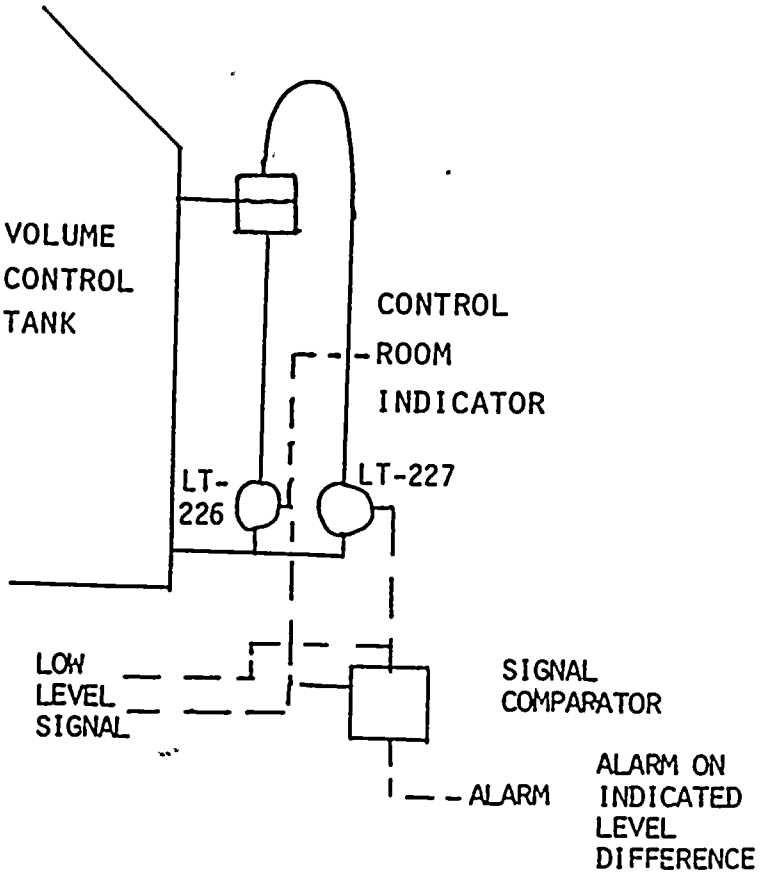
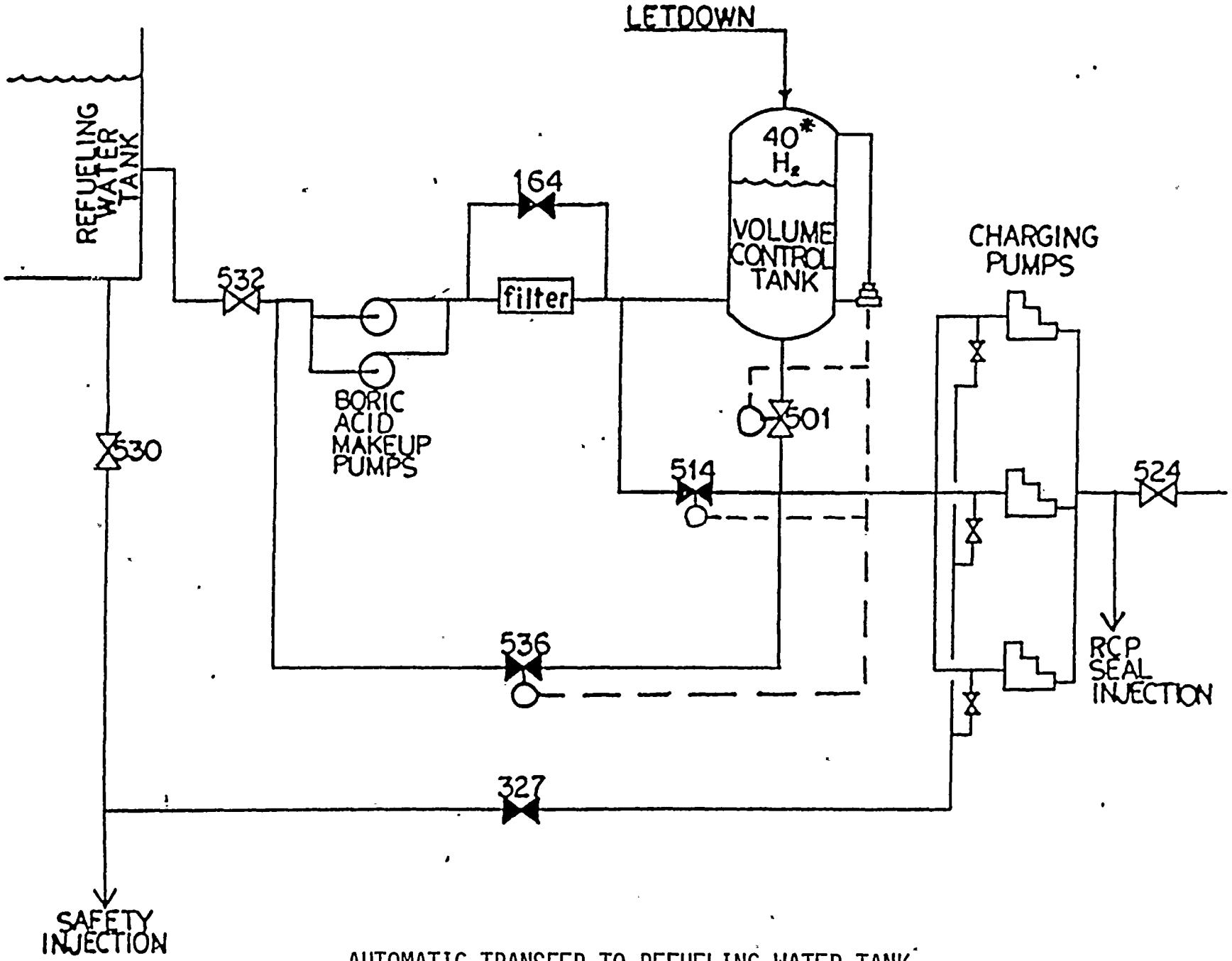


IMPROVEMENTS

1. SEPERATE REFERENCE LEG TO EACH TRANSMITTER
2. ONE WET AND ONE DRY LEG TO PROVIDE DIVERSE REFERENCE
3. COMPARATOR ALARM PROVIDES INDICATION OF POSSIBLE LOSS OF CORRECT REFERENCE TO ONE OF THE TRANSMITTERS



AUTOMATIC TRANSFER TO REFUELING WATER TANK

ENHANCEMENT EVALUATION

- BORATED WATER SOURCE REMAINS AVAILABLE TO CONTROL ROOM OPERATOR FOLLOWING LOP AND SIAS

- INACCURATE VCT LEVEL IS ALARMED IN CONTROL ROOM

- OPERATOR WORK LOAD REDUCED BY AUTO TRANSFER OF V501 AND V536

ENHANCEMENT EVALUATION

- BORATED WATER SOURCE REMAINS AVAILABLE TO CONTROL ROOM OPERATOR FOLLOWING LOP AND SIAS

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- OPERATOR WORK LOAD REDUCED BY AUTO TRANSFER OF V501 AND V536

JAN 7 1986

MEETING SUMMARY DISTRIBUTION

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