AUXILIARY SYSTEMS BRANCH
REVIEW BOARDS

AUXILIARY FEEDWATER SYSTEM — 8/21-22/80

AUXILIARY SYSTEMS I — 4/8/81

- Fuel Pool Cooling and Cleanup
- Fuel Storage and Handling
- Essential Cooling Water System
- Essential Spray Pond System

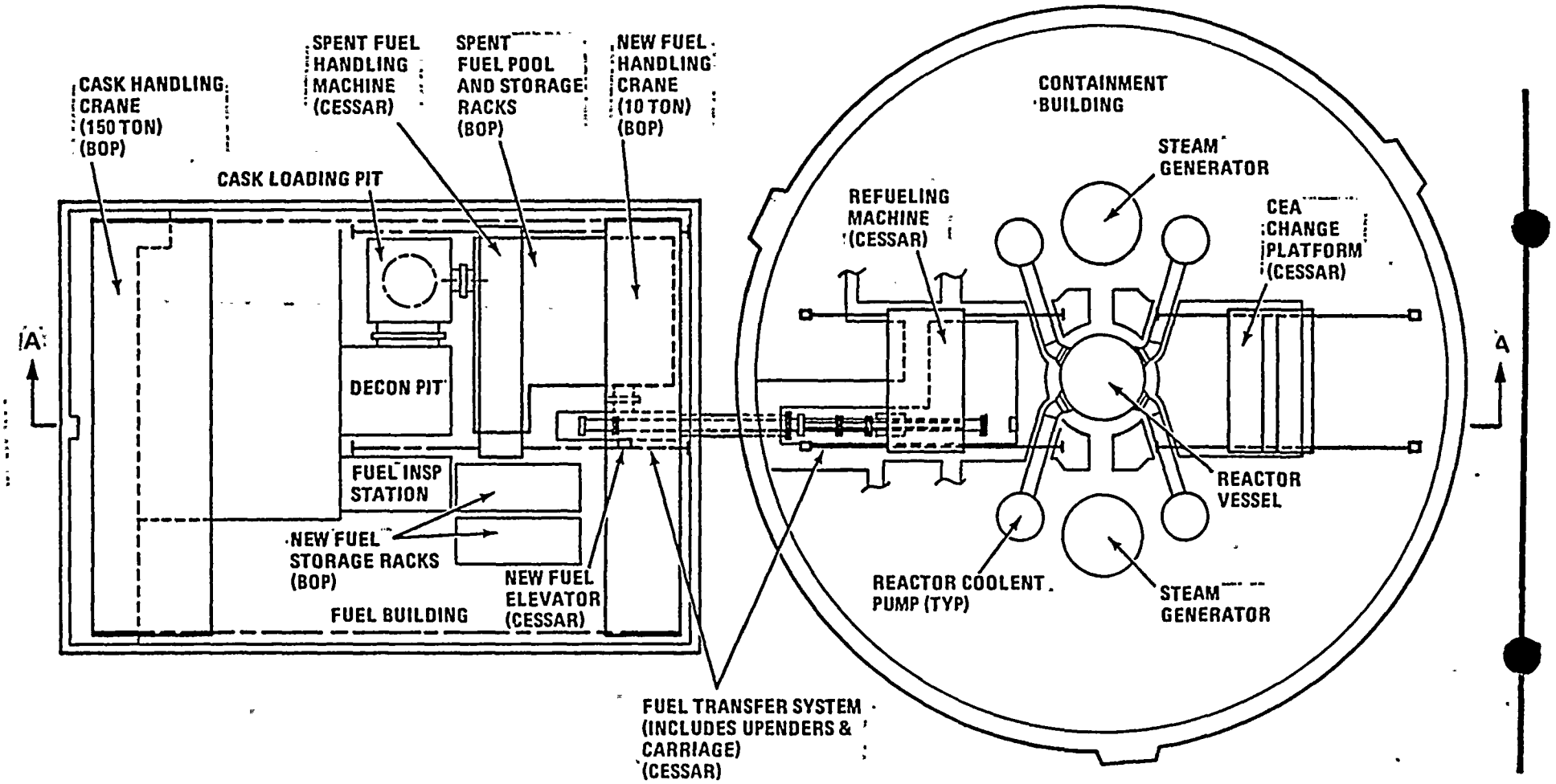
AUXILIARY SYSTEMS II — 8/5/81F

- Reactor Drain Tank
- Demineralized Water System
- Potable and Sanitary Water System
- Condensate Storage
- Compressed Air
- Floor Drainage
- Main Steam
- Circulating Water System
- Condensate and Feedwater
- Heating, Ventilation and Air-Conditioning Systems

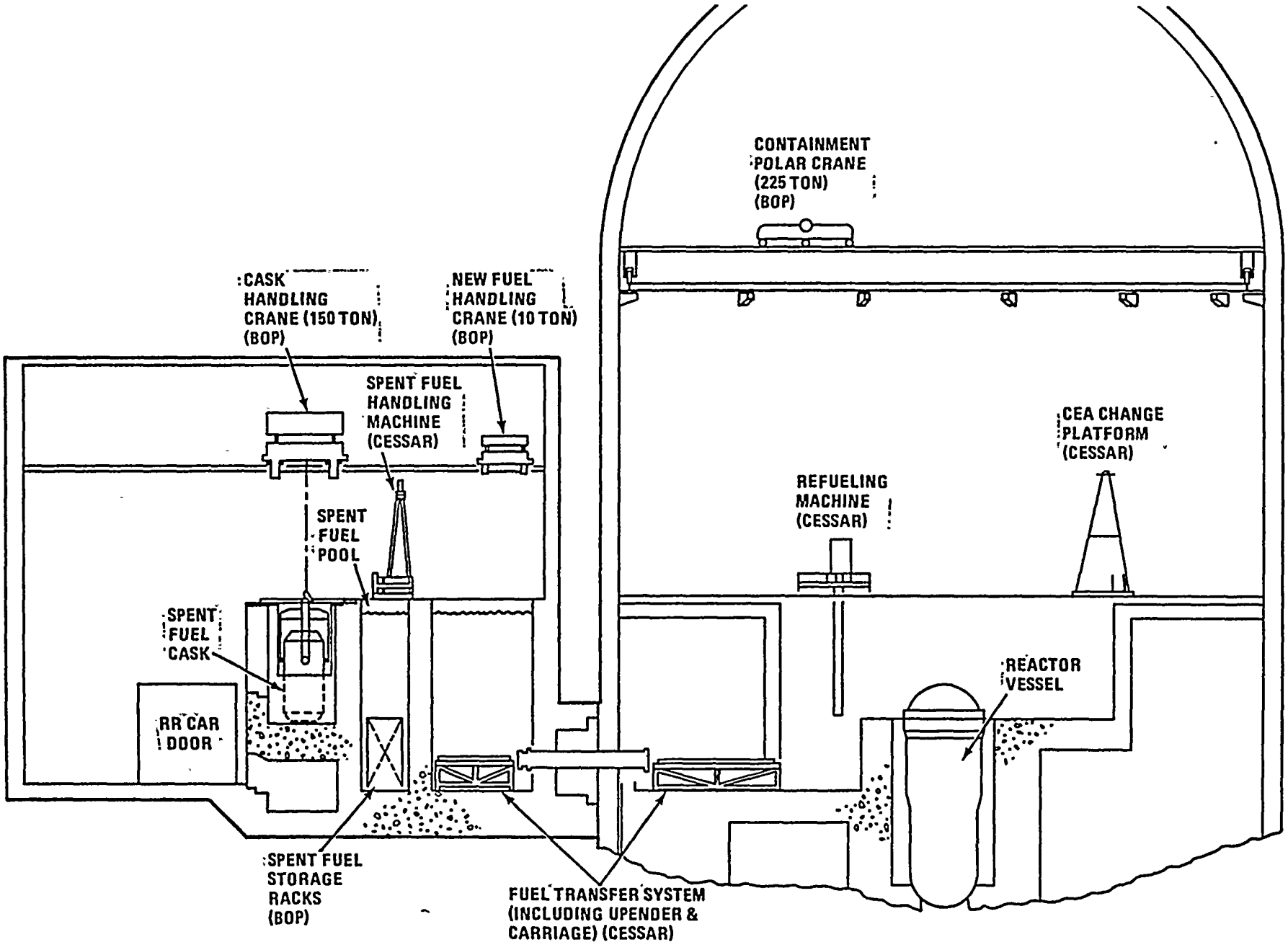
AUXILIARY SYSTEMS III — 9/2/81F

- Flood Protection
- Missile Protection
- High and Moderate Energy Line Breaks

EXHIBIT 1-1



FUEL STORAGE AND HANDLING SYSTEMS – PLAN VIEW
FIGURE 1-2



FUEL STORAGE AND HANDLING SYSTEMS – SECTION "A"
FIGURE 1-3

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 1-3

DESIGN CRITERIA
FUEL STORAGE AND HANDLING SYSTEM

3) THE NEW FUEL HANDLING CRANE IS DESIGNED IN ACCORDANCE WITH THE FOLLOWING DESIGN BASES:

A. THE LOAD BEARING MEMBERS OF THE NEW FUEL HANDLING CRANE SHALL BE SEISMIC CATEGORY I.

B. THE CRANE SHALL BE DESIGNED IN ACCORDANCE WITH CMAA SPECIFICATION No. 70 - ELECTRIC OVERHEAD TRAVELLING CRANES.

C. THE NEW FUEL HANDLING CRANE SHALL BE DESIGNED TO PREVENT TROLLEY OPERATION OVER THE SPENT FUEL POOL EXCEPT BY THE USE OF A KEY-OPERATED INTERLOCK OVERRIDE.

D. HOISTING LOAD LIFT FORCE SHALL BE RESTRICTED TO 5000 POUNDS WHEN FUEL ASSEMBLIES ARE BEING LIFTED.

E. THE NEW FUEL HANDLING CRANE SHALL BE RESTRAINED AND SUPPORTED SUCH THAT IT DOES NOT BECOME A HAZARD, IN THE EVENT OF AN SSE, TO SAFETY GRADE COMPONENTS, SYSTEMS, OR STRUCTURES.

5) THE CONTAINMENT POLAR CRANE IS DESIGNED IN ACCORDANCE WITH THE FOLLOWING DESIGN BASES:

A. THE LOAD-BEARING MEMBERS OF THE CONTAINMENT POLAR CRANE SHALL BE SEISMIC CATEGORY I.

B. THE CRANE SHALL BE DESIGNED IN ACCORDANCE WITH CMAA SPECIFICATION No. 70 - ELECTRIC OVERHEAD TRAVELLING CRANES.

C. THE CONTAINMENT POLAR CRANE SHALL BE RESTRAINED AND SUPPORTED SUCH THAT IT DOES NOT BECOME A HAZARD, IN THE EVENT OF AN SSE, TO SAFETY GRADE COMPONENTS, SYSTEMS OR STRUCTURES.

D. THE CONTAINMENT POLAR CRANE SHALL BE DESIGNED NOT TO RAISE THE BOTTOM OF THE REACTOR VESSEL HEAD HIGHER THAN 17 FEET ABOVE THE REACTOR VESSEL FLANGE WHILE THE CRANE HOOK IS OVER THE REACTOR VESSEL FLANGE, EXCEPT WITH A KEY-OPERATED INTERLOCK OVERRIDE USED WITH APPROPRIATE OPERATIONAL PROCEDURES.

SYSTEM DESCRIPTION
FUEL POOL COOLING AND CLEANUP SYSTEM

1) FUEL POOL COOLING SYSTEM

- CLOSED-LOOP SYSTEM CONSISTING OF TWO TRAINS, EACH CONSISTING OF ONE PUMP AND ONE HEAT EXCHANGER, AND PIPING, VALVES, CONTROLS AND INSTRUMENTATION REQUIRED TO FORM A COMPLETE FUNCTIONAL SYSTEM.

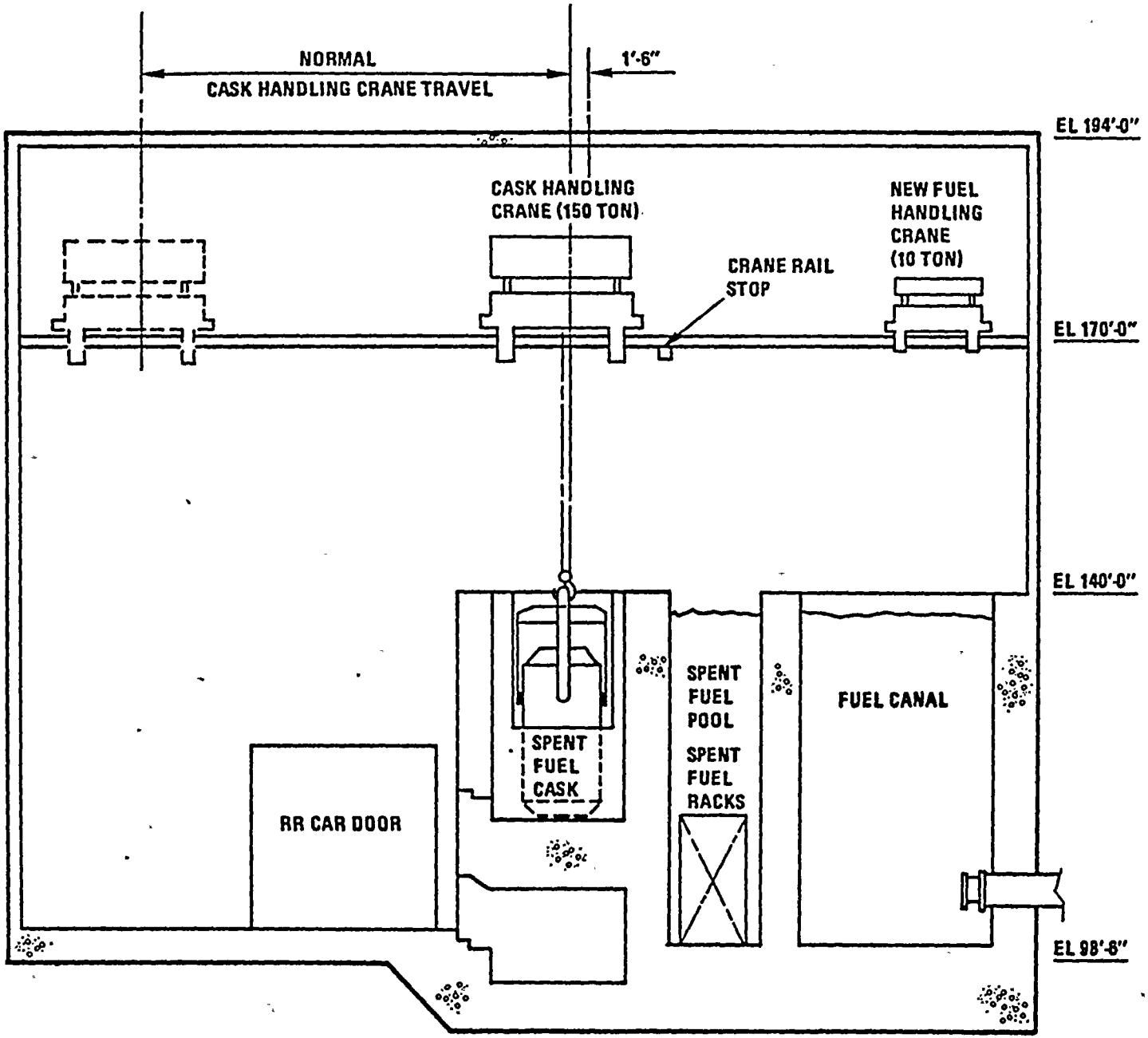
- PUMPS ARE PIPED IN PARALLEL AND TAKE SUCTION FROM THE SFP THROUGH A COMMON SUCTION HEADER. EACH PUMP DISCHARGES, THROUGH A SEPARATE HEAT EXCHANGER, INTO A COMMON DISCHARGE HEADER WHICH RETURNS COOLED WATER TO THE SFP.

2) FUEL POOL CLEANUP SYSTEM

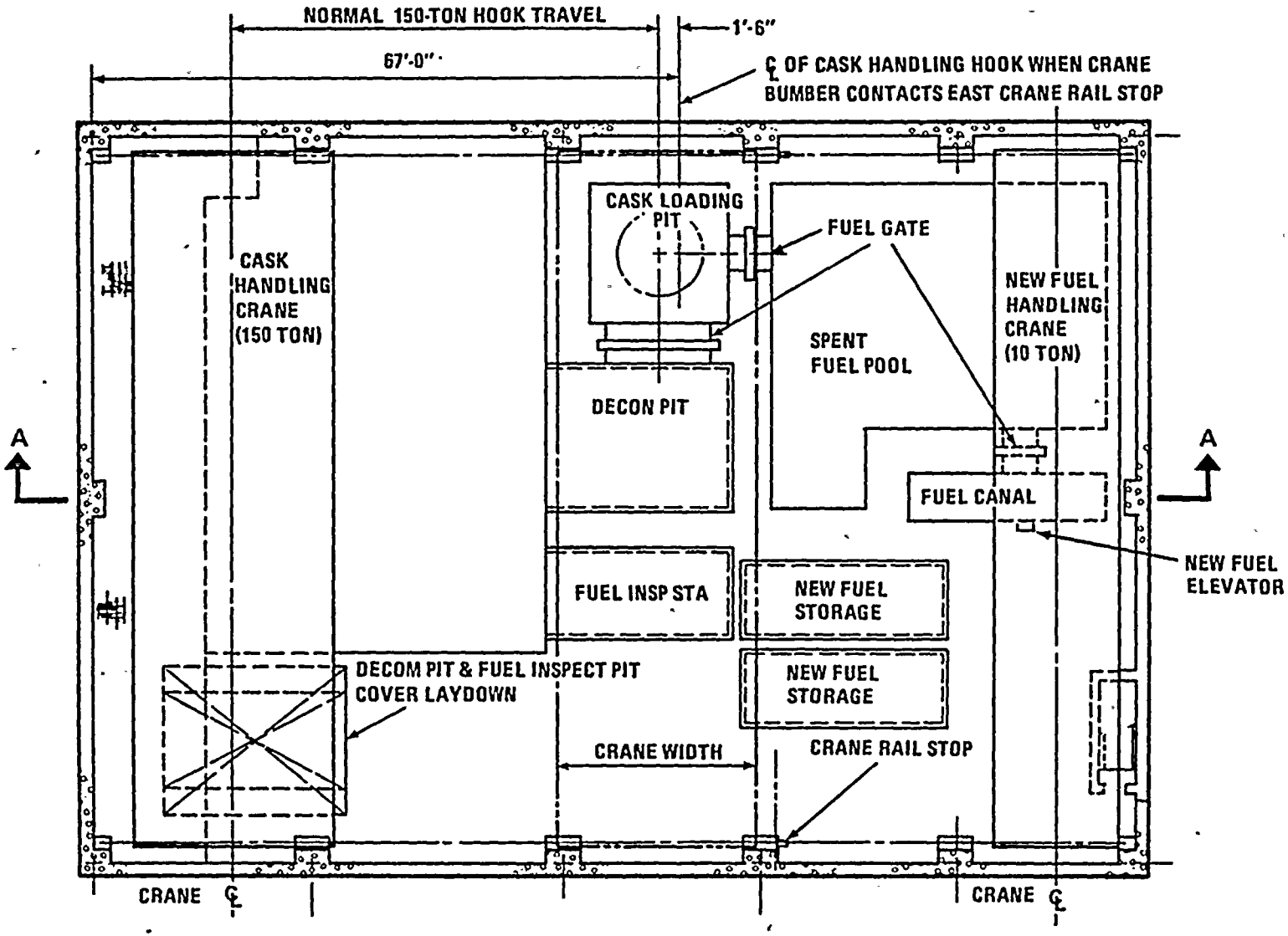
- THE FUEL POOL CLEANUP SYSTEM IS COMPOSED OF TWO FLOW TRAINS, EACH CONSISTING OF STRAINER, PUMP, FILTER, AND MIXED BED ION EXCHANGER. EITHER ONE OR BOTH TRAINS CAN BE ALIGNED TO CLEAN WATER IN THE SFP, REFUELING POOL, OR RWT.

- PROVISION IS MADE FOR TAKING SUCTION FROM ANY OR ALL OF THREE DIFFERENT LEVELS, AND FROM THE SURFACE SKIMMER IN THE SFP.

EXHIBIT 2-24



FUEL BUILDING FUEL STORAGE AND HANDLING – SECTION "A"
FIGURE 2-9



FUEL BUILDING FUEL HANDLING AND STORAGE

FIGURE 2-10

BTP ASB 9-1, OVERHEAD HANDLING SYSTEMS FOR NUCLEAR POWER PLANTS (CONT'D)

	REQUIREMENT	DESIGN FEATURE
N.	THE DYNAMIC AND STATIC ALIGNMENT OF ALL HOISTING COMPONENTS SHOULD BE MAINTAINED THROUGHOUT THE RANGE OF LOADS TO BE LIFTED.	IN COMPLIANCE.
O.	INCREMENT DRIVES FOR HOISTING MAY BE PROVIDED BY STEPLESS CONTROL OR INCHING MOTOR DRIVES.	IN COMPLIANCE. AN INCHING MOTOR DRIVE IS PROVIDED.
P.	CONTROL AND HOLDING BRAKES SHALL EACH BE RATED AT 100% OF THE MAXIMUM DRIVE TORQUE.	IN COMPLIANCE.
Q.	THE COMPLETE OPERATING CONTROL SYSTEM FOR THE OVERHEAD CRANE HANDLING SYSTEM SHOULD BE LOCATED IN THE MAIN CAB ON THE BRIDGE. LIMITING DEVICES SHOULD BE PROVIDED TO INDICATE, CONTROL, PRE-OVERTRAVEL, OVERSPEED OF HOIST AND/OR TROLLEY TRAVEL MOVEMENTS.	IN COMPLIANCE. THE NEW FUEL HANDLING CRANE HAS COMPLETE OPERATING CONTROL PROVIDED ON A PENDANT. THE CASK HANDLING AND CONTAINMENT POLAR CRANES HAVE CONTROLS LOCATED IN THE MAIN CABIN OF THE BRIDGE. RADIO CONTROL IS PROVIDED FOR THE CASK HANDLING AND POLAR CRANES.

ESSENTIAL COOLING WATER SYSTEM (ECWS)
DESIGN CRITERIA

1) THE ECWS SHALL CONSIST OF TWO INDEPENDENT IDENTICAL CLOSED-LOOP TRAINS. EACH TRAIN SHALL BE CAPABLE OF REMOVING 100 PERCENT OF THE HEAT LOAD FROM THE SAFETY-RELATED REACTOR AUXILIARIES DURING NORMAL OR FORCED SHUTDOWN OF THE PLANT.

2) HEAT SHALL BE REMOVED FROM THE ECWS BY THE ESSENTIAL SPRAY POND SYSTEM (ESPS) THROUGH THE ECWS HEAT EXCHANGERS. THE ESPS SHALL BE PIPED TO THE TUBE SIDE OF THESE HEAT EXCHANGERS.

3) EACH TRAIN OF THE ECWS, IN CONJUNCTION WITH THE SAFETY INJECTION AND SHUTDOWN COOLING SYSTEM, SHALL BE CAPABLE OF REMOVING SUFFICIENT HEAT FROM THE CONTAINMENT AND SAFETY-RELATED REACTOR AUXILIARIES TO ENSURE SAFE REACTOR SHUTDOWN IN THE EVENT OF A LOSS OF COOLANT ACCIDENT (LOCA) COINCIDENT WITH A LOSS OF OFFSITE POWER (LOP).

4) THE ECWS SHALL BE DESIGNED TO PERMIT THE DETECTION OF LEAKAGE INTO OR OUT OF THE SYSTEM.

5) THE MAXIMUM WATER TEMPERATURE AT THE SHELL SIDE OUTLET OF THE ECWS HEAT EXCHANGERS SHALL NOT EXCEED 105F 27-1/2 HOURS AFTER A NORMAL SHUTDOWN, AND 120F DURING A LOCA.

6) DESIGN OF THE ECWS SHALL INCLUDE PROVISIONS FOR ACCOMMODATING THE CLOSED-LOOP WATER EXPANSION AND CONTRACTION DUE TO THERMAL CHANGES IN THE SYSTEM.

EXHIBIT 3-1

ESSENTIAL COOLING WATER SYSTEM

CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR SECTION 5.4.7.1

REQUIREMENT

DESIGN FEATURE

B. COOLING WATER SHALL BE SUPPLIED AT THE FOLLOWING TEMPERATURES AND BE ABLE TO REMOVE THE HEAT LOADS LISTED FOR THE GIVEN CONDITIONS:

SHUTDOWN COOLING HEAT EXCHANGERS

SITUATION	COOLING WATER INLET TEMPERATURE	DESIGN HEAT LOAD (MILLION BTU/ HOUR) (INCLUDES BOTH HEAT EXCHANGERS)	EXPECTED RANGE OF COOLING WATER INLET TEMPERATURE	DESIGN HEAT LOAD (MILLION BTU/ HOUR) (INCLUDES BOTH HEAT EXCHANGERS
POST-LOCA SHUTDOWN COOLING:	65 - 120F	290	65 - 120F	290
3-1/2 HOURS AFTER SHUTDOWN	65 - 120F	247	65 - 120F	255
27-1/2 HOURS AFTER SHUTDOWN	65 - 105F	87.6	65 - 105F	87.8

EXHIBIT 3-6

ESSENTIAL COOLING WATER SYSTEM

CESSAR INTERFACE REQUIREMENTS
REFERENCE: CESSAR SECTION 5.4.7.1

REQUIREMENT		DESIGN FEATURE
c. FOR ALL CONDITIONS, COOLING WATER SHALL BE SUPPLIED AS FOLLOWS:		
PARAMETER	REQUIRED VALUE PER HEAT EXCHANGER	VALUE PER HEAT EXCHANGER
NORMAL ALLOWABLE DELIVERY PRESSURE	100 PSIG	50 PSIG
MAXIMUM ALLOWABLE DELIVERY PRESSURE	150 PSIG	88 PSIG
REQUIRED FLOWRATE	11,000 GAL/MIN	14,000 GAL/MIN
MAXIMUM ALLOWABLE FLOWRATE	13,000 GAL/MIN	14,000 GAL/MIN

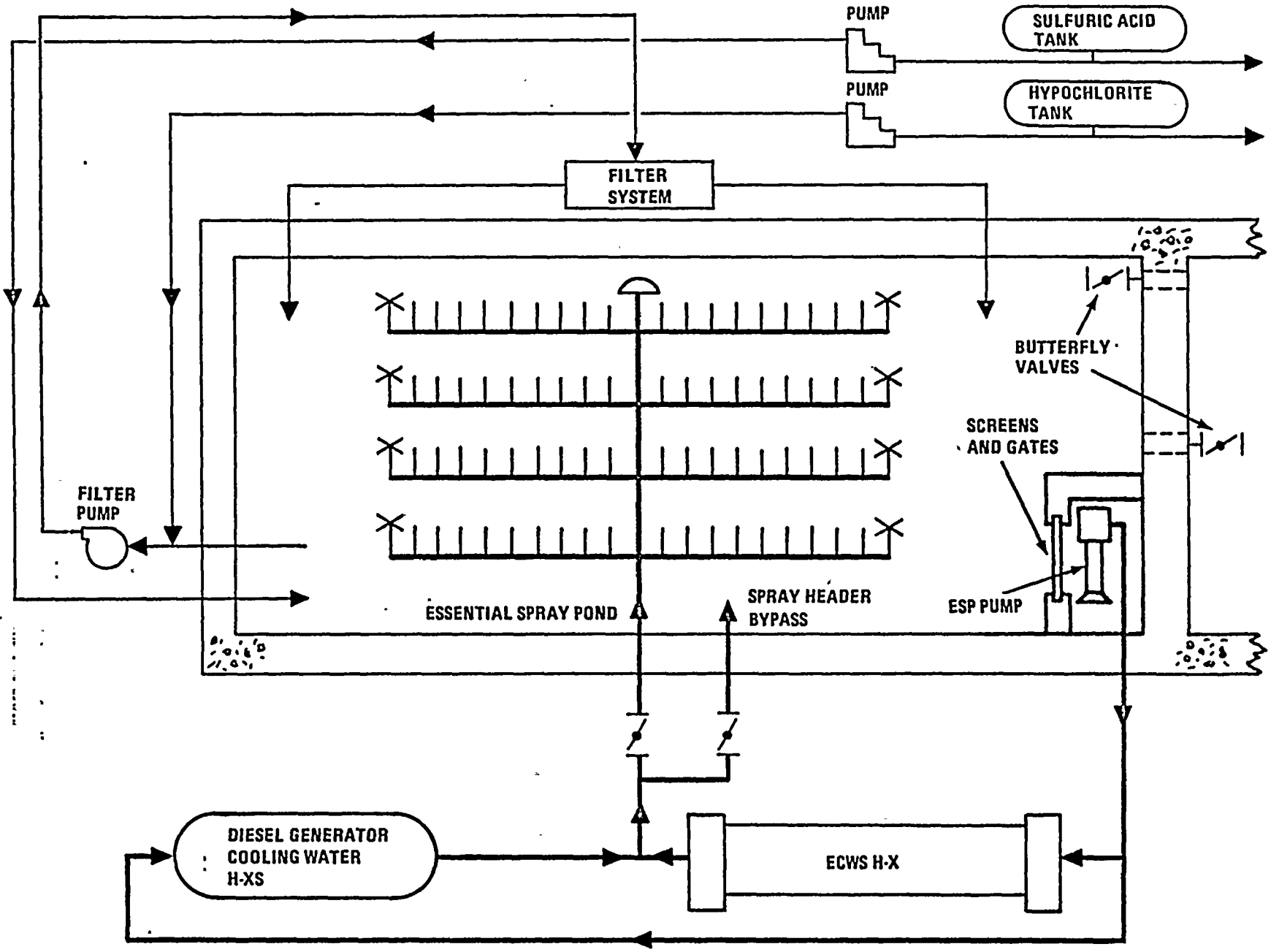
EXHIBIT 3-7

SRP ACCEPTANCE CRITERIA

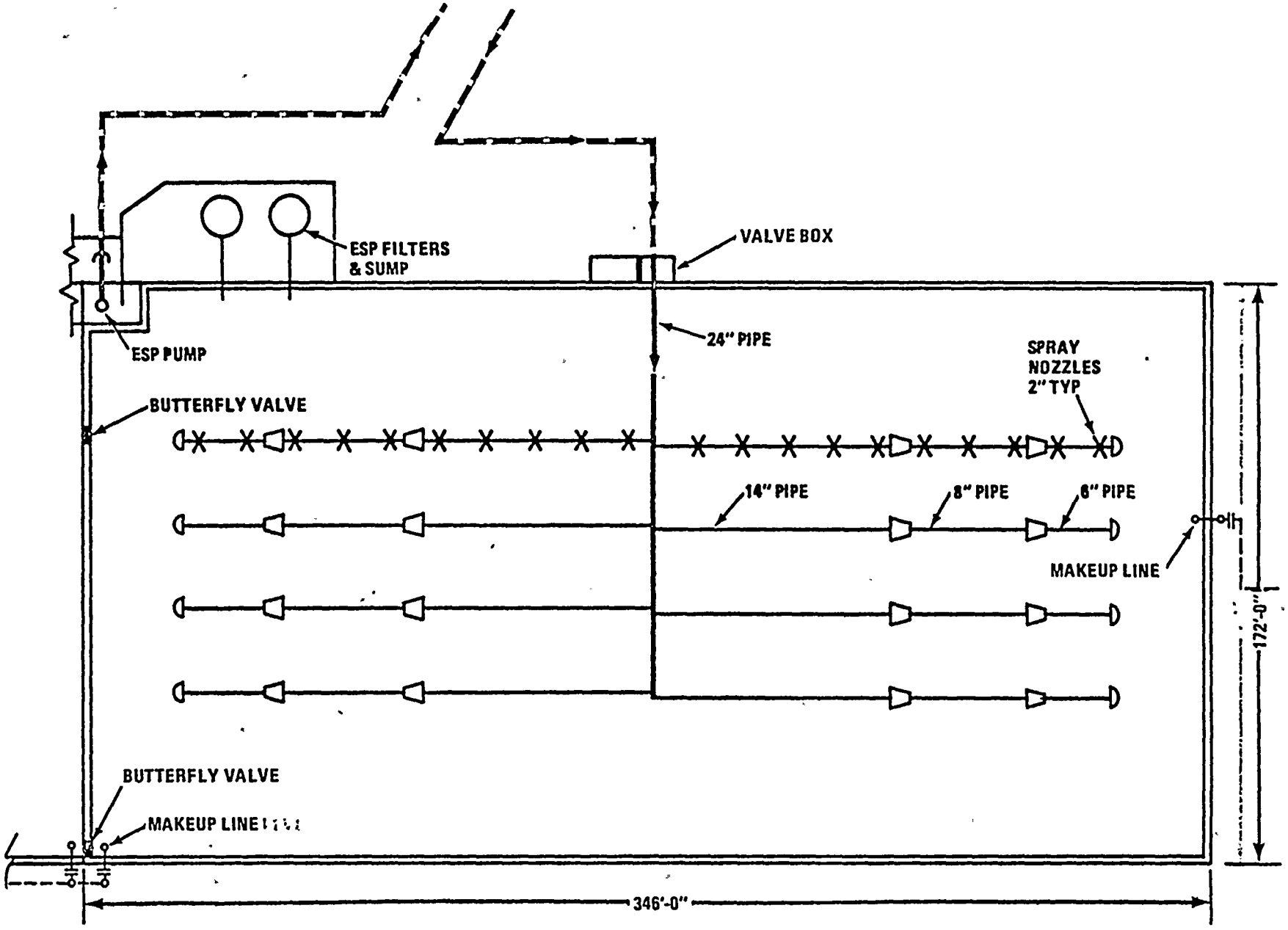
GENERAL DESIGN CRITERION 44, COOLING WATER

REQUIREMENT	DESIGN FEATURE
A SAFETY SYSTEM SHALL BE PROVIDED TO TRANSFER THE COMBINED HEAT LOAD OF ESF STRUCTURES, SYSTEMS, AND COMPONENTS UNDER NORMAL OPERATING AND ACCIDENT CONDITIONS TO AN ULTIMATE HEAT SINK. SUITABLE REDUNDANCY IN COMPONENTS AND FEATURES, AND SUITABLE INTERCONNECTIONS, LEAK DETECTION, AND ISOLATION CAPABILITIES SHALL BE PROVIDED TO ASSURE THAT THE SYSTEM SAFETY FUNCTION CAN BE ACCOMPLISHED, ASSUMING A SINGLE FAILURE WITH OR WITHOUT A LOSS OF OFFSITE POWER.	IN COMPLIANCE. EITHER OF THE TWO SEPARATE ECWS TRAINS WILL PROVIDE ADEQUATE COOLING WATER FLOW TO THE SHUTDOWN COOLING HEAT EXCHANGERS.

EXHIBIT 3-16



ESSENTIAL SPRAY POND SYSTEM (ONE OF TWO TRAINS)
FIGURE 4-2



ESP – TRAIN "B"
FIGURE 4-4

04-1-81