INDEPENDENT DESIGN REVIEW

of the

PALO VERDE NUCLEAR GENERATING STATION

CONTAINMENT SYSTEMS

Before the

CONTAINMENT SYSTEMS REVIEW BOARD

VOLUME II

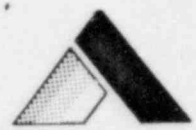
A P P E N D I X

Phoenix, Arizona
May 21, 1981

GRUMLEY REPORTERS
PHOENIX, ARIZONA

8111200645 811113
PDR ADOCK 05000528
A PDR

PALO VERDE NUCLEAR GENERATING STATION
CONTAINMENT SYSTEMS REVIEW BOARD



PHOENIX, AZ
MAY 21, 1981

CONTAINMENT SYSTEMS INDEPENDENT DESIGN REVIEW

5/21/81	BOARD CONVENES FOR BECHTEL PRESENTATION
5/28/81	APS LICENSING REVIEWS TRANSCRIPT
6/04/81	FINAL TRANSCRIPT SENT TO NRC, REVIEW BOARD AND BECHTEL
6/18/81	BECHTEL'S DRAFT RESPONSE SENT TO APS FOR INFORMAL REVIEW
6/25/81	APS COMMENTS ON DRAFT RESPONSE SENT TO BECHTEL
7/09/81	BECHTEL SENDS RESPONSES TO BOARD
7/16/81	APS SENDS BOARD'S COMMENTS ON RESPONSES TO BECHTEL
7/23/81	THOSE BOARD MEMBERS WITH COMMENTS WILL RECONVENE TO MEET WITH BECHTEL*
7/30/81	LETTER TO NRC CLOSING OUT REVIEW

*RECONVENING MAY BE FULFILLED WITH CONFERENCE CALL

SCHEDULE I

CONTAINMENT SYSTEMS REVIEW BOARD AGENDA

I. General Introduction

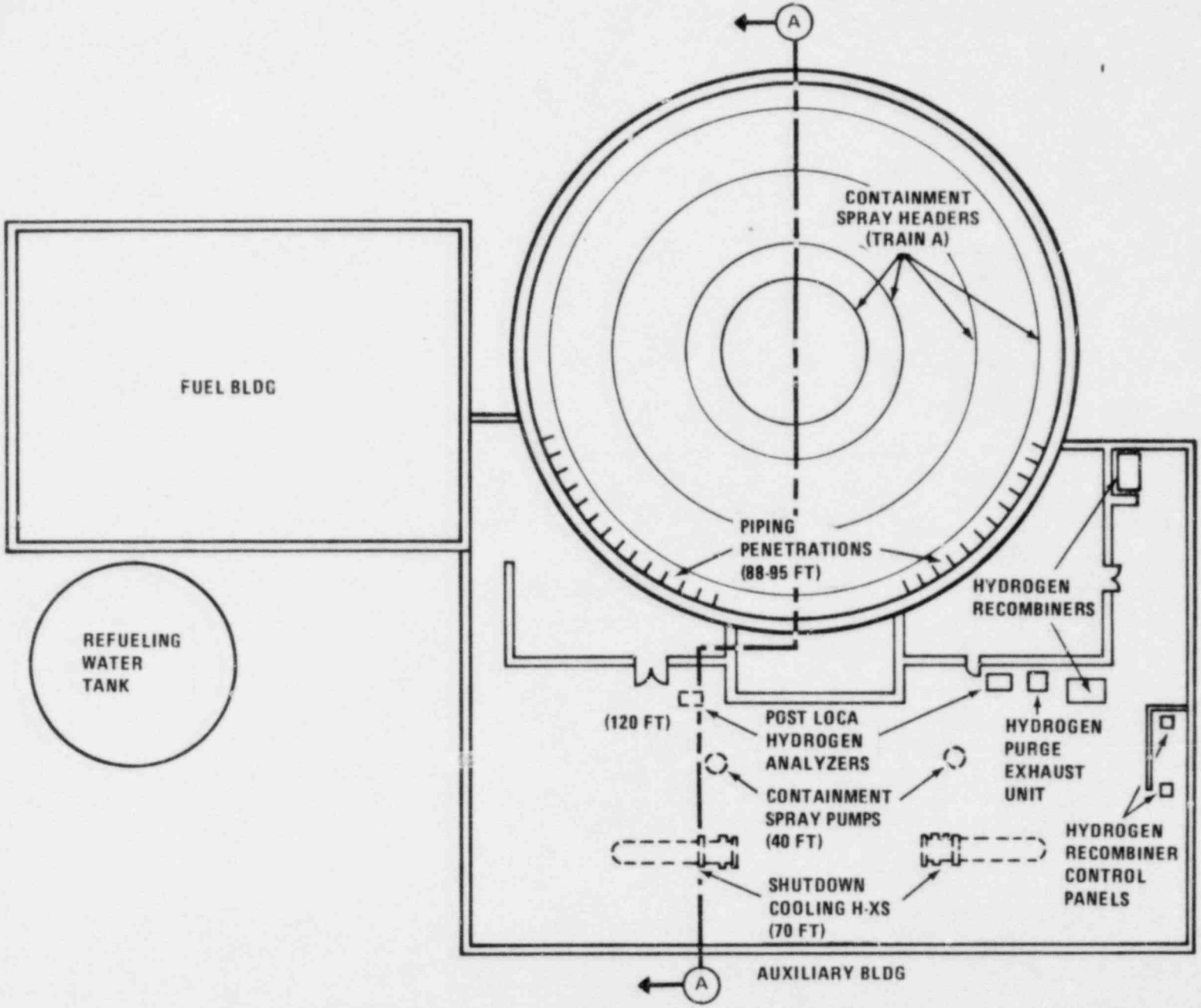
II. Containment Spray System (Containment Heat Removal System)

1. Introduction
2. System Overview
   - A. Design Criteria
   - B. CESSAR Interfaces
   - C. System Description
   - D. Operation
3. Conformance with Regulatory Requirements
   - A. SRP 6.2.2
   - B. GDC 38, 39, 40, 50
   - C. RG 1.1, 1.26, 1.29, 1.82
   - D. NUREG-0737 Item II.F.1, Subparts 4, 5

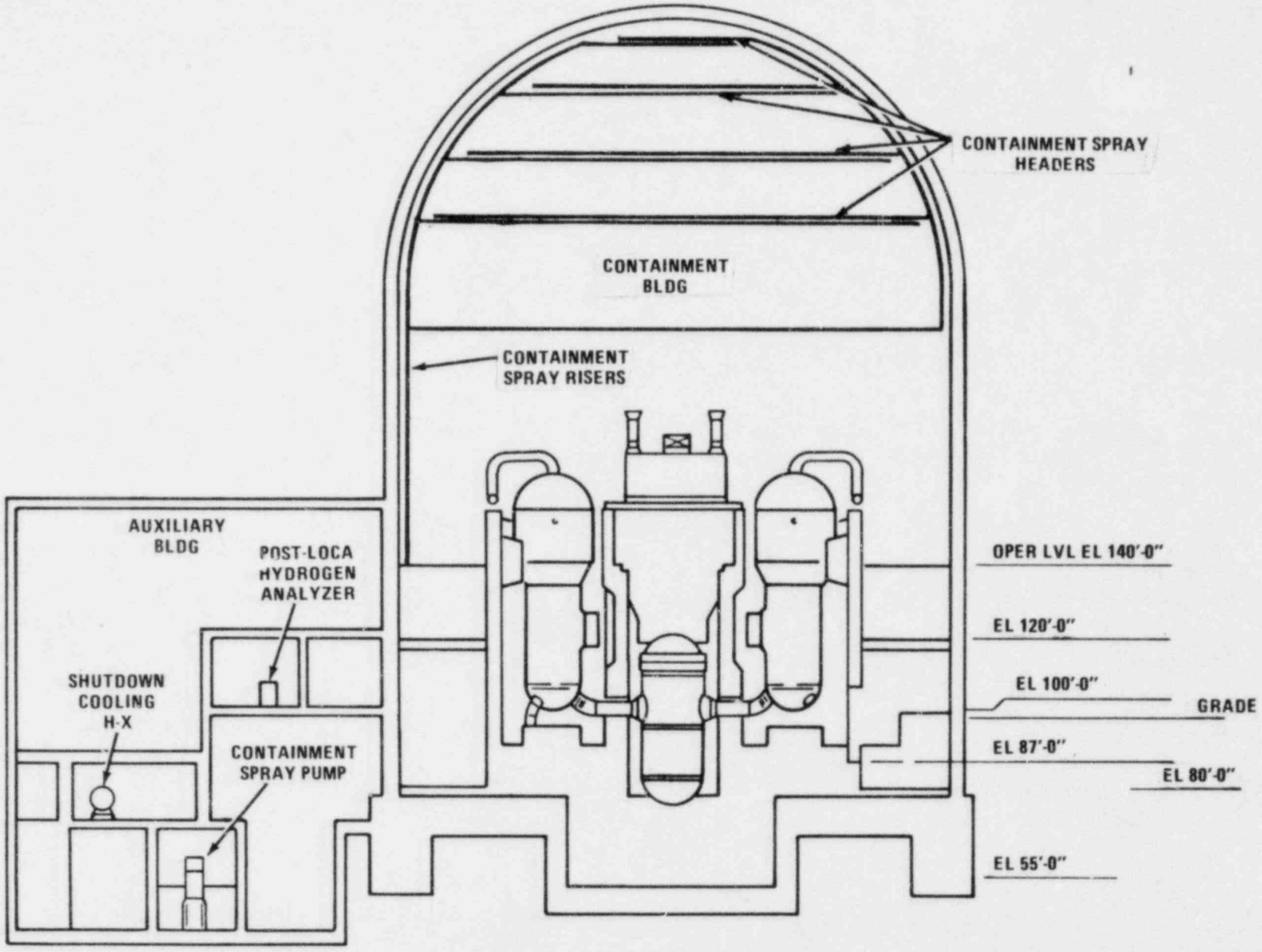
III. Containment Isolation Systems

1. Introduction
2. System Overview
   - A. Design Criteria
   - B. CESSAR Interfaces
   - C. System Description
   - D. Operation
3. Conformance with Regulatory Requirements
   - A. SRP 6.2.4
   - B. GDC 54, 55, 56, 57
   - C. RG 1.11, 1.26, 1.29, 1.141
   - D. BTP CSB 6-4
   - E. NUREG-0737 Item II.E.4.2

EXHIBIT 1



CONTAINMENT SYSTEMS COMPONENTS - EL. 100 FT (UNLESS OTHERWISE NOTED)
PLAN VIEW
FIGURE 1-1



CONTAINMENT SYSTEMS COMPONENTS - SECTION A
FIGURE 1-2

PVNGS CLASSIFICATIONS

A. Quality Class "Q"

- Full compliance with 10CFR50, Appendix B, Per ANSI N45.2-1971. (All engineered safety features [ESF] and/or ASME Section III components are "Q")

B. Quality Class "R"

- Similar to 10CFR50, Appendix B, but requires less extensive documentation.

C. Quality Class "S"

- Industry standard equipment.

D. Seismic Category I

- Remain functional for SSE and functional and within elastic range for OBE

E. Seismic Category II

- Components essential to power generation designed to not malfunction for an equivalent static load of 0.13G horizontal and 0.09G vertical

F. Seismic Category III

- Designed for an equivalent static load of 0.05G or to meet uniform building code for Seismic Zone 2

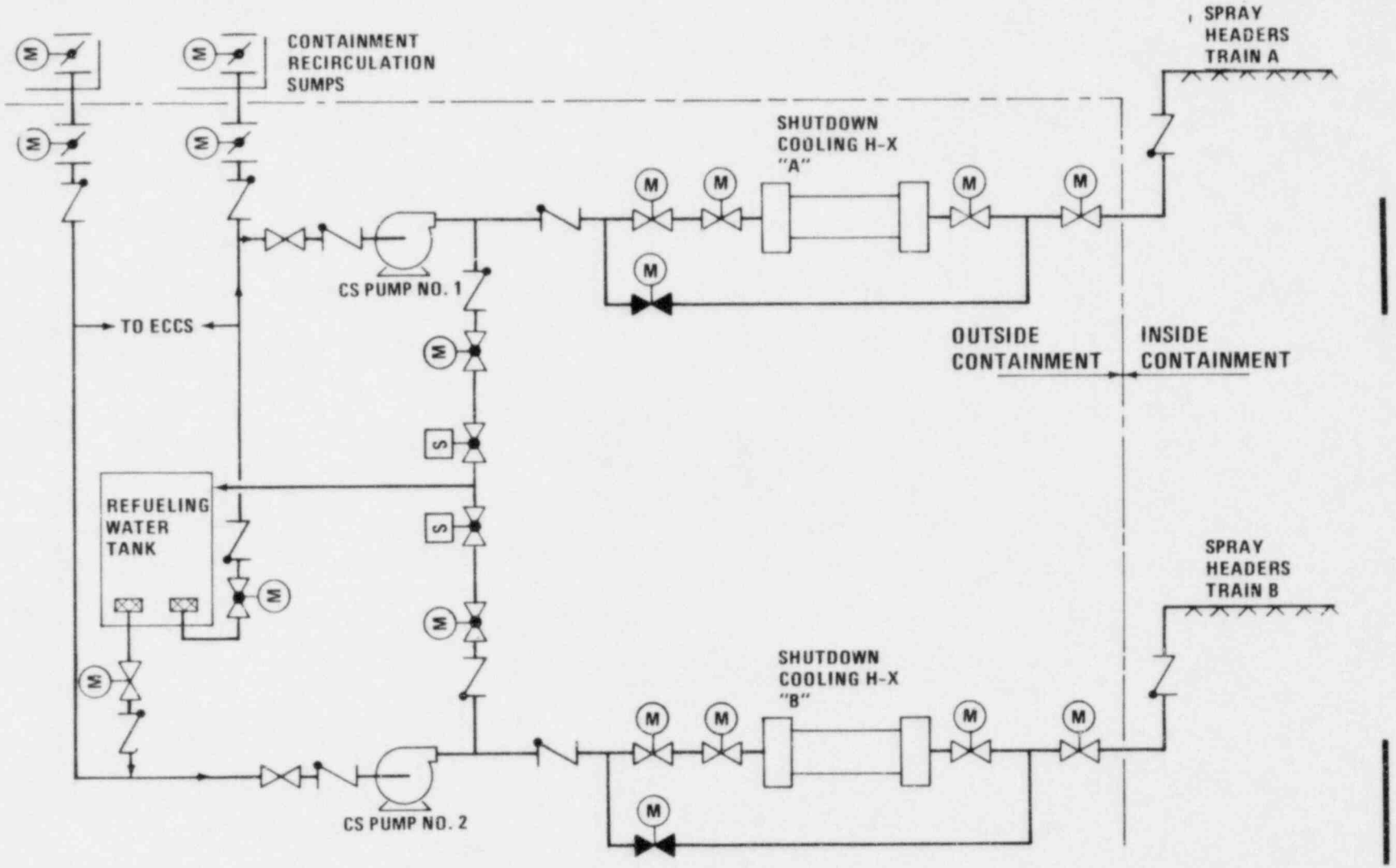
G. Seismic Category IX

- Design analyzed for non-collapse for SSE.

EXHIBIT 1-1

II. CONTAINMENT SPRAY SYSTEM
(CONTAINMENT HEAT REMOVAL SYSTEMS)

EXHIBIT 2-1



CONTAINMENT SPRAY SYSTEM
FIGURE 2-1

CONTAINMENT SPRAY SYSTEM
DESIGN CRITERIA

1) THE CONTAINMENT SPRAY SYSTEM (CSS) SHALL BE DESIGNED TO RAPIDLY REDUCE THE CONTAINMENT PRESSURE AND TEMPERATURE FOLLOWING A LOSS OF COOLANT ACCIDENT (LOCA) OR MAIN STEAM LINE BREAK (MSLB) AND MAINTAIN THESE PARAMETERS AT ACCEPTABLY LOW LEVELS AS REQUIRED BY GENERAL DESIGN CRITERIA (GDC) 38.

2) THE CSS SHALL CONSIST OF TWO REDUNDANT AND INDEPENDENT TRAINS EACH OF WHICH PROVIDES 100% OF THE REQUIRED HEAT REMOVAL CAPABILITY.

3) THE HEAT REMOVAL CAPACITY OF THE SYSTEM SHALL BE SUFFICIENT TO KEEP THE CONTAINMENT PRESSURE AND TEMPERATURE BELOW DESIGN CONDITIONS FOR ANY SIZE BREAK IN THE REACTOR COOLANT SYSTEM PIPING UP TO AND INCLUDING A DOUBLE-ENDED BREAK OF THE LARGEST REACTOR COOLANT PIPE. THE SYSTEM IS ALSO DESIGNED TO MITIGATE THE CONSEQUENCES OF ANY SIZE BREAK IN THE MAIN STEAM LINE PIPING, UP TO AND INCLUDING A DOUBLE-ENDED BREAK OF THE MAIN STEAM LINE FROM A SINGLE STEAM GENERATOR. DURING RECIRCULATION, THE SYSTEM SHALL CONTINUE TO REDUCE CONTAINMENT PRESSURE AND TEMPERATURE AND MAINTAIN THEM AT ACCEPTABLE LEVELS. FOR THE CONTAINMENT DESIGN BASIS ACCIDENT, THE CONTAINMENT SPRAY SYSTEM SHALL BE DESIGNED TO REDUCE CONTAINMENT PRESSURE FROM THE PEAK VALUE TO THE ONE-HALF PEAK VALUE IN LESS THAN 24 HOURS.

EXHIBIT 2-1

CONTAINMENT SPRAY SYSTEM
DESIGN CRITERIA

4) THE PORTIONS OF THE CSS LOCATED INSIDE CONTAINMENT SHALL BE DESIGNED TO REMAIN OPERABLE IN THE CONTAINMENT ACCIDENT ENVIRONMENT.

5) THE CSS SHALL BE DESIGNED SUCH THAT A SINGLE FAILURE OF ANY ACTIVE COMPONENT WILL NOT DEGRADE THE SYSTEM ABILITY TO FULFILL DESIGN OBJECTIVES.

6) EACH TRAIN OF THE CSS SHALL RECEIVE POWER FROM A SEPARATE EMERGENCY DIESEL GENERATOR IN THE EVENT THAT OFFSITE POWER IS UNAVAILABLE DURING AN ACCIDENT. THE TWO TRAINS SHALL BE PHYSICALLY SEPARATED FROM EACH OTHER SO THAT A FAILURE IN ONE TRAIN WILL NOT RESULT IN FAILURE OF THE OTHER TRAIN DUE TO FIRE, FLOODING, JET IMPINGEMENT, OR MISSILES.

7) EACH TRAIN SHALL RECEIVE SEPARATE ACTUATION SIGNALS. CRITICAL PLANT PARAMETERS SHALL BE MONITORED AND THE ACTUATION SIGNALS SHALL BE PRODUCED IN THE ENGINEERED SAFETY FEATURES ACTUATION SYSTEM (ESFAS).

8) THE CSS SHALL BE DESIGNED TO SEISMIC CATEGORY I REQUIREMENTS.

9) THE CSS SHALL BE PROTECTED AGAINST THE DYNAMIC EFFECTS ASSOCIATED WITH THE POSTULATED RUPTURE OF PIPING.

EXHIBIT 2-2

CONTAINMENT SPRAY SYSTEM
DESIGN CRITERIA

10) THE CSS SHALL BE DESIGNED TO PERMIT PERIODIC INSPECTION AND TESTING.

11) THE CSS SHALL BE DESIGNED TO ACCOMMODATE THE ADDITION OF HYDRAZINE TO THE SPRAY WATER TO RAPIDLY REDUCE FISSION PRODUCT IODINE CONCENTRATION IN THE CONTAINMENT ATMOSPHERE.

12) SYSTEM SIZING SHALL BE BASED ON THE LONG-TERM HEAT REJECTION FUNCTION OF THE SYSTEM. THE CSS SHALL USE THE SHUTDOWN COOLING HEAT EXCHANGERS (SDCHE) TO REJECT HEAT FROM THE CONTAINMENT.

EXHIBIT 2-3

CONTAINMENT SPRAY SYSTEM
DESIGN CRITERIA

13) The following design codes and standards shall be met:

A. Piping and Valves

- American Society of Mechanical Engineers (ASME), Boiler and Pressure Vessel Code, Section III, Class 2.
- ASME Boiler and Pressure Vessel Code, Section XI, Rules for Inservice Inspection for Nuclear Power Plant Components.

B. Pumps

- ASME Boiler and Pressure Vessel Code, Section III, Class 2

C. Heat Exchangers

- Tube Side
  - ASME Boiler and Pressure Vessel Code, Section III, Class 2
- Shell Side
  - ASME Boiler and Pressure Vessel Code, Section III, Class 3

EXHIBIT 2-4

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
POWER	
1) THE CSS PUMPS, VALVES, AND INSTRUMENTATION SHALL BE CAPABLE OF BEING POWERED FROM THE PLANT TURBINE GENERATOR (ONSITE POWER SOURCE), PLANT STARTUP POWER SOURCE (OFFSITE POWER), AND THE EMERGENCY GENERATORS (EMERGENCY POWER).	IN COMPLIANCE
2) POWER CONNECTIONS SHALL BE THROUGH A MINIMUM OF TWO INDEPENDENT BUSES SO THAT IN THE EVENT OF A LOCA IN CONJUNCTION WITH A SINGLE FAILURE IN THE ELECTRICAL SUPPLY, THE FLOW FROM ONE CONTAINMENT SPRAY TRAIN SHALL BE AVAILABLE.	IN COMPLIANCE

EXHIBIT 2-5

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
3)	EACH ELECTRICAL BUS OF THE ABOVE SHALL BE CONNECTED TO ONE CONTAINMENT SPRAY PUMP AND ASSOCIATED VALVES AND INSTRUMENTATION.	IN COMPLIANCE
4)	EACH EMERGENCY GENERATOR AND THE AUTOMATIC SEQUENCERS NECESSARY FOR GENERATOR LOADING SHALL BE DESIGNED SUCH THAT FLOW TO THE CONTAINMENT ATMOSPHERE IS ATTAINED WITHIN A MAXIMUM OF 58 SECONDS AFTER A CONTAINMENT SPRAY ACTUATION SIGNAL (CSAS).	THE FULL CONTAINMENT SPRAY FLOW CAN BE ATTAINED WITHIN 90 SECONDS AFTER A CSAS. CALCULATIONS VERIFY CONTAINMENT HEAT REMOVAL REQUIREMENTS ARE MET.
5)	INSTRUMENT POWER SUPPLIES SHALL BE PROVIDED AS STATED IN CESSAR SECTION 8.3.1.	IN COMPLIANCE

EXHIBIT 2-6

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
PROTECTION FROM NATURAL PHENOMENA	
1) CSS COMPONENTS SHALL BE CAPABLE OF FUNCTIONING IN THE EVENT OF THE MAXIMUM PROBABLE FLOOD OR OTHER NATURAL PHENOMENA DEFINED IN GDC 2.	IN COMPLIANCE
PROTECTION FROM PIPE FAILURE	
1) THE MAXIMUM EXPECTED LEAKAGE FROM A MODERATE ENERGY PIPE RUPTURE POSTULATED DURING NORMAL PLANT CONDITIONS IN THE CSS SHALL BE AS DEFINED BY THE METHODS OF CESSAR SECTION 3.6.1. ISOLATION VALVES USED TO CONTAIN LEAKAGE SHALL BE PROTECTED FROM THE ADVERSE EFFECTS OF A HIGH OR MODERATE ENERGY PIPE RUPTURE WHICH MIGHT PRECLUDE THEIR OPERATION WHEN REQUIRED.	IN COMPLIANCE

EXHIBIT 2-7

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
2)	NO LIMITED LEAKAGE PASSIVE FAILURE OR THE EFFECTS THEREOF (SUCH AS FLOODING, SPRAY IMPINGEMENT, STEAM, TEMPERATURE, PRESSURE, RADIATION, LOSS OF NPSH, OR LOSS OF RECIRCULATION WATER INVENTORY), IN THE CSS DURING THE RECIRCULATION MODE SHALL PRECLUDE THE AVAILABILITY OF AT LEAST ONE CSS TRAIN.	IN COMPLIANCE
3)	THE CSS SHALL BE PROTECTED FROM THE EFFECTS OF PIPE RUPTURE AND PIPE WHIP.	IN COMPLIANCE

EXHIBIT 2-8

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
MISSILES	
1) THE CSS SHALL BE PROTECTED FROM MISSILES.	IN COMPLIANCE
SEPARATION	
1) ADEQUATE PHYSICAL SEPARATION SHALL BE MAINTAINED BETWEEN THE REDUNDANT PIPING PATHS AND CONTAINMENT PENETRATIONS OF THE CSS SUCH THAT THE CSS WILL MEET ITS FUNCTIONAL REQUIREMENTS EVEN WITH THE FAILURE OF A SINGLE ACTIVE COMPONENT DURING THE INJECTION MODE, OR WITH A SINGLE ACTIVE FAILURE OR A LIMITED LEAKAGE PASSIVE FAILURE DURING THE RECIRCULATION MODE.	IN COMPLIANCE

EXHIBIT 2-9

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
2)	THE CABLING WHICH IS ASSOCIATED WITH REDUNDANT CHANNELS OF VITAL CLASS 1E CIRCUITS FOR THE CSS SHALL BE PHYSICALLY SEPARATED TO PRESERVE REDUNDANCY AND PREVENT A SINGLE EVENT FROM CAUSING MULTIPLE CHANNEL MALFUNCTIONS OR INTERACTIONS BETWEEN CHANNELS. ASSOCIATED CIRCUIT CABLING FROM REDUNDANT CHANNELS SHALL EITHER BE SEPARATED, PROVIDED WITH ISOLATION DEVICES, OR ANALYZED AND/OR TESTED TO DEMONSTRATE THAT NO CREDIBLE SINGLE FAILURE COULD ADVERSELY AFFECT REDUNDANT CHANNELS OF CLASS 1E CIRCUITS.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
3)	IN THE ROUTING OF CSS CLASS 1E CIRCUITS AND LOCATION OF EQUIPMENT SERVED BY THESE CLASS 1E CIRCUITS, CONSIDERATION SHALL BE GIVEN TO THEIR EXPOSURE TO POTENTIAL HAZARDS SUCH AS POSTULATED RUPTURES OF PIPING, FLAMMABLE MATERIAL, FLOODING, AND NON-FLAME RETARDANT WIRING. ADEQUATE SEPARATION OR PROTECTIVE MEASURES SHALL BE PROVIDED.	IN COMPLIANCE
4)	FAILURES OF NONSAFETY GRADE SYSTEMS SHALL NOT COMPROMISE REDUNDANCY OF THE CSS.	IN COMPLIANCE

EXHIBIT 2-11

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
INDEPENDENCE	
1) EACH CSS TRAIN SHALL BE PROVIDED WITH AN INDEPENDENT ENVIRONMENTAL CONTROL SYSTEM.	IN COMPLIANCE
2) POWER CONNECTIONS FOR CSS COMPONENTS SHALL BE FROM A MINIMUM OF TWO INDEPENDENT ELECTRICAL BUSES.	IN COMPLIANCE
3) TWO INDEPENDENT VITAL INSTRUMENT POWER SOURCES SHALL BE PROVIDED FOR THE CSS INSTRUMENTATION.	IN COMPLIANCE

EXHIBIT 2-12

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
THERMAL LIMITATIONS	
1) EACH CSS TRAIN SHALL BE PROVIDED WITH AN INDEPENDENT ENVIRONMENTAL CONTROL SYSTEM SUCH THAT THE SAFETY-RELATED EQUIPMENT IN EACH TRAIN OPERATES WITHIN THE ENVIRONMENTAL DESIGN LIMITS SPECIFIED IN CESSAR SECTION 3.11.	IN COMPLIANCE
MONITORING	
1) PROVISIONS SHALL BE MADE FOR THE DETECTION, CONTAINMENT, AND ISOLATION OF THE MAXIMUM EXPECTED LEAKAGE FROM A MODERATE ENERGY PIPE RUPTURE IN ONE TRAIN. PROCESS INSTRUMENTATION SHALL BE AVAILABLE TO THE OPERATOR IN THE CONTROL ROOM TO ASSIST IN ASSESSING POST-LOCA CONDITIONS.	IN COMPLIANCE

EXHIBIT 2-13

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
INSPECTION AND TESTING	
1) Inspection and testing requirements for the CSS are contained in CESSAR Appendix 6A Section 8.0 and CESSAR Section 16. Prior to initial plant startup, CSS flow tests which comply with CESSAR Appendix 6A Section 9.0 shall be performed. An adequate supply of water and the necessary test connections at the containment sump and containment spray header piping penetrations shall be provided.	In compliance.

EXHIBIT 2-14

CONTAINMENT SPRAY SYSTEMS
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
CHEMISTRY AND SAMPLING	
1) The CSS shall be designed for the following fluid conditions: Basic Fluid — Water with: Boric Acid — 3.5 w/o Hydrazine — 50 to 100 ppm Phosphate-controlled pH of 10 max.	In compliance
SAMPLING	
1) The sampling system shall provide means of obtaining remote liquid samples for laboratory analysis.	In compliance

EXHIBIT 2-15

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
2)	THE SAMPLE LINES IN CONTACT WITH THE REACTOR COOLANT SHALL BE AUSTENITIC STAINLESS STEEL OR EQUIVALENT, SUCH THAT THE MATERIAL IS COMPATIBLE WITH THE FLUID CHEMISTRY.	IN COMPLIANCE.
3)	THE FLUID VELOCITY IN THE SAMPLE LINES SHOULD BE SELECTED TO OBTAIN REPRESENTATIVE SAMPLES. THE PURGE FLOW RATE SHOULD BE HIGH ENOUGH TO REMOVE CRUD FROM LINES.	IN COMPLIANCE
4)	SAMPLE TAPS SHOULD BE LOCATED ON VERTICAL RUNS OF PIPE WHENEVER POSSIBLE. WHERE THIS CANNOT BE DONE, IT IS PERMISSIBLE TO TAKE SAMPLES FROM THE TOP OF HORIZONTAL PIPE RUNS.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
MATERIALS	
1) CSS PIPING AND FITTINGS SHALL BE SEISMIC CATEGORY I.	IN COMPLIANCE
2) DESIGN AND FABRICATION OF THE CSS PIPING AND FITTINGS SHALL CONFORM TO ASME BOILER AND PRESSURE VESSEL CODE (B&PV) SECTION III, CLASS 2.	IN COMPLIANCE
3) PIPES AND ALL PARTS IN CONTACT WITH THE SYSTEM FLUID SHALL BE OF AUSTENITIC STAINLESS STEEL. THE STAINLESS STEEL SHALL BE TYPE 316 OR TYPE 304. VALVE PACKINGS, GASKETS, AND VALVE DIAPHRAGM MATERIALS SHALL ALSO BE COMPATIBLE WITH THE CHEMISTRY OF THE FLUID AND THE RADIOACTIVE DOSE AT THAT LOCATION.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
4)	CARE SHALL BE TAKEN TO PREVENT SENSITIZATION AND TO CONTROL THE DELTA FERRITE CONTENT OF: (1) THE WELDS WHICH JOIN ANY SYSTEM FABRICATED OF AUSTENITIC STAINLESS STEEL TO THE CSS, AND (2) THE FIELD WELDS ON THE CSS.	IN COMPLIANCE
5)	CONTROLS SHALL BE EXERCISED TO ASSURE THAT CONTAMINANTS DO NOT SIGNIFICANTLY CONTRIBUTE TO STRESS CORROSION OF STAINLESS STEEL.	IN COMPLIANCE
6)	MATERIALS USED FOR THE CONTAINMENT AND ITS INTERNAL STRUCTURES SHALL WITHSTAND EXPOSURE TO ALL POST-ACCIDENT CONDITIONS WITHOUT CAUSING UNDESIRABLE REACTIONS, OR SIGNIFICANTLY ALTERING THE RECIRCULATING WATER CHEMISTRY.	IN COMPLIANCE

EXHIBIT 2-18

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
7)	IF THE CSS UTILIZES A COMMON SUCTION WITH THE SAFETY INJECTION SYSTEM FROM THE REFUELING WATER TANK (RWT) OR CONTAINMENT SUMP, THE MATERIALS USED IN THIS SYSTEM SHALL BE AUSTENITIC STAINLESS STEEL, TYPE 316 OR 304, OR OTHER COMPATIBLE MATERIAL SUBJECT TO APPROVAL BY C-E, AND SHALL CONFORM TO SECTION III CLASS 2, ASME B&PV CODE.	IN COMPLIANCE

EXHIBIT 2-19

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
PHYSICAL ARRANGEMENT	
1) To assure that CSS flow requirements are met, maximum and minimum acceptable head losses for the piping and fittings, as given in CESSAR Appendix 6A, Table 7-13, along with the required NPSH shall be met.	In compliance. The CSS is designed to meet the flow/pressure requirements of the containment spray nozzles.
2) Flow measurement devices shall be provided on the containment spray pump discharge lines. The piping runs upstream and downstream of the orifices shall meet the recommendations of "ASME Fluid Meters: Their Theory and Application, Parts 1 and 2".	In compliance

EXHIBIT 2-20

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
3)	FOR EACH SPRAY TRAIN, THE TOP OF THE PIPING JUNCTION BETWEEN THE RWT DISCHARGE AND THE CONTAINMENT SUMP MUST BE LOCATED AT A MINIMUM OF 16 FEET BELOW THE MINIMUM CONTAINMENT SUMP WATER LEVEL DURING RECIRCULATION. IF CONTAINMENT PRESSURE COULD BE SUBATMOSPHERIC BY VALUES GREATER THAN 3 PSIG, THIS MUST BE ACCOMMODATED FOR BY INCREASING THE DISTANCE OF THE PIPING JUNCTION TOP BELOW THE MINIMUM CONTAINMENT SUMP WATER LEVEL DURING RECIRCULATION BY 2.31 FEET FOR EACH ADDITIONAL PSIG.	IN COMPLIANCE

EXHIBIT 2-21

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
4)	FRICTIONAL LOSSES IN THE CSS PUMP SUCTION PIPING BETWEEN THE CONTAINMENT SUMP AND THE JUNCTION WITH THE RWT SHALL NOT EXCEED 7 FEET, UNLESS THE ELEVATION OF THE TOP OF THIS JUNCTION IS LOWERED AN ADDITIONAL FOOT FOR EACH ADDITIONAL FOOT OF HEAD LOSS.	IN COMPLIANCE. FRICTIONAL LOSSES IN THE CSS PUMP SUCTION PIPING BETWEEN THE CONTAINMENT SUMP AND THE JUNCTION WITH THE RWT ARE NEARLY 10 FEET, WHICH EXCEEDS THE REQUIREMENT BY 3 FEET. HOWEVER, THE JUNCTION POINT IS LOCATED 22 FEET LOWER THAN THE C-E REQUIRED MINIMUM OF 16 FEET, LEADING TO AN ACCEPTABLE HEAD LOSS.
5)	THE CSS PUMPS SHALL BE LOCATED IN THE AUXILIARY BUILDING AS CLOSE AS PRACTICABLE TO THE CONTAINMENT STRUCTURE.	IN COMPLIANCE
6)	THE ELEVATION OF THESE PUMPS SHALL BE LOW ENOUGH SUCH THAT ADEQUATE NPSH IS AVAILABLE DURING THE RECIRCULATION MODE WHEN THE PUMPS TAKE SUCTION FROM THE CONTAINMENT SUMP.	IN COMPLIANCE

EXHIBIT 2-22

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
7)	THE AVAILABLE NPSH SHALL BE CALCULATED AT THE PUMP IMPELLER EYE.	IN COMPLIANCE
8)	THE CALCULATION OF NPSH SHALL CONSIDER CONCURRENT HIGH PRESSURE SAFETY INJECTION, LOW PRESSURE SAFETY INJECTION AND CONTAINMENT SPRAY PUMP OPERATION.	IN COMPLIANCE
9)	IN THE EVENT OF A LIMITED LEAKAGE PASSIVE FAILURE IN ONE CSS TRAIN DURING RECIRCULATION, PERSONNEL ACCESS TO THE INTACT TRAIN SHALL BE POSSIBLE.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
10) THE TWO CSS CHECK VALVES IN EACH OF THE SPRAY HEADER LINES SHALL BE LOCATED AS CLOSE AS PRACTICAL TO THE CONTAINMENT PENETRATION:	IN COMPLIANCE
A. ALLOWANCE SHALL BE MADE FOR VALVE ACCESSIBILITY AND MAINTENANCE.	IN COMPLIANCE
B. THE TOTAL VOLUME OF THE SPRAY HEADER PIPING SHALL BE KEPT TO A MINIMUM IN ORDER TO MINIMIZE SPRAY DELAY TIME.	IN COMPLIANCE
11) MANUALLY OPERATED VALVES SHALL BE PROVIDED WITH LOCKING PROVISIONS.	IN COMPLIANCE

EXHIBIT 2-24

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
12)	PHYSICAL IDENTIFICATION OF SAFETY-RELATED CSS EQUIPMENT AND CABLING SHALL BE PROVIDED TO ALLOW RECOGNITION OF SAFETY STATUS BY PLANT PERSONNEL.	IN COMPLIANCE
13)	IN THE ROUTING OF CSS CLASS 1E CIRCUITS AND LOCATION OF EQUIPMENT SERVED BY THESE CLASS 1E CIRCUITS, CONSIDERATION SHALL BE GIVEN TO THEIR EXPOSURE TO POTENTIAL HAZARDS.	IN COMPLIANCE
14)	THE CSS CONTAINMENT PENETRATIONS SHALL NOT BE SUBJECT TO LOSS OF FUNCTION FROM DYNAMIC EFFECTS (E.G., MISSILES, PIPE REACTIONS, FLUID REACTION FORCES) RESULTING FROM FAILURE OF EQUIPMENT OR PIPING INSIDE OR OUTSIDE THE CONTAINMENT.	IN COMPLIANCE

EXHIBIT 2-25

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
15)	WHERE REQUIRED, BELLOWS SHALL BE PROVIDED BETWEEN PIPING AND THE CONTAINMENT WALL TO PREVENT EXCESSIVE FORCES ON THE PIPING.	IN COMPLIANCE
16)	EACH CSS PUMP BYPASS FLOW LINE SHALL BE CAPABLE OF PASSING 150 GAL/MIN WITH :TS CSS PUMP OPERATING AT DESIGN OPERATING CONDITIONS.	IN COMPLIANCE
17)	THE DESIGN OF THE CSS PIPING AND SPRAY HEADERS S'ALL CONSIDER THE EFFECTS OF WATER HAMMER. FILL AND DRAIN CONNECTIONS TOGETHER WITH ASSOCIATED VALVES AND INSTRUMENTATION SHALL BE PROVIDED IF FILLING OF THE RISER PIPING INSIDE THE CONTAINMENT IS REQUIRED TO PRECLUDE THE EFFECTS OF WATER HAMMER.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
18)	THE MAXIMUM SPRAY HEADER ELEVATION ABOVE THE RWT OUTLET NOZZLES SHALL NOT EXCEED 185 FEET.	PARTIAL COMPLIANCE. THE MAXIMUM SPRAY HEADER ELEVATION ABOVE THE RWT OUTLET DOES NOT EXCEED 192 FEET. HOWEVER, THE SYSTEM ANALYSIS HAS SHOWN THE SYSTEM PERFORMS ADEQUATELY.
19)	THE RESISTANCE OF THE RWT RETURN LINES SHALL BE ESTABLISHED SO AS TO PERMIT PERIODIC TESTING OF EACH SPRAY PUMP AT CONDITIONS AS NEAR TO DESIGN AS PRACTICAL. FOR PRE-OPERATIONAL TESTING, PROVISIONS SHOULD BE MADE TO PROVIDE FULL FLOW. FOR THIS TEST, THE RWT RETURN LINE OR AN ALTERNATE MAY BE USED.	PARTIAL COMPLIANCE. PROVISION IS MADE FOR ONE-HALF OF THE NORMAL PUMP FLOW TO BE RECIRCULATED TO THE RWT DURING PREOPERATIONAL AND PERIODIC TESTING.

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
21)	ACCESS TO SYSTEM COMPONENTS NOT DESIGNED TO ASME SECTION III SHOULD BE PROVIDED FOR PERIODIC VISUAL INSPECTION.	IN COMPLIANCE
22)	A MINIMUM FREE FALL HEIGHT OF 90 FT SHALL BE PROVIDED BETWEEN THE SPRAY NOZZLE HEADERS LOCATED IN THE UPPER PART OF THE CONTAINMENT AND THE OPERATING DECK TO PROVIDE ADEQUATE SPRAY DROP RESIDENCE TIME.	IN COMPLIANCE

EXHIBIT 2-28

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6B, SECTION 7

	REQUIREMENT	DESIGN FEATURE
1)	THE SPRAY NOZZLE HEADERS SHALL BE LOCATED AS HIGH AS PRACTICAL IN THE UPPER REGIONS OF THE CONTAINMENT TO MINIMIZE UNSPRAYED VOLUME ABOVE THE HEADERS.	IN COMPLIANCE
2)	THE REGION DEFINED AS THE SPRAYED VOLUME SHALL HAVE A 90% SPRAY AREA COVERAGE AT THE OPERATING DECK LEVEL. COVERAGE SHALL BE EVALUATED AT CONTAINMENT DESIGN PRESSURE.	IN COMPLIANCE
3)	THE SPRAY NOZZLES SHALL BE SELECTED ON THE BASIS OF DROPLET SIZE. THEY SHALL BE A NON-CLOGGING DESIGN, HAVING A NOMINAL THROAT DIAMETER OF 3/8 IN, WITH A PRESSURE DIFFERENTIAL OF 40 PSID ACROSS THE NOZZLE AT DESIGN PRESSURE. 230 NOZZLES SHOULD BE PROVIDED FOR EACH CSS TRAIN TO ACHIEVE THE REQUIRED CONTAINMENT COVERAGE AND DROP SIZE DISTRIBUTION.	IN COMPLIANCE

EXHIBIT 2-29

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
RADIOLOGICAL WASTE COLLECTION	
1) CSS LEAKAGE TO THE SAFEGUARDS ROOM WILL NORMALLY DRAIN TO THE ROOM SUMP. PROVISIONS SHALL BE MADE TO ACCEPT THE MAXIMUM LEAKAGE RATES LISTED BELOW:	IN COMPLIANCE
CSS PUMP SEALS: 100 CC/HR/PUMP	
VALVES	
BACKSEAT LEAKAGE: 10 CC/HR/INCH SEAT DIAMETER/ VALVE	
ACROSS THE VALVE SEAT: 10 CC/HR/INCH OF NOMINAL VALVE SIZE/VALVE	
ALL LEAKAGES SHALL BE TREATED AS RADIOACTIVE WASTE WITH A LOW DISSOLVED SOLIDS AND ORGANIC CONTENT.	

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
OVERPRESSURE PROTECTION	
1) Relief valves shall be provided for overpressure protection.	In compliance
RELATED SERVICES	
1) Refueling Water Tank	
a. The RWT will have 100% of the capacity required to operate the CSS pumps at a flow of 4,400 gal/min/pump for the required minimum injection period of 20 minutes in addition to the requirements of other systems.	In compliance
b. The maximum particle size in the water exiting from the RWT shall be 0.09 in in diameter in order to preclude flow blockage in ESF components, and piping, and in the reactor.	In compliance
c. The contents of both the RWT and piping associated with the CSS must be maintained at a minimum temperature of 60F to preclude possible boron precipitation.	In compliance

EXHIBIT 2-31

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
2) CONTAINMENT SPRAY SUMP	
THE CONTAINMENT RECIRCULATION SUMP SHALL BE DESIGNED TO COMPLY WITH REGULATORY GUIDE 1.82. BAFFLES AND INTAKE SCREENS SHALL BE INSTALLED TO LIMIT THE MAXIMUM PARTICLE SIZE ENTERING THE RECIRCULATION PIPING TO 0.09 IN DIAMETER. THE SUMP INTAKES SHALL BE DESIGNED TO PRECLUDE THE ENTRAINMENT OF AIR INTO THE SUMP SUCTION LINES. THE PRESSURE DROP ACROSS THE BAFFLES AND INTAKE SCREENS SHALL BE SUFFICIENTLY LOW TO PROVIDE THE NPSH REQUIRED BY THE CONTAINMENT SPRAY PUMPS. THE POST-LOCA SUMP pH SHALL BE RAISED TO A MINIMUM OF 7.0 WITHIN FOUR HOURS POST-ACCIDENT. THE MAXIMUM LONG-TERM pH SHALL NOT EXCEED 8.5.	IN COMPLIANCE. SCREENING TO 0.09 IN. DIAMETER IS USED. THE MAIN SPRAY HEADER NOZZLES HAVE AN ORIFICE OF OF 0.375 IN. AND AUXILIARY SPRAY NOZZLES HAVE AN ORIFICE OF 0.188 IN. TRISODIUM PHOSPHATE IS USED TO CONTROL THE pH BETWEEN 7-7.5.

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
3) SHUTDOWN COOLING HEAT EXCHANGER	
A) COOLING WATER SHALL BE PROVIDED TO EACH SDCHE TO TRANSFER HEAT FROM THE SUMP FLUID DURING THE RECIRCULATION MODE.	IN COMPLIANCE
B) THE COOLING WATER SUPPLIED TO EACH SDCHE SHALL BE PROVIDED AT A FLOW-RATE OF 11,000 GAL/MIN.	IN COMPLIANCE. THE COOLING WATER SUPPLIED TO EACH SHUTDOWN COOLING HEAT EXCHANGER IS PROVIDED AT A FLOW RATE OF UP TO 14,000 GAL/MIN DUE TO THE USE OF A LARGER SDCHE AT PVNGS THAN THAT REQUIRED BY C-E.
C) COOLING WATER FLOW SHALL BE ESTABLISHED TO THE SDCHE PRIOR TO OR SIMULTANEOUSLY WITH THE START OF RECIRCULATION.	IN COMPLIANCE
D) THE COOLING WATER TEMPERATURE TO THE INLET OF THE SDCHE SHALL BE WITHIN THE LIMITS OF 65-120F DURING A LOCA.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
4) FIRE PROTECTION	
A FIRE PROTECTION SYSTEM SHALL BE PROVIDED TO PROTECT THE CSS CONSISTENT WITH THE REQUIREMENTS OF GDC 3, AND SHALL INCLUDE, AS A MINIMUM:	
A) FACILITIES FOR FIRE DETECTION AND ALARMING.	IN COMPLIANCE
B) FACILITIES OR METHODS TO MINIMIZE THE PROBABILITY OF FIRE AND ITS ASSOCIATED EFFECTS.	IN COMPLIANCE
C) FACILITIES FOR FIRE EXTINGUISHMENT.	IN COMPLIANCE
D) METHODS OF FIRE PREVENTION SUCH AS USE OF FIRE RESISTANT AND NONCOMBUSTIBLE MATERIALS WHENEVER PRACTICAL, AND MINIMIZING EXPOSURE OF COMBUSTIBLE MATERIALS TO FIRE HAZARDS.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

	REQUIREMENT	DESIGN FEATURE
E)	ASSURANCE THAT FIRE PROTECTION SYSTEMS DO NOT ADVERSELY AFFECT THE FUNCTIONAL AND STRUCTURAL INTEGRITY OF SAFETY-RELATED STRUCTURES, SYSTEMS, AND COMPONENTS.	IN COMPLIANCE
F)	CARE SHOULD BE EXERCISED TO ENSURE FIRE PROTECTION SYSTEMS ARE DESIGNED TO ASSURE THAT THEIR RUPTURE OR INADVERTENT OPERATION DOES NOT SIGNIFICANTLY IMPAIR THE CAPABILITY OF SAFETY-RELATED STRUCTURES, SYSTEMS, AND COMPONENTS.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR APPENDIX 6A, SECTION 7

REQUIREMENT	DESIGN FEATURE
5) MECHANICAL INTERACTION	
CSS COMPONENTS SHALL BE PROPERLY SUPPORTED SUCH THAT PIPE STRESSES AND SUPPORT REACTIONS ARE WITHIN ALLOWABLE LIMITS, AS DEFINED IN CESSAR SECTION 3.9.2. C-E PROVIDES THE APPLICANT WITH THE LOADS AT THE SUPPORT/STRUCTURE INTERFACE LOCATIONS FOR COMPONENTS THAT C-E SUPPLIES, UNDER NORMAL, UPSET, EMERGENCY, FAULTED, AND TEST CONDITIONS. CSS PIPING AND FITTINGS SHALL BE SEISMIC CATEGORY I.	IN COMPLIANCE

CONTAINMENT SPRAY SYSTEM
SYSTEM DESCRIPTION

1) THE CSS MAKES USE OF THE RWT, TWO CONTAINMENT RECIRCULATION SUMPS, TWO CS PUMPS, TWO SDCHEs OF THE SHUTDOWN COOLING SYSTEM (SCS), TWO INDEPENDENT SPRAY HEADERS, AND ASSOCIATED VALVES, PIPING AND INSTRUMENTATION.

2) THE CSS PROVIDES COOLING SPRAYS OF BORATED WATER FROM THE UPPER REGIONS OF THE CONTAINMENT TO REDUCE CONTAINMENT PRESSURE AND TEMPERATURE DURING EITHER A MAJOR LOCA OR A MAJOR STEAM LINE BREAK INCIDENT INSIDE CONTAINMENT. THE SPRAY FLOW IS PROVIDED BY THE CS PUMPS WHICH TAKE SUCTION FROM THE RWT DURING THE INJECTION MODE AND FROM THE CONTAINMENT RECIRCULATION SUMPS DURING THE RECIRCULATION MODE OF OPERATION.

3) THE PUMPS DISCHARGE INTO THE CONTAINMENT ATMOSPHERE THROUGH THE SDCHEs AND THE SPRAY CONTROL VALVES TO A DUAL SET OF SPRAY NOZZLE HEADERS. THE MAIN SPRAY HEADERS ARE LOCATED IN THE UPPER PART OF THE CONTAINMENT BUILDING TO ALLOW THE FALLING SPRAY DROPLETS TIME TO REACH THERMAL EQUILIBRIUM WITH THE STEAM-AIR ATMOSPHERE. ADDITIONALLY, AUXILIARY SPRAY HEADERS ARE LOCATED BELOW CONCRETE DECKS AT ELEVATION 140 FT AND 120 FT TO PROVIDE SPRAY COVERAGE TO CONTAINMENT VOLUMES NOT REACHED BY THE MAIN SPRAY. THE CONDENSATION OF THE STEAM BY THE FALLING SPRAY RESULTS IN A REDUCTION OF CONTAINMENT PRESSURE AND TEMPERATURE.

4) THE FOLLOWING SPRAY NOZZLES ARE USED:

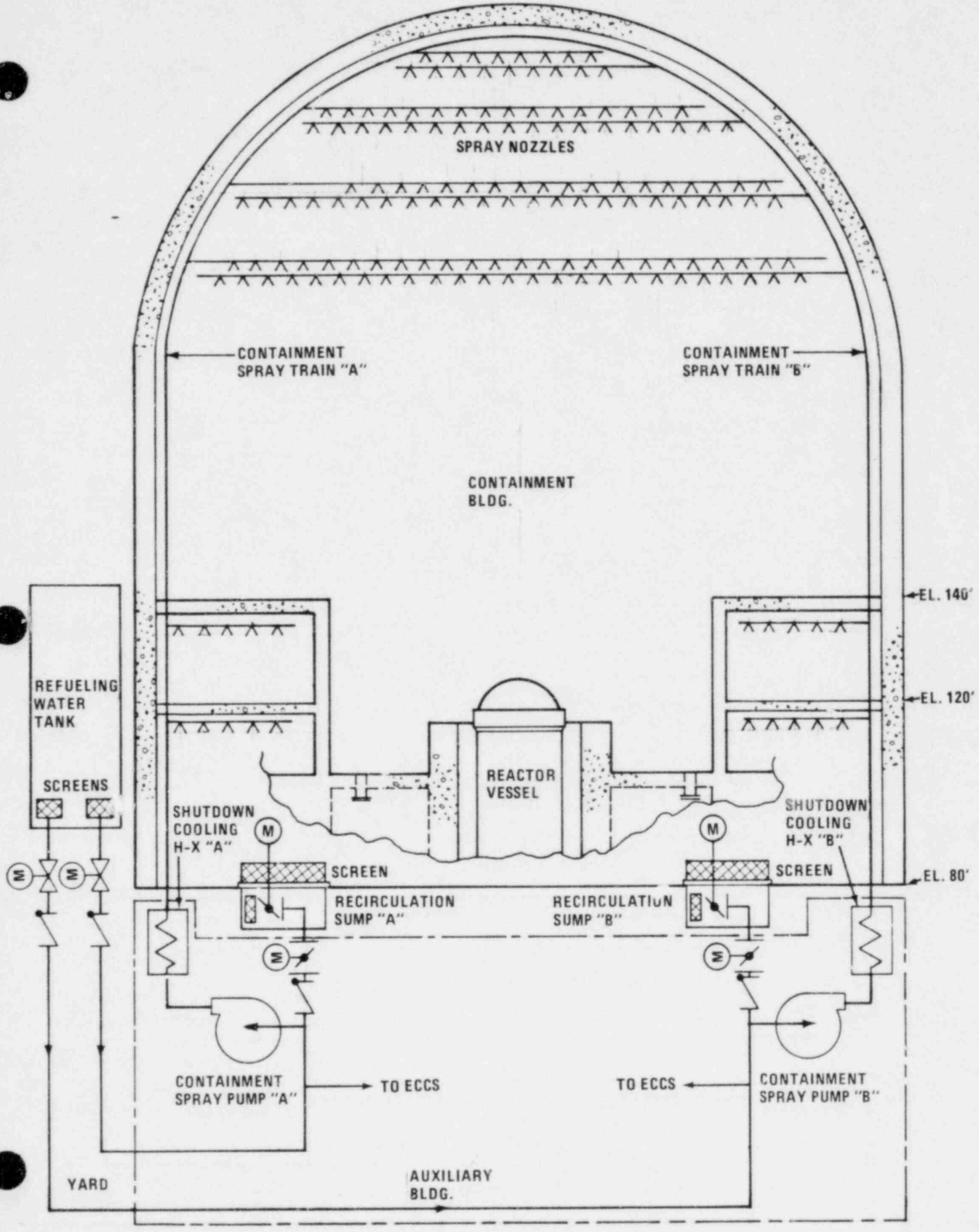
MAIN SPRAY HEADERS: 230 HOLLOW CONE RAMP BOTTOM, SPRACO NO. 17071417 (PER TRAIN)
AUXILIARY SPRAY HEADERS: 80 HOLLOW CONE RAMP BOTTOM, SPRACO NO. 17651308 (PER TRAIN)

EXHIBIT 2-37

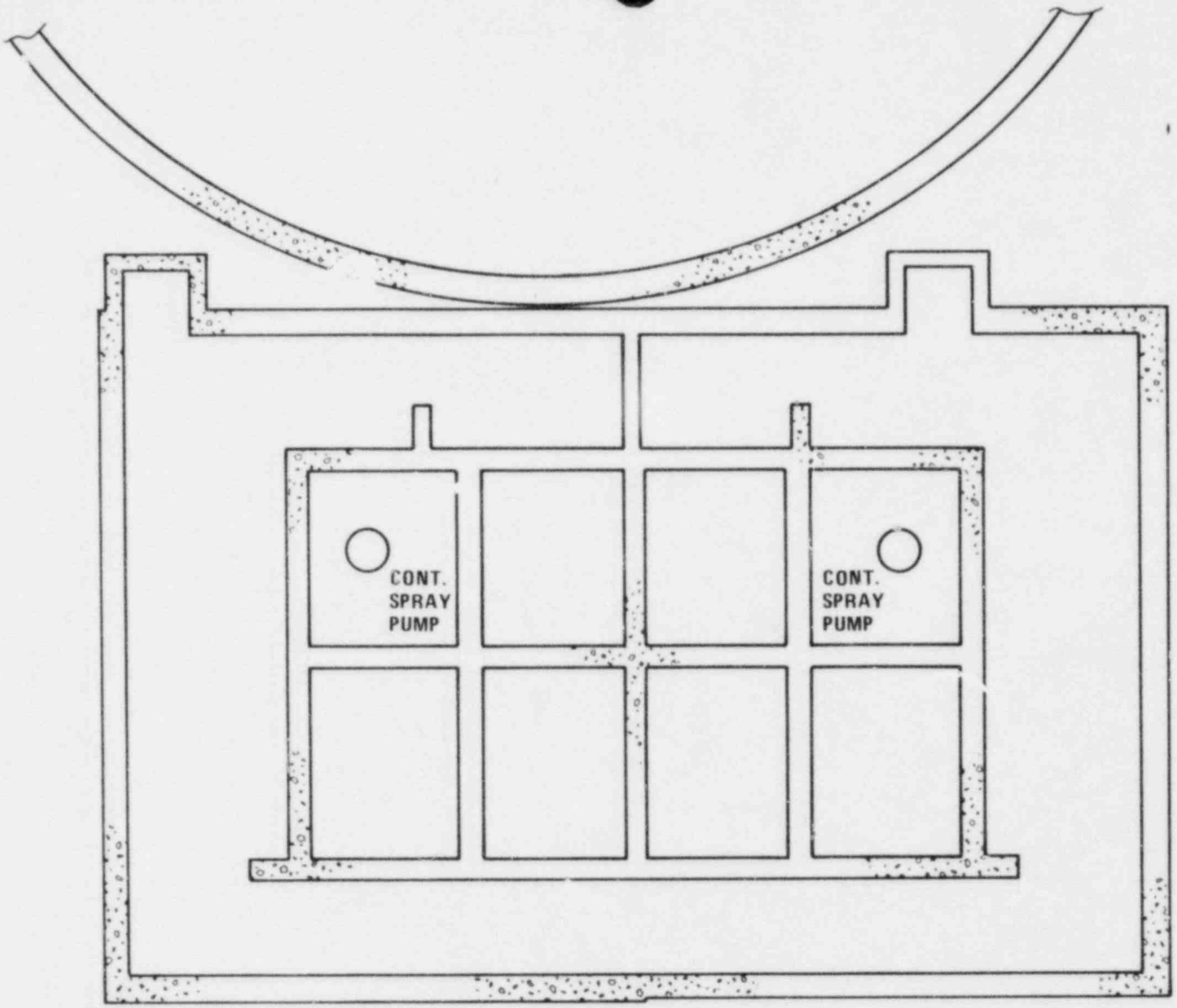
CONTAINMENT SPRAY SYSTEM
SYSTEM DESCRIPTION

5) THE CSS IS INITIATED BY A CSAS WHICH OCCURS ON HIGH-HIGH CONTAINMENT PRESSURE. THE SIGNAL STARTS THE CS PUMPS AND OPENS THE SPRAY CONTROL VALVES TO THE CONTAINMENT. IF THE OFFSITE AC POWER SOURCES ARE LOST, THE CSS IS SHED FROM THE OFFSITE POWER AND THEN CONNECTED TO THE DIESEL GENERATOR (DG) EMERGENCY POWER SUPPLY IN ACCORDANCE WITH THE ESF ACTUATION SYSTEM LOAD SEQUENCING. ONE PUMP AND ITS SPRAY CONTROL VALVE IS CONNECTED TO EACH DG.

6) WHEN A LOW RWT LEVEL IS REACHED, A RECIRCULATION ACTUATION SIGNAL (RAS) IS GENERATED AND THE PUMP SUCTION IS AUTOMATICALLY TRANSFERRED TO CONTAINMENT RECIRCULATION SUMPS TO MAINTAIN CONTINUOUS CONTAINMENT SPRAY. THE RECIRCULATED SUMP WATER IS COOLED BY THE SDCHEs PRIOR TO DISCHARGE INTO THE CONTAINMENT ATMOSPHERE. ONCE INITIATED, RECIRCULATION SPRAY CONTINUES UNTIL TERMINATED OR MODIFIED BY THE OPERATOR.

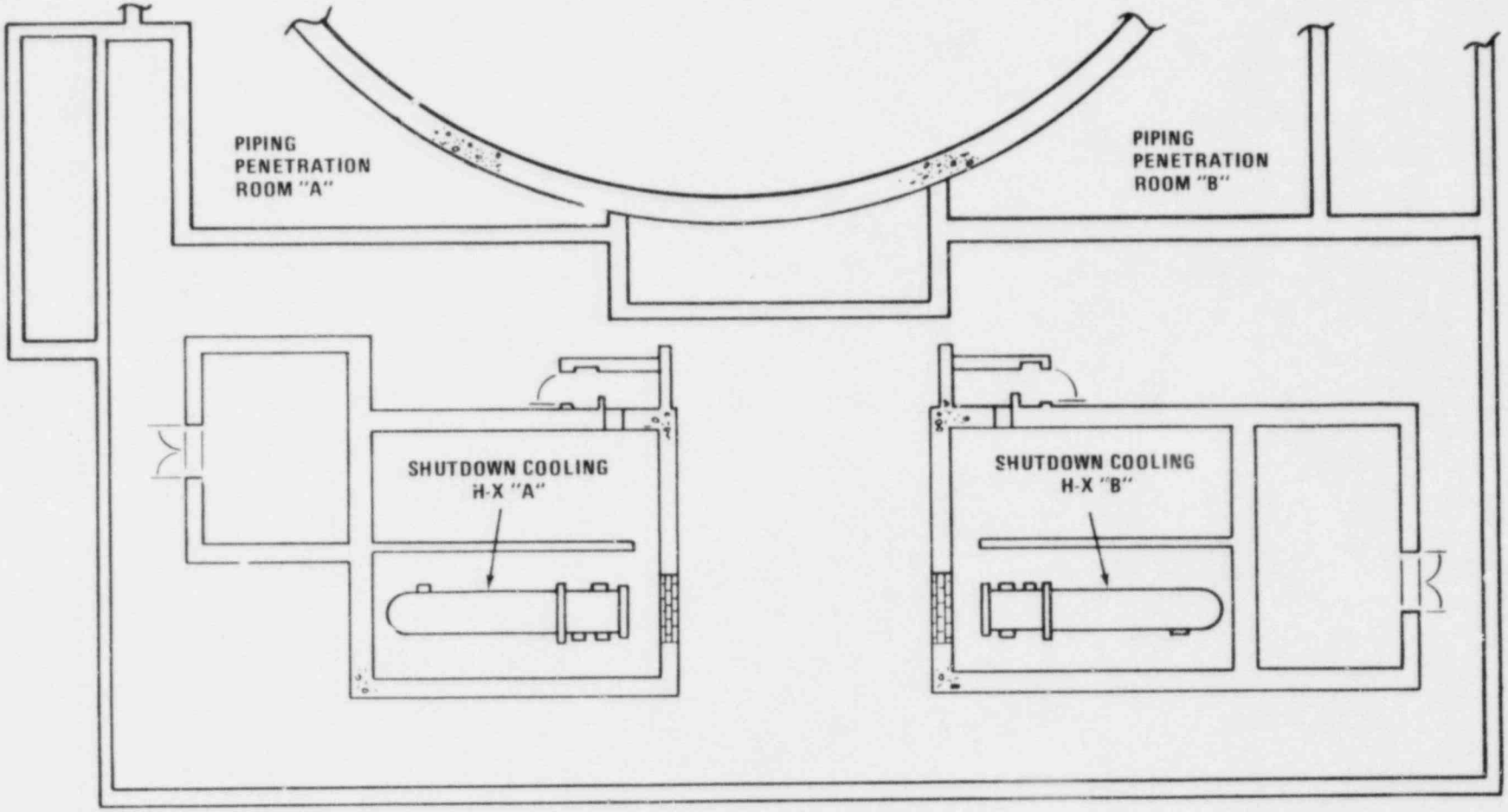


CONTAINMENT SPRAY SYSTEM SCHEMATIC
FIGURE 2-2



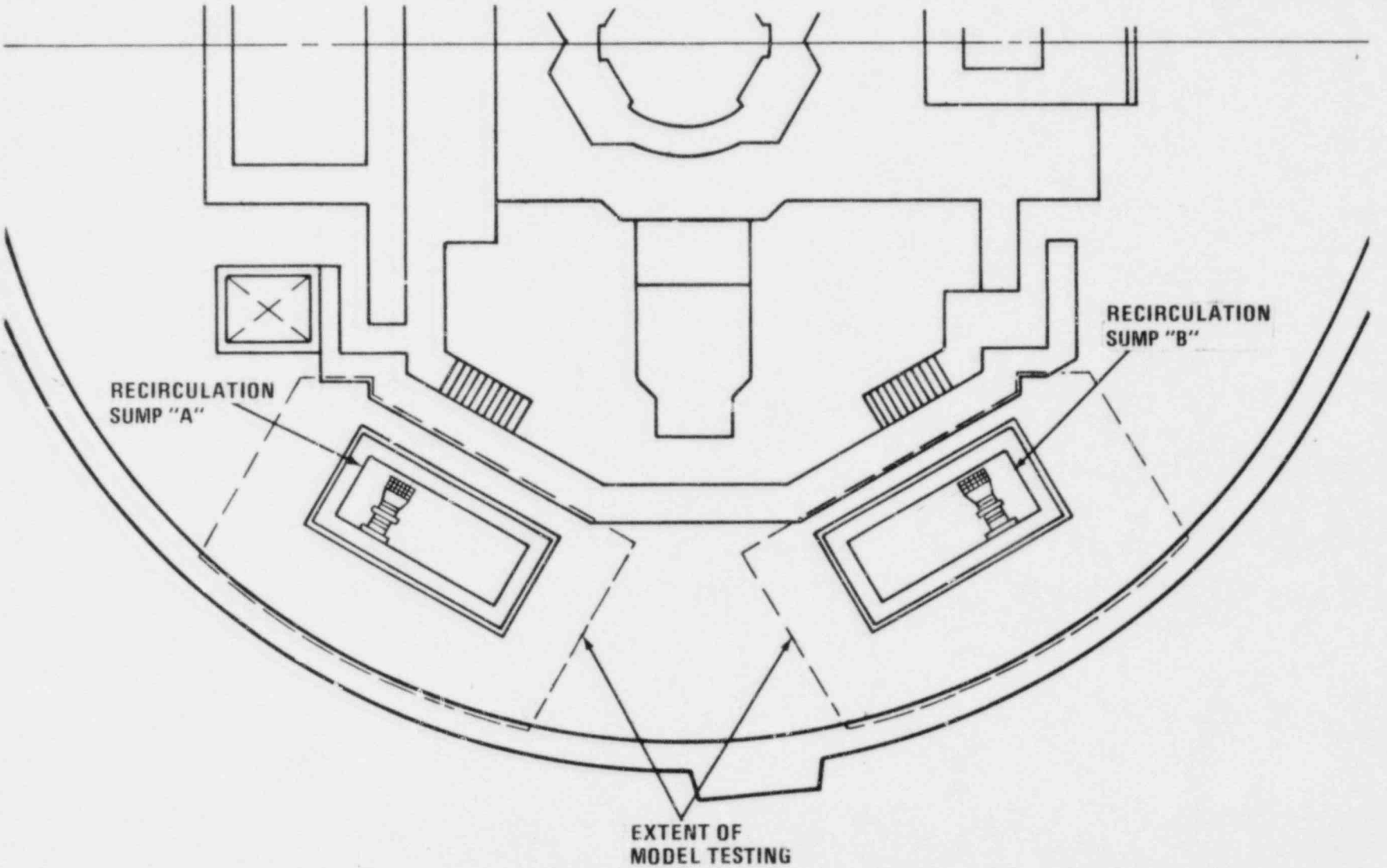
CONTAINMENT SPRAY PUMPS
AUXILIARY BLDG. 40'

FIGURE 2-3

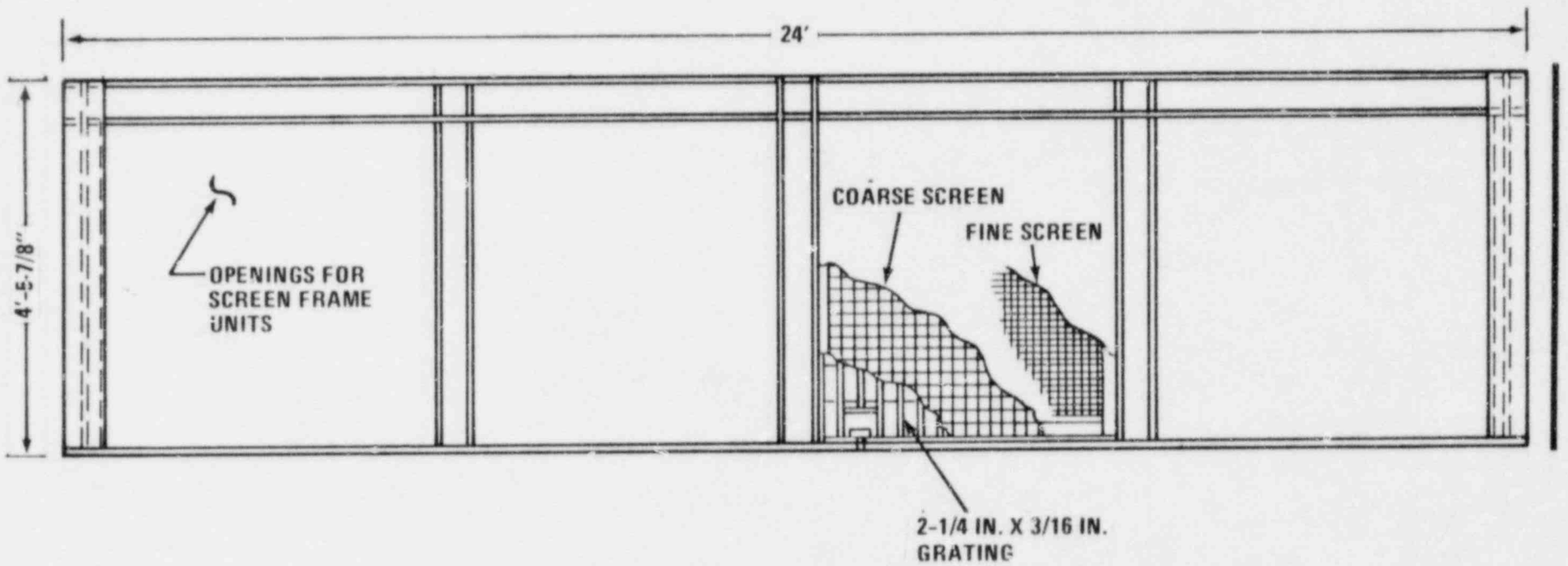


SHUTDOWN COOLING H-X'S
AUXILIARY BLDG EL. 70'

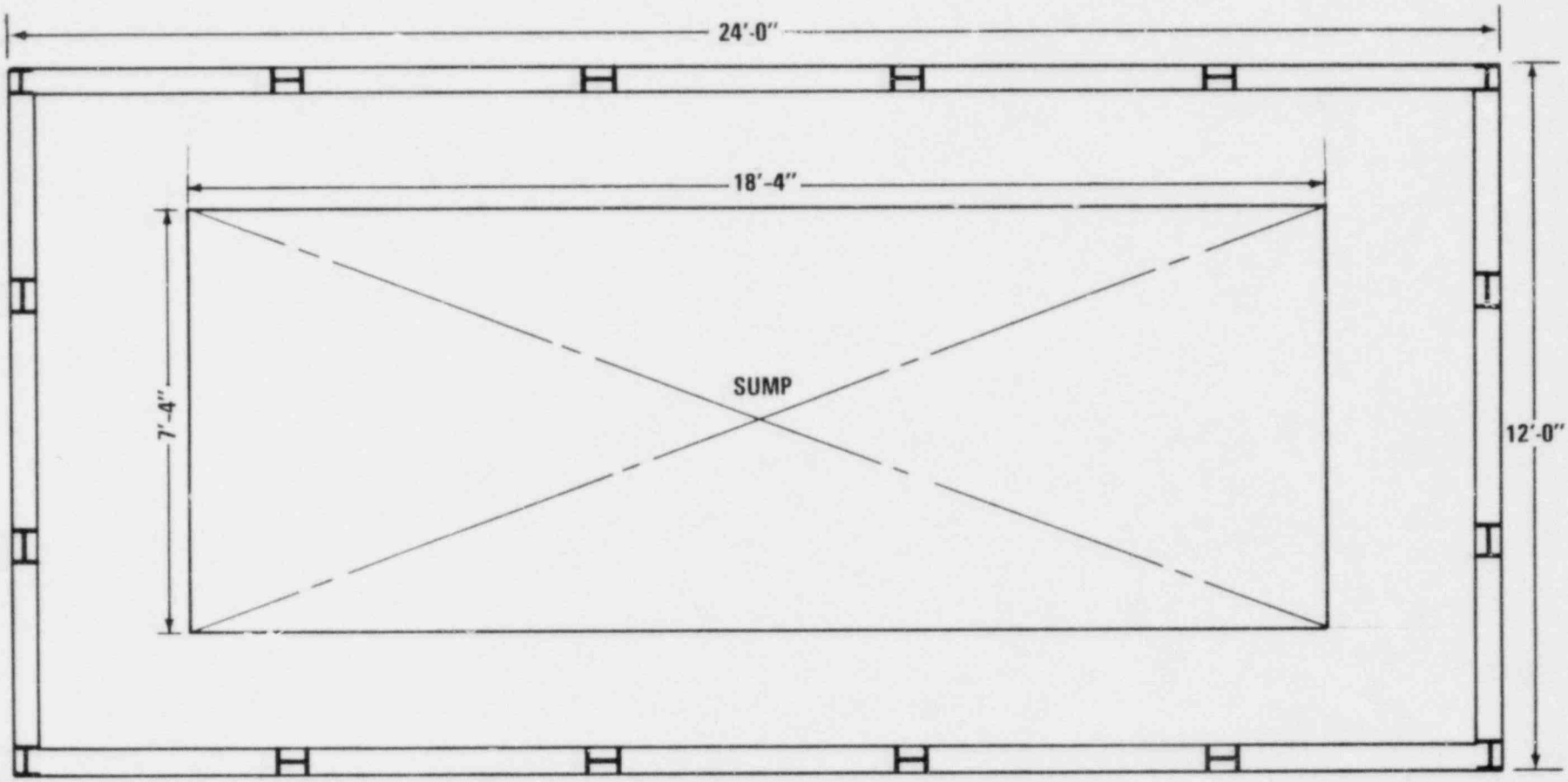
FIGURE 2-4



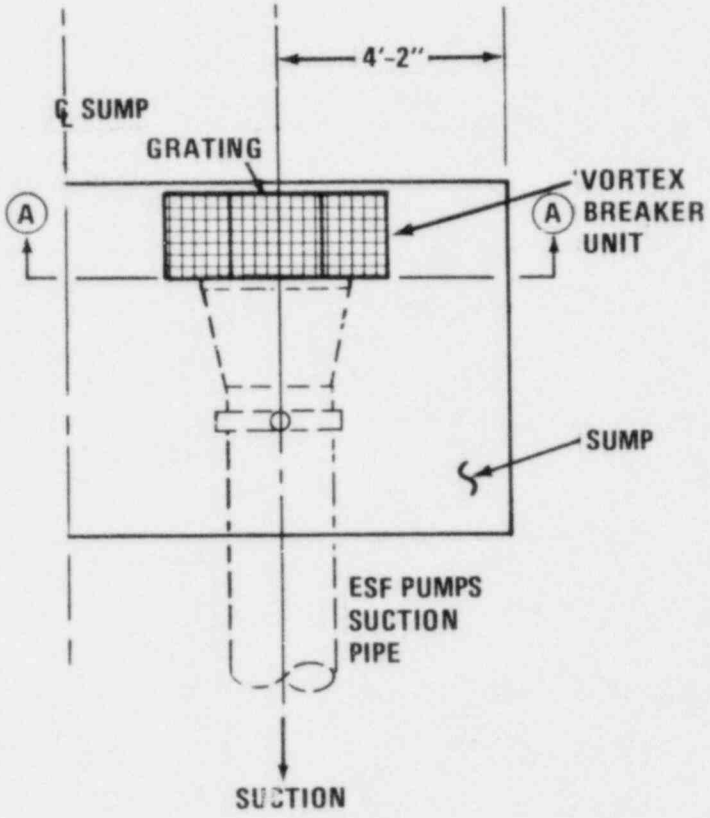
RECIRCULATION SUMPS
CONTAINMENT BLDG. EL. 80'
FIGURE 2-5



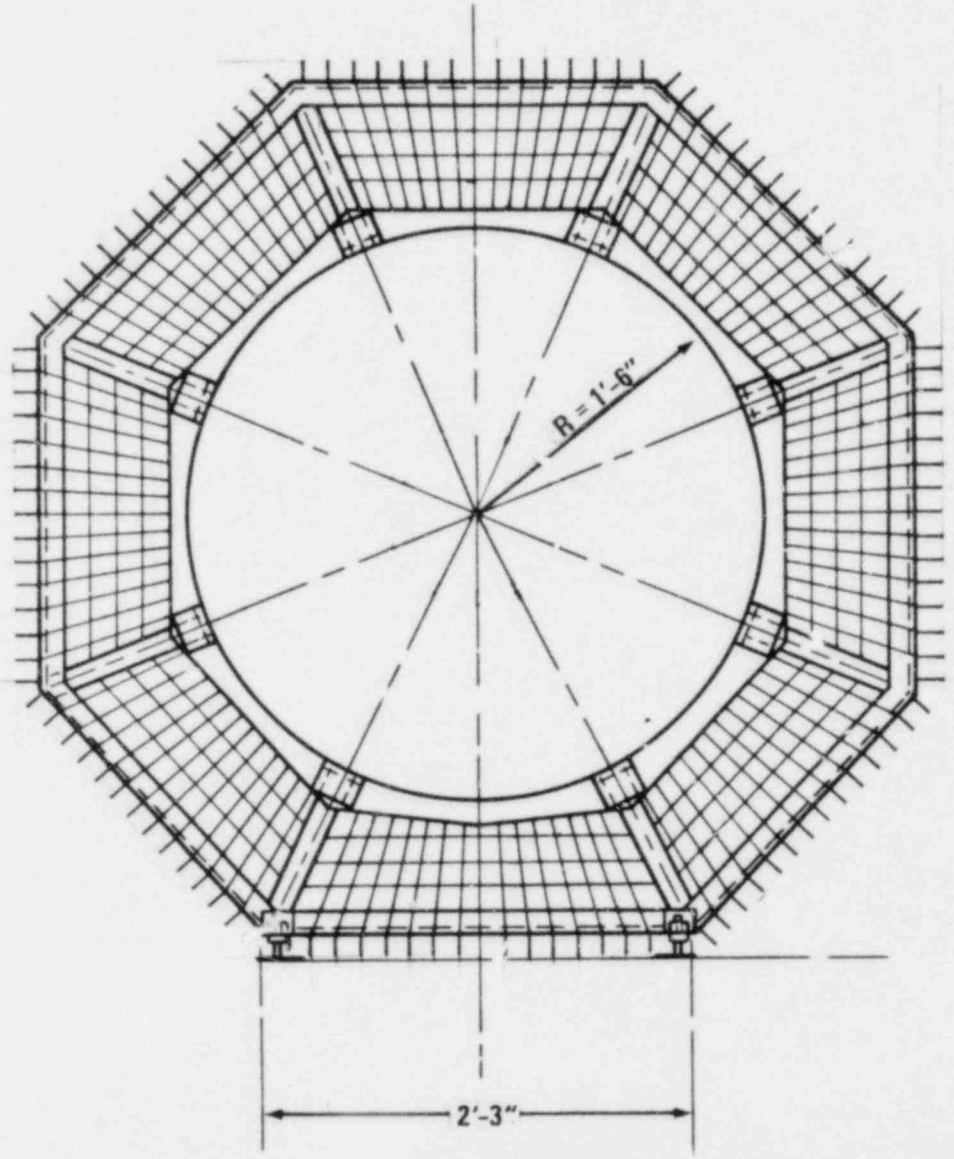
CONTAINMENT SUMP SCREENS AND GRATING - ELEVATION VIEW
FIGURE 2-6



CONTAINMENT SUMP
PLAN VIEW OF BASE
FIGURE 2-7



CONTAINMENT SUMP PIPE AND VORTEX-BREAKING UNIT
PLAN VIEW (TYPICAL)
FIGURE 2-8



VORTEX - BREAKING UNIT -
SECTION "A"
FIGURE 2-9

CONTAINMENT SPRAY SYSTEM
OPERATION

Plant Startup

1) During plant startup, prior to reaching the maximum allowable shutdown cooling pressure or temperature, the SCS is secured and then realigned to the automatic CSS initiation configuration. The CSAS block is removed. The CSS is now ready for normal plant operation.

Normal Operation

1) During normal operation, the CSS is in the standby condition aligned for possible emergency operation. During this period no CSS equipment is operating.

CONTAINMENT SPRAY SYSTEM
OPERATION

PLANT SHUTDOWN

1) THE CSS REMAINS ALIGNED FOR CONTAINMENT SPRAYING THROUGH THE SDCHES UNTIL SHUTDOWN COOLING IS INITIATED.

2) DURING SHUTDOWN COOLING OPERATIONS, WHILE THE RCS TEMPERATURE IS BETWEEN APPROXIMATELY 200F AND 350F, THE CSS VALVE ALIGNMENT IS MODIFIED IN SUCH A MANNER AS TO ALLOW THE SDCHES TO BE USED FOR REMOVING CORE DECAY HEAT WITHOUT HAMPERING THE CAPABILITY OF THE CSS TO PERFORM ITS SAFETY FUNCTION.

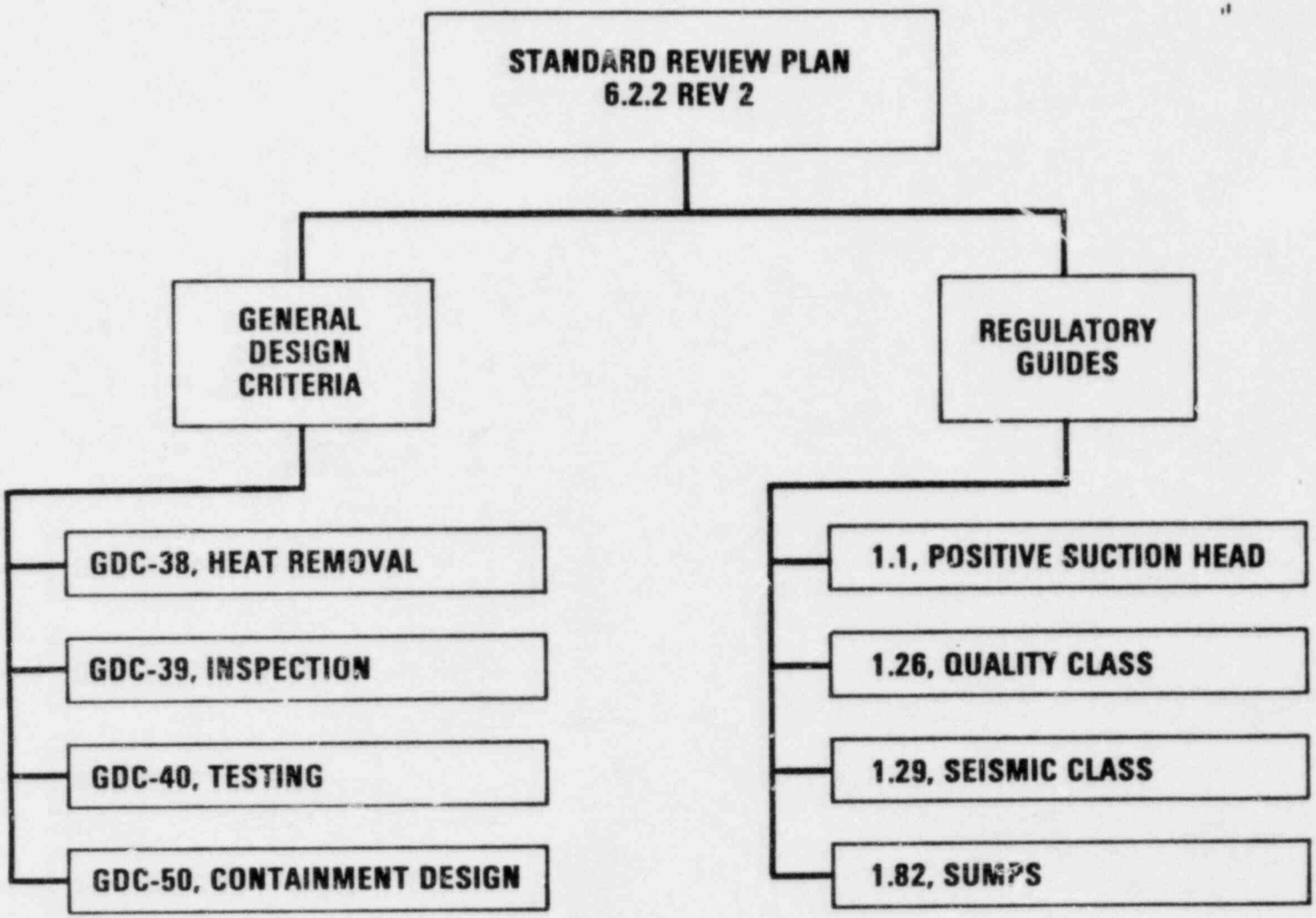
3) WHEN THE RCS TEMPERATURE IS BELOW 200F (TYPICALLY 170F) AND THE RCS PRESSURE IS EQUAL TO OR LESS THAN 350 PSIA, THE CS PUMPS ARE REALIGNED TO PROVIDE ADDITIONAL FLOW THROUGH THE SDCHES.

4) SHUTDOWN COOLING IS CONTINUED USING THE LOW PRESSURE SAFETY INJECTION (LPSI) AND CS PUMPS UNTIL THE REFUELING TEMPERATURE OF 125F IS ATTAINED.

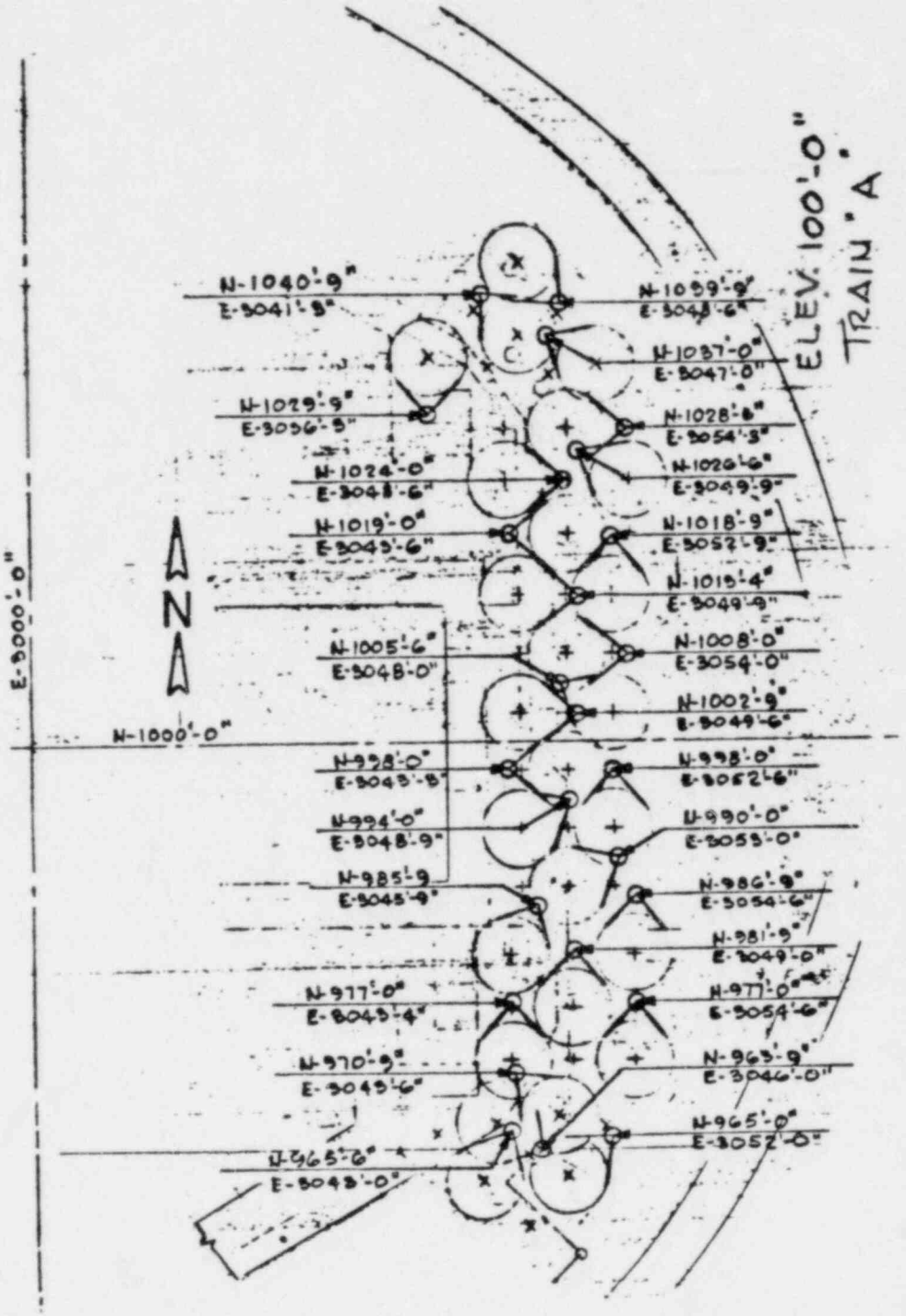
CONTAINMENT SPRAY SYSTEM
OPERATION

EMERGENCY OPERATION

1) CONTAINMENT SPRAY IS AUTOMATICALLY INITIATED BY THE HIGH-HIGH CONTAINMENT PRESSURE (10 PSIG) SIGNAL. THE CSAS STARTS THE CS PUMPS AND OPENS THE SPRAY ISOLATION VALVES. CONTAINMENT SPRAY CAN ALSO BE INITIATED MANUALLY. THE CS PUMPS INITIALLY TAKE SUCTION FROM THE RWT. WHEN A LOW LEVEL IS REACHED IN THE RWT, A LOW LEVEL SIGNAL GENERATES A RAS WHICH AUTOMATICALLY TRANSFERS THE PUMP SUCTION TO THE CONTAINMENT SUMP. OPERATOR ACTION CLOSES THE VALVES AT THE OUTLET OF THE RWT. DURING THE RECIRCULATION MODE, THE SPRAY WATER IS COOLED BY THE SDCHES PRIOR TO DISCHARGE INTO THE CONTAINMENT.

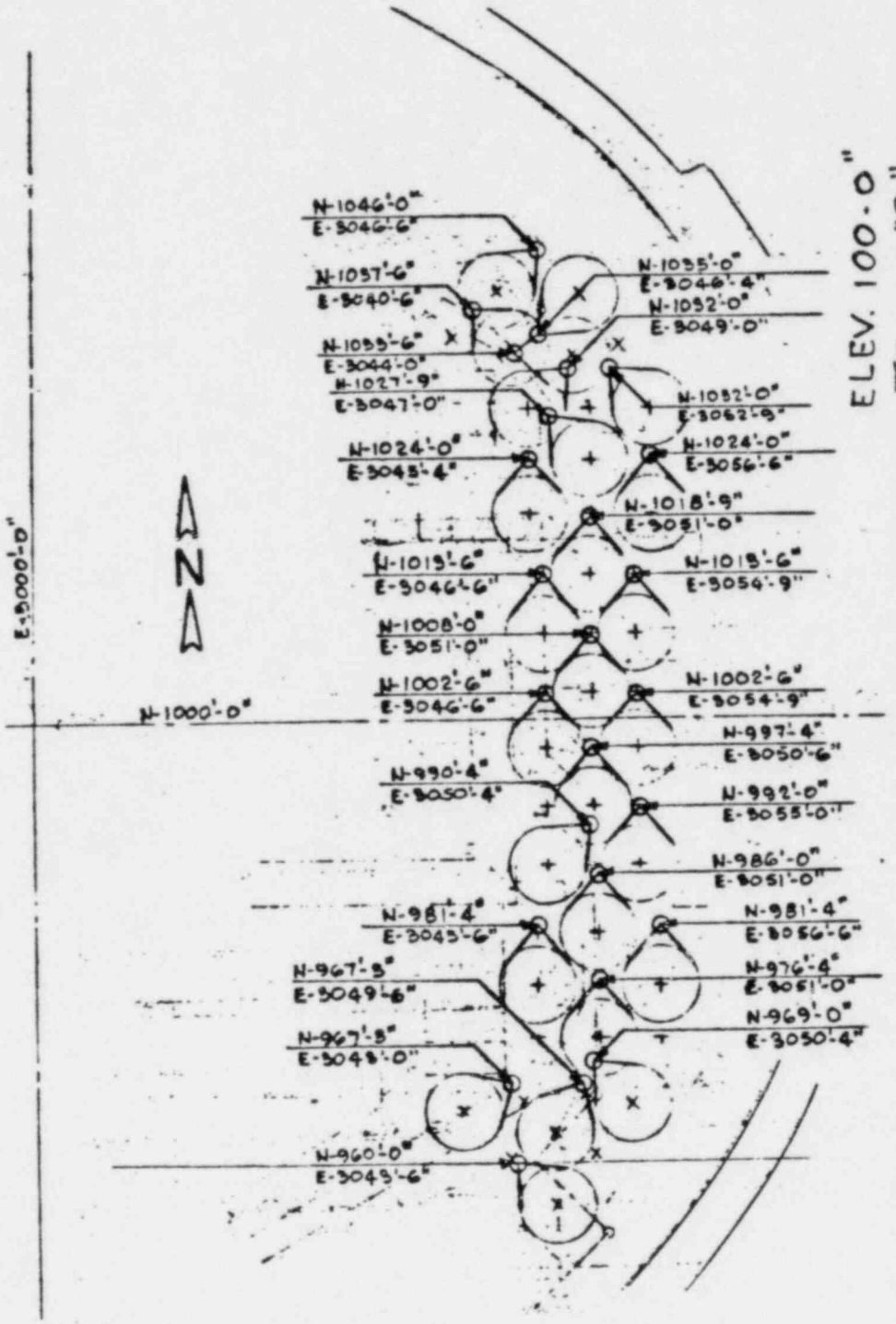


STANDARD REVIEW PLAN 6.2.2 REV. 2
FIGURE 2-10



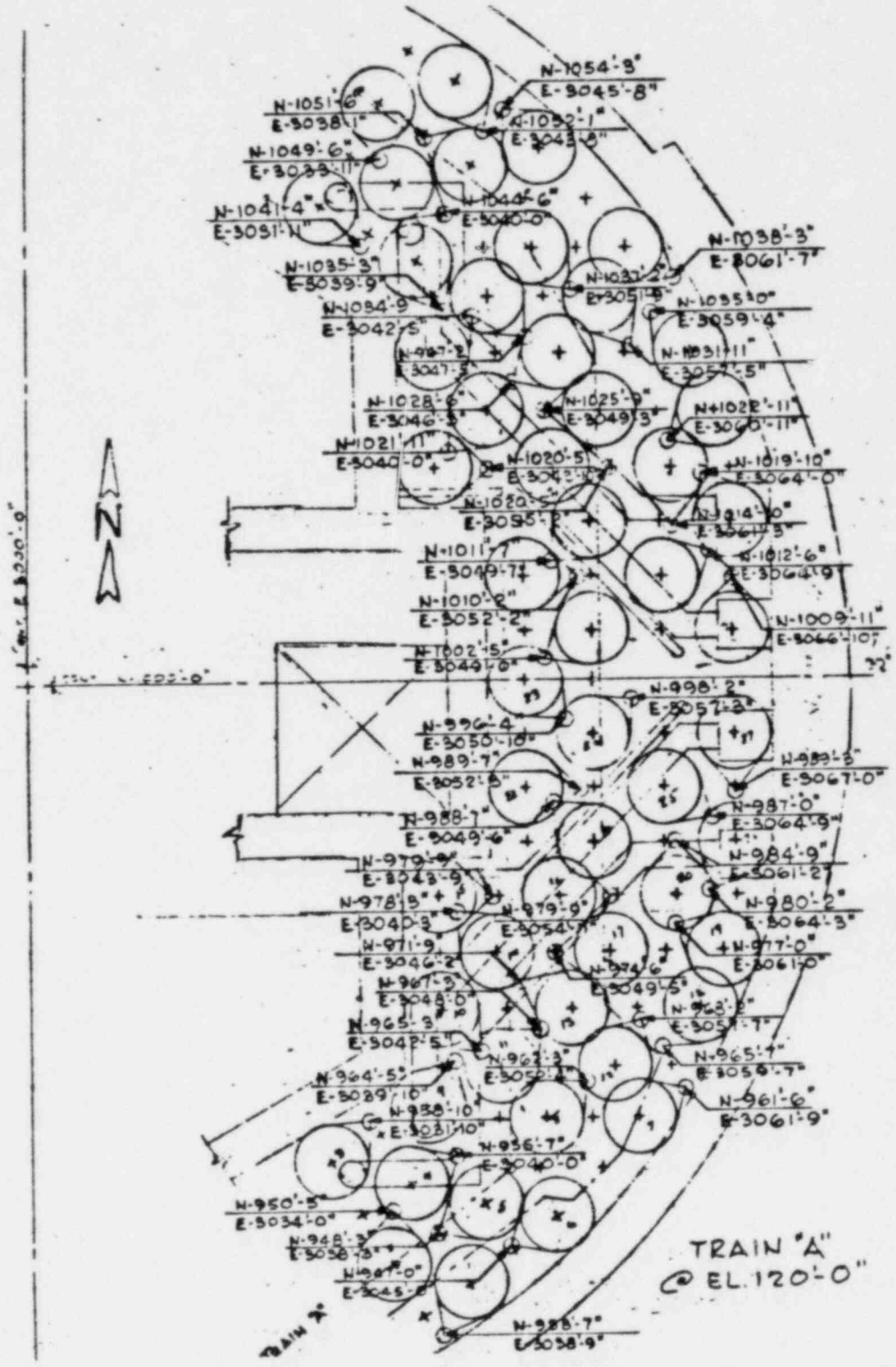
AUXILIARY SPRAY PATTERNS

Figure 2-11



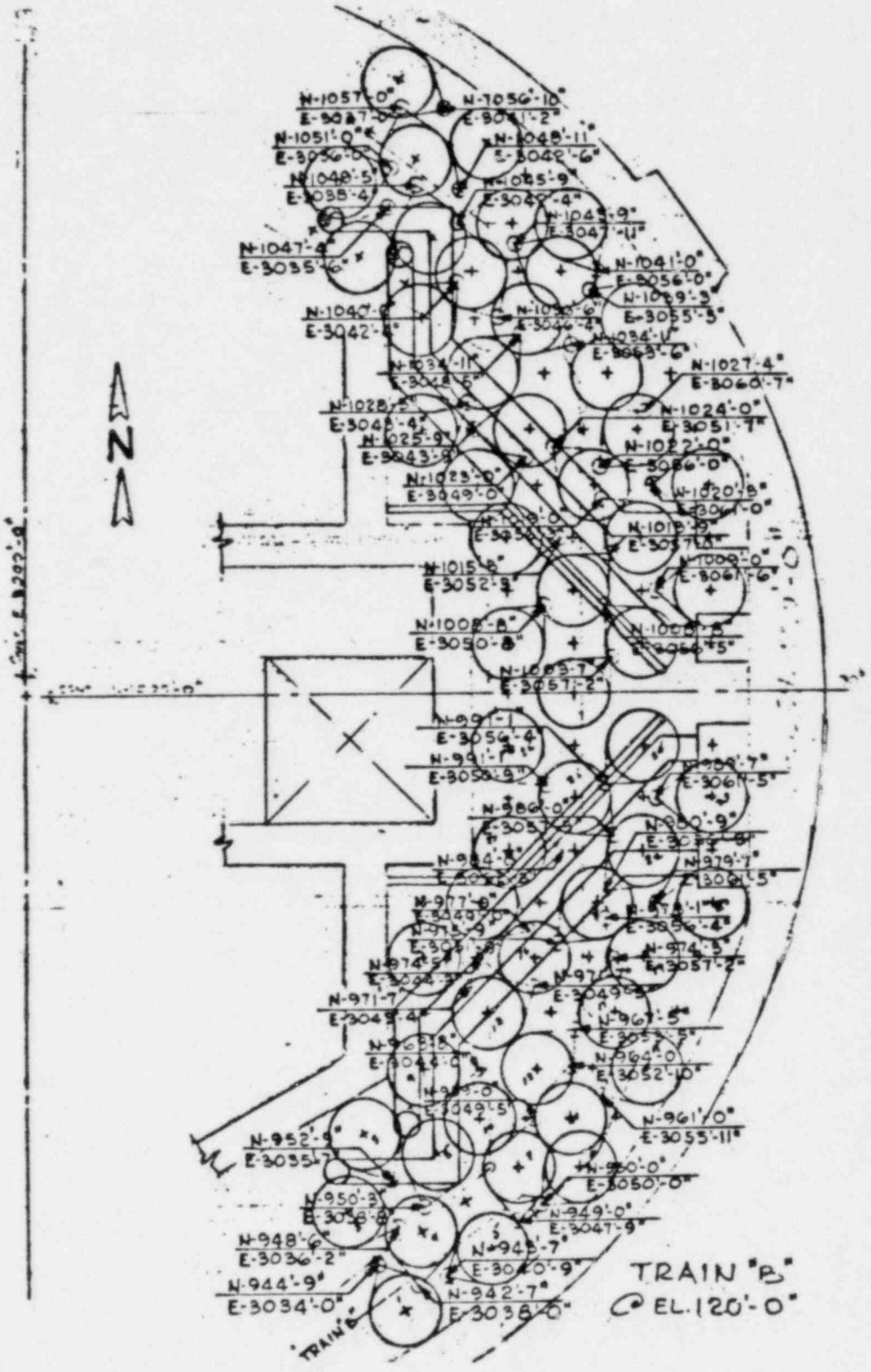
AUXILIARY SPRAY PATTERNS

Figure 2-12



AUXILIARY SPRAY PATTERNS

Figure 2-13



AUXILIARY SPRAY PATTERNS

Figure 2-14

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM

REQUIREMENT	DESIGN FEATURE
1) THE CSS SHOULD MEET THE REDUNDANCY AND POWER SOURCE REQUIREMENTS FOR AN ESF; I.E., THE SYSTEMS SHOULD BE DESIGNED TO ACCOMMODATE A SINGLE ACTIVE FAILURE WITHOUT LOSS OF FUNCTION.	1) IN COMPLIANCE. REDUNDANT HEAT REMOVAL TRAINS ARE PROVIDED. THE SYSTEM IS CAPABLE OF WITHSTANDING A SINGLE ACTIVE FAILURE WITHOUT LOSS OF FUNCTION.

EXHIBIT 2-42

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

REQUIREMENT	DESIGN FEATURE
2) THE RECIRCULATION SPRAY SYSTEM IS REQUIRED TO CIRCULATE WATER IN THE CONTAINMENT IN THE LONG TERM FOLLOWING A LOCA AND SHOULD BE DESIGNED TO ACCOMPLISH THIS WITHOUT PUMP CAVITATION OCCURRING. THEREFORE, THE NPSH AVAILABLE TO THE RECIRCULATION PUMPS SHOULD BE GREATER THAN THE REQUIRED NPSH. A SUPPORTING ANALYSIS SHOULD BE PRESENTED IN SUFFICIENT DETAIL TO PERMIT THE STAFF TO DETERMINE THE ADEQUACY OF THE ANALYSIS AND SHOULD SHOW THAT THE AVAILABLE NPSH IS GREATER THAN THE REQUIRED NPSH.	IN COMPLIANCE. ANALYSES OF THE NPSHA WERE MADE BASED ON THE CONTAINMENT PRESSURE EQUAL TO THE SUMP WATER VAPOR PRESSURE AND HAVE SHOWN THAT ADEQUATE NPSH IS AVAILABLE FOR ALL SAFETY-RELATED PUMPS. THE EFFECT OF THE SUMP SCREEN ON HYDRAULICS OF THE PUMP SUCTION HAS BEEN MODELED ON A 1:1 MODEL. VORTEXING OR AIR ENTRAINMENT WILL NOT OCCUR WHEN A VORTEX-BREAKING GRATING CAGE IS INSTALLED ON THE SUCTION PIPE.

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

REQUIREMENT	DESIGN FEATURE
3) Analyses of the heat removal capability of the spray system should be based on the following considerations: A) The locations of the spray headers relative to the internal structures. B) The arrangement of the spray nozzles on the spray headers and the expected spray pattern.	3) In compliance. The heat removal capability of the spray system was analyzed by C-E.

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

REQUIREMENT	DESIGN FEATURE
c) THE TYPE OF SPRAY NOZZLES USED AND THE NOZZLE ATOMIZING CAPABILITY, I.E., THE SPRAY DROP SIZE SPECTRUM AND MEAN DROP SIZE EMITTED FROM EACH TYPE OF NOZZLE AS A FUNCTION OF DIFFERENTIAL PRESSURE ACROSS THE NOZZLE.	IN COMPLIANCE (CONT'D)
d) THE EFFECT OF DROP RESIDENCE TIME AND DROP SIZE ON THE HEAT REMOVAL EFFECTIVENESS OF THE SPRAY DROPLETS SHALL BE CONSIDERED. THE SPRAY SYSTEMS SHOULD BE DESIGNED TO ASSURE THAT THE SPRAY HEADER AND NOZZLE ARRANGEMENTS PRODUCE SPRAY PATTERNS WHICH MAXIMIZE THE CONTAINMENT VOLUME COVERED AND MINIMIZE THE OVERLAPPING OF THE SPRAYS.	

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

	REQUIREMENT	DESIGN FEATURE
4)	THE DESIGN HEAT REMOVAL CAPABILITY (I.E., HEAT REMOVAL RATE VS. CONTAINMENT TEMPERATURE) OF FAN COOLERS SHOULD BE ESTABLISHED ON THE BASIS OF QUALIFICATIONS TESTS ON PRODUCTION UNITS OR ACCEPTABLE ANALYSES.	4) THIS REQUIREMENT IS NOT APPLICABLE SINCE AN ESF FAN COOLING SYSTEM IS NOT PROVIDED ON THE PVNGS.

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

	REQUIREMENT	DESIGN FEATURE
5)	THE POTENTIAL FOR SURFACE FOULING OF THE SECONDARY SIDES OF THE RESIDUAL HEAT REMOVAL EXCHANGERS BY THE COOLING WATER OVER THE LIFE OF THE PLANT AND THE EFFECT OF SURFACE FOULING ON THE HEAT REMOVAL CAPACITY OF THE HEAT EXCHANGERS SHOULD BE ANALYZED AND THE RESULTS DISCUSSED IN THE SAR. THE ANALYSIS WILL BE ACCEPTABLE IF IT IS SHOWN THAT PROVISIONS SUCH AS CLOSED COOLING WATER SYSTEMS ARE PROVIDED TO PREVENT SURFACE FOULING OR SURFACE FOULING HAS BEEN ACCOUNTED FOR IN ESTABLISHING THE HEAT REMOVAL CAPABILITY OF THE HEAT EXCHANGERS.	5) IN COMPLIANCE. SURFACE FOULING OF THE SDCHES WAS TAKEN INTO CONSIDERATION. ADDITIONALLY, THE WATER CHEMISTRY IN THE COMPONENT COOLING AND SERVICE WATER/ULTIMATE HEAT SINK SYSTEMS ARE CONTROLLED BY THE ADDITION OF CHEMICALS.

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

	REQUIREMENT	DESIGN FEATURE
6)	THE CSS SHOULD BE DESIGNED, FABRICATED, ERECTED, AND TESTED TO GROUP B QUALITY STANDARDS, AS RECOMMENDED BY RG 1.26.	6) IN COMPLIANCE
7)	THE CSS SHOULD BE DESIGNATED SEISMIC CATEGORY I, AS RECOMMENDED BY RG 1.29.	7) IN COMPLIANCE
8)	PROVISIONS SHOULD BE MADE IN THE DESIGN OF THE CSS FOR PERIODIC INSPECTION AND OPERABILITY TESTING OF THE SYSTEMS AND SYSTEM COMPONENTS SUCH AS PUMPS, VALVES, DUCT PRESSURE-RELIEVING DEVICES, AND SPRAY NOZZLES. THE INSPECTION AND TEST PROGRAM WILL BE ACCEPTABLE IF IT IS JUDGED BY THE CONTAINMENT SYSTEMS BRANCH TO BE CONSISTENT WITH THAT PROPOSED FOR OTHER ESFS.	8) IN COMPLIANCE. PERIODIC INSPECTION AND TESTING OF CSS COMPONENTS CAN BE DONE IN ACCORDANCE WITH ASME SECTION XI.

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

REQUIREMENT	DESIGN FEATURE
9) INSTRUMENTATION SHOULD BE PROVIDED TO MONITOR THE CSS AND SYSTEM COMPONENT PERFORMANCE UNDER NORMAL AND ACCIDENT CONDITIONS. THE INSTRUMENTATION SHOULD BE CAPABLE OF DETERMINING WHETHER A SYSTEM IS PERFORMING ITS INTENDED FUNCTION, OR A SYSTEM TRAIN OR COMPONENT IS MALFUNCTIONING AND SHOULD BE ISOLATED.	9) IN COMPLIANCE. SAFETY-RELATED INSTRUMENTATION IS PROVIDED FOR THE CSS AND SYSTEMS WITH WHICH THE CSS INTERFACES ON A SAFETY BASIS.

EXHIBIT 2-49

SRP ACCEPTANCE CRITERIA
SRP 6.2.2 CONTAINMENT SPRAY SYSTEM (CONT'D)

REQUIREMENT	DESIGN FEATURE
10) PROVISIONS SHOULD BE MADE TO ALLOW DRAINAGE OF SPRAY AND EMERGENCY CORE COOLING WATER TO THE RECIRCULATION SUMPS. THE DESIGN OF PROTECTIVE SCREEN ASSEMBLIES AROUND RECIRCULATION PIPING SUCTION POINTS WILL BE ACCEPTABLE IF IT IS CAPABLE OF PREVENTING DEBRIS FROM ENTERING THE RECIRCULATING PIPING.	10) IN COMPLIANCE. THE CONTAINMENT RECIRCULATION SUMP AND SCREENS ARE DESIGNED IN CONFORMANCE WITH RG 1.82 AND THE C-E REQUIREMENT FOR A SCREEN OPENING OF 0.09 IN.

SRP ACCEPTANCE CRITERIA

GDC 38, CONTAINMENT HEAT REMOVAL

REQUIREMENT	DESIGN FEATURE
A SYSTEM TO REMOVE HEAT FROM THE REACTOR CONTAINMENT SHALL BE PROVIDED. THE SYSTEM SAFETY FUNCTION SHALL BE TO REDUCE RAPIDLY, CONSISTENT WITH THE FUNCTIONING OF OTHER ASSOCIATED SYSTEMS, THE CONTAINMENT PRESSURE AND TEMPERATURE FOLLOWING ANY LOCA AND MAINTAIN THEM AT ACCEPTABLY LOW LEVELS.	IN COMPLIANCE. THE SYSTEM HEAT REMOVAL CAPABILITY WAS ANALYZED BY C-E.
SUITABLE REDUNDANCY IN COMPONENTS AND FEATURES, AND SUITABLE INTERCONNECTIONS, LEAK DETECTION, ISOLATION, AND CONTAINMENT CAPABILITIES SHALL BE PROVIDED TO ASSURE THAT FOR ONSITE ELECTRIC POWER SYSTEM OPERATION (ASSUMING OFFSITE POWER IS NOT AVAILABLE) AND FOR OFFSITE ELECTRIC POWER SYSTEM OPERATION (ASSUMING ONSITE POWER IS NOT AVAILABLE) THE SYSTEM SAFETY FUNCTION CAN BE ACCOMPLISHED, ASSUMING A SINGLE FAILURE.	

SRP ACCEPTANCE CRITERIA

GDC 39, INSPECTION

REQUIREMENT	DESIGN FEATURE
THE CONTAINMENT HEAT REMOVAL SYSTEM SHALL BE DESIGNED TO PERMIT APPROPRIATE PERIODIC INSPECTION OF SYSTEM COMPONENTS.	IN COMPLIANCE

EXHIBIT 2-52

SRP ACCEPTANCE CRITERIA

GDC 40, TESTING

REQUIREMENT	DESIGN FEATURE
THE CONTAINMENT HEAT REMOVAL SYSTEM SHALL BE DESIGNED TO PERMIT APPROPRIATE PERIODIC PRESSURE AND FUNCTIONAL TESTING TO ASSURE (1) THE STRUCTURAL AND LEAKTIGHT INTEGRITY OF ITS COMPONENTS, (2) THE OPERABILITY AND PERFORMANCE OF THE ACTIVE COMPONENTS OF THE SYSTEM, AND (3) THE OPERABILITY OF THE SYSTEM AS A WHOLE, AND, UNDER CONDITIONS AS CLOSE TO THE DESIGN AS PRACTICAL, THE PERFORMANCE OF THE FULL OPERATIONAL SEQUENCE THAT BRINGS THE SYSTEM INTO OPERATION, INCLUDING OPERATION OF APPLICABLE PORTIONS OF THE PROTECTION SYSTEM, THE TRANSFER BETWEEN NORMAL AND EMERGENCY POWER SOURCES, AND THE OPERATION OF THE ASSOCIATED COOLING WATER SYSTEM.	IN COMPLIANCE

EXHIBIT 2-53

SRP ACCEPTANCE CRITERIA

GDC 50, CONTAINMENT DESIGN

REQUIREMENT	DESIGN FEATURE
THE REACTOR CONTAINMENT STRUCTURE, INCLUDING ACCESS OPENINGS, PENETRATIONS, AND THE CONTAINMENT HEAT REMOVAL SYSTEM, SHALL BE DESIGNED SO THAT THE CONTAINMENT STRUCTURE AND ITS INTERNAL COMPARTMENTS CAN ACCOMMODATE, WITHOUT EXCEEDING THE DESIGN LEAKAGE RATE AND WITH SUFFICIENT MARGIN, THE CALCULATED PRESSURE AND TEMPERATURE CONDITIONS RESULTING FROM ANY LOCA. THIS MARGIN SHALL REFLECT CONSIDERATION OF (1) THE EFFECTS OF POTENTIAL ENERGY SOURCES THAT HAVE NOT BEEN INCLUDED IN THE DETERMINATION OF THE PEAK CONDITIONS, SUCH AS ENERGY IN STEAM GENERATORS AND, AS REQUIRED BY 10CFR50.44, ENERGY FROM METAL-WATER AND OTHER CHEMICAL REACTIONS THAT MAY RESULT FROM DEGRADATION, BUT NOT TOTAL FAILURE, OF EMERGENCY CORE COOLING FUNCTIONING; (2) THE LIMITED EXPERIENCE AND EXPERIMENTAL DATA AVAILABLE FOR DEFINING ACCIDENT PHENOMENA AND CONTAINMENT RESPONSES; AND (3) THE CONSERVATISM OF THE CALCULATIONAL MODEL AND INPUT PARAMETERS.	IN COMPLIANCE

EXHIBIT 2-54

SRP ACCEPTANCE CRITERIA

RG 1.1, NET POSITIVE SUCTION HEAD FOR EMERGENCY CORE COOLING AND CONTAINMENT HEAT REMOVAL SYSTEM PUMPS

REQUIREMENT	DESIGN FEATURE
EMERGENCY CORE COOLING AND CONTAINMENT HEAT REMOVAL SYSTEMS SHOULD BE DESIGNED SO THAT ADEQUATE NPSH IS PROVIDED TO SYSTEM PUMPS ASSUMING MAXIMUM EXPECTED TEMPERATURES OF PUMPED FLUIDS AND NO INCREASE IN CONTAINMENT PRESSURE FROM THAT PRESENT PRIOR TO POSTULATED LOCAs.	IN COMPLIANCE. THE NPSH IS CONSERVATIVELY CALCULATED BASED ON THE ASSUMPTION THAT THE CONTAINMENT PRESSURE EQUALS THE VAPOR PRESSURE OF SUMP WATER.

EXHIBIT 2-55

SRP ACCEPTANCE CRITERIA

RG 1.26, QUALITY GROUP CLASSIFICATIONS

REQUIREMENT	DESIGN FEATURE
SYSTEMS OR PORTIONS OF SYSTEMS IMPORTANT TO SAFETY THAT ARE DESIGNED FOR POST-ACCIDENT CONTAINMENT HEAT REMOVAL SHALL MEET THE REQUIREMENTS OF ASME B&PV CODE, SECTION III, CLASS 2.	IN COMPLIANCE

EXHIBIT 2-56

SRP ACCEPTANCE CRITERIA

RG 1.29, SEISMIC CLASSIFICATIONS

REQUIREMENT	DESIGN FEATURE
SYSTEMS OR PORTIONS OF SYSTEMS THAT ARE REQUIRED FOR POST-ACCIDENT CONTAINMENT HEAT REMOVAL SHALL BE DESIGNATED SEISMIC CATEGORY I AND BE DESIGNED TO WITHSTAND THE EFFECTS OF THE SSE AND REMAIN FUNCTIONAL. THE QUALITY ASSURANCE REQUIREMENTS OF APPENDIX B TO 10CFR50 SHALL APPLY.	IN COMPLIANCE

EXHIBIT 2-57

SRP ACCEPTANCE CRITERIA

RG 1.82, SUMPS FOR EMERGENCY CORE COOLING AND CONTAINMENT SPRAY SYSTEMS

	REQUIREMENT	DESIGN FEATURE
1)	A MINIMUM OF TWO SUMPS SHOULD BE PROVIDED, EACH WITH SUFFICIENT CAPACITY TO SERVE ONE OF THE REDUNDANT HALVES OF THE ECCS AND CSS SYSTEMS.	IN COMPLIANCE
2)	THE REDUNDANT SUMPS SHOULD BE PHYSICALLY SEPARATED FROM EACH OTHER AND FROM HIGH-ENERGY PIPING SYSTEMS BY STRUCTURAL BARRIERS, TO THE EXTENT PRACTICAL, TO PRECLUDE DAMAGE TO THE SUMP INTAKE FILTERS BY WHIPPING PIPES OR HIGH-VELOCITY JETS OF WATER OR STEAM.	IN COMPLIANCE

EXHIBIT 2-58

SRP ACCEPTANCE CRITERIA

RG 1.82, SUMPS FOR EMERGENCY CORE COOLING AND CONTAINMENT SPRAY SYSTEMS (CONT'D)

	REQUIREMENT	DESIGN FEATURE
3)	THE SUMPS SHOULD BE LOCATED ON THE LOWEST FLOOR ELEVATION IN THE CONTAINMENT EXCLUSIVE OF THE REACTOR VESSEL CAVITY. AT A MINIMUM, THE SUMP INTAKE SHOULD BE PROTECTED BY TWO SCREENS: (1) AN OUTER TRASH RACK AND (2) A FINE INNER SCREEN. THE SUMP SCREENS SHOULD NOT BE DEPRESSED BELOW THE FLOOR ELEVATION.	IN COMPLIANCE. SUMPS LOCATED IN THE LOWEST FLOOR OF THE CONTAINMENT BUILDING, AT ELEVATION 80 FT, ARE PROTECTED BY A TRASH RACK AND TWO SCREENS. THE SUMP SCREENS ARE PLACED ON A 3 IN. HIGH CURB.
4)	THE FLOOR LEVEL IN THE VICINITY OF THE COOLANT SUMP LOCATION SHOULD SLOPE GRADUALLY DOWN AWAY FROM THE SUMP.	IN COMPLIANCE. THE FLOOR LEVEL IN THE SUMP VICINITY SLOPES TOWARD LOCAL FLOOR DRAINS.

SRP ACCEPTANCE CRITERIA

RG 1.82, SUMPS FOR EMERGENCY CORE COOLING AND CONTAINMENT SPRAY SYSTEMS (CONT'D)

	REQUIREMENT	DESIGN FEATURE
5)	ALL DRAINS FROM THE UPPER REGIONS OF THE REACTOR BUILDING SHOULD TERMINATE IN SUCH A MANNER THAT DIRECT STREAMS OF WATER, WHICH MAY CONTAIN ENTRAINED DEBRIS, WILL NOT IMPINGE ON THE FILTER ASSEMBLIES.	IN COMPLIANCE. NO DRAINS FROM UPPER REGIONS IMPINGE ON THE SCREEN ASSEMBLIES.
6)	A VERTICALLY MOUNTED OUTER TRASH RACK SHOULD BE PROVIDED TO PREVENT LARGE DEBRIS FROM REACHING THE FINE INNER SCREEN. THE STRENGTH OF THE TRASH RACK SHOULD BE CONSIDERED IN PROTECTING THE INNER SCREEN FROM MISSILES AND LARGE DEBRIS.	IN COMPLIANCE. THE TRASH RACK IS CONSTRUCTED FROM STANDARD 2-1/4 IN. X 3/16 IN. GRATING.

SRP ACCEPTANCE CRITERIA

RG 1.82, SUMPS FOR EMERGENCY CORE COOLING AND CONTAINMENT SPRAY SYSTEMS (CONT'D)

	REQUIREMENT	DESIGN FEATURE
7)	A VERTICALLY MOUNTED FINE INNER SCREEN SHOULD BE PROVIDED. THE DESIGN COOLANT VELOCITY AT THE INNER SCREEN SHOULD BE APPROXIMATELY 6 CM/S (0.2 FT/S). THE AVAILABLE SURFACE AREA USED IN DETERMINING THE DESIGN COOLANT VELOCITY SHOULD BE BASED ON ONE-HALF OF THE FREE SURFACE AREA OF THE FINE INNER SCREEN TO CONSERVATIVELY ACCOUNT FOR PARTIAL BLOCKAGE. ONLY THE VERTICAL SCREENS SHOULD BE CONSIDERED IN DETERMINING AVAILABLE SURFACE AREA.	IN COMPLIANCE. THE DESIGN VELOCITY FOR A 50% PLUGGED FINE INNER SCREEN (STAINLESS STEEL WIRE CLOTH WITH 0.09 IN. OPENINGS) IS 0.18 FT/S. THE DESIGN VELOCITY AT A 50% PLUGGED OUTER COARSE SCREEN (STAINLESS STEEL WIRE CLOTH WITH 0.5 IN. OPENINGS) IS 0.18 FT/S. VELOCITY AT A 50% PLUGGED TRASH RACK IS 0.17 FT/S. ONLY VERTICAL SCREENS ARE PROVIDED.
8)	A SOLID TOP DECK IS PREFERABLE, AND THE TOP DECK SHOULD BE DESIGNED TO BE FULLY SUBMERGED AFTER A LOCA AND COMPLETION OF THE SAFETY INJECTION.	IN COMPLIANCE. A SOLID TOP DECK IS PROVIDED AND WILL BE SUBMERGED DURING THE RECIRCULATION MODE OF OPERATION AT MINIMUM WATER LEVEL CONDITIONS.

SRP ACCEPTANCE CRITERIA

RG 1.82, SUMPS FOR EMERGENCY CORE COOLING AND CONTAINMENT SPRAY SYSTEMS (CONT'D)

	REQUIREMENT	DESIGN FEATURE
9)	THE TRASH RACK AND SCREENS SHOULD BE DESIGNED TO WITHSTAND THE VIBRATORY MOTION OF SEISMIC EVENTS WITHOUT LOSS OF STRUCTURAL INTEGRITY.	IN COMPLIANCE
10)	THE SIZE OF OPENINGS IN THE FINE SCREEN SHOULD BE BASED ON THE MINIMUM RESTRICTIONS FOUND IN SYSTEMS SERVED BY THE SUMP. THE MINIMUM RESTRICTION SHOULD TAKE INTO ACCOUNT THE OVERALL OPERABILITY OF THE SYSTEM SERVED.	IN COMPLIANCE. THE MAXIMUM FINE SCREEN OPENING OF 0.09 IN. SATISFIES C-E REQUIREMENTS ON SUMP SCREEN DESIGN.
11)	PUMP INTAKE LOCATIONS IN THE SUMP SHOULD BE CAREFULLY CONSIDERED TO PREVENT DEGRADING EFFECTS SUCH AS VORTEXING ON THE PUMP PERFORMANCE.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.82, SUMPS FOR EMERGENCY CORE COOLING AND CONTAINMENT SPRAY SYSTEMS (CONT'D)

	REQUIREMENT	DESIGN FEATURE
12)	MATERIALS FOR TRASH RACKS AND SCREENS SHOULD BE SELECTED TO AVOID DEGRADATION DURING PERIODS OF INACTIVITY AND OPERATION AND SHOULD HAVE A LOW SENSITIVITY TO ADVERSE EFFECTS SUCH AS STRESS-ASSISTED CORROSION THAT MAY BE INDUCED BY THE CHEMICALLY REACTIVE SPRAY DURING LOCA CONDITIONS.	IN COMPLIANCE. THE ENTIRE SCREEN IS FABRICATED FROM AUSTENITIC STAINLESS STEEL WHICH HAS A LOW SENSITIVITY TO SPRAY-INDUCED CORROSION AND WILL NOT BE ADVERSELY AFFECTED BY PERIODS OF INACTIVITY.
13)	THE TRASH RACK AND SCREEN STRUCTURE SHOULD INCLUDE ACCESS OPENINGS TO FACILITATE INSPECTION OF THE STRUCTURE AND PUMP SUCTION INTAKE.	IN COMPLIANCE. A MANHOLE IS PROVIDED IN THE TOP DECK TO FACILITATE ACCESS INTO THE SUMP AND SUCTION INTAKE STRUCTURES.

SRP ACCEPTANCE CRITERIA

RG 1.82, SUMPS FOR EMERGENCY CORE COOLING AND CONTAINMENT SPRAY SYSTEMS (CONT'D)

REQUIREMENT	DESIGN FEATURE
14) INSERVICE INSPECTION REQUIREMENTS FOR COOLANT SUMP COMPONENTS (TRASH RACKS, SCREENS, AND PUMP SUCTION INLETS) SHOULD INCLUDE THE FOLLOWING: A. COOLANT SUMP COMPONENTS SHOULD BE INSPECTED DURING EVERY REFUELING PERIOD DOWNTIME, AND B. THE INSPECTION SHOULD BE A VISUAL EXAMINATION OF THE COMPONENTS FOR EVIDENCE OF STRUCTURAL DISTRESS OR CORROSION.	IN COMPLIANCE. THE MANHOLE FACILITATES ACCESS FOR INSPECTION OF INSIDE SCREEN PARTS. ADEQUATE SPACE IS PROVIDED AROUND THE SCREEN TO FACILITATE UNOBSTRUCTED INSPECTION OF THE OUTSIDE SCREENS.

CONTAINMENT SPRAY SYSTEM
NUREG-0737

ITEM II.F.1, SUBPART 4

REQUIREMENT	DESIGN FEATURE
A CONTINUOUS INDICATION OF CONTAINMENT PRESSURE SHALL BE PROVIDED IN THE CONTROL ROOM OF EACH OPERATING REACTOR. MEASUREMENT AND INDICATION CAPABILITY SHALL INCLUDE THREE TIMES THE DESIGN PRESSURE OF THE CONTAINMENT FOR CONCRETE, FOUR TIMES THE DESIGN PRESSURE FOR STEEL, AND -5 PSIG FOR ALL CONTAINMENTS.	IN COMPLIANCE. CONTAINMENT PRESSURE IS MONITORED OVER THE RANGE -5 TO 180 PSIG BY REDUNDANT INSTRUMENTATION HAVING CLASS 1E POWER, WITH RECORDING ON CHANNEL A.

EXHIBIT 2-65

CONTAINMENT SPRAY SYSTEM
NUREG-0737

ITEM II.F.1, SUBPART 5

REQUIREMENT

A CONTINUOUS INDICATION OF CONTAINMENT WATER LEVEL SHALL BE PROVIDED IN THE CONTROL ROOM FOR ALL PLANTS. A NARROW RANGE INSTRUMENT SHALL BE PROVIDED FOR PWRS AND COVER THE RANGE FROM THE BOTTOM TO THE TOP OF THE CONTAINMENT SUMP. A WIDE RANGE INSTRUMENT SHALL ALSO BE PROVIDED FOR PWRS AND SHALL COVER THE RANGE FROM THE BOTTOM OF THE CONTAINMENT TO THE ELEVATION EQUIVALENT TO A 600,000 GALLON CAPACITY. FOR BWRS, A WIDE RANGE INSTRUMENT SHALL BE PROVIDED AND COVER THE RANGE FROM THE BOTTOM TO 5 FEET ABOVE THE NORMAL WATER LEVEL OF THE SUPPRESSION POOL.

DESIGN FEATURE

IN COMPLIANCE. A NARROW RANGE INSTRUMENT READING FROM THE BOTTOM TO +6 IN. ABOVE THE SUMP IS PROVIDED FOR EACH CONTAINMENT RADWASTE SUMP. THE INSTRUMENTS ARE NON-1E, HAVING A RELIABLE POWER SOURCE, AND ARE QUALIFIED TO A POST-LOCA ENVIRONMENT. REDUNDANT, WIDE-RANGE INSTRUMENTS (11 FT) READING FROM 80 FT 6 IN. (+6 IN. ABOVE SUMP) TO 91 FT 6 IN. (+6 IN. ABOVE MAXIMUM FLOOD LEVEL) ARE PROVIDED. THE INSTRUMENTS HAVE CLASS 1E POWER WITH RECORDING ON CHANNEL A.

III. CONTAINMENT ISOLATION SYSTEM

EXHIBIT 3-i

CONTAINMENT ISOLATION SYSTEM
INTRODUCTION

1) THE DESIGN OBJECTIVE OF THE CONTAINMENT ISOLATION SYSTEM (CIS) IS TO ALLOW NORMAL OR EMERGENCY PASSAGE OF FLUIDS THROUGH THE CONTAINMENT BOUNDARY WHILE PRESERVING THE ABILITY OF THE BOUNDARY TO PREVENT OR LIMIT THE ESCAPE OF FISSION PRODUCTS THAT MAY RESULT FROM POSTULATED ACCIDENTS.

2) THE CIS IS NOT A SPECIFIC ENGINEERED SYSTEM. EACH PIPING SYSTEM WHICH PENETRATES THE CONTAINMENT INCORPORATES REQUIREMENTS OF THE INTEGRITY OF THE CONTAINMENT PRESSURE BOUNDARY IN THE PENETRATION DESIGN.

EXHIBIT 3-1

CONTAINMENT ISOLATION SYSTEM
DESIGN CRITERIA

1) TWO ISOLATION VALVES SHALL BE PROVIDED, ONE INSIDE AND ONE OUTSIDE OF THE CONTAINMENT.

2) PENETRATION LINES AND VALVES SHALL BE CONSTRUCTED TO ASME III, CLASS 2, SEISMIC CATEGORY I CRITERIA.

3) THE DESIGN PRESSURE AND TEMPERATURES OF THE CONTAINMENT PENETRATION LINES AND THEIR ASSOCIATED ISOLATION VALVES SHALL MEET OR EXCEED CONTAINMENT DESIGN CONDITIONS. VALVE OPERATORS SHALL BE DESIGNED TO THE PREVAILING ENVIRONMENTAL CONDITIONS.

EXHIBIT 3-2

CONTAINMENT ISOLATION SYSTEM
CESSAR INTERFACES

REFERENCE: CESSAR SECTION 6.2.4.1.2

	REQUIREMENT	DESIGN FEATURE
1)	ISOLATION VALVES AND PIPING SHALL BE DESIGNED TO SAFETY CLASS 2 AND SEISMIC CATEGORY I.	IN COMPLIANCE
2)	ISOLATION VALVES AND INTERCONNECTING PIPING ARE PROTECTED AGAINST MISSILES.	IN COMPLIANCE. VALVES AND PIPING INSIDE THE CONTAINMENT ARE LOCATED BETWEEN THE CONTAINMENT WALL AND THE SECONDARY SHIELD WALL, WHICH SERVES AS A MISSILE BARRIER. THE VALVES AND PIPING OUTSIDE THE CONTAINMENT ARE PROTECTED BY STEEL AND CONCRETE WALLS AND FLOORS OF ADJACENT BUILDINGS.

EXHIBIT 3-3

CONTAINMENT ISOLATION SYSTEM
CESSAR INTERFACES (CONT'D)

REFERENCE: CESSAR SECTION 6.2.4.1.2

	REQUIREMENT	DESIGN FEATURE
3)	ISOLATION VALVES AND PIPING SHALL BE PROTECTED AGAINST THE EFFECTS OF PIPE WHIP AND JET IMPINGEMENT.	IN COMPLIANCE. SEPARATION FROM HIGH ENERGY LINES, PIPE WHIP RESTRAINTS, AND BARRIERS ARE PROVIDED WHERE APPROPRIATE.
4)	THE MAXIMUM ALLOWABLE PARTICLE SIZE IN THE WATER FROM THE CONTAINMENT SUMP SHALL BE LIMITED.	IN COMPLIANCE. SUCTION SCREENS ARE PROVIDED IN THE CONTAINMENT SUMP.
5)	ISOLATION VALVES SHALL BE DESIGNED TO OPERATE UNDER ENVIRONMENTAL CONDITIONS AND TO FULFILL THEIR SAFETY-RELATED FUNCTION UNDER POST-ACCIDENT ENVIRONMENTAL CONDITIONS.	IN COMPLIANCE

EXHIBIT 3-4

CONTAINMENT ISOLATION SYSTEM
CESSAR INTERFACES (CONT'D)

REFERENCE: CESSAR SECTION 6.2.4.1.2

	REQUIREMENT	DESIGN FEATURE
6)	ISOLATION VALVES AND PIPING SHALL BE QUALIFIED TO ASME III, CLASS 2.	IN COMPLIANCE
7)	VALVE OPERATORS AND POWER SOURCES SHALL BE SELECTED FOR CESSAR SCOPE ISOLATION VALVES CONSISTENT WITH THEIR REQUIRED SAFETY FUNCTION.	IN COMPLIANCE. THE OPERATORS ARE SUPPLIED BY C-E. THE INTERFACE REQUIREMENTS FOR POWER SOURCES ARE SATISFIED.
8)	CONTROLS FOR ISOLATION VALVES SHALL BE DESIGNED TO ACTUATE REMOTE MANUAL, AUTOMATICALLY, OR MANUALLY LOCALLY.	IN COMPLIANCE. REMOTE AND AUTOMATIC CONTROL IS PROVIDED.

EXHIBIT 3-5

CONTAINMENT ISOLATION SYSTEM
SYSTEM DESCRIPTION

1) THE CIS CONSISTS OF PIPING PENETRATIONS, PIPE, VALVES AND TEST CONNECTIONS TO CONTROL THE PASSAGE OF FLUIDS THROUGH THE CONTAINMENT BOUNDARY AND TO TEST THE BOUNDARY LEAKAGE.

2) SIX BASIC TYPES OF PENETRATION ARRANGEMENTS ARE USED:

   A. NORMALLY IN A CLOSED, OR ISOLATED, POSITION

   B. NORMALLY OPERATING, CLOSED UPON A CONTAINMENT ISOLATION ACTUATION SIGNAL (CIAS), MAIN STEAM ISOLATION SIGNAL (MSIS), AUXILIARY FEEDWATER ACTUATION SIGNAL (AFAS), SAFETY INJECTION ACTUATION SIGNAL (SIAS), OR REMOTE MANUAL

   C. NORMALLY CLOSED, OPEN ON A SIAS, AFAS, CONTAINMENT SPRAY ACTUATION SIGNAL (CSAS), OR RECIRCULATION ACTUATION SIGNAL (RAS)

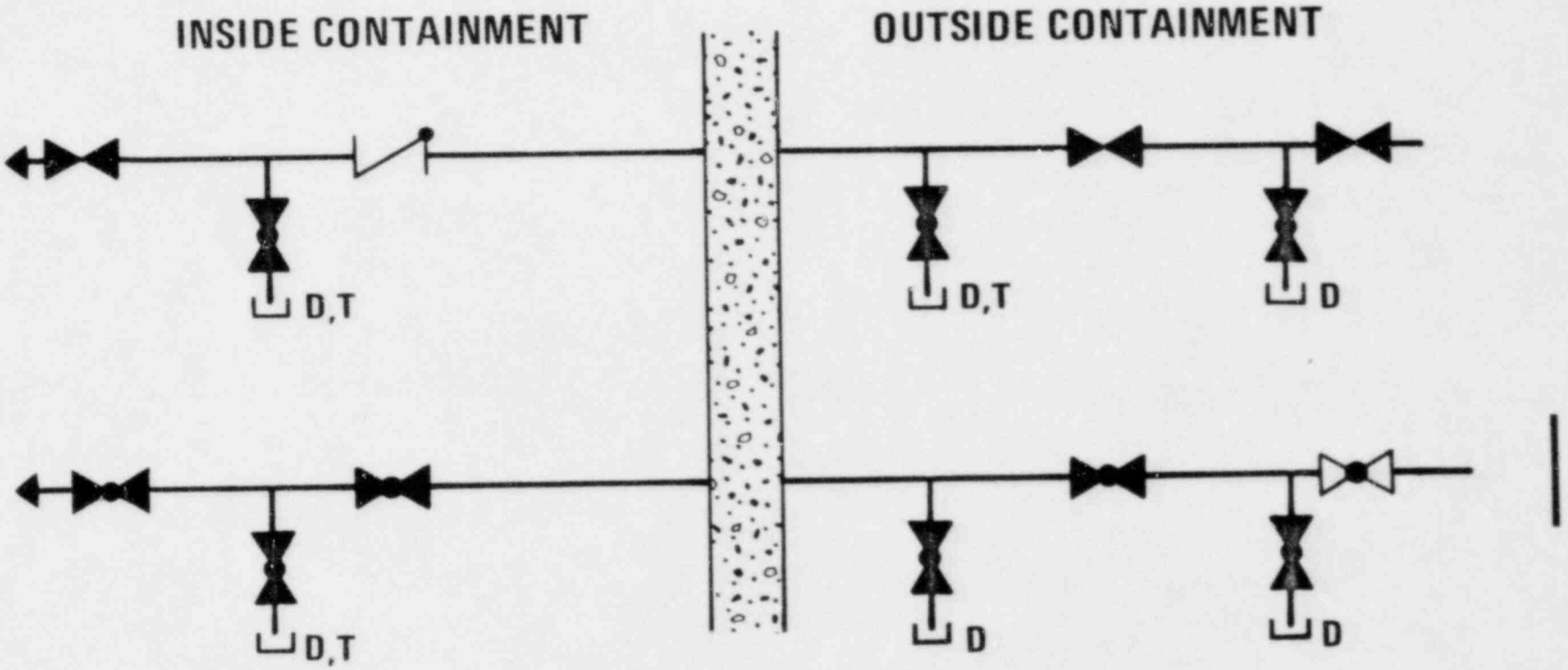
   D. PART OF THE CLOSED SECONDARY SIDE OF THE STEAM GENERATORS

   E. INSTRUMENT CONNECTIONS FOR CONTAINMENT PRESSURE

   F. FLANGED CONNECTIONS AND PERSONNEL LOCKS

3) C-E DEFINES THE SYSTEMS AND POSITIONS OF ISOLATION VALVES FOR THEIR SCOPE OF SUPPLY. PENETRATIONS FOR SUPPORT SYSTEMS FALL INTO ONE OF THE ABOVE CATEGORIES. THE PVNGS FINAL SAFETY ANALYSIS REPORT (FSAR), SECTION 6.2.4, DESCRIBES EACH PENETRATION IN DETAIL.

EXHIBIT 3-6

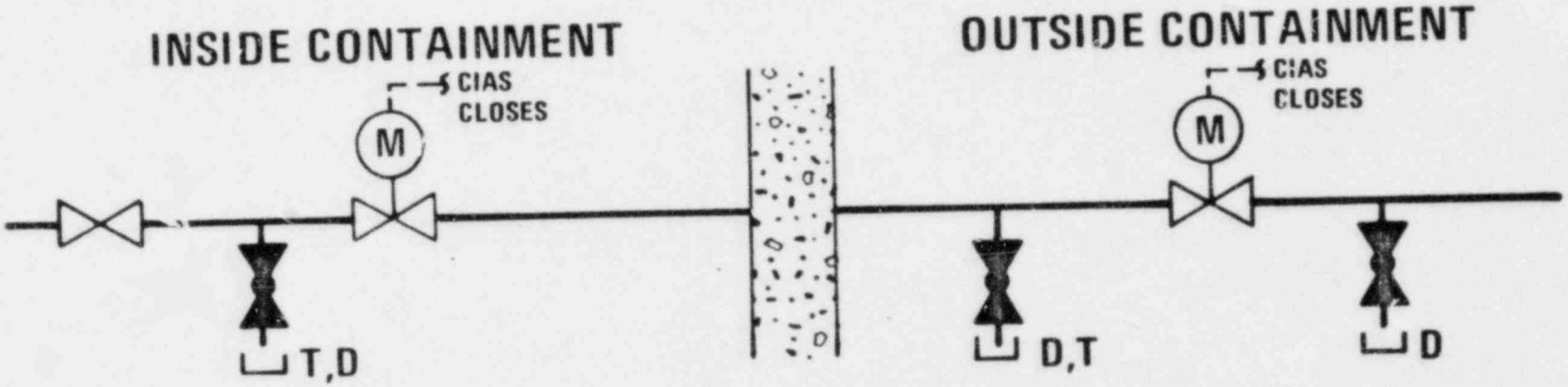


LEGEND:

D = DRAIN
T = TEST
V = VENT

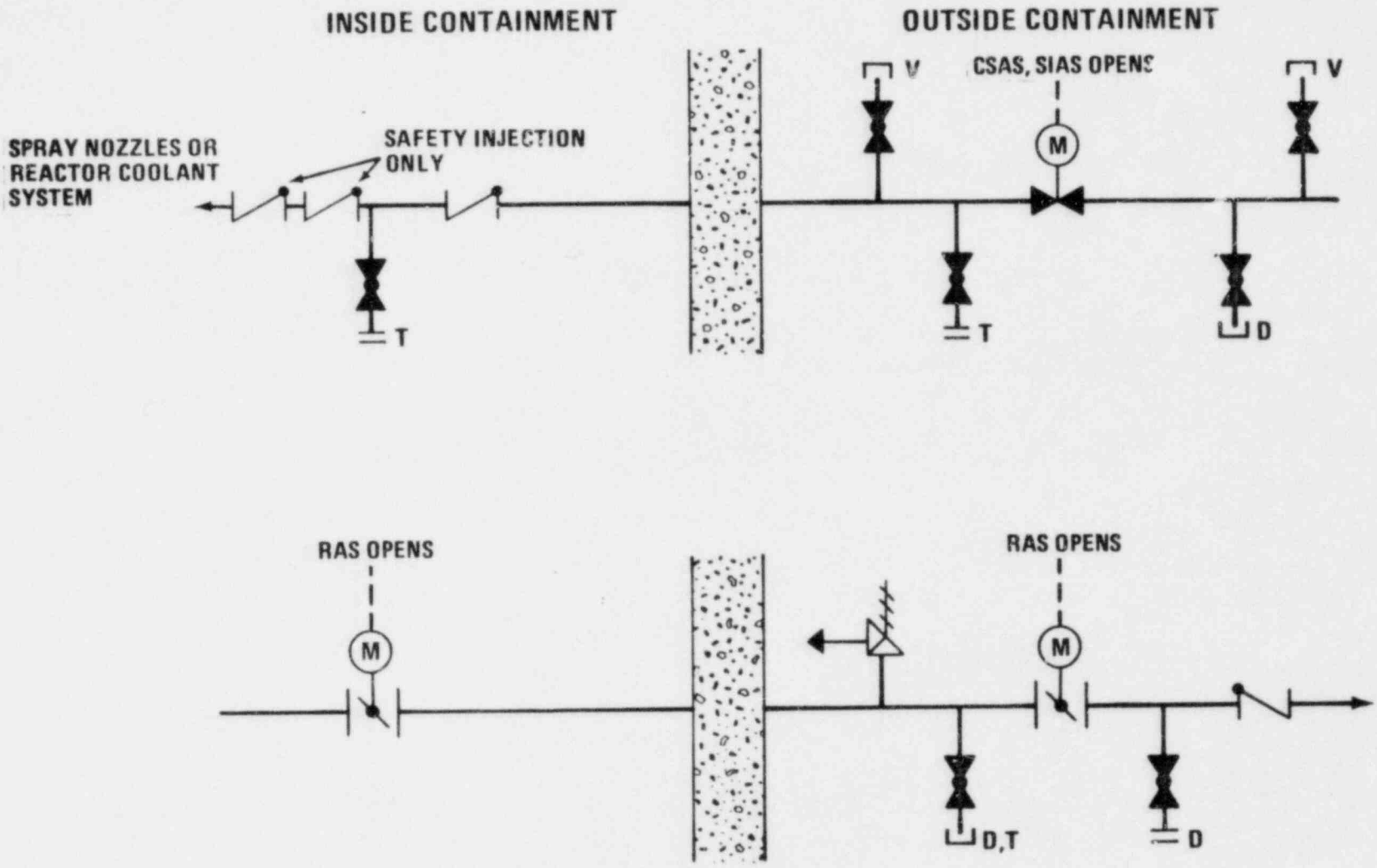
TYPE "A" PENETRATION ARRANGEMENT
(TYPICAL FOR SERVICE AIR, FIRE PROTECTION
AND DEMINERALIZED WATER)

FIGURE 3-1



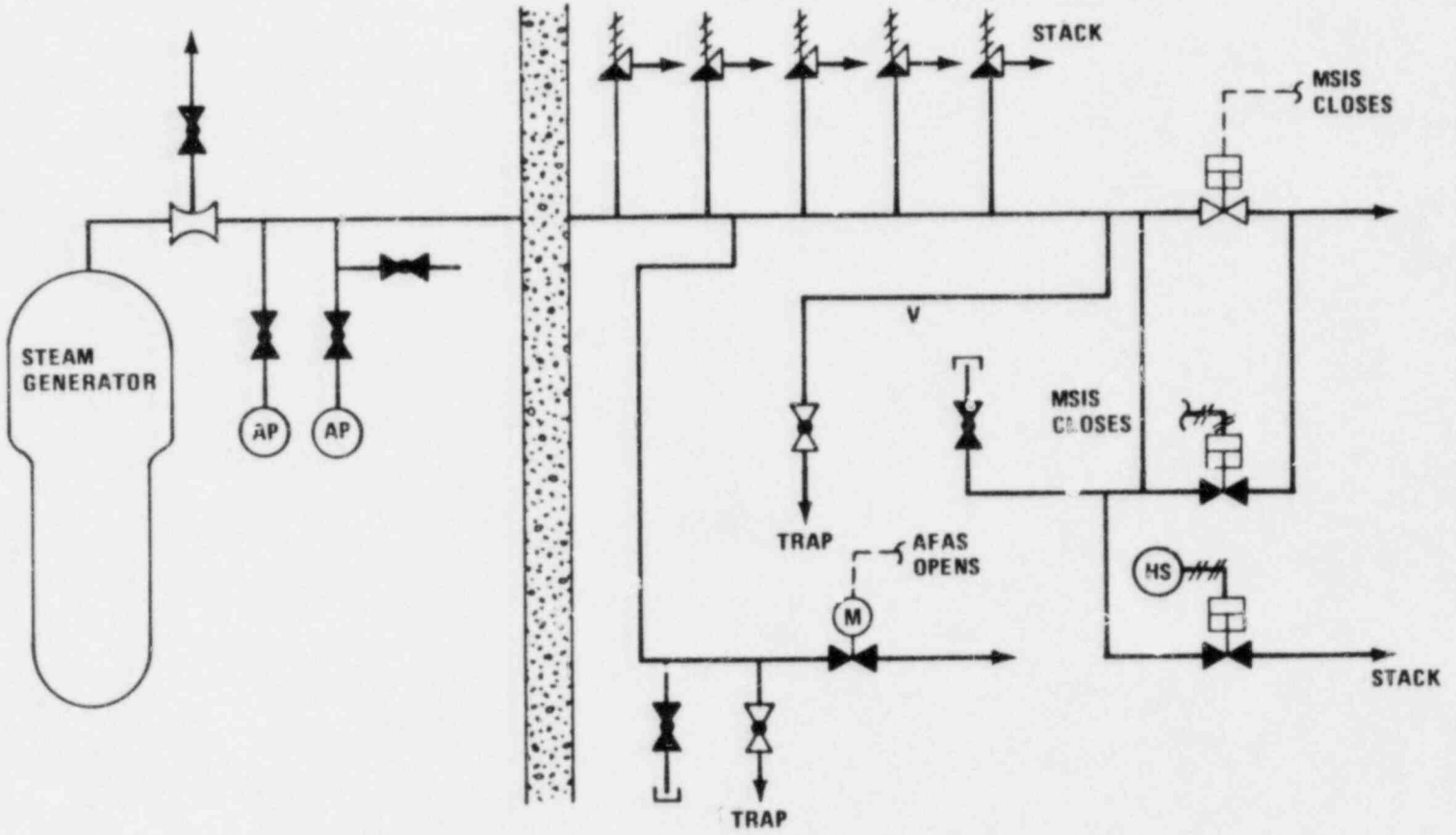
TYPE "B" PENETRATION ARRANGEMENT
(TYPICAL FOR COOLING WATER, LETDOWN LINE, REACTOR DRAIN TANK VENT, CONTAINMENT PURGE (BUTTERFLY VALVES), AND RADWASTE SUMP DISCHARGE)

FIGURE 3-2



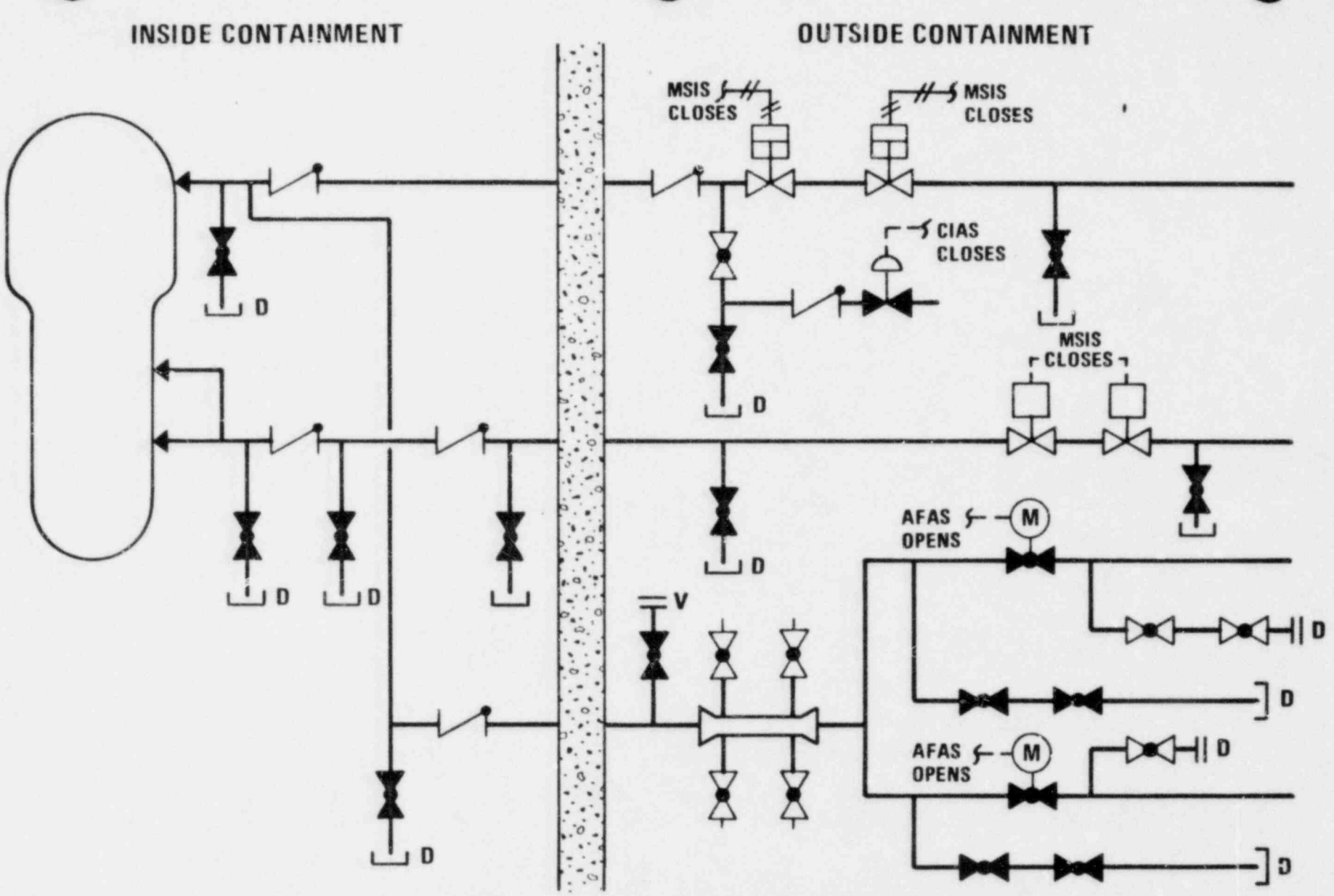
TYPE "C" PENETRATION ARRANGEMENT
(TYPICAL FOR SAFETY INJECTION, CONTAINMENT SPRAY, AND RECIRCULATION SUMP PIPING)

FIGURE 3-3



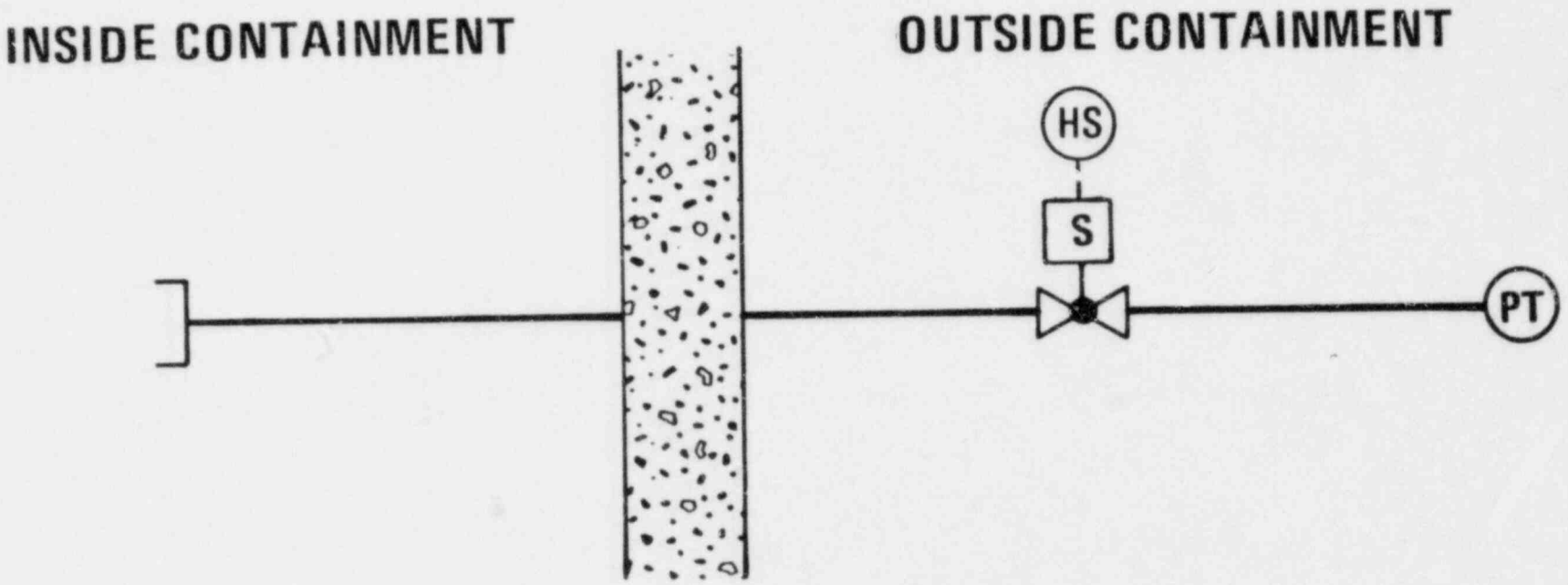
TYPE "D" PENETRATION ARRANGEMENT
FOR MAIN STEAM LINES

FIGURE 3-4



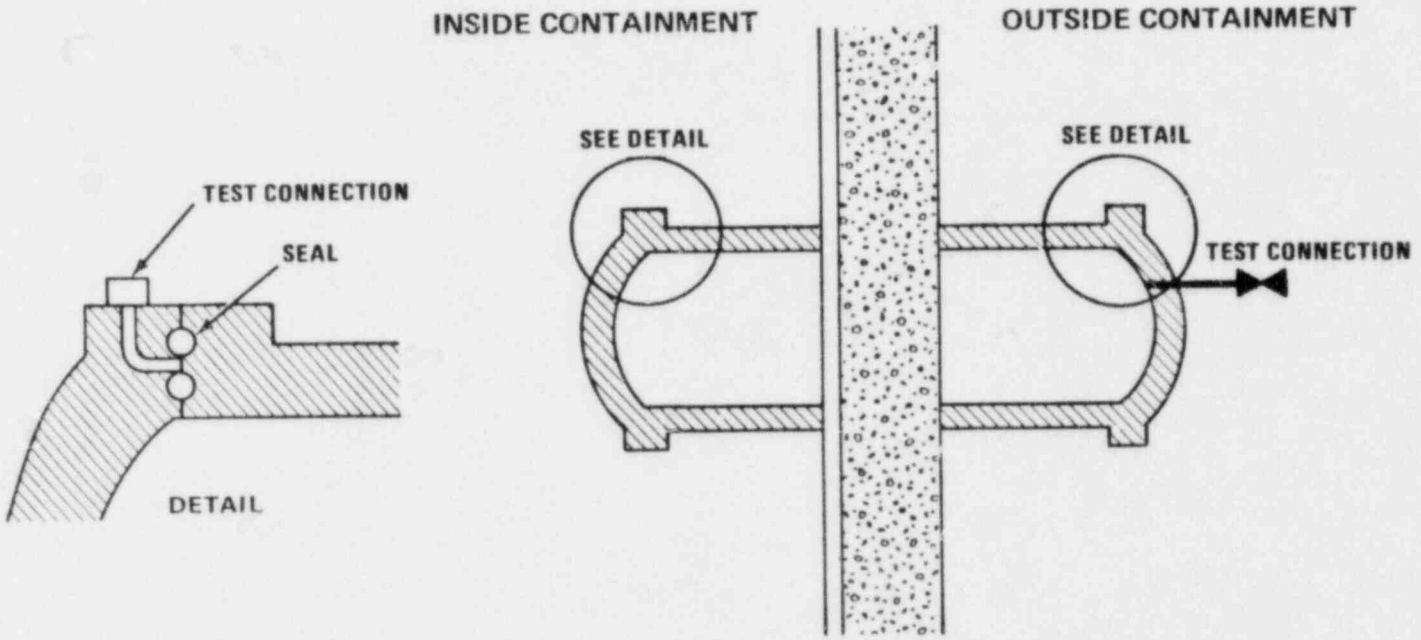
TYPE "D" PENETRATION ARRANGEMENT
FOR MAIN FEEDWATER AND AUXILIARY FEEDWATER LINES

FIGURE 3-5



TYPE "E" PENETRATION ARRANGEMENT
FOR CONTAINMENT BLDG PRESSURE MONITORS

FIGURE 3-6



TYPE "F" PENETRATION ARRANGEMENT
TYPICAL FOR PERSONNEL HATCHES
(DETAIL TYPICAL FOR BLIND FLANGED PENETRATIONS)

FIGURE 3-7

CONTAINMENT ISOLATION SYSTEM
SYSTEM OPERATION

1) CONTAINMENT PRESSURE IS MONITORED BY FOUR DIFFERENT PRESSURE INSTRUMENTS. UPON DETECTION OF HIGH CONTAINMENT PRESSURE (5 PSIG) BY ANY TWO INSTRUMENTS, OR UPON PRESSURIZER LOW PRESSURE (<1685 PSIG), A CIAS IS GENERATED.

2) A CIAS CLOSES THE APPROPRIATE VALVES. THE FOLLOWING VALVES HAVE PENETRATION VALVES ACTUATED BY A CIAS:

- CONTAINMENT HVAC (RADIATION MONITORS)
- CONTAINMENT PURGE (ALSO CLOSED BY CPIAS HIGH RADIATION)
- SERVICE GAS (NITROGEN)
- CHILLED WATER SYSTEM
- INSTRUMENT AIR
- NUCLEAR (COMPONENT) COOLING WATER
- HYDROGEN CONTROL
- CHEMICAL AND VOLUME CONTROL
- SECONDARY SAMPLING

EXHIBIT 3-7

CONTAINMENT ISOLATION SYSTEM
SYSTEM OPERATION

3) Other systems which have penetration valves closed by a SIAS, AFAS, or MSIS are:

SYSTEM	SIGNAL
Main Steam	MSIS
Main Feedwater	MSIS
Steam Generator Blowdown and Blowdown Sampling	MSIS, AFAS or SIAS
Safety Injection Tank Drain	SIAS

Parameters which generate an SIAS also generate a CIAS.

EXHIBIT 3-8

4) Certain penetrations are not isolated following an accident:

- It is desirable to leave reactor coolant pump seal injection and chemical and volume control system (CVCS) charging paths open to provide additional core protection after an accident in which offsite power is available.

- Charging pumps are automatically transferred to emergency power in the event that offsite power is lost.

- Undesirable to lose charging or seal injection capability during normal operation due to an inadvertent CIAS. The potential release of fission products through the penetration is not a concern for the following reasons:

  (1) Flow is into the containment and RCS.

  (2) Check valves inside the containment prevent backflow out of the containment if the charging pumps stop.

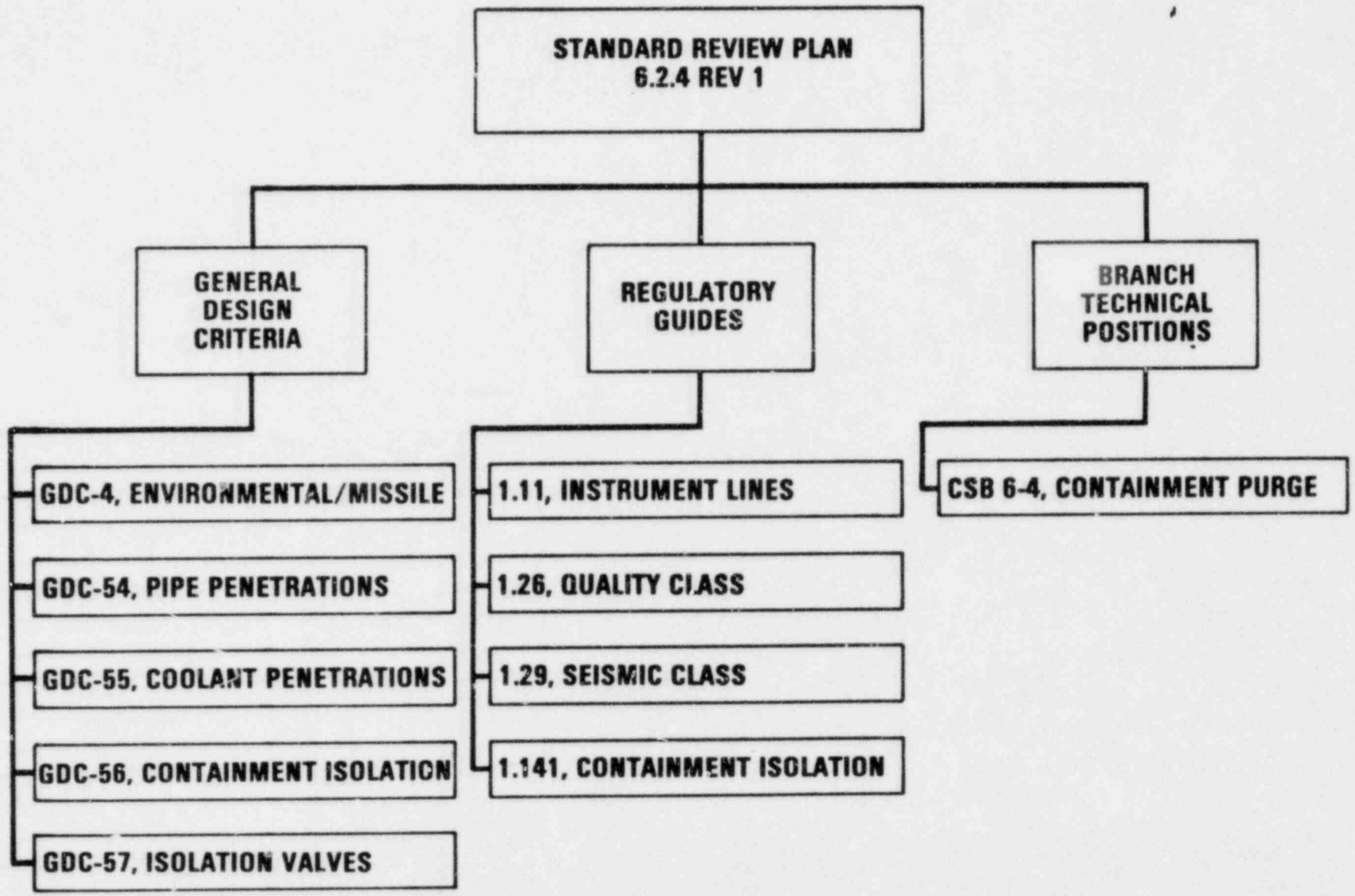
  (3) Connecting portions of the CVCS outside of containment are designed to Safety Class 2, Seismic Category I standards and have a design pressure well in excess of containment design pressure.

  (4) Operator has the capability of isolating these lines if continued charging or seal injection proves to be unnecessary.

CONTAINMENT ISOLATION SYSTEM
SYSTEM OPERATION

- THE MAIN STEAM AND FEEDWATER SYSTEMS, WHILE NOT ESSENTIAL, AID IN HEAT REMOVAL DURING A SMALL LOCA. THESE SYSTEMS SHOULD NOT BE ISOLATED BY A CIAS GENERATED ON LOW PRESSURIZER PRESSURE. THE STEAM AND FEEDWATER SYSTEMS ARE ISOLATED FOR A MAIN STEAM LINE BREAK BY A MSIS ON HIGH CONTAINMENT PRESSURE (5 PSIG) OR LOW STEAM GENERATOR PRESSURE (870 PSIG).

- OVERRIDE OF A CIAS SIGNAL IS AVAILABLE FOR EACH CONTAINMENT ISOLATION VALVE VIA THE CONTROL SWITCH FOR THAT VALVE. RESETTING OF A CIAS DOES NOT RESULT IN THE AUTOMATIC OPENING OF CONTAINMENT ISOLATION VALVES. REOPENING REQUIRES OPERATOR ACTION FOR EACH VALVE AND DOES NOT COMPROMISE THE CONTAINMENT ISOLATION SIGNAL.



STANDARD REVIEW PLAN 6.2.4 REV. 1
FIGURE 3-8

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
1) GDC 55 AND 56 REQUIRE THAT LINES THAT PENETRATE THE PRIMARY CONTAINMENT BOUNDARY AND EITHER ARE PART OF THE REACTOR COOLANT PRESSURE BOUNDARY OR CONNECT DIRECTLY TO THE CONTAINMENT ATMOSPHERE SHOULD BE PROVIDED WITH ISOLATION VALVES AS FOLLOWS:	IN COMPLIANCE
A. ONE LOCKED CLOSED ISOLATION VALVE INSIDE AND ONE LOCKED CLOSED ISOLATION VALVE OUTSIDE CONTAINMENT; OR	
B. ONE AUTOMATIC ISOLATION VALVE INSIDE AND ONE LOCKED CLOSED ISOLATION VALVE OUTSIDE CONTAINMENT; OR	
C. ONE LOCKED CLOSED ISOLATION VALVE INSIDE AND ONE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT; OR	
D. ONE AUTOMATIC ISOLATION VALVE INSIDE AND ONE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT.	

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
2) GDC 57 REQUIRES THAT LINES THAT PENETRATE THE PRIMARY CONTAINMENT BOUNDARY AND ARE NEITHER PART OF THE REACTOR COOLANT PRESSURE BOUNDARY NOR CONNECTED DIRECTLY TO THE CONTAINMENT ATMOSPHERE SHOULD BE PROVIDED WITH AT LEAST ONE LOCKED CLOSED, REMOTE-MANUAL, OR AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT.	IN COMPLIANCE WITH RESPECT TO THE MAIN STEAM AND FEEDWATER SYSTEMS.
3) THE GDC PERMIT CONTAINMENT ISOLATION PROVISIONS FOR LINES PENETRATING THE PRIMARY CONTAINMENT BOUNDARY THAT DIFFER FROM THE EXPLICIT REQUIREMENTS OF GDC 55 AND 56 IF THE BASIS FOR ACCEPTABILITY IS DEFINED. FOLLOWING ARE GUIDELINES FOR ACCEPTABLE ALTERNATE CONTAINMENT ISOLATION PROVISIONS FOR CERTAIN CLASSES OF LINES:	
A. RG 1.11 DESCRIBES ACCEPTABLE CONTAINMENT ISOLATION PROVISIONS FOR INSTRUMENT LINES. IN ADDITION, INSTRUMENT LINES THAT ARE CLOSED BOTH INSIDE AND OUTSIDE CONTAINMENT, ARE DESIGNED TO WITHSTAND THE PRESSURE AND TEMPERATURE CONDITIONS FOLLOWING A LOCA, AND ARE DESIGNED TO WITHSTAND DYNAMIC EFFECTS, ARE ACCEPTABLE WITHOUT ISOLATION VALVES.	IN COMPLIANCE

EXHIBIT 3-12

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
B. CONTAINMENT ISOLATION PROVISIONS FOR LINES IN ESFs OR ESF-RELATED SYSTEMS MAY INCLUDE REMOTE-MANUAL VALVES, BUT PROVISIONS SHOULD BE MADE TO DETECT POSSIBLE LEAKAGE FROM THESE LINES OUTSIDE CONTAINMENT.	IN COMPLIANCE
C. CONTAINMENT ISOLATION PROVISIONS FOR LINES IN SYSTEMS NEEDED FOR SAFE SHUTDOWN OF THE PLANT MAY INCLUDE REMOTE-MANUAL VALVES, BUT PROVISION SHOULD BE MADE TO DETECT POSSIBLE LEAKAGE FROM THESE LINES OUTSIDE CONTAINMENT.	IN COMPLIANCE

EXHIBIT 3-13

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
D. CONTAINMENT ISOLATION PROVISIONS FOR LINES IN THE SYSTEMS IDENTIFIED IN ITEMS B AND C NORMALLY CONSIST OF ONE ISOLATION VALVE INSIDE AND ONE ISOLATION VALVE OUTSIDE CONTAINMENT. IF IT IS NOT PRACTICAL TO LOCATE A VALVE INSIDE CONTAINMENT (FOR EXAMPLE, THE VALVE MAY BE UNDER WATER AS A RESULT OF AN ACCIDENT), BOTH VALVES MAY BE LOCATED OUTSIDE CONTAINMENT. FOR THIS TYPE OF ISOLATION VALVE ARRANGEMENT, THE VALVE NEAREST THE CONTAINMENT AND THE PIPING BETWEEN THE CONTAINMENT AND THE VALVE SHOULD BE ENCLOSED IN A LEAK-TIGHT OR CONTROLLED LEAKAGE HOUSING. IF, IN LIEU OF A HOUSING, CONSERVATIVE DESIGN OF THE PIPING AND VALVE IS ASSUMED TO PRECLUDE A BREACH OF PIPING INTEGRITY, THE DESIGN SHOULD CONFORM TO THE REQUIREMENTS OF SRP SECTION 3.6.2. DESIGN OF THE VALVE AND/OR THE PIPING COMPARTMENT SHOULD PROVIDE THE CAPABILITY TO DETECT LEAKAGE FROM THE VALVE SHAFT AND/OR BONNET SEALS AND TERMINATE THE LEAKAGE.	IN COMPLIANCE. PVNGS USES VALVES INSIDE CONTAINMENT.

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

	REQUIREMENT	DESIGN FEATURE
E.	CONTAINMENT ISOLATION PROVISIONS FOR LINES IN ESF OR ESF-RELATED SYSTEMS NORMALLY CONSIST OF TWO ISOLATION VALVES IN SERIES. A SINGLE ISOLATION VALVE WILL BE ACCEPTABLE IF IT CAN BE SHOWN THAT THE SYSTEM RELIABILITY IS GREATER WITH ONLY ONE ISOLATION VALVE IN THE LINE, THE SYSTEM IS CLOSED OUTSIDE CONTAINMENT, AND A SINGLE ACTIVE FAILURE CAN BE ACCOMMODATED WITH ONLY ONE ISOLATION VALVE IN THE LINE.	NOT APPLICABLE. THIS TYPE OF ISOLATION IS NOT USED AT PVNGS.
F.	SEALED CLOSED BARRIERS MAY BE USED IN PLACE OF AUTOMATIC ISOLATION VALVES. SEALED CLOSED BARRIERS INCLUDE BLIND FLANGES AND SEALED CLOSED ISOLATION VALVES WHICH MAY BE CLOSED MANUAL VALVES, CLOSED REMOTE-MANUAL VALVES, AND CLOSED AUTOMATIC VALVES WHICH REMAIN CLOSED AFTER A LOCA. SEALED CLOSED ISOLATION VALVES SHOULD BE UNDER ADMINISTRATIVE CONTROL TO ASSURE THAT THEY CANNOT BE INADVERTENTLY OPENED. ADMINISTRATIVE CONTROL INCLUDES MECHANICAL DEVICES TO SEAL OR LOCK THE VALVE CLOSED, OR TO PREVENT POWER FROM BEING SUPPLIED TO THE VALVE OPERATOR.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
G. RELIEF VALVES MAY BE USED AS ISOLATION VALVES PROVIDED THE RELIEF SET POINT IS GREATER THAN 1.5 TIMES THE CONTAINMENT DESIGN PRESSURE.	ONLY MAIN STEAM RELIEF VALVES ARE USED AS ISOLATION VALVES. THE SETPOINT IS WELL ABOVE THE CONTAINMENT DESIGN PRESSURE.
4) ISOLATION VALVES OUTSIDE CONTAINMENT SHOULD BE LOCATED AS CLOSE TO THE CONTAINMENT AS PRACTICAL, AS REQUIRED BY GDC 55, 56, AND 57.	IN COMPLIANCE
5) THE POSITION OF AN ISOLATION VALVE FOR NORMAL AND SHUTDOWN PLANT OPERATING CONDITIONS AND POST-ACCIDENT CONDITIONS DEPENDS ON THE FLUID SYSTEM FUNCTION. IF A FLUID SYSTEM DOES NOT HAVE A POST-ACCIDENT FUNCTION, THE ISOLATION VALVES IN THE LINES SHOULD BE AUTOMATICALLY CLOSED. FOR ESF OR ESF-RELATED SYSTEMS, ISOLATION VALVES IN THE LINES MAY REMAIN OPEN OR BE OPENED. THE POSITION OF AN ISOLATION VALVE IN THE EVENT OF POWER FAILURE TO THE VALVE OPERATOR SHOULD BE THE "SAFE" POSITION. NORMALLY THIS POSITION WOULD BE THE POST-ACCIDENT VALVE POSITION. ALL POWER-OPERATED ISOLATION VALVES SHOULD HAVE POSITION INDICATION IN THE MAIN CONTROL ROOM.	IN COMPLIANCE

EXHIBIT 3-16

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

	REQUIREMENT	DESIGN FEATURE
6)	THERE SHOULD BE DIVERSITY IN THE PARAMETERS SENSED FOR THE INITIATION OF CONTAINMENT ISOLATION.	IN COMPLIANCE
7)	SYSTEM LINES WHICH PROVIDE AN OPEN PATH FROM THE CONTAINMENT TO THE ENVIRONS SHOULD BE EQUIPPED WITH RADIATION MONITORS THAT ARE CAPABLE OF ISOLATING THESE LINES UPON A HIGH RADIATION SIGNAL. A HIGH RADIATION SIGNAL SHOULD NOT BE CONSIDERED ONE OF THE DIVERSE CONTAINMENT ISOLATION PARAMETERS.	IN COMPLIANCE
8)	CONTAINMENT ISOLATION VALVE CLOSURE TIMES SHOULD BE SELECTED TO ASSURE RAPID ISOLATION OF THE CONTAINMENT FOLLOWING POSTULATED ACCIDENTS. THE VALVE CLOSURE TIME IS THE TIME IT TAKES FOR A POWER OPERATED VALVE TO BE IN THE FULLY CLOSED POSITION AFTER THE ACTUATOR POWER HAS REACHED THE OPERATOR ASSEMBLY; IT DOES NOT INCLUDE THE TIME TO REACH ACTUATION SIGNAL SETPOINTS OR INSTRUMENT DELAY TIMES, WHICH SHOULD BE CONSIDERED IN DETERMINING THE OVERALL TIME TO CLOSE A VALVE. SYSTEM DESIGN CAPABILITIES SHOULD BE CONSIDERED IN ESTABLISHING VALVE CLOSURE TIMES. FOR LINES WHICH PROVIDE AN OPEN PATH FROM THE CONTAINMENT TO THE ENVIRONS;	IN COMPLIANCE WITH BTP CSB 6-4 SECTION B.1c AND B.5a. PVNGS USES AN ON-LINE PURGE SYSTEM WITH 8 IN. LINES AND BUTTERFLY ISOLATION VALVES WHICH MAY BE OPERATED CONTINUOUSLY. THE ACCIDENT ANALYSIS IS COVERED IN FSAR SECTIONS 15.4.5 AND 15.6.6.

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT

DESIGN FEATURE

E.G., THE CONTAINMENT PURGE AND VENT LINES, ISOLATION VALVE CLOSURE TIMES ON THE ORDER OF 5 SECONDS OR LESS MAY BE NECESSARY. THE CLOSURE TIMES OF THESE VALVES SHOULD BE ESTABLISHED ON THE BASIS OF MINIMIZING THE RELEASE OF CONTAINMENT ATMOSPHERE TO THE ENVIRONS, TO MITIGATE THE OFFSITE RADIOLOGICAL CONSEQUENCES, AND ASSURE THAT EMERGENCY CORE COOLING SYSTEM (ECCS) EFFECTIVENESS IS NOT DEGRADED BY A REDUCTION IN THE CONTAINMENT BACKPRESSURE. ANALYSES OF THE RADIOLOGICAL CONSEQUENCES AND THE EFFECT ON THE CONTAINMENT BACKPRESSURE DUE TO THE RELEASE OF CONTAINMENT ATMOSPHERE SHOULD BE PROVIDED TO JUSTIFY THE SELECTED VALVE CLOSURE TIME. ADDITIONAL GUIDANCE ON THE DESIGN AND USE OF CONTAINMENT PURGE SYSTEMS WHICH MAY BE USED DURING THE NORMAL PLANT OPERATING MODES (I.E., STARTUP, POWER OPERATION, HOT STANDBY AND HOT SHUTDOWN) IS PROVIDED IN BTP CSB 6-4. FOR PLANTS UNDER REVIEW FOR OPERATING LICENSES OR PLANTS FOR WHICH THE SER FOR CONSTRUCTION PERMIT APPLICATION WAS ISSUED PRIOR TO JULY 1, 1975, THE METHODS DESCRIBED IN SECTION B, ITEMS B.1., A, B, D, E, F, AND G, B.2 THROUGH B.4, AND B.5.B, C, AND D OF

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
BTP 6-4 SHOULD BE IMPLEMENTED. FOR THESE PLANTS, BTP ITEMS B.1.C AND B.5.A, REGARDING THE SIZE OF THE PURGE SYSTEM USED DURING NORMAL PLANT OPERATION AND THE JUSTIFICATION BY ACCEPTABLE DOSE CONSEQUENCE ANALYSIS, MAY BE WAIVED IF THE APPLICANT COMMITS TO LIMIT THE USE OF THE PURGE SYSTEM TO LESS THAN 90 HOURS PER YEAR WHILE THE PLANT IS IN THE STARTUP, POWER, HOT STANDBY AND HOT SHUTDOWN MODES OF OPERATIONS. THIS COMMITMENT SHOULD BE INCORPORATED INTO THE TECHNICAL SPECIFICATIONS USED IN THE OPERATION OF THE PLANT.	
9) THE USE OF A CLOSED SYSTEM INSIDE CONTAINMENT AS ONE OF THE ISOLATION BARRIERS WILL BE ACCEPTABLE IF THE DESIGN OF THE CLOSED SYSTEM SATISIFIES THE FOLLOWING REQUIREMENTS:	IN COMPLIANCE FOR THE MAIN STEAM AND FEEDWATER SYSTEMS.
A. THE SYSTEM DOES NOT COMMUNICATE WITH EITHER THE REACTOR COOLANT SYSTEM OR THE CONTAINMENT ATMOSPHERE.	
B. THE SYSTEM IS PROTECTED AGAINST MISSILES AND PIPE WHIP.	

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT

DESIGN FEATURE

C. THE SYSTEM IS DESIGNATED SEISMIC CATEGORY I.

D. THE SYSTEM IS CLASSIFIED SAFETY CLASS 2.

E. THE SYSTEM IS DESIGNED TO WITHSTAND TEMPERATURES AT LEAST EQUAL TO THE CONTAINMENT DESIGN TEMPERATURE.

F. THE SYSTEM IS DESIGNED TO WITHSTAND THE EXTERNAL PRESSURE FROM THE CONTAINMENT STRUCTURAL ACCEPTANCE TEST.

G. THE SYSTEM IS DESIGNED TO WITHSTAND THE LOCA TRANSIENT AND ENVIRONMENT.

INSOFAR AS CSB IS CONCERNED WITH THE STRUCTURAL DESIGN OF CONTAINMENT INTERNAL STRUCTURES AND PIPING SYSTEMS, THE PROTECTION OF ISOLATION BARRIERS AGAINST LOSS OF FUNCTION FROM MISSILES, PIPE WHIP, AND EARTHQUAKES WILL BE ACCEPTABLE IF ISOLATION BARRIERS ARE LOCATED BEHIND MISSILE BARRIERS, PIPE WHIP WAS CONSIDERED IN THE DESIGN OF PIPE RESTRAINTS AND THE LOCATION OF PIPING PENETRATING THE CONTAINMENT, AND THE ISOLATION BARRIERS, INCLUDING THE PIPING BETWEEN ISOLATION VALVES, ARE DESIGNATED SEISMIC CATEGORY I, I.E., DESIGNED TO WITHSTAND THE EFFECTS OF THE SAFE SHUTDOWN EARTHQUAKE, AS RECOMMENDED BY RG 1.29.

EXHIBIT 3-20

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
10. THE DESIGN CRITERIA APPLIED TO COMPONENTS PERFORMING A CONTAINMENT ISOLATION FUNCTION, INCLUDING THE ISOLATION BARRIERS AND THE PIPING BETWEEN THEM, OR THE PIPING BETWEEN THE CONTAINMENT AND THE OUTERMOST ISOLATION BARRIER, ARE ACCEPTABLE IF:	IN COMPLIANCE
A. GROUP B QUALITY STANDARDS, AS DEFINED IN RG 1.26 ARE APPLIED TO THE COMPONENTS, UNLESS THE SERVICE FUNCTION DICTATES THAT GROUP A QUALITY STANDARDS BE APPLIED.	
B. THE COMPONENTS ARE DESIGNATED SEISMIC CATEGORY I, IN ACCORDANCE WITH RG 1.29.	
11) THE DESIGN OF THE CONTAINMENT ISOLATION SYSTEM IS ACCEPTABLE IF PROVISIONS ARE MADE TO ALLOW THE OPERATOR IN THE MAIN CONTROL ROOM TO KNOW WHEN TO ISOLATE FLUID SYSTEMS THAT ARE EQUIPPED WITH REMOTE MANUAL ISOLATION VALVES. SUCH PROVISIONS MAY INCLUDE INSTRUMENTS TO MEASURE FLOW RATE, SUMP WATER LEVEL, TEMPERATURE, PRESSURE, AND RADIATION LEVEL.	IN COMPLIANCE

EXHIBIT 3-21

SRP ACCEPTANCE CRITERIA
SRP 6.2.4 CONTAINMENT ISOLATION SYSTEM

REQUIREMENT	DESIGN FEATURE
12) PROVISIONS SHOULD BE MADE IN THE DESIGN OF THE CONTAINMENT ISOLATION SYSTEM FOR OPERABILITY TESTING OF THE CONTAINMENT ISOLATION VALVES AND LEAKAGE RATE TESTING OF THE ISOLATION BARRIERS. THE ISOLATION VALVE TESTING PROGRAM SHOULD BE CONSISTENT WITH THAT PROPOSED FOR OTHER ESFs. THE ACCEPTANCE CRITERIA FOR THE LEAKAGE RATE TESTING PROGRAM FOR CONTAINMENT ISOLATION BARRIERS ARE PRESENTED IN SRP SECTION 6.2.6.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

GDC 4, ENVIRONMENTAL AND MISSILE DESIGN

REQUIREMENT	DESIGN FEATURE
STRUCTURES, SYSTEMS, AND COMPONENTS IMPORTANT TO SAFETY SHALL BE DESIGNED TO ACCOMMODATE THE EFFECTS OF AND TO BE COMPATIBLE WITH THE ENVIRONMENTAL CONDITIONS ASSOCIATED WITH NORMAL OPERATION, MAINTENANCE, TESTING, AND POSTULATED ACCIDENTS, INCLUDING LOCAs. THESE STRUCTURES, SYSTEMS, AND COMPONENTS SHALL BE APPROPRIATELY PROTECTED AGAINST DYNAMIC EFFECTS, INCLUDING THE EFFECTS OF MISSILES, PIPE WHIPPING, AND DISCHARGING FLUIDS, THAT MAY RESULT FROM EQUIPMENT FAILURES AND FROM EVENTS AND CONDITIONS OUTSIDE THE NUCLEAR POWER UNIT.	IN COMPLIANCE

EXHIBIT 3-23

SRP ACCEPTANCE CRITERIA

GDC 54, PIPING SYSTEMS PENETRATING CONTAINMENT

REQUIREMENT	DESIGN FEATURE
Piping systems penetrating primary reactor containment shall be provided with leak detection, isolation, and containment capabilities having redundancy, reliability, and performance capabilities which reflect the importance to safety of isolating these piping systems. Such piping systems shall be designed with a capability to test periodically the operability of the isolation valves and associated apparatus and to determine if valve leakage is within acceptable limits.	In compliance

EXHIBIT 3-24

SRP ACCEPTANCE CRITERIA

GDC 55, REACTOR COOLANT PRESSURE BOUNDARY PENETRATING CONTAINMENT

REQUIREMENT	DESIGN FEATURE
EACH LINE THAT IS PART OF THE REACTOR COOLANT PRESSURE BOUNDARY AND THAT PENETRATES PRIMARY REACTOR CONTAINMENT SHALL BE PROVIDED WITH CONTAINMENT ISOLATION VALVES AS FOLLOWS, UNLESS IT CAN BE DEMONSTRATED THAT THE CONTAINMENT ISOLATION PROVISIONS FOR A SPECIFIC CLASS OF LINES, SUCH AS INSTRUMENT LINES, ARE ACCEPTABLE ON SOME OTHER DEFINED BASIS: (1) ONE LOCKED CLOSED ISOLATION VALVE INSIDE AND ONE LOCKED CLOSED ISOLATION VALVE OUTSIDE CONTAINMENT; OR (2) ONE AUTOMATIC ISOLATION VALVE INSIDE AND ONE LOCKED CLOSED ISOLATION VALVE OUTSIDE CONTAINMENT; OR (3) ONE LOCKED CLOSED ISOLATION VALVE INSIDE AND ONE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT. A SIMPLE CHECK VALVE MAY NOT BE USED AS THE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT; OR (4) ONE AUTOMATIC ISOLATION VALVE INSIDE AND ONE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT. A SIMPLE CHECK VALVE MAY NOT BE USED AS THE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT.	IN COMPLIANCE

EXHIBIT 3-25

SRP ACCEPTANCE CRITERIA

GDC 55, REACTOR COOLANT PRESSURE BOUNDARY PENETRATING CONTAINMENT (CONT'D)

REQUIREMENT	DESIGN FEATURE
ISOLATION VALVES OUTSIDE CONTAINMENT SHALL BE LOCATED AS CLOSE TO CONTAINMENT AS PRACTICAL AND UPON LOSS OF ACTUATING POWER, AUTOMATIC ISOLATION VALVES SHALL BE DESIGNED TO TAKE THE POSITION THAT PROVIDES GREATER SAFETY.	IN COMPLIANCE
OTHER APPROPRIATE REQUIREMENTS TO MINIMIZE THE PROBABILITY OF CONSEQUENCES OF AN ACCIDENTAL RUPTURE OF THESE LINES OR OF LINES CONNECTED TO THEM SHALL BE PROVIDED AS NECESSARY TO ASSURE ADEQUATE SAFETY. DETERMINATION OF THE APPROPRIATENESS OF THESE REQUIREMENTS, SUCH AS HIGHER QUALITY IN DESIGN, FABRICATION, AND TESTING, ADDITIONAL PROVISIONS FOR INSERVICE INSPECTION, PROTECTION AGAINST MORE SEVERE NATURAL PHENOMENA, AND ADDITIONAL ISOLATION VALVES AND CONTAINMENT, SHALL INCLUDE CONSIDERATION OF THE POPULATION DENSITY, USE CHARACTERISTICS, AND PHYSICAL CHARACTERISTICS OF THE SITE ENVIRONS.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

GDC 56, PRIMARY CONTAINMENT ISOLATION

REQUIREMENT

EACH LINE THAT CONNECTS DIRECTLY TO THE CONTAINMENT ATMOSPHERE AND PENETRATES PRIMARY REACTOR CONTAINMENT SHALL BE PROVIDED WITH CONTAINMENT ISOLATION VALVES AS FOLLOWS, UNLESS IT CAN BE DEMONSTRATED THAT THE CONTAINMENT ISOLATION PROVISIONS FOR A SPECIFIC CLASS OF LINES, SUCH AS INSTRUMENT LINES, ARE ACCEPTABLE ON SOME OTHER DEFINED BASIS:

(1) ONE LOCKED CLOSED ISOLATION VALVE INSIDE AND ONE LOCKED CLOSED ISOLATION VALVE OUTSIDE CONTAINMENT; OR

(2) ONE AUTOMATIC ISOLATION VALVE INSIDE AND ONE LOCKED CLOSED ISOLATION VALVE OUTSIDE CONTAINMENT; OR

(3) ONE LOCKED CLOSED ISOLATION VALVE INSIDE AND ONE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT. A SIMPLE CHECK VALVE MAY NOT BE USED AS THE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT; OR

(4) ONE AUTOMATIC ISOLATION VALVE INSIDE AND ONE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT. A SIMPLE CHECK VALVE MAY NOT BE USED AS THE AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT.

DESIGN FEATURE

IN COMPLIANCE. THE CONTAINMENT PRESSURE INSTRUMENT CONNECTIONS ARE CONSIDERED PART OF THE CONTAINMENT BOUNDARY. THE HATCHES, LOCKS, AND DOUBLE-FLANGED CONNECTIONS ARE ALSO CONSIDERED PART OF THE CONTAINMENT BOUNDARY.

SRP ACCEPTANCE CRITERIA

GDC 56, PRIMARY CONTAINMENT ISOLATION (CONT'D)

REQUIREMENT	DESIGN FEATURE
ISOLATION VALVES OUTSIDE CONTAINMENT SHALL BE LOCATED AS CLOSE TO THE CONTAINMENT AS PRACTICAL AND, UPON LOSS OF ACTUATING POWER, AUTOMATIC ISOLATION VALVES SHALL BE DESIGNED TO TAKE THE POSITION THAT PROVIDES GREATER SAFETY.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

GDC 57, CLOSED SYSTEM ISOLATION VALVES

REQUIREMENT

EACH LINE THAT PENETRATES PRIMARY REACTOR CONTAINMENT AND IS NEITHER PART OF THE REACTOR COOLANT PRESSURE BOUNDARY NOR CONNECTED DIRECTLY TO THE CONTAINMENT ATMOSPHERE SHALL HAVE AT LEAST ONE CONTAINMENT ISOLATION VALVE WHICH SHALL BE EITHER AUTOMATIC, OR LOCKED CLOSED, OR CAPABLE OF REMOTE MANUAL OPERATION. THIS VALVE SHALL BE OUTSIDE CONTAINMENT AND LOCATED AS CLOSE TO THE CONTAINMENT AS PRACTICAL. A SIMPLE CHECK VALVE MAY NOT USED AS THE AUTOMATIC ISOLATION VALVE.

DESIGN FEATURE

IN COMPLIANCE FOR SYSTEMS CONNECTED TO THE SECONDARY SIDE OF THE STEAM GENERATORS WITH SEISMIC CATEGORY I LINES. OTHER SYSTEMS WHICH DO NOT CONNECT TO THE REACTOR COOLANT SYSTEM OR TO THE CONTAINMENT ATMOSPHERE ARE DESIGNED TO GDC 56.

SRP ACCEPTANCE CRITERIA

RG 1.11. INSTRUMENT LINES PENETRATING PRIMARY REACTOR CONTAINMENT

REQUIREMENT	DESIGN FEATURE
1) FOR INSTRUMENTS THAT ARE PART OF THE PROTECTION SYSTEM:	
A. SHOULD SATISFY REQUIREMENTS FOR REDUNDANCY, INDEPENDENCE AND TESTABILITY OF THE PROTECTION SYSTEM.	IN COMPLIANCE
B. SHOULD BE SIZED OR ORIFICED TO ASSURE THAT IN THE EVENT OF A PIPING OR COMPONENT FAILURE THE LEAKAGE IS REDUCED TO THE MAXIMUM EXTENT POSSIBLE WITH OTHER SAFETY REQUIREMENTS. THE POTENTIAL OFFSITE EXPOSURE SHOULD BE SUBSTANTIALLY BELOW 10CFR100 GUIDELINES.	IN COMPLIANCE. THE FOUR INSTRUMENT LINES ARE 3/4 IN.
C. SHOULD BE PROVIDED WITH AN ISOLATION VALVE OUTSIDE CONTAINMENT CAPABLE OF REMOTE OPERATION. STATUS SHOULD BE INDICATED. VALVE SHOULD NOT CLOSE ACCIDENTALLY.	IN COMPLIANCE. THE ISOLATION VALVE IS REMOTE-MANUALLY OPERATED FROM THE CONTROL ROOM. OPEN OR CLOSED POSITION IS INDICATED. VALVE FAILS OPEN.
D. SHOULD BE DESIGNED AT LEAST TO THE CONTAINMENT QUALITY AND PROTECTED FROM ENVIRONMENTAL EFFECTS.	IN COMPLIANCE

EXHIBIT 3-30

SRP ACCEPTANCE CRITERIA

RG 1.26, QUALITY GROUP CLASSIFICATION

REQUIREMENT	DESIGN FEATURE
SYSTEMS OR PORTIONS OF SYSTEMS IMPORTANT TO SAFETY THAT ARE DESIGNED FOR REACTOR SHUTDOWN, RESIDUAL HEAT REMOVAL, OR POST-ACCIDENT FISSION PRODUCT REMOVAL SHOULD BE DESIGNATED AS QUALITY GROUP B, DESIGNED TO ASME III, CLASS 2 STANDARDS.	IN COMPLIANCE

EXHIBIT 3-31

SRP ACCEPTANCE CRITERIA

RG 1.29, SEISMIC DESIGN CLASSIFICATION

REQUIREMENT	DESIGN FEATURE
THE PRIMARY CONTAINMENT AND PENETRATION SHOULD BE DESIGNED TO SEISMIC CATEGORY I.	IN COMPLIANCE

EXHIBIT 3-32

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS
REF: ANSI N271-1976

	REQUIREMENT	DESIGN FEATURE
1)	FOR THE ISOLATION FUNCTION, ONE ISOLATION BARRIER IS REQUIRED AFTER THE OCCURRENCE OF A SINGLE ACTIVE FAILURE IN THE ISOLATION PROVISIONS.	IN COMPLIANCE
2)	ALL CONTAINMENT ISOLATION VALVES MUST BE CAPABLE OF TIGHT SHUTOFF AGAINST LEAKAGE TO MEET THE REQUIREMENTS OF 10CFR50, APP. J. A CONTAINMENT ISOLATION VALVE CAN BE AN AUTOMATIC ISOLATION VALVE, A SEALED CLOSED VALVE, OR A REMOTE MANUAL VALVE.	IN COMPLIANCE
3)	IF A CLOSED SYSTEM INSIDE CONTAINMENT IS USED AS ONE OF THE TWO CONTAINMENT ISOLATION BARRIERS, IT SHALL MEET THE CRITERIA THAT FOLLOW. HOWEVER, IF THESE CRITERIA CANNOT BE FULLY MET, THEN GDC 56 SHALL BE MET.	IN COMPLIANCE. PVNGS USES THE MORE STRINGENT GDC 56 FOR CLOSED SYSTEMS OTHER THAN THE MAIN STEAM AND FEEDWATER SYSTEMS.

EXHIBIT 3-33

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
4) OTHER DEFINED BASES	
A. GDC 55 AND 56 REQUIRE THAT EACH LINE THAT PENETRATES THE CONTAINMENT AND IS PART OF THE REACTOR COOLANT PRESSURE BOUNDARY OR IS CONNECTED DIRECTLY TO THE CONTAINMENT ATMOSPHERE HAVE ONE ISOLATION VALVE INSIDE AND ONE ISOLATION VALVE OUTSIDE CONTAINMENT.	IN COMPLIANCE
B. A SUITABLE BASIS FOR DEMONSTRATING THE ACCEPTABILITY OF INSTRUMENT LINES PENETRATING CONTAINMENT IS AVAILABLE. IN ADDITION, INSTRUMENT LINES WITH CLOSED SYSTEMS BOTH INSIDE AND OUTSIDE OF CONTAINMENT, SUCH AS CONTAINMENT PRESSURE INSTRUMENTATION, WHICH ARE FABRICATED TO WITHSTAND THE MAXIMUM CONTAINMENT TEST PRESSURE OF THE STRUCTURAL INTEGRITY TEST, THE MAXIMUM CONTAINMENT TEMPERATURE, AND ARE PROTECTED FROM MISSILES AND DYNAMIC EFFECTS ARE ACCEPTABLE WITHOUT ISOLATION VALVES.	IN COMPLIANCE PER REGULATORY GUIDE 1.11

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
C. ISOLATION PROVISIONS MAY USE A REMOTE MANUAL VALVE INSTEAD OF AN AUTOMATIC ISOLATION VALVE OUTSIDE CONTAINMENT.	IN COMPLIANCE
D. RELIEF VALVES IN THE BACKFLOW DIRECTION MAY BE EMPLOYED AS ISOLATION VALVES PROVIDED THEY SATISFY THE REQUIREMENTS OF THIS STANDARD.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
E. IF A CLOSED SYSTEM OUTSIDE CONTAINMENT IS USED AS ONE OF THE TWO CONTAINMENT ISOLATION BARRIERS FOR AN ESF THE CLOSED SYSTEM SHALL:	IN COMPLIANCE
(1) NOT COMMUNICATE WITH THE OUTSIDE ATMOSPHERE	
(2) MEET SAFETY CLASS 2 DESIGN REQUIREMENTS	
(3) WITHSTAND TEMPERATURE AND INTERNAL PRESSURE EQUAL TO THE CONTAINMENT DESIGN CONDITIONS	
(4) WITHSTAND LOCA TRANSIENT AND ENVIRONMENT	
(5) MEET SEISMIC CATEGORY I DESIGN REQUIREMENTS	
(6) BE PROTECTED AGAINST OVERPRESSURE FROM THERMAL EXPANSION WHEN ISOLATED, IF REQUIRED	
(7) BE PROTECTED AGAINST A HIGH ENERGY LINE BREAK OUTSIDE OF CONTAINMENT WHEN THE CLOSED SYSTEM IS NEEDED FOR CONTAINMENT ISOLATION.	

EXHIBIT 3-36

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
5) PIPING WHICH IS OUTSIDE THE CONTAINMENT AND IS EITHER BETWEEN THE CONTAINMENT AND THE OUTSIDE ISOLATION VALVE OR BETWEEN TWO OUTSIDE ISOLATION VALVES SHALL: (1) MEET SAFETY CLASS 2 DESIGN REQUIREMENTS (2) WITHSTAND THE CONTAINMENT DESIGN TEMPERATURE (3) WITHSTAND INTERNAL PRESSURE FROM CONTAINMENT STRUCTURAL INTEGRITY TEST (4) WITHSTAND LOCA TRANSIENT AND ENVIRONMENT (5) MEET SEISMIC CATEGORY I DESIGN REQUIREMENTS (6) BE PROTECTED AGAINST A HIGH ENERGY LINE BREAK OUTSIDE OF CONTAINMENT WHEN NEEDED FOR CONTAINMENT ISOLATION.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
6) DESIGN REQUIREMENT	
A. AS A MINIMUM, CONTAINMENT ISOLATION PROVISIONS INSIDE THE CONTAINMENT SHALL BE DESIGNED TO WITHSTAND THE MAXIMUM CONTAINMENT TEMPERATURE AND, NON-CONCURRENTLY, THE CONTAINMENT PRESSURE RESULTING FROM THE STRUCTURAL INTEGRITY TEST AND THE APPROPRIATE COMBINATIONS OF DESIGN CONDITIONS.	IN COMPLIANCE
B. ALL POWER-OPERATED ISOLATION VALVES SHALL BE CAPABLE OF REMOTE MANUAL ACTUATION FROM THE MAIN CONTROL ROOM.	IN COMPLIANCE
C. ALL POWER-OPERATED ISOLATION VALVES SHALL HAVE PROVISIONS IN THE CONTROL ROOM FOR INDICATION OF THE STATUS OF THE VALVE SHOWING OPEN AND CLOSED POSITIONS.	IN COMPLIANCE
D. ISOLATION VALVE CLOSURE SHALL BE COMPLETED WHEN AN ISOLATION SIGNAL IS RECEIVED AND THE VALVE SHALL NOT BE OPENED UNTIL THE SIGNAL IS REMOVED AND DELIBERATE OPERATOR ACTION IS TAKEN (RESET SWITCH).	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

	REQUIREMENT	DESIGN FEATURE
E.	DIVERSITY IN MEANS OF ACTUATION OF AUTOMATIC ISOLATION VALVES IN SERIES SHOULD BE CONSIDERED TO PRECLUDE COMMON MODE FAILURE.	IN COMPLIANCE
F.	CONTAINMENT ISOLATION VALVES SHALL BE PROVIDED WITH ACTUATION FEATURES APPROPRIATE TO THE VALVE TYPE AND REQUIRED CLOSURE TIME.	IN COMPLIANCE
G.	THE POSITION OF AN ISOLATION VALVE FOR NORMAL AND SHUTDOWN PLANT OPERATING CONDITIONS DEPENDS ON THE FLUID SYSTEM REQUIREMENTS.	IN COMPLIANCE
H.	THE OBJECTIVE IN ESTABLISHING VALVE CLOSURE TIMES SHOULD BE TO LIMIT TO AS LOW AS REASONABLY ATTAINABLE THE RELEASE OF RADIO-ACTIVITY FROM THE CONTAINMENT.	IN COMPLIANCE
I.	A CONTAINMENT ISOLATION SIGNAL INITIATES CLOSING OF ISOLATION VALVES IN THOSE LINES THAT MUST BE ISOLATED IMMEDIATELY FOLLOWING AN ACCIDENT.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

	REQUIREMENT	DESIGN FEATURE
J.	DIVERSITY IN THE ACTUATION PARAMETERS SENSED SHOULD BE CONSIDERED.	IN COMPLIANCE
K.	REDUNDANCY SHALL BE CONSIDERED IN THE ELECTRICAL AS WELL AS THE MECHANICAL DESIGN.	IN COMPLIANCE
L.	IF A CLOSED SYSTEM IS TO BE CONSIDERED AN ISOLATION BARRIER, IT SHALL MEET THE APPLICABLE REQUIREMENTS FOR CONTAINMENT ISOLATION BARRIER DESIGN GIVEN IN GDC 57.	IN COMPLIANCE. ALSO, PVNGS PROVIDES ISOLATION VALVES INSIDE THE CONTAINMENT, EXCEPT FOR THE MAIN STEAM AND FEEDWATER LINES.
M.	GUIDANCE FOR DESIGNING CONTAINMENT ISOLATION PROVISIONS SO THAT THEY WILL REMAIN FUNCTIONAL UNDER COMBINATIONS OF MECHANICAL AND OPERATIONAL LOADINGS IS AVAILABLE.	IN COMPLI...

EXHIBIT 3-40

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

	REQUIREMENT	DESIGN FEATURE
N.	CONTAINMENT ISOLATION BARRIERS ARE ASSIGNED TO EITHER SAFETY CLASS 1 OR 2 IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD N18.2-1973, N18.2A-1975 (ANS 51.1).	IN COMPLIANCE
O.	PROTECTION FOR CONTAINMENT ISOLATION PROVISIONS AGAINST LOSS OF FUNCTION FROM MISSILES, PIPE WHIP, AND JET FORCE SHALL BE CONSIDERED.	IN COMPLIANCE
P.	PROTECTION FOR CONTAINMENT ISOLATION PROVISIONS AGAINST LOSS OF FUNCTION FROM FLOODING SHALL BE CONSIDERED.	IN COMPLIANCE
Q.	PROTECTION FOR CONTAINMENT ISOLATION PROVISIONS AGAINST LOSS OF FUNCTION FROM EARTHQUAKES SHALL BE PROVIDED.	IN COMPLIANCE
R.	PROTECTION FOR CONTAINMENT ISOLATION PROVISIONS AGAINST LOSS OF FUNCTION FROM FIRE SHALL BE CONSIDERED.	IN COMPLIANCE

EXHIBIT 3-41

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

	REQUIREMENT	DESIGN FEATURE
S.	THE PHYSICAL SEPARATION ASPECTS OF CONTAINMENT ISOLATION PROVISIONS SHALL BE CONSIDERED.	IN COMPLIANCE
T.	THE CONTAINMENT ISOLATION LOCATED INSIDE THE CONTAINMENT SHALL BE DESIGNED TO FUNCTION UNDER THE APPROPRIATE COMBINATIONS OF CONDITIONS FOR NORMAL OPERATION, THE LOCA AND ANY MORE SEVERE LOCAL ACCIDENTS.	IN COMPLIANCE
U.	THE CONTAINMENT ISOLATION PROVISIONS LOCATED OUTSIDE THE CONTAINMENT SHALL BE DESIGNED TO FUNCTION UNDER THE MOST ADVERSE ANTICIPATED ENVIRONMENTAL CONDITIONS TO WHICH THEY MAY BE EXPOSED.	IN COMPLIANCE
V.	CONTAINMENT ISOLATION PROVISIONS SHALL BE DESIGNED TO BE OPERABLE UNDER THE MAXIMUM INTEGRATED RADIATION DOSES TO WHICH THEY MAY BE EXPOSED DURING THEIR SERVICE LIFE IN THE PLANT.	IN COMPLIANCE

EXHIBIT 3-42

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

	REQUIREMENT	DESIGN FEATURE
W.	ISOLATION VALVES MAY BE GATE, GLOBE, BUTTERFLY, DIAPHRAGM, CHECK (SIMPLE CHECK VALVES ARE ACCEPTABLE ONLY INSIDE CONTAINMENT), BALL, PLUG, AND RELIEF VALVES, DEPENDING UPON THE FLUID SYSTEM REQUIREMENTS.	IN COMPLIANCE
X.	THE OBJECTIVE SHALL BE TO LIMIT VALVE LEAKAGE TO AS LOW AS REASONABLY ATTAINABLE.	IN COMPLIANCE
Y.	AMERICAN NATIONAL STANDARD SELF-OPERATED AND POWER-OPERATED SAFETY-RELATED VALVES FUNCTIONAL SPECIFICATION STANDARD, N278.1-1975, HAS BEEN ISSUED AND PROVIDES GUIDANCE ON VALVE OPERABILITY REQUIREMENTS FOR PREPARATION OF PURCHASER'S SPECIFICATION FOR ISOLATION VALVES.	IN COMPLIANCE
Z.	WHEN RELIEF VALVES DISCHARGE INTO THE CONTAINMENT AND ALSO SERVE AS ISOLATION VALVES, THE DISCHARGE SIDE OF THE VALVE SHALL BE DESIGNED TO WITHSTAND AND BE TESTED AT THE CONTAINMENT DESIGN PRESSURE.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

	REQUIREMENT	DESIGN FEATURE
AA.	SUITABLE GUIDANCE FOR ISOLATION PROVISIONS ON INSTRUMENT LINES PENETRATING THE CONTAINMENT IS AVAILABLE. (RG 1.11)	IN COMPLIANCE
BB.	ELECTRICAL POWER-OPERATORS SHALL BE ASSIGNED CLASS 1E.	IN COMPLIANCE
CC.	FLANGED CLOSURES ARE UNDER ADMINISTRATIVE CONTROLS SIMILAR TO MANUAL VALVES.	IN COMPLIANCE
DD.	A SYSTEM FOR PROVIDING A SEALING FLUID OR VACUUM BETWEEN ISOLATION VALVES OR ISOLATION BARRIERS MAY BE REQUIRED WHEN SITE POPULATION DENSITY CONDITIONS REQUIRE THE LOWEST PRACTICABLE LEAKAGE THROUGH THE CONTAINMENT ISOLATION BARRIERS OR THE LEAKAGE RATE REQUIREMENTS OF 10CFR50, APPENDIX J CANNOT OTHERWISE BE MET.	A SEAL SYSTEM IS NOT REQUIRED AT PVNGS.
EE.	REMOTE MANUAL VALVES MAY BE PROVIDED ON ESF OR ESF-RELATED SYSTEMS IN ORDER TO MAINTAIN CONTAINMENT OR PRESERVE SYSTEM FUNCTION IN THE EVENT OF A LEAK OR LINE BREAK IN SUCH SYSTEMS.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
FF. THE PIPING BETWEEN ISOLATION BARRIERS OR THE PIPING WHICH FORMS PART OF ISOLATION BARRIERS SHALL MEET THE REQUIREMENTS OF SECTION 5 OF THIS STANDARD AND APPLICABLE REQUIREMENTS FOR ISOLATION BARRIERS.	IN COMPLIANCE
7) TESTING	
A. THE RULES OF SUBSECTION IWV OF ASME B&PV SECTION XI FOR VALVE EXERCISING PRESENT REQUIREMENTS FOR ISOLATION VALVE OPERABILITY TESTING THAT SHALL BE FOLLOWED AFTER THE ISOLATION VALVE IS INSTALLED IN THE PLANT.	IN COMPLIANCE
B. 10CFR50, APPENDIX J SHALL BE FOLLOWED FOR ISOLATION BARRIER LEAKAGE RATE TESTING.	IN COMPLIANCE
C. PROVISIONS SHALL BE MADE FOR LEAKAGE RATE TESTING OF CONTAINMENT ISOLATION VALVES.	IN COMPLIANCE.

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
8) MAINTENANCE	
A. THE DESIGN OF CONTAINMENT ISOLATION PROVISIONS SHALL PERMIT IMPLEMENTATION OF PREVENTIVE MAINTENANCE PROCEDURES FOR THE INSPECTION, ADJUSTMENT, SERVICING AND REPAIR OF SUCH PROVISIONS.	IN COMPLIANCE
B. PROCEDURES AND PREVENTIVE MAINTENANCE SCHEDULES SHALL BE PREPARED IN ACCORDANCE WITH AMERICAN NATIONAL STANDARD FOR ADMINISTRATIVE CONTROLS FOR NUCLEAR POWER PLANTS, N18.7-1972 (ANS-3.2).	PVNGS WILL COMPLY
C. A ROUTINE PREVENTIVE MAINTENANCE PROGRAM SHALL BE ESTABLISHED WHICH IS CONSISTENT WITH THE OPERATIONAL REQUIREMENTS AND PREVIOUS OPERATING EXPERIENCE ON THE ISOLATION PROVISIONS, INCLUDING PREVIOUS OPERATING EXPERIENCE ON SIMILAR ISOLATION PROVISIONS AT OTHER PLANTS.	PVNGS WILL COMPLY

SRP ACCEPTANCE CRITERIA

RG 1.141, CONTAINMENT ISOLATION PROVISIONS FOR FLUID SYSTEMS (CONT'D)
REF: ANSI N271-1976

REQUIREMENT	DESIGN FEATURE
9) MATERIALS	
ISOLATION BARRIERS AND PIPING BETWEEN THEM SHALL MEET THE MATERIAL REQUIREMENTS FOR METAL PARTS AS SPECIFIED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) BOILER AND PRESSURE VESSEL CODE, SECTION III, DIVISION 1, SUBSECTION NA, "NUCLEAR POWER PLANT COMPONENTS."	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

BTP CSB 6-4, CONTAINMENT PURGING DURING NORMAL PLANT OPERATIONS

REQUIREMENTS	DESIGN FEATURE
1) THE ON-LINE PURGE SYSTEM IS USED TO PURGE THE CONTAINMENT FOR THE REACTOR OPERATIONAL MODES OF POWER OPERATION, STARTUP, HOT STANDBY AND HOT SHUTDOWN. THE ON-LINE PURGE SYSTEM SHOULD BE INDEPENDENT OF THE PURGE SYSTEM USED FOR THE REACTOR OPERATIONAL MODES OF COLD SHUTDOWN AND REFUELING.	IN COMPLIANCE
2) THE ON-LINE PURGE SYSTEM SHOULD BE DESIGNED IN ACCORDANCE WITH THE FOLLOWING CRITERIA:	
A. THE PERFORMANCE AND RELIABILITY OF THE PURGE SYSTEM ISOLATION VALVES SHOULD BE CONSISTENT WITH BTP MEB-2, PUMP AND VALVE OPERABILITY ASSURANCE PROGRAM. THE DESIGN BASIS FOR THE VALVES AND ACTUATORS SHOULD INCLUDE THE BUILDUP OF CONTAINMENT PRESSURE FOR THE LOCA BREAK SPECTRUM, AND THE PURGE LINE AND VENT LINE FLOWS AS A FUNCTION OF TIME UP TO AND DURING VALVE CLOSURE.	IN COMPLIANCE
B. THE NUMBER OF PURGE AND VENT LINES THAT MAY BE USED SHOULD BE LIMITED TO ONE PURGE LINE AND ONE VENT LINE.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

BTP CSB 6-4, CONTAINMENT PURGING DURING NORMAL PLANT OPERATIONS

	REQUIREMENTS	DESIGN FEATURE
C.	THE SIZE OF THE PURGE AND VENT LINES SHOULD NOT EXCEED ABOUT EIGHT INCHES IN DIAMETER UNLESS DETAILED JUSTIFICATION FOR LARGER LINE SIZES IS PROVIDED.	IN COMPLIANCE
D.	THE CONTAINMENT ISOLATION PROVISIONS FOR THE PURGE SYSTEM LINES SHOULD MEET THE STANDARDS APPROPRIATE TO ESF'S.	IN COMPLIANCE
E.	INSTRUMENTATION AND CONTROL SYSTEMS PROVIDED TO ISOLATE THE PURGE SYSTEM LINES SHOULD BE INDEPENDENT AND ACTUATED BY DIVERSE PARAMETERS; E.G., CONTAINMENT PRESSURE, SAFETY INJECTION ACTUATION, AND CONTAINMENT RADIATION LEVEL. IF ENERGY IS REQUIRED TO CLOSE THE VALVES, AT LEAST TWO DIVERSE SOURCES OF ENERGY SHALL BE PROVIDED, EITHER OF WHICH CAN AFFECT THE ISOLATION FUNCTION.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

BTP CSB 6-4, CONTAINMENT PURGING DURING NORMAL PLANT OPERATIONS

REQUIREMENTS	DESIGN FEATURE
f. Purge system isolation valve closure times, including instrumentation delays, should not exceed five seconds.	Partial compliance. Valve closure time is five seconds. Instrumentation delay is one second or less. Calculations show that off-site exposure is within guidelines for six sec closure time.
g. Provisions should be made to ensure that isolation valve closure will not be prevented by debris which could potentially become entrained in the escaping air and steam.	In compliance
3) The purge system should not be relied on for temperature and humidity control within the containment.	In compliance
4) Provisions should be made to minimize the need for purging of the containment by providing containment atmosphere cleanup systems within the containment.	In compliance

EXHIBIT 3-50

SRP ACCEPTANCE CRITERIA

BTP CSB 6-4, CONTAINMENT PURGING DURING NORMAL PLANT OPERATIONS

REQUIREMENTS	DESIGN FEATURE
5) PROVISIONS SHOULD BE MADE FOR TESTING THE AVAILABILITY OF THE ISOLATION FUNCTION AND THE LEAKAGE RATE OF THE ISOLATION VALVES, INDIVIDUALLY, DURING REACTOR OPERATION.	IN COMPLIANCE. A LEAKAGE TEST CONNECTION IS PROVIDED BETWEEN THE ISOLATION VALVES OUTSIDE THE CONTAINMENT.
6) THE FOLLOWING ANALYSES SHOULD BE PERFORMED TO JUSTIFY THE CONTAINMENT PURGE SYSTEM DESIGN:	
A. AN ANALYSIS OF THE RADIOLOGICAL CONSEQUENCES OF A LOCA.	IN COMPLIANCE. THE ANALYSES ARE DISCUSSED IN FSAR SECTIONS 15.4.5 AND 15.6.6
B. AN ANALYSIS WHICH DEMONSTRATES THE ACCEPTABILITY OF THE PROVISIONS MADE TO PROTECT STRUCTURES AND SAFETY-RELATED EQUIPMENT; E.G., FANS, FILTERS, AND DUCTWORK, LOCATED BEYOND THE PURGE SYSTEM ISOLATION VALVES AGAINST LOSS OF FUNCTION FROM THE ENVIRONMENT CREATED BY THE ESCAPING AIR AND STEAM.	IN COMPLIANCE. EQUIPMENT OUTSIDE THE CONTAINMENT BEYOND THE ISOLATION VALVES ARE NON-SAFETY RELATED. A POSTULATED ACCIDENT DURING PURGE OPERATION WILL NOT RESULT IN A RELEASE EXCEEDING 10CFR100 GUIDELINES.

SRP ACCEPTANCE CRITERIA

BTP CSB 6-4, CONTAINMENT PURGING DURING NORMAL PLANT OPERATIONS

REQUIREMENTS	DESIGN FEATURE
C. AN ANALYSIS OF THE REDUCTION IN THE CONTAINMENT PRESSURE RESULTING FROM THE PARTIAL LOSS OF CONTAINMENT ATMOSPHERE DURING THE ACCIDENT FOR ESSENTIAL CORE COOLING SYSTEM BACKPRESSURE DETERMINATION.	IN COMPLIANCE. THE CALCULATIONS FOR SAFETY PUMPS NPSH ASSUMED THE CONTAINMENT ATMOSPHERE IS ENTIRELY STEAM, AND NO CREDIT WAS TAKEN FOR AIR PRESSURE TO INCREASE AVAILABLE NPSH.
D. THE ALLOWABLE LEAK RATES OF THE PURGE AND VENT ISOLATION VALVES SHOULD BE SPECIFIED FOR THE SPECTRUM OF DESIGN BASIS PRESSURES AND FLOWS AGAINST WHICH THE VALVES MUST CLOSE.	IN COMPLIANCE. THE PURGE ISOLATION VALVES LEAK RATES ARE SPECIFIED TO MEET AWWA C-504.

CONTAINMENT ISOLATION SYSTEM
NUREG 0737

ITEM II.E.4.2

REQUIREMENT	DESIGN FEATURE
1) Containment isolation system designs shall comply with the recommendations of SRP Section 6.2.4 (i.e., that there be diversity in the parameters sensed for the initiation of containment isolation).	1) In compliance. A containment isolation signal is diversely generated by either a high containment pressure signal (5 psig) or a low pressurizer pressure signal (1685 psig). The power access purge and refueling purge are additionally isolated by high containment purge radioactivity.

EXHIBIT 3-53

ITEM II.E.4.2 (CONTINUED)

REQUIREMENT	DESIGN FEATURE
2) ALL PLANT PERSONNEL SHALL GIVE CAREFUL CONSIDERATION TO THE DEFINITION OF ESSENTIAL AND NONESSENTIAL SYSTEMS, IDENTIFY EACH SYSTEM DETERMINED TO BE ESSENTIAL, IDENTIFY EACH SYSTEM DETERMINED TO BE NON-ESSENTIAL, DESCRIBE THE BASIS FOR SELECTION OF EACH ESSENTIAL SYSTEM, MODIFY THEIR CONTAINMENT ISOLATION DESIGNS ACCORDINGLY, AND REPORT THE RESULTS OF THE REEVALUATION TO THE NRC.	2) IN COMPLIANCE. A GENERIC REVIEW OF FLUID SYSTEMS PENETRATING THE CONTAINMENT FOR C-E DESIGNED PLANTS WAS CONDUCTED FOR THE C-E OWNERS GROUP ON POST-TMI EFFORTS. THE RESULTS OF THIS REVIEW WERE USED BY APS TO EVALUATE THE PVNGS CONTAINMENT ISOLATION SYSTEM. ESSENTIAL SYSTEMS ARE THOSE SYSTEMS CRITICAL TO ENSURE THE CAPABILITY TO MITIGATE CONSEQUENCES OF ACCIDENTS, TO ENSURE THE INTEGRITY OF THE REACTOR COOLANT PRESSURE BOUNDARY AND TO ENSURE THE CAPABILITY TO SHUT DOWN THE REACTOR AND MAINTAIN IT IN A SAFE SHUTDOWN CONDITION. TABLE 3-1 LISTS ESSENTIAL SYSTEMS PENETRATING THE PVNGS CONTAINMENT. NO ESSENTIAL SYSTEMS ARE FUNCTIONALLY ISOLATED BY A CIAS WITH THE EXCEPTION OF THE HYDROGEN CONTROL SYSTEM. THIS SYSTEM IS NOT IMMEDIATELY REQUIRED FOR ACCIDENT MITIGATION. THE ISOLATION VALVES CAN BE MANUALLY OPENED FROM THE CONTROL ROOM AS PART OF THE HYDROGEN RECOMBINER STARTUP PROCEDURES.

TABLE 3-1

ESSENTIAL SYSTEMS PENETRATING THE PVNGS CONTAINMENT

SYSTEM	NORMAL POSITION	POST CIAS POSITION	NOTES
HPSI	CLOSED	CLOSED	1
LPSI	CLOSED	CLOSED	1
CONTAINMENT SPRAY	CLOSED	CLOSED	2
RECIRCULATION SUMP SUCTION	CLOSED	CLOSED	3
LONG TERM RECIRCULATION	CLOSED	CLOSED	4
AUXILIARY FEEDWATER	CLOSED	CLOSED	5
H_2 CONTROL	CLOSED	CLOSED	4,7
CONTAINMENT PRESSURE SENSOR	OPEN	OPEN	6
SHUTDDOWN COOLING	CLOSED	CLOSED	4

1. OPENS ON SIAS
2. OPENS ON CSAS
3. OPENS ON RAS
4. MANUALLY OPENED FROM CONTROL ROOM
5. OPENS ON AFAS
6. FUNCTION REQUIRES IT TO REMAIN OPEN
7. ISOLATES ON CIAS

CONTAINMENT ISOLATION SYSTEM
NUREG 0737

ITEM II.E.4.2 (CONTINUED)

REQUIREMENT	DESIGN FEATURE
3) ALL NONESSENTIAL SYSTEMS SHALL BE AUTOMATICALLY ISOLATED BY THE CONTAINMENT ISOLATION SIGNAL.	3) IN COMPLIANCE. NON-ESSENTIAL SYSTEMS PENETRATING THE PVNGS CONTAINMENT ARE LISTED IN TABLE 3-2. NON-ESSENTIAL SYSTEMS ARE AUTOMATICALLY ISOLATED BY A CIAS WITH THE EXCEPTION OF THE FOLLOWING SYSTEMS: A. THOSE CONTAINING LOCKED CLOSED VALVES OR FLANGED CLOSED CONNECTIONS. B. MAIN STEAM AND FEEDWATER C. STEAM GENERATOR BLOWDOWN AND BLOWDOWN SAMPLE AND SAFETY INJECTION DRAIN D. RCP SEAL INJECTION AND CVCS CHARGING THE MAIN STEAM AND FEEDWATER SYSTEMS, WHILE NOT ESSENTIAL, AID IN HEAT REMOVAL DURING A SMALL LOCA. THESE SYSTEMS SHOULD NOT, THEREFORE, BE ISOLATED BY A CIAS GENERATED ON LOW PRESSURIZER PRESSURE. THE STEAM AND FEEDWATER SYSTEMS ARE ISOLATED FOR A MAIN STEAM LINE BREAK BY MSIS ON HIGH CONTAINMENT PRESSURE (5 PSIG) OR LOW STEAM GENERATOR PRESSURE (870 PSIG).

EXHIBIT 3-56

TABLE 3-2

NON-ESSENTIAL SYSTEMS PENETRATING THE PVNGS CONTAINMENT

SYSTEM	NORMAL POSITION	POST CIAS POSITION	NOTES
DEMINERALIZED WATER	C	C	LOCKED
FIRE PROTECTION	C	C	LOCKED
POOL COOLING	C	C	LOCKED
FUEL TRANSFER	C	C	FLANGED
CONTAINMENT TEST	C	C	FLANGED
SERVICE AIR	C	C	LOCKED
INTEGRATED LEAK RATE TEST	C	C	FLANGED
PERSONNEL LOCK	C	C	-
EQUIPMENT HATCH	C	C	-
EMERGENCY LOCK	C	C	-
PRESSURIZER SAMPLE - WATER	C	C	1
PRESSURIZER SAMPLE - STEAM	C	C	1
HOT LEG SAMPLE	C	C	1
HIGH PRESSURE NITROGEN	C	C	1
CONTAINMENT PURGE (REFUELING)	C	C	1,2
RADIATION MONITOR	C	C	1
LOW PRESSURE NITROGEN	C	C	1
INSTRUMENT AIR	C	C	1
NUCLEAR COOLING WATER	O	C	1
CVCS LETDOWN	O	C	1
REACTOR DRAIN TANK (RDT) VENT	O	C	1
CVCS RDT DRAIN/FILL	O	C	1
CHILLED WATER	O	C	1

EXHIBIT 3-57

TABLE 3-2

NON-ESSENTIAL SYSTEMS PENETRATING THE PVNGS CONTAINMENT (CONTINUED)

System	Normal Position	Post CIAS Position	Notes
Power Access Purge	o	c	1,2
Containment Normal Sump	o	c	1
Main Steam	o	o	3
Main Feedwater	o	o	3
Steam Generator Blowdown	o	o	4
Steam Generator Blowdown Sample 1	c	c	4
Steam Generator Blowdown Sample 2	o	o	4
Safety Injection Drain	c	o	5
RCP Seal Injection	o	o	6
CVCS Charging	o	o	6

1. Closes on CIAS
2. Closes on Containment Purge Isolation Actuation Signal
3. Closes on MSIS
4. Closes on MSIS, AFAS or SIAS
5. Closes on SIAS
6. Seismic Category I check valve inside containment

CONTAINMENT ISOLATION SYSTEM
NUREG 0737

ITEM II.E.4.2 (CONTINUED)

REQUIREMENT	DESIGN FEATURE
3) (CONTINUED)	THE STEAM GENERATOR BLOWDOWN AND BLOWDOWN SAMPLE SYSTEMS ARE ISOLATED BY EITHER A MSIS, AFAS OR SIAS. THE SAFETY INJECTION DRAIN IS ISOLATED ON A SIAS. PLANT PARAMETERS WHICH GENERATE SIAS ALSO GENERATE CIAS. IT IS DESIRABLE TO LEAVE RCP SEAL INJECTION AND CVCS CHARGING PATHS OPEN TO PROVIDE ADDITIONAL CORE PROTECTION AFTER AN ACCIDENT IN WHICH OFFSITE POWER IS AVAILABLE. IN ADDITION, THE CHARGING PUMPS ARE AUTOMATICALLY TRANFERRED TO EMERGENCY POWER IN THE EVENT THAT OFFSITE POWER IS LOST. CONVERSELY, IT IS UNDESIRABLE TO LOSE CHARGING OR SEAL INJECTION CAPABILITY DURING NORMAL OPERATION DUE TO AN INADVERTENT CIAS. THE POTENTIAL RELEASE OF FISSION PRODUCTS THROUGH THE PENETRATION IS NOT A CONCERN FOR THE FOLLOWING REASONS: A. FLOW IS INTO THE CONTAINMENT AND RCS. B. CHECK VALVES INSIDE THE CONTAINMENT PREVENT BACKFLOW OUT OF THE CONTAINMENT IF THE CHARGING PUMPS STOP.

EXHIBIT 3-59

ITEM II.E.4.2 (CONTINUED)

REQUIREMENT	DESIGN FEATURE
3) (CONTINUED)	C. THE CONNECTING PORTIONS OF THE CVCS OUTSIDE OF CONTAINMENT ARE DESIGNED TO SAFETY CLASS 2, SEISMIC CATEGORY I STANDARDS AND HAVE DESIGN PRESSURE WELL IN EXCESS OF CONTAINMENT DESIGN PRESSURE. D. THE OPERATOR HAS THE CAPABILITY OF ISOLATING THESE LINES IF CONTINUED CHARGING OR SEAL INJECTION PROVES TO BE UNNECESSARY.

ITEM II.E.4.2 (CONTINUED)

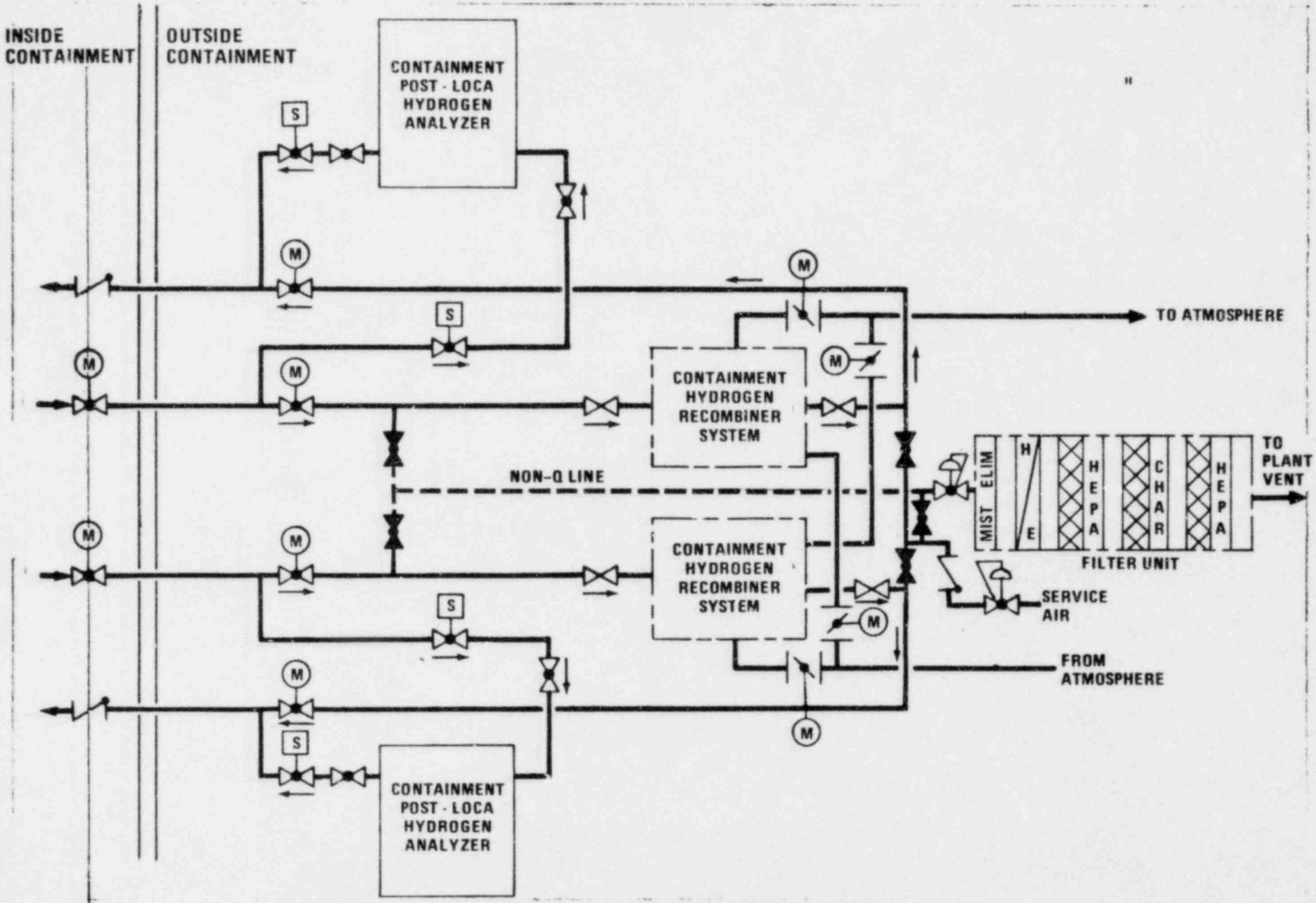
REQUIREMENT	DESIGN FEATURE
4) THE DESIGN OF CONTROL SYSTEMS FOR AUTOMATIC CONTAINMENT ISOLATION VALVES SHALL BE SUCH THAT RESETTING THE ISOLATION SIGNAL WILL NOT RESULT IN THE AUTOMATIC REOPENING OF CONTAINMENT ISOLATION VALVES. REOPENING OF CONTAINMENT ISOLATION VALVES SHALL REQUIRE DELIBERATE OPERATOR ACTION.	4) IN COMPLIANCE. OVERRIDE OF A CIAS SIGNAL IS AVAILABLE FOR EACH CONTAINMENT ISOLATION VALVE VIA THE CONTROL SWITCH FOR THAT VALVE. RESETTING OF A CIAS DOES NOT RESULT IN THE AUTOMATIC OPENING OF CONTAINMENT ISOLATION VALVES. REOPENING REQUIRES OPERATOR ACTION FOR EACH VALVE AND DOES NOT COMPROMISE THE CONTAINMENT ISOLATION SIGNAL.
5) THE CONTAINMENT SETPOINT PRESSURE THAT INITIATES CONTAINMENT ISOLATION FOR NONESSENTIAL PENETRATIONS MUST BE REDUCED TO THE MINIMUM COMPATIBLE WITH NORMAL OPERATING CONDITIONS.	5) IN COMPLIANCE. ITEM 1 ABOVE IDENTIFIES 5 PSIG AS THE CONTAINMENT SETPOINT PRESSURE THAT INITIATES CONTAINMENT ISOLATION. CALCULATIONS ARE IN PROGRESS CONFIRMING THAT THE TRIP SETPOINT REPRESENTS THE MINIMUM VALUE COMPATIBLE WITH NORMAL OPERATING CONDITIONS.

ITEM II.E.4.2 (CONTINUED)

	REQUIREMENT	DESIGN FEATURE
6)	CONTAINMENT PURGE VALVES THAT DO NOT SATISFY THE OPERABILITY CRITERIA SET FORTH IN BRANCH TECHNICAL POSITION CSB 6-4 MUST BE SEALED CLOSED.	6) IN COMPLIANCE. CONTAINMENT POWER ACCESS PURGE ISOLATION VALVES SATISFY THE OPERABILITY CRITERIA SET FORTH IN BRANCH TECHNICAL POSITION CSB 6-4.
7)	CONTAINMENT PURGE AND VENT ISOLATION VALVES MUST CLOSE ON A HIGH RADIATION SIGNAL.	7) IN COMPLIANCE. BOTH THE POWER ACCESS PURGE AND THE REFUELING PURGE ISOLATE ON HIGH CONTAINMENT PURGE RADIOACTIVITY.

IV. COMBUSTIBLE GAS CONTROL IN CONTAINMENT

EXHIBIT 4-1



COMBUSTIBLE GAS CONTROL SYSTEM
FIGURE 4-1

COMBUSTIBLE GAS CONTROL IN CONTAINMENT
DESIGN CRITERIA

1) THE CONTAINMENT HYDROGEN RECOMBINER SYSTEM (CHRS) SHALL BE DESIGNED WITH TWO EXTERNAL MOBILE RECOMBINERS FOR THE THREE UNITS, AND SHALL BE CAPABLE OF BEING CONNECTED TO REQUIRED SERVICES WITHIN 72 HOURS AND INITIATED WITHIN 100 HOURS FOLLOWING A LOCA.

2) THE POST-ACCIDENT HYDROGEN PURGE SYSTEM SHALL BE DESIGNED AS A BACKUP TO HYDROGEN RECOMBINER SYSTEMS. THE SYSTEM SHALL CONSIST OF A MOBILE FILTER UNIT CONNECTED TO ANY OF THE UNITS AS NEEDED.

3) THE CONTAINMENT HYDROGEN CONTROL SYSTEM SHALL BE DESIGNED TO BE MANUALLY INITIATED PRIOR TO HYDROGEN CONCENTRATION REACHING 3.5 PERCENT BY VOLUME FOR THE HYDROGEN RECOMBINERS AND AT 4.0 PERCENT BY VOLUME FOR THE POST-ACCIDENT HYDROGEN PURGE SYSTEM TO PREVENT THE CONCENTRATION OF HYDROGEN FROM EXCEEDING THE LOWER FLAMMABLE LIMIT OF 4.0 PERCENT BY VOLUME.

4) THE MAXIMUM CONTAINMENT TEMPERATURE AND PRESSURE FOR THE COMPONENTS AT THE SYSTEM SHALL BE AS FOLLOWS:

	TEMPERATURE	PRESSURE
o HYDROGEN ANALYZER	350F	60 PSIG
o HYDROGEN RECOMBINER	180F	10 PSIG
o HYDROGEN PURGE	165F	5 PSIG

5) PROVISION SHALL BE MADE FOR CONTINUATION OF AIR FLOW THROUGH THE FILTER UNIT TO REMOVE HEAT GENERATED BY RADIOACTIVITY AFTER POST-LOCA OPERATION.

EXHIBIT 4-1

COMBUSTIBLE GAS CONTROL IN CONTAINMENT
DESIGN CRITERIA

6) EACH RECOMBINER AND THE FILTER UNIT SHALL CONTINUE TO FUNCTION AFTER EXPOSURE TO 1×10^6 RADS.

7) HYDROGEN CONCENTRATION IN THE CONTAINMENT AND RECOMBINER PERFORMANCE SHALL BE MONITORED PERIODICALLY USING HYDROGEN ANALYZERS.

8) THE SEISMIC CATEGORY I CHRS SHALL BE DESIGNED SUCH THAT COMPONENTS REMAIN FUNCTIONAL AFTER AN SSE WITH THE RECOMBINER SHUTDOWN. COMPONENTS OF THE CHRS SHALL BE DESIGNED TO REMAIN FUNCTIONAL DURING AND AFTER AN OBE WITH THE RECOMBINER OPERATING.

9) BOTH HYDROGEN RECOMBINERS AND HYDROGEN ANALYZERS SHALL BE PROVIDED WITH CLASS 1E POWER.

10) SPECIAL ELECTRICAL RECEPTACLES FED FROM THE CLASS 1E POWER SYSTEM SHALL BE PROVIDED AT THE OPERATING LOCATIONS OF THE EXTERNAL MOBILE RECOMBINERS. POWER LEADS ON THE RECOMBINERS SHALL BE PROVIDED WITH MATING PLUGS. NO OTHER EQUIPMENT IN THE PLANT SHALL BE CAPABLE OF USING THESE POWER RECEPTACLES.

EXHIBIT 4-2

COMBUSTIBLE GAS CONTROL IN CONTAINMENT
SYSTEM DESCRIPTION

1) THE CHRS CONSISTS OF TWO MOBILE, SAFETY-GRADE, THERMAL HYDROGEN RECOMBINERS CAPABLE OF PROCESSING 50 FT^3/MIN EACH OF CONTAINMENT ATMOSPHERE GAS CONTAINING UP TO 5% HYDROGEN. ALL EQUIPMENT IS LOCATED EXTERNAL TO CONTAINMENT EXCEPT PIPING, TWO MOTOR-OPERATED CONTAINMENT ISOLATION VALVES, AND TWO CHECK VALVES.

2) THE HYDROGEN PURGE FILTER UNIT CONSISTS OF A SINGLE, NON-SAFETY GRADE MOBILE HOUSING WITH A MOISTURE SEPARATOR, TWO HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTERS AND A CHARCOAL ADSORBER (NON-SAFETY GRADE) WITH A PROCESS CAPACITY OF 50 FT^3/MIN.

3) THE HYDROGEN ANALYZERS CONSIST OF TWO INSTRUMENTS WITH READOUT AND ALARMS IN THE CONTROL ROOM. THE ANALYZERS HAVE NO INTERACTION OR CONTROL FUNCTION WITH THE RECOMBINERS. THE ANALYZERS ARE NORMALLY IN A WARMUP MODE TO ALLOW OPERATION WITHIN 30 MINUTES OF AN ACCIDENT.

4) THE CONTAINMENT ISOLATION VALVES CONSIST OF SIX MOTOR-OPERATED VALVES (CLASS 1E) AND TWO CHECK VALVES (RECOMBINER EXHAUST TO CONTAINMENT).

EXHIBIT 4-3

COMBUSTIBLE GAS CONTROL IN CONTAINMENT
SYSTEM OPERATION

1) THE POST-ACCIDENT HYDROGEN ANALYZERS ARE PLACED IN OPERATION.

2) THE HYDROGEN RECOMBINERS INCLUDING CONTROL CABINETS ARE CONNECTED TO THE CONTAINMENT PENETRATIONS AND STARTED AT OR BELOW 3.5 VOLUME PERCENT HYDROGEN CONCENTRATION.

3) THE INLET GAS TEMPERATURE IS RAISED BY THE RECOMBINER HEATERS UNTIL HYDROGEN-OXYGEN REACTION STARTS (~ 1300F).

4) THE RECOMBINER BLOWER CREATES A DIFFERENTIAL PRESSURE TO RETURN THE RECOMBINER EXHAUST GAS TO CONTAINMENT.

5) THE PURGE SYSTEM MAY BE USED TO EXHAUST CONTAINMENT ATMOSPHERE THROUGH FILTERS TO THE OUTSIDE ENVIRONMENT AT A RATE OF 50 FT^3/MIN.

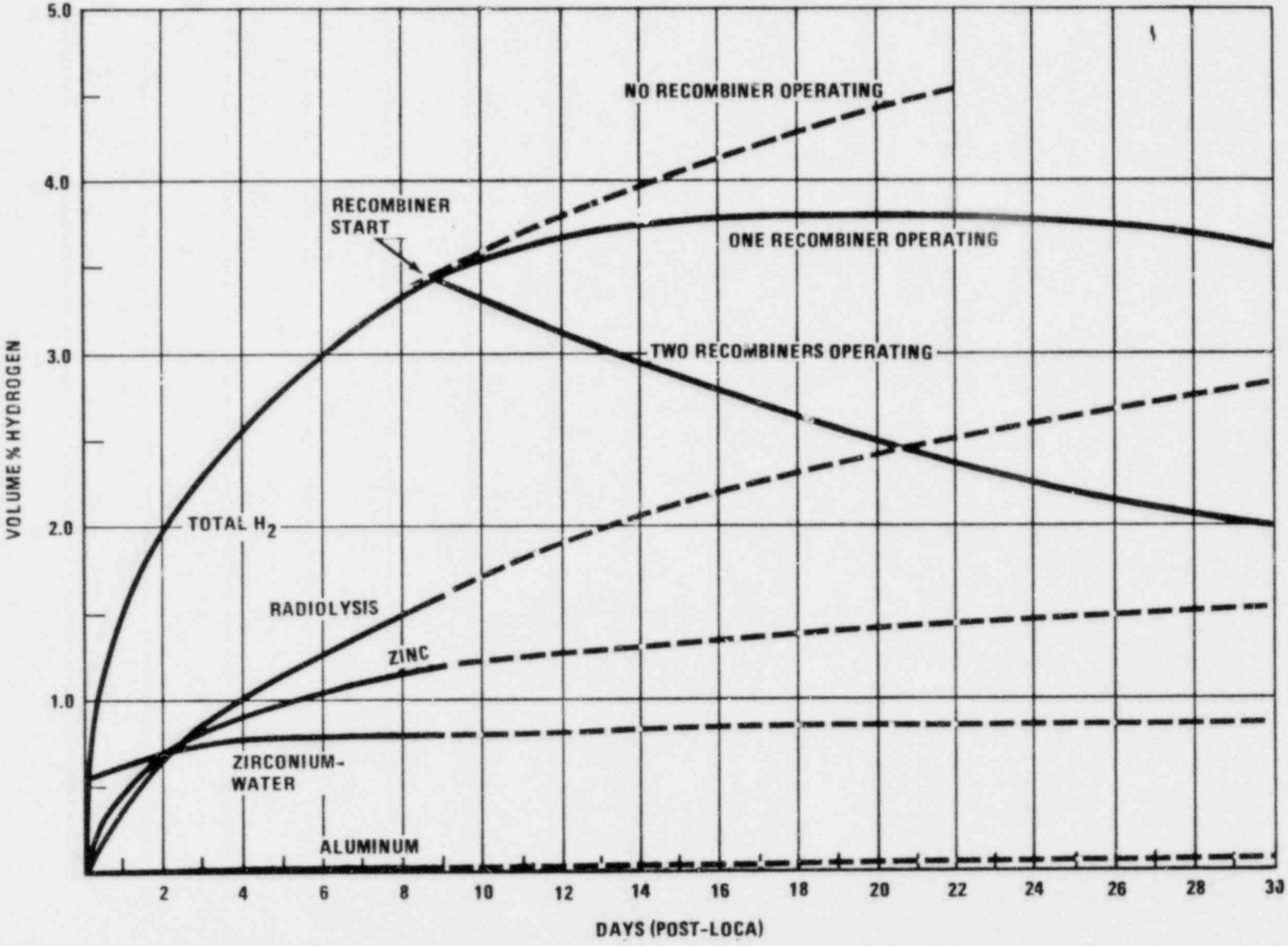
EXHIBIT 4-4

COMBUSTIBLE GAS CONTROL IN CONTAINMENT CALCULATIONS

TO CHECK COMPLIANCE WITH DESIGN CRITERIA, THE POST-ACCIDENT CONTAINMENT ATMOSPHERE HYDROGEN CONCENTRATION WAS CALCULATED ASSUMING:

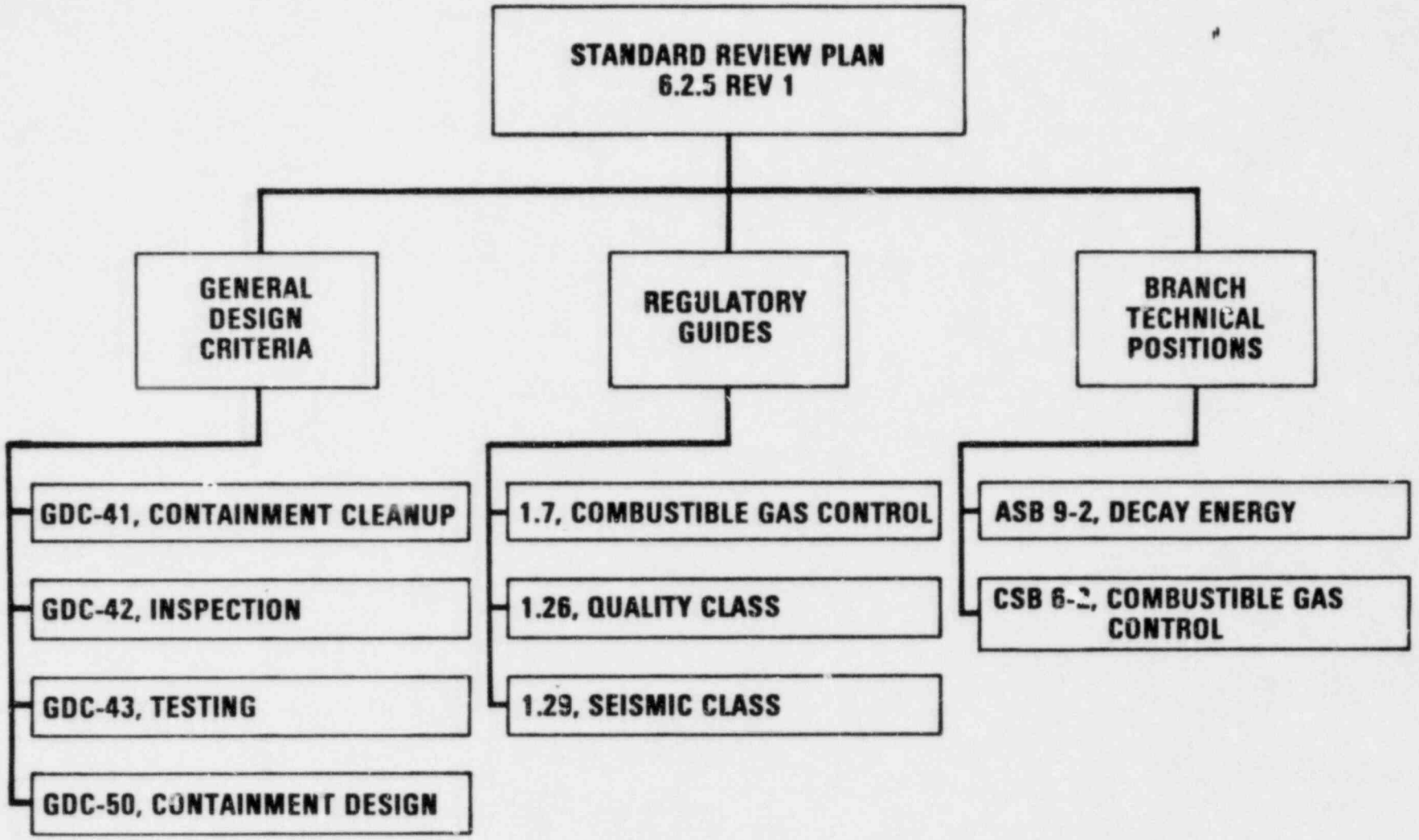
- T_{MAX} = 300F (FSAR FIGURE 6.2.1-4)
- CONTAINMENT NET FREE VOLUME = 2.6×10^6 FT^3
- ZIRCONIUM - WATER REACTION FRACTION = 5% (i.e. 5 x 1%)
- OPERATING POWER LEVEL = 3817 MW_T
- 234 LBS ALUMINUM WITHIN CONTAINMENT
- 58,498 LBS ZIRCONIUM WITHIN THE CORE
- 26,335 LBS (OVER 278,940 FT^2) ZINC AS GALVANIZED STEEL
  7,200 LBS (OVER 181,000 FT^2) ZINC AS ZINC-BASED PAINT

EXHIBIT 4-5



POST LOCA H_2 BUILDUP

FIGURE 4-2



STANDARD REVIEW PLAN 6.2.5 REV. 1

FIGURE 4-3

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT

REQUIREMENT	DESIGN FEATURE
1. THE ANALYSIS OF HYDROGEN AND OXYGEN PRODUCTION IN THE CONTAINMENT FOLLOWING POSTULATED ACCIDENTS, FOR THE PURPOSE OF ESTABLISHING THE DESIGN BASIS FOR COMBUSTIBLE GAS CONTROL SYSTEMS, SHOULD BE BASED ON THE PARAMETERS LISTED IN TABLE 1 OF BTP CSB 6-2.	1. IN COMPLIANCE. THE DESIGN IS BASED ON PARAMETERS LISTED IN TABLE 1 OF BTP CSB 6-2 EXCEPT THAT 1) A METAL-WATER REACTION FRACTION WAS CONSERVATIVELY TAKEN AS FIVE TIMES THE 1% MASS.
2. THE FISSION PRODUCT DECAY ENERGY USED IN THE CALCULATION OF HYDROGEN AND OXYGEN PRODUCTION FROM RADIOLYSIS OF THE EMERGENCY CORE COOLING WATER AND SUMP WATER IS ACCEPTABLE IF IT IS EQUAL TO OR MORE CONSERVATIVE THAN THE DECAY ENERGY MODEL GIVEN IN BTP ASB 9-2 IN SRP SECTION 9.2.5.	2. IN COMPLIANCE.

EXHIBIT 4-6

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
3.	A SYSTEM SHOULD BE PROVIDED TO MIX THE COMBUSTIBLE GASES WITHIN THE CONTAINMENT. THE FUNCTIONAL DESIGN OF THIS SYSTEM WILL DEPEND ON THE TYPE OF CONTAINMENT. THIS SYSTEM MAY CONSIST OF A FAN, A FAN COOLER, OR CONTAINMENT SPRAY. AN ANALYSIS SHOULD BE PRESENTED WHICH SHOWS THAT EXCESSIVE STRATIFICATION OF COMBUSTIBLE GASES WILL NOT OCCUR WITHIN THE CONTAINMENT OR WITHIN A CONTAINMENT SUBCOMPARTMENT. FOR CONTAINMENTS WHICH RELY ON CONVECTIVE MIXING IN CONJUNCTION WITH SYSTEM OPERATION TO MIX THE COMBUSTIBLE GASES, THE CONTAINMENT INTERNAL STRUCTURES MUST HAVE DESIGN FEATURES WHICH PROMOTE THE FREE CIRCULATION OF THE ATMOSPHERE. AN ANALYSIS OF THE EFFECTIVENESS OF THESE FEATURES FOR CONVECTIVE MIXING SHOULD BE PRESENTED. THIS ANALYSIS IS ACCEPTABLE IF IT CAN BE SHOWN THAT COMBUSTIBLE GASES WILL NOT ACCUMULATE WITHIN A COMPARTMENT OR CUBICLE TO FORM AN EXPLOSIVE MIXTURE.	3. IN COMPLIANCE. PVNGS USES CONTAINMENT SPRAYS AND NATURAL CONVECTION BASED ON TEMPERATURE DIFFERENTIALS TO MIX COMBUSTIBLE GASES. INTERNAL STRUCTURES ARE DESIGNED TO PROMOTE FREE CIRCULATION OF THE ATMOSPHERE.

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
4.	THE SYSTEMS PROVIDED TO REDUCE THE CONCENTRATION OF HYDROGEN OR OXYGEN IN THE CONTAINMENT WILL BE ACCEPTED, FROM A FUNCTIONAL STANDPOINT, IF ANALYSES INDICATE THAT A SINGLE SYSTEM TRAIN IS CAPABLE OF MAINTAINING THE CONCENTRATION OF HYDROGEN OR OXYGEN BELOW THE CONCENTRATION LIMITS SPECIFIED IN TABLE 1 OF BTP CSB 6-2. ACCEPTANCE OF THE FUNCTIONAL CAPABILITY OF THE SYSTEMS IS BASED ON CONFIRMATORY ANALYSES PERFORMED BY CSB USING SYSTEM OPERATING PARAMETERS PRESENTED IN THE SAFETY ANALYSIS REPORT. THE PROPOSED OPERATION OF THE COMBUSTIBLE GAS CONTROL EQUIPMENT IS ACCEPTABLE IF THERE IS AN APPROPRIATE MARGIN, E.G., ON THE ORDER OF 0.5 VOLUME PERCENT, BETWEEN THE LIMITING HYDROGEN CONCENTRATION LIMIT AND THE HYDROGEN CONCENTRATION AT WHICH THE EQUIPMENT WOULD BE ACTUATED.	4. IN COMPLIANCE. SYSTEMS PROVIDED FOR COMBUSTIBLE GAS CONTROL ARE FULLY REDUNDANT. MARGIN IS AS SHOWN IN FIGURE 4-2 WITH A SINGLE TRAIN CAPABLE OF MAINTAINING HYDROGEN CONCENTRATION BELOW 4 VOLUME % WHEN RECOMBINERS ARE INITIATED APPROXIMATELY 9 DAYS POST-ACCIDENT.

EXHIBIT 4-8

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
5.	CONTAINMENT ATMOSPHERE SAMPLING OR ANALYZING EQUIPMENT TEMPERATURE LIMITATIONS SHOULD BE COMPATIBLE WITH THE TEMPERATURE OF THE SAMPLE GASES.	5. IN COMPLIANCE
6.	COMBUSTIBLE GAS CONTROL SYSTEMS SHOULD MEET THE REDUNDANCY AND POWER SOURCE REQUIREMENTS FOR ESFs AND SHOULD BE DESIGNED TO WITHSTAND A SINGLE ACTIVE COMPONENT FAILURE. SUPPORTING FAILURE MODE AND EFFECTS ANALYSES OF EACH SYSTEM SHOULD BE PROVIDED IN THE SAFETY ANALYSIS REPORT.	6. IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
7.	COMBUSTIBLE GAS CONTROL SYSTEMS SHOULD BE DESIGNED, FABRICATED, ERECTED, AND TESTED TO GROUP B QUALITY STANDARDS, AS RECOMMENDED IN RG 1.26.	7. IN COMPLIANCE
8.	COMBUSTIBLE GAS CONTROL SYSTEMS, INCLUDING FOUNDATIONS AND SUPPORTS, SHOULD BE DESIGNATED AS SEISMIC CATEGORY I, I.E., DESIGNED TO WITHSTAND THE EFFECTS OF THE SSE WITHOUT LOSS OF FUNCTION, AS RECOMMENDED IN RG 1.29.	8. IN COMPLIANCE
9.	QUALIFICATION TESTS SHOULD BE PERFORMED ON SYSTEM COMPONENTS, SUCH AS HYDROGEN RECOMBINERS, COMBUSTIBLE GAS ANALYZERS, AIR MOVING EQUIPMENT MOTORS, AND VALVE OPERATORS. THE TESTS SHOULD SUPPORT THE ANALYSES OF THE FUNCTIONAL CAPABILITY OF THE EQUIPMENT AND DEMONSTRATE THAT THE EQUIPMENT WILL REMAIN OPERABLE IN THE ACCIDENT ENVIRONMENT FOR AS LONG AS ACCIDENT CONDITIONS REQUIRE.	9. IN COMPLIANCE

EXHIBIT 4-10

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
10.	COMBUSTIBLE GAS CONTROL SYSTEMS SHOULD BE DESIGNED WITH PROVISIONS FOR PERIODIC INSERVICE INSPECTION, OPERABILITY TESTING AND LEAK RATE TESTING OF THE SYSTEMS OR COMPONENTS. THE INSPECTION AND TEST PROGRAM IS ACCEPTABLE IF IT IS JUDGED TO BE CONSISTENT WITH THAT PROPOSED FOR OTHER ESFs.	10. IN COMPLIANCE
11.	COMBUSTIBLE GAS CONTROL SYSTEM DESIGNS SHOULD INCLUDE INSTRUMENTATION NEEDED TO MONITOR SYSTEM OR COMPONENT PERFORMANCE UNDER NORMAL AND ACCIDENT CONDITIONS. THE INSTRUMENTATION SHOULD BE CAPABLE OF DETERMINING THAT A SYSTEM IS PERFORMING ITS INTENDED FUNCTION, OR THAT A SYSTEM TRAIN OR COMPONENT IS MALFUNCTIONING AND SHOULD BE ISOLATED. THE INSTRUMENTATION SHOULD HAVE READOUT AND ALARM CAPABILITY IN THE CONTROL ROOM.	11. IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
12.	THE SHARING OF SYSTEM EQUIPMENT BETWEEN NUCLEAR POWER UNITS AT A MULTI-UNIT SITE OR BETWEEN SITES IS ACCEPTABLE PROVIDED (A) THE AVAILABILITY OF THE SHARED EQUIPMENT MEETS THE REDUNDANCY REQUIREMENTS FOR AN ESF, (B) THE SHARED EQUIPMENT IS DESIGNED TO SEISMIC CATEGORY I CRITERIA, (C) THE SHARED EQUIPMENT IS MOUNTED IN A SEISMIC CATEGORY I STRUCTURE, (D) ADEQUATE DESIGN, INSTALLATION, AND PROCEDURAL PROVISIONS HAVE BEEN MADE, AND (E) THE STORED EQUIPMENT CAN BE MADE AVAILABLE TO PERFORM ITS FUNCTION IN A TIME PERIOD THAT IS EQUAL TO OR LESS THAN ONE-HALF THE TIME BEFORE IT IS REQUIRED TO OPERATE.	12. IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

SRP 6.2.5, COMBUSTIBLE GAS CONTROL IN CONTAINMENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
13.	WHERE SYSTEM EQUIPMENT IS SHARED BETWEEN NUCLEAR POWER UNITS AT A MULTI-UNIT SITE OR BETWEEN SITES, SURVEILLANCE PROGRAMS SHOULD BE COORDINATED TO ASSURE THAT REDUNDANT EQUIPMENT IS NOT OUT OF SERVICE AT THE SAME TIME.	13. PVNGS WILL COMPLY.
14.	BTP CSB 6-2 RECOMMENDS THAT A BACKUP PURGE SYSTEM BE PROVIDED. THE BACKUP PURGE SYSTEM IS NOT REQUIRED TO BE DESIGNED TO ESF REQUIREMENTS WITH REGARD TO SINGLE FAILURE PROTECTION SINCE IT IS NOT THE PRIMARY METHOD FOR CONTROLLING COMBUSTIBLE GAS CONCENTRATIONS IN THE CONTAINMENT. THE BACKUP PURGE SYSTEM IS ACCEPTABLE IF PURGE DOSES ARE WITHIN THE GUIDELINES ESTABLISHED IN BTP CSB 6-2.	14. IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

GDC 41, CONTAINMENT ATMOSPHERE CLEANUP

REQUIREMENT	DESIGN FEATURE
SYSTEMS TO CONTROL FISSION PRODUCTS, HYDROGEN, OXYGEN, AND OTHER SUBSTANCES WHICH MAY BE RELEASED INTO THE REACTOR CONTAINMENT SHALL BE PROVIDED AS NECESSARY TO REDUCE, CONSISTENT WITH THE FUNCTIONING OF OTHER ASSOCIATED SYSTEMS, THE CONCENTRATION AND QUALITY OF FISSION PRODUCTS RELEASED TO THE ENVIRONMENT FOLLOWING POSTULATED ACCIDENTS, AND TO CONTROL THE CONCENTRATION OF HYDROGEN OR OXYGEN AND OTHER SUBSTANCES IN THE CONTAINMENT ATMOSPHERE FOLLOWING POSTULATED ACCIDENTS TO ASSURE THAT CONTAINMENT INTEGRITY IS MAINTAINED. EACH SYSTEM SHALL HAVE SUITABLE REDUNDANCY IN COMPONENTS AND FEATURES, AND SUITABLE INTERCONNECTIONS, LEAK DETECTION, ISOLATION, AND CONTAINMENT CAPABILITIES TO ASSURE THAT FOR ONSITE ELECTRIC POWER SYSTEM OPERATION (ASSUMING OFFSITE POWER IS NOT AVAILABLE) AND FOR OFFSITE ELECTRIC POWER SYSTEM OPERATION (ASSUMING ONSITE POWER IS NOT AVAILABLE) ITS SAFETY FUNCTION CAN BE ACCOMPLISHED, ASSUMING A SINGLE FAILURE.	IN COMPLIANCE.

SRP ACCEPTANCE CRITERIA

GDC 42, INSPECTION

REQUIREMENT	DESIGN FEATURE
THE CONTAINMENT ATMOSPHERE CLEANUP SYSTEMS SHALL BE DESIGNED TO PERMIT APPROPRIATE PERIODIC INSPECTION OF IMPORTANT COMPONENTS, SUCH AS FILTER FRAMES, DUCTS, AND PIPING TO ASSURE THE INTEGRITY AND CAPABILITY OF THE SYSTEMS.	IN COMPLIANCE.

SRP ACCEPTANCE CRITERIA

GDC 43, TESTING

REQUIREMENT	DESIGN FEATURE
THE CONTAINMENT ATMOSPHERE CLEANUP SYSTEMS SHALL BE DESIGNED TO PERMIT APPROPRIATE PERIODIC PRESSURE AND FUNCTIONAL TESTING TO ASSURE (1) THE STRUCTURAL AND LEAK-TIGHT INTEGRITY OF ITS COMPONENTS, (2) THE OPERABILITY AND PERFORMANCE OF THE ACTIVE COMPONENTS OF THE SYSTEMS SUCH AS FANS, FILTERS, DAMPERS, PUMPS, AND VALVES AND (3) THE OPERABILITY OF THE SYSTEMS AS A WHOLE AND, UNDER CONDITIONS AS CLOSE TO DESIGN AS PRACTICAL, THE PERFORMANCE OF THE FULL OPERATIONAL SEQUENCE THAT BRINGS THE SYSTEMS INTO OPERATION, INCLUDING OPERATION OF APPLICABLE PORTIONS OF THE PROTECTION SYSTEM, THE TRANSFER BETWEEN NORMAL AND EMERGENCY POWER SOURCES, AND THE OPERATION OF ASSOCIATED SYSTEMS.	IN COMPLIANCE

EXHIBIT 4-16

SRP ACCEPTANCE CRITERIA

GDC 50, CONTAINMENT DESIGN

REQUIREMENT	DESIGN FEATURE
THE REACTOR CONTAINMENT STRUCTURE, INCLUDING ACCESS OPENINGS, PENETRATIONS, AND THE CONTAINMENT HEAT REMOVAL SYSTEM, SHALL BE DESIGNED SO THAT THE CONTAINMENT STRUCTURE AND ITS INTERNAL COMPARTMENTS CAN ACCOMMODATE, WITHOUT EXCEEDING THE DESIGN LEAKAGE RATE AND WITH SUFFICIENT MARGIN, THE CALCULATED PRESSURE AND TEMPERATURE CONDITIONS RESULTING FROM ANY LOCA. THIS MARGIN SHALL REFLECT CONSIDERATION OF (1) THE EFFECTS OF POTENTIAL ENERGY SOURCES THAT HAVE NOT BEEN INCLUDED IN THE DETERMINATION OF THE PEAK CONDITIONS, SUCH AS ENERGY IN STEAM GENERATORS AND, AS REQUIRED BY 10CFR50.44, ENERGY FROM METAL-WATER AND OTHER CHEMICAL REACTIONS THAT MAY RESULT FROM DEGRADATION, BUT NOT TOTAL FAILURE, OF EMERGENCY CORE COOLING FUNCTIONING; (2) THE LIMITED EXPERIENCE AND EXPERIMENTAL DATA AVAILABLE FOR DEFINING ACCIDENT PHENOMENA AND CONTAINMENT RESPONSES; AND (3) THE CONSERVATISM OF THE CALCULATIONAL MODEL AND INPUT PARAMETERS.	IN COMPLIANCE. CONTAINMENT STRUCTURE IS DESIGNED TO ACCEPT POST-LOCA PRESSURE OF 60 PSIG. (CALCULATED WORSE CASE PRESSURE OF 49.2 PSIG).

EXHIBIT 4-17

SRP ACCEPTANCE CRITERIA

RG 1.7, CONTROL OF COMBUSTIBLE GAS CONCENTRATIONS IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT

REQUIREMENT	DESIGN FEATURE
1) EACH BOILING OR PRESSURIZED LIGHT-WATER NUCLEAR POWER REACTOR FUELED WITH URANIUM OXIDE PELLETS WITHIN CYLINDRICAL ZIRCALOY CLADDING SHOULD HAVE THE CAPABILITY TO:	
A. MEASURE THE HYDROGEN CONCENTRATION IN THE CONTAINMENT, AND	A. IN COMPLIANCE. REDUNDANT HYDROGEN ANALYZERS INCORPORATED.
B. MIX THE ATMOSPHERE IN THE CONTAINMENT, AND	B. IN COMPLIANCE. MIXING ATTAINED BY NATURAL CONVECTION AND REDUNDANT CONTAINMENT SPRAY SYSTEMS.
C. CONTROL COMBUSTIBLE GAS CONCENTRATIONS WITHOUT RELYING ON PURGING AND/OR REPRESSURIZATION OF THE CONTAINMENT ATMOSPHERE FOLLOWING A LOCA.	C. IN COMPLIANCE. REDUNDANT, SAFETY-GRADE RECOMBINERS ARE USED.

EXHIBIT 4-18

SRP ACCEPTANCE CRITERIA

RG 1.7, CONTROL OF COMBUSTIBLE GAS CONCENTRATIONS IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
2)	THE CONTINUOUS PRESENCE OF REDUNDANT COMBUSTIBLE GAS CONTROL EQUIPMENT AT THE SITE MAY NOT BE NECESSARY PROVIDED IT IS AVAILABLE ON AN APPROPRIATE TIME SCALE. HOWEVER, APPROPRIATE DESIGN AND PROCEDURAL PROVISIONS SHOULD BE MADE FOR ITS USE. THESE PROVISIONS SHOULD INCLUDE CONSIDERATION OF SHIELDING REQUIREMENTS TO PERMIT:	
	A. ACCESS TO THE AREA WHERE THE MOBILE COMBUSTIBLE GAS CONTROL SYSTEM WILL BE CONNECTED.	A. IN COMPLIANCE. REDUNDANT HYDROGEN COMBINERS LOCATED ON SITE. ACCESS TO THE RECOMBINERS POSSIBLE AT ANY TIME SINCE HOOKUP LOCATIONS OUTSIDE OF CONTAINMENT.
	B. THE COUPLING OPERATION TO BE EXECUTED. IN ADDITION, CENTRALIZED STORAGE FACILITIES THAT WOULD SERVE MULTIPLE SITES MAY BE USED, PROVIDED THESE FACILITIES INCLUDE PROVISIONS SUCH AS MAINTENANCE, PROTECTIVE FEATURES, TESTING, AND TRANSPORTATION FOR REDUNDANT UNITS TO A PARTICULAR SITE.	B. IN COMPLIANCE. COUPLING OPERATION DESIGNED TO BE ACCOMPLISHED WITHIN 72 HOURS POST-ACCIDENT.

EXHIBIT 4-19

SRP ACCEPTANCE CRITERIA

RG 1.7, CONTROL OF COMBUSTIBLE GAS CONCENTRATIONS IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
3)	COMBUSTIBLE GAS CONTROL SYSTEMS AND THE PROVISIONS FOR MIXING, MEASURING, AND SAMPLING SHOULD MEET THE DESIGN, QUALITY ASSURANCE, REDUNDANCY, ENERGY SOURCE, AND INSTRUMENTATION REQUIREMENTS FOR AN ESF. IN ADDITION, THE SYSTEM ITSELF SHOULD NOT INTRODUCE SAFETY PROBLEMS THAT MAY AFFECT CONTAINMENT INTEGRITY. THE COMBUSTIBLE GAS CONTROL SYSTEM SHOULD BE DESIGNATED SEISMIC CATEGORY I, AND THE GROUP B QUALITY STANDARDS OF RG 1.26 SHOULD BE APPLIED.	IN COMPLIANCE. COMBUSTIBLE GAS CONTROL SYSTEM MEETS REQUIREMENTS OF ESFs. SYSTEM WILL NOT INTRODUCE SAFETY PROBLEMS WHICH COULD AFFECT CONTAINMENT INTEGRITY (I.E., NOT FLAME-TYPE RECOMBINER).

SRP ACCEPTANCE CRITERIA

RG 1.7, CONTROL OF COMBUSTIBLE GAS CONCENTRATIONS IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT (CONT'D)

REQUIREMENT	DESIGN FEATURE
4) ALL WATER-COOLED POWER REACTORS SHOULD ALSO HAVE THE INSTALLED CAPABILITY FOR A CONTROLLED PURGE OF THE CONTAINMENT ATMOSPHERE TO AID IN CLEANUP. THE PURGE OR VENTILATION SYSTEM MAY BE A SEPARATE SYSTEM OR PART OF AN EXISTING SYSTEM. IT NEED NOT BE REDUNDANT OR BE DESIGNATED SEISMIC CATEGORY I, EXCEPT INSOFAR AS PORTIONS OF THE SYSTEM CONSTITUTE PART OF THE PRIMARY CONTAINMENT BOUNDARY OR CONTAIN FILTERS.	IN COMPLIANCE. A NON-SAFETY GRADE PURGE EXHAUST UNIT IS PROVIDED.
5) DEFINED PARAMETER VALUES SHOULD BE USED IN (A) CALCULATING HYDROGEN AND OXYGEN GAS CONCENTRATIONS IN CONTAINMENTS AND (B) EVALUATING DESIGNS PROVIDED TO CONTROL AND TO PURGE COMBUSTIBLE GASES EVOLVED IN THE COURSE OF LOCAs. THESE VALUES MAY BE CHANGED ON THE BASIS OF ADDITIONAL EXPERIMENTAL EVIDENCE AND ANALYSES.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.7, CONTROL OF COMBUSTIBLE GAS CONCENTRATIONS IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT (CONT'D)

REQUIREMENT	DESIGN FEATURE
6) MATERIALS WITHIN THE CONTAINMENT THAT WOULD YIELD HYDROGEN GAS DUE TO CORROSION FROM THE EMERGENCY COOLING OR CONTAINMENT SPRAY SOLUTIONS SHOULD BE IDENTIFIED, AND THEIR USE SHOULD BE LIMITED AS MUCH AS PRACTICAL.	IN COMPLIANCE

SRP ACCEPTANCE CRITERIA

RG 1.26, QUALITY GROUP CLASSIFICATIONS

REQUIREMENT	DESIGN FEATURE
PIPING AND VALVES THAT ARE NOT PART OF THE REACTOR COOLANT PRESSURE BOUNDARY AND ARE DESIGNED FOR EMERGENCY CORE COOLING, POST-ACCIDENT CONTAINMENT ATMOSPHERE CLEANUP OR RESIDUAL HEAT REMOVAL FROM THE REACTOR SHALL MEET THE REQUIREMENTS OF ASME B&PV CODE, SECTION III, CLASS 2.	IN COMPLIANCE

EXHIBIT 4-23

SRP ACCEPTANCE CRITERIA

RG 1.29, SEISMIC CLASSIFICATIONS

REQUIREMENT	DESIGN FEATURE
THE POST-ACCIDENT CONTAINMENT ATMOSPHERE CLEANUP SYSTEM SHALL BE DESIGNATED SEISMIC CATEGORY I TO WITHSTAND THE EFFECTS OF THE SSE AND REMAIN FUNCTIONAL. THE QUALITY ASSURANCE REQUIREMENTS OF APPENDIX B TO 10CFR50 SHALL APPLY.	IN COMPLIANCE

BRANCH TECHNICAL POSITIONS

BTP ASB 9-2: RESIDUAL DECAY ENERGY

REQUIREMENT	DESIGN FEATURE
THE AUXILIARY SYSTEMS BRANCH HAS DEVELOPED ACCEPTABLE ASSUMPTIONS AND FORMULATIONS THAT MAY BE USED TO CALCULATE THE RESIDUAL DECAY ENERGY RELEASE RATE FOR LIGHT-WATER-COOLED REACTORS FOR LONG-TERM COOLING OF THE REACTOR FACILITY.	IN COMPLIANCE

BRANCH TECHNICAL POSITIONS

BTP CSB 6-2, CONTROL OF COMBUSTIBLE GAS CONCENTRATION IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT

REQUIREMENT	DESIGN FEATURE
1) ALL WATER-COOLED POWER REACTOR FACILITIES SHOULD HAVE THE CAPABILITY FOR MEASUREMENT OF THE HYDROGEN CONCENTRATION, FOR MIXING THE ATMOSPHERE IN THE CONTROLLING COMBUSTIBLE GAS CONCENTRATIONS WITHOUT RELIANCE ON PURGING OF THE CONTAINMENT ATMOSPHERE FOLLOWING A LOCA.	IN COMPLIANCE
2) THE CONTINUOUS PRESENCE OF COMBUSTIBLE GAS CONTROL EQUIPMENT AT THE SITE MAY NOT BE NECESSARY PROVIDED IT IS AVAILABLE ON AN APPROPRIATE TIME SCALE; HOWEVER, APPROPRIATE DESIGN AND PROCEDURAL PROVISIONS SHOULD BE MADE FOR ITS USE. IN ADDITION, CENTRALIZED STORAGE FACILITIES THAT WOULD SERVE MULTIPLE SITES MAY BE USED PROVIDED THAT THESE FACILITIES INCLUDE PROVISIONS SUCH AS MAINTENANCE, PROTECTIVE FEATURES, TESTING, AND TRANSPORTATION FOR REDUNDANT UNITS TO A PARTICULAR SITE.	IN COMPLIANCE

BRANCH TECHNICAL POSITIONS

BTP CSB 6-2, CONTROL OF COMBUSTIBLE GAS CONCENTRATION IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT (CONT'D)

	REQUIREMENT	DESIGN FEATURE
3)	COMBUSTIBLE GAS CONTROL SYSTEMS AND THE PROVISIONS FOR MIXING, MEASURING, AND SAMPLING SHOULD MEET THE DESIGN, QUALITY ASSURANCE, REDUNDANCY, ENERGY SOURCE, AND INSTRUMENTATION REQUIREMENTS FOR AN ESF, AND THE SYSTEM ITSELF SHOULD NOT INTRODUCE SAFETY PROBLEMS THAT MAY AFFECT CONTAINMENT INTEGRITY. THE COMBUSTIBLE GAS CONTROL SYSTEM SHOULD BE DESIGNATED SEISMIC CATEGORY I AND THE GROUP B QUALITY STANDARDS OF RG 1.26 SHOULD BE APPLIED.	IN COMPLIANCE
4)	ALL WATER-COOLED POWER REACTORS SHOULD ALSO HAVE THE INSTALLED CAPABILITY FOR A CONTROLLED PURGE OF THE CONTAINMENT ATMOSPHERE. THE PURGE SYSTEM NEED NOT BE REDUNDANT NOR BE DESIGNATED SEISMIC CATEGORY I, EXCEPT INSOFAR AS PORTIONS OF THE SYSTEM CONSTITUTE PART OF THE PRIMARY CONTAINMENT BOUNDARY. FILTRATION OF THE PURGE STREAM SHOULD BE PROVIDED AS NECESSARY TO REDUCE THE SUM OF THE LONG-TERM DOSES FROM THE LOCA AND THE PURGE TO VALUES LESS THAN THE GUIDELINES OF 10CFR100 AT THE LOW POPULATION ZONE OUTER BOUNDARY.	IN COMPLIANCE

BRANCH TECHNICAL POSITIONS

BTP CSB 6-2, CONTROL OF COMBUSTIBLE GAS CONCENTRATION IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT (CONT'D)

REQUIREMENT	DESIGN FEATURE
5) DEFINED PARAMETER VALUES SHOULD BE USED FOR THE PURPOSE OF CALCULATING HYDROGEN AND OXYGEN GAS CONCENTRATIONS IN CONTAINMENTS AND EVALUATING DESIGNS PROVIDED TO CONTROL AND TO PURGE COMBUSTIBLE GASES EVOLVED IN THE COURSE OF LOCAs. THESE VALUES MAY BE CHANGED ON THE BASIS OF ADDITIONAL EXPERIMENTAL EVIDENCE AND ANALYSES.	IN COMPLIANCE
6) MATERIALS WITHIN THE CONTAINMENT THAT WOULD YIELD HYDROGEN GAS DUE TO CORROSION FROM THE EMERGENCY COOLING OR CONTAINMENT SPRAY SOLUTIONS SHOULD BE IDENTIFIED, AND THEIR USE SHOULD BE LIMITED AS MUCH AS PRACTICAL.	IN COMPLIANCE

BRANCH TECHNICAL POSITIONS

BTP CSB 6-2, CONTROL OF COMBUSTIBLE GAS CONCENTRATION IN CONTAINMENT FOLLOWING A LOSS-OF-COOLANT ACCIDENT (CONT'D)

REQUIREMENT	DESIGN FEATURE
7) For plants for which a notice of hearing on the application for a construction permit was published after November 5, 1970:	
A. Plants receiving operating licenses on the basis (in part) of ECCS evaluations under 10CFR50.46 should conform to Items 1-6, above, prior to operation.	A. PVNGS complies with Items 1-6.

COMBUSTIBLE GAS CONTROL
NUREG 0737

ITEM II.E.4.1

REQUIREMENT	DESIGN FEATURE
PLANTS USING EXTERNAL RECOMBINERS OR PURGE SYSTEMS FOR POST-ACCIDENT COMBUSTIBLE GAS CONTROL OF THE CONTAINMENT ATMOSPHERE SHOULD PROVIDE CONTAINMENT PENETRATION SYSTEMS FOR EXTERNAL RECOMBINER OR PURGE SYSTEMS THAT ARE DEDICATED TO THAT SERVICE ONLY, THAT MEET THE REDUNDANCY AND SINGLE-FAILURE REQUIREMENTS OF GENERAL DESIGN CRITERIA 54 AND 56 OF APPENDIX A TO 10 CFR 50, AND THAT ARE SIZED TO SATISFY THE FLOW REQUIREMENTS OF THE RECOMBINER OR PURGE SYSTEM.	IN COMPLIANCE. TWO PORTABLE HYDROGEN RECOMBINERS WILL BE ONSITE AND AVAILABLE FOR CONNECTION TO THE AFFECTED UNIT. EITHER RECOMBINER IS CAPABLE OF REDUCING HYDROGEN LEVELS AS NOTED IN FSAR SECTION 6.2.5. THE TWO SYSTEMS ARE COMPLETELY INDEPENDENT AND MEET SINGLE FAILURE CRITERIA. EACH SYSTEM HAS DEDICATED CONTAINMENT PENETRATIONS, EXTERNAL HYDROGEN MONITORS, AND CONNECTION POINTS FOR AN EXTERNAL HYDROGEN RECOMBINER. AN ADDITIONAL HYDROGEN REDUCTION CAPABILITY IS PROVIDED BY A NON-SAFETY GRADE CHARCOAL FILTERED PURGE EXHAUST UNIT.

EXHIBIT 4-30

COMBUSTIBLE GAS CONTROL
NUREG 0737

ITEM II.E.4.1 (CONTINUED)

REQUIREMENT	DESIGN FEATURE
THE PROCEDURES FOR THE USE OF COMBUSTIBLE GAS CONTROL SYSTEMS FOLLOWING AN ACCIDENT THAT RESULTS IN A DEGRADED CORE AND RELEASE OF RADIOACTIVITY TO THE CONTAINMENT MUST BE REVIEWED AND REVISED, IF NECESSARY.	PROCEDURES FOR USE OF THE PVNGS HYDROGEN CONTROL SYSTEM FOLLOWING AN ACCIDENT RESULTING IN A DEGRADED CORE AND RELEASE OF RADIOACTIVITY IN THE CONTAINMENT WILL BE REVIEWED AND REVISED IF NECESSARY.

COMBUSTIBLE GAS CONTROL
NUREG 0737

ITEM II.F.1. SUBPART 6

REQUIREMENT

A CONTINUOUS INDICATION OF HYDROGEN CONCENTRATION IN THE CONTAINMENT ATMOSPHERE SHALL BE PROVIDED IN THE CONTROL ROOM. MEASUREMENT CAPABILITY SHALL BE PROVIDED OVER THE RANGE OF 0 TO 10% HYDROGEN CONCENTRATION UNDER BOTH POSITIVE AND NEGATIVE AMBIENT PRESSURE

DESIGN FEATURE

IN COMPLIANCE. CONTINUOUS INDICATION OF CONTAINMENT ATMOSPHERE HYDROGEN CONCENTRATION IS AVAILABLE IN THE CONTROL ROOM (INDICATION IS AVAILABLE WITHIN 30 MINUTES OF THE INITIATION OF SAFETY INJECTION).

THE ANALYZER FUNCTIONS REQUIREMENTS ARE AS FOLLOWS:

- RANGES: 0 TO 1 AND 0 TO 10 VOLUME %
- ACCURACY: ±1% FULL SCALE
- SPEED OF RESPONSE: 90% IN 30 SECONDS
- REPEATABILITY: ±2% FULL SCALE
- REPRODUCIBILITY (24 HR): ±2% FULL SCALE
- DRIFT: <1% IN 24 HRS
- SEISMIC CATEGORY: I
- QUALITY CLASS: Q
- POWER SUPPLY: 1E
- SYSTEM WARMUP: <6 HRS.

EXHIBIT 4-32

V.

BACKGROUND INFORMATION

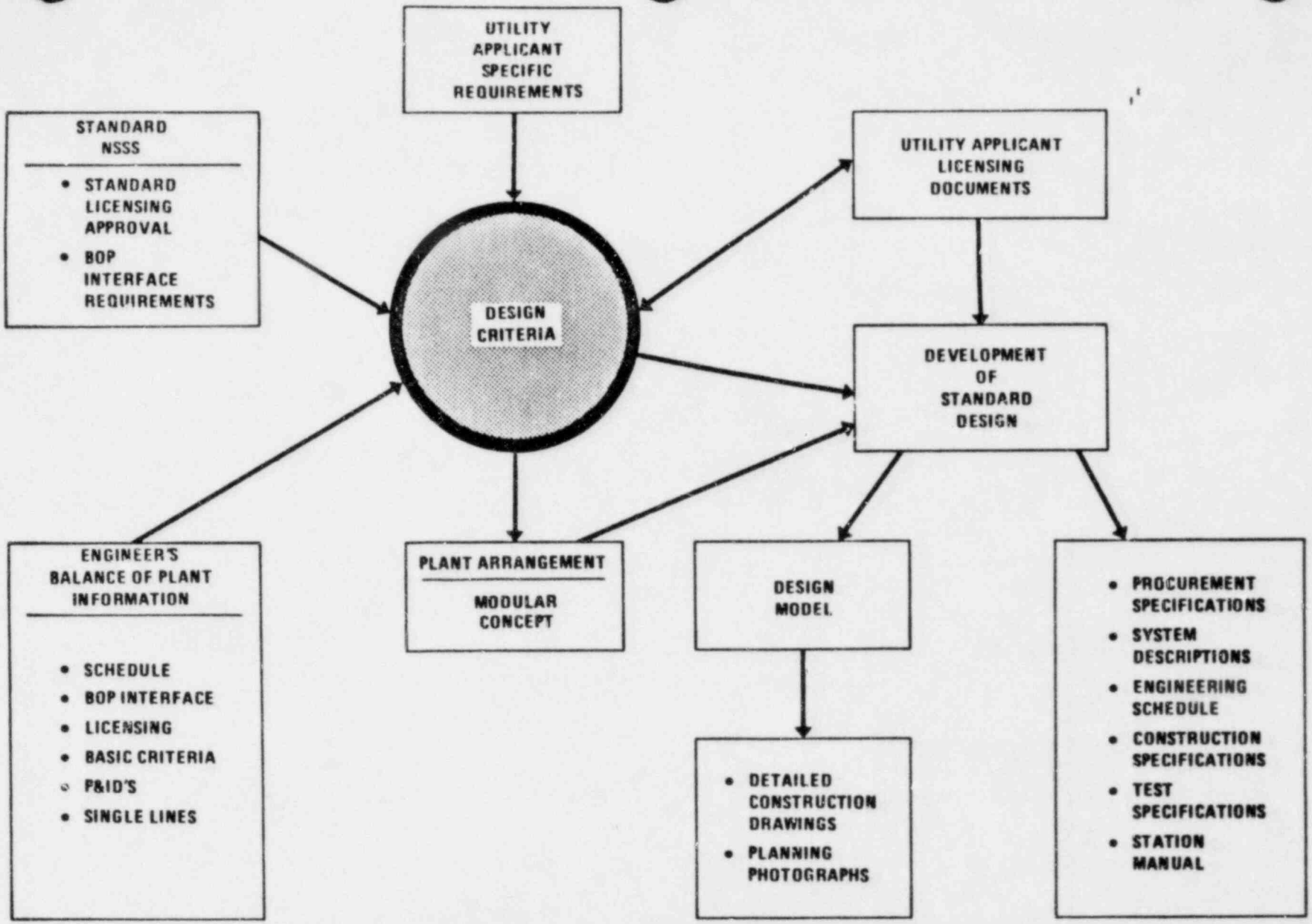
EXHIBIT 5-i

PVNGS DESIGN DEVELOPMENT

THE PVNGS DESIGN DEVELOPMENT, REPRESENTED IN FIGURE B-1, IS CENTERED AROUND THE DESIGN CRITERIA, WHICH ACT AS THE HUB OF THE DESIGN. THESE CRITERIA ARE REVIEWED AND APPROVED BY THE OWNER AND ESTABLISH THE SCOPE OF THE SYSTEM. THEY ARE ASSEMBLED IN THREE VOLUMES ENTITLED "DESIGN CRITERIA MANUAL - PALO VERDE UNITS 1, 2 AND 3" AND REFLECT ALL THE DESIGN CRITERIA FOR THE PLANT. THIS IS A DYNAMIC DOCUMENT THAT IS UPDATED AS NEW CRITERIA ARE INCORPORATED INTO THE PLANT DESIGN. AS SHOWN IN FIGURE B-1, A SERIES OF DOCUMENTS ESTABLISH THE CRITERIA, INCLUDING UTILITY OR OWNER-APPLICANT'S SPECIFIC REQUIREMENTS, STANDARD NSSS SYSTEM 80 LICENSING AND BALANCE OF PLANT (BOP) INTERFACE REQUIREMENTS, AND THE ENGINEER'S BOP INFORMATION (SCHEDULE, INTERFACES, LICENSING, BASIC CRITERIA, P&IDs, AND SINGLE LINE DRAWINGS). THESE ALL SERVE AS INPUT TO THE DESIGN CRITERIA HUB, WHICH BY AN ITERATIVE PROCESS RESULTS IN APPLICANT LICENSING DOCUMENTS, DEVELOPMENT OF THE MODULAR PLANT ARRANGEMENT AND THE STANDARD DESIGN, AND FEEDBACK FROM THE REGULATORS. FROM THIS, PROCUREMENT SPECIFICATIONS, SYSTEM DESCRIPTIONS, SCHEDULES, CONSTRUCTION SPECIFICATIONS, TEST SPECIFICATIONS, AND THE STATION MANUAL ARE DEVELOPED. THE PLANT ARRANGEMENT IS ALSO DERIVED FROM THE DESIGN CRITERIA, AS REPRESENTED BY A THREE-QUARTER INCH TO THE FOOT SCALE MODEL OF THE PVNGS POWER BLOCK. THE MODEL IS USED TO DERIVE DETAILED CONSTRUCTION DRAWINGS AND PLANNING PHOTOGRAPHS.

IN SUMMARY, ONE SET OF DOCUMENTS ESTABLISH THE CRITERIA. FROM THIS SET, DESCRIPTIONS ARE PUT INTO LICENSING DOCUMENTS AND KEPT CURRENT BY CONTINUING REVIEW. MULTI-DISCIPLINE REVIEWS ARE CARRIED OUT WHERE DIFFERENT DISCIPLINES GET TOGETHER AT THE MODEL AND ANALYZE THE SYSTEMS, ASSESSING THE DESIGN, SAFETY, SEPARATION AND ALL CRITERIA, TO ENSURE THAT THE SYSTEM MEETS THE ESTABLISHED CRITERIA. THIS PROCESS GENERALLY TAKES TWO TO THREE YEARS TO ASSURE THAT THE DESIGN IS CORRECT AND REFLECTS ALL THE REQUIREMENTS.

EXHIBIT 5-1



PVNGS DESIGN DEVELOPMENT
FIGURE 5-1