VERMONT YANKEE
NUCLEAR POWER CORPORATION

RD 5, Box 169, Ferry Road, Brattleboro, VT 05301

FVY 88-47

REPLY TO
ENGINEERING OFFICE
1671 WORCESTER ROAD
FRAMINGHAM, MASSACHUSETTS 01701
TELEPHONE 617-872-8100

June 7, 1988

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

References:
- a) License No. DPR-28 (Docket No. 50-271)
- b) Letter, VYNPC to USNRC, FVY 86-34, "Proposed Technical Specification Change for New and Spent Fuel Storage", dated 4/24/86
- c) Letter, VYNPC to USNRC, FVY 88-17, "Vermont Yankee Proposed Change No. 133 - Spent Fuel Pool Expansion," dated 3/2/88
- d) Letter, USNRC to VYNPC, NVY 88-093, "Spent Fuel Pool Expansion Reracking - Amendment No. 104," dated 5/20/88

Dear Sir:

Subject: Vermont Yankee Proposed Technical Specification Change for New and Spent Fuel Storage

By letter dated April 24, 1986 [Reference b)], Vermont Yankee submitted a proposed license amendment request to revise Section 5.5, "Spent and New Fuel Storage" of the Vermont Yankee Technical Specifications to increase the number of spent fuel assemblies allowed to be stored in the spent fuel pool. By letter dated March 2, 1988 [Reference c)], Vermont Yankee commited to design, install, test, and make operational, a redundant seismically designed Spent Fuel Pool Cooling System prior to the time Vermont Yankee exceeds the existing Technical Specification limit of 2,000 spent fuel assembly storage limit in the Vermont Yankee spent fuel pool. Subsequently, by letter dated May 20, 1988 [Reference d)], Amendment No. 104 to Vermont Yankee's license was issued allowing the installation of racks of a new design in the spent fuel pool sufficient to accommodate 2,870 fuel assemblies, and the storage of fuel assemblies in the new racks up to the present Technical Specification limit of 2,000 assemblies in the pool. Use of the remaining 870 storage positions for the storage of fuel assemblies was not authorized by the license amendment.

The NRC letter of May 20, 1988 transmitting Amendment No. 104 to the Vermont Yankee license stated that the staff would complete its review of the thermal-hydraulic aspects of Vermont Yankee's proposed change and consider a decision to increase the Technical Specification limit to 2,870

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1/1

assemblies after learning more about Vermont Yankee's plans for enhancing the Spent Fuel Pool Cooling System. Accordingly, Vermont Yankee submits as Attachment A to this letter a description of the enhanced Spent Fuel Pool Cooling System in the format of a revised Final Safety Analysis Report (FSAR). The design, installation and testing of the enhanced system will be in accordance with 10 CFR 50.59. On the basis of the information provided in Attchment A, Vermont Yankee requests issuance of the subject license amendment allowing Vermont Yankee use of the full 2,870 storage positions for storage of fuel assemblies in the spent fuel storage pool.

Very truly yours,

VERMONT YANKEE NUCLEAR POWER CORPORATION

Warren P. Murphy

Warren P. Murphy
Vice President and
Manager of Operations

/dm
cc: Mr. V. Rooney, USNRC
USNRC Regional Administrator, Region I
USNRC Resident Inspector, VYNPC
ASLB Service List

VYNPS

FUEL POOL COOLING AND DEMINERALIZER SYSTEM

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A FUEL POOL COOLING AND DEMINERALIZER SYSTEM

A.1 Power Generation Objective

The objective of the Fuel Pool Cooling and Demineralizer System is to remove the decay heat released from the spent fuel elements. The system maintains a specified fuel pool water temperature, purity, water clarity, and water level.

A.2 Safety Objective

The safety objective of the Fuel Pool Cooling and Demineralizer System is to remove decay heat from the stored fuel and maintain fuel pool water temperature at a level which will help maintain the Reactor Building environment within the bounding limits of the environmental qualification of electrical equipment.

A.3 Power Generation Design Bases

1. The Fuel Pool Cooling and Demineralizer System shall minimize corrosion product buildup within the spent fuel pool and shall maintain proper water clarity, so that the fuel assemblies can be efficiently handled underwater.

2. The Fuel Pool Cooling and Demineralizer System shall minimize fission product concentration in the spent fuel pool water, thereby minimizing the radioactivity which could be released from the pool to the Reactor Building environment.

3. The Fuel Pool Cooling and Demineralizer System shall monitor fuel pool water level and maintain a water level above the fuel sufficient to provide shielding for normal building occupancy.

4. The Fuel Pool Cooling System shall be capable of maintaining the spent fuel pool temperature below $150^{o}F$.

A.4 Safety Design Basis

The Fuel Pool Cooling and Demineralizer System shall be designed to remove the decay heat from the fuel assemblies and maintain fuel pool water temperature at a level which will help maintain the Reactor Building environment within the bounding limits of the environmental qualification of electrical equipment.

A.5 Description

General

The Fuel Pool Cooling and Demineralizer System (FPCDS) consists of four heat exchangers, four pumps, two demineralizers, piping and sufficient valves for control of the design functions and required isolation capability. The Fuel Pool Cooling and Demineralizer System pumps and heat exchangers are located in the Reactor Building below the bottom elevation of the fuel pool.

The fuel pool concrete structure, metal liner, spent fuel storage racks, and the Emergency Standby Subsystem of the FPCDS are designed to withstand Seismic Class I earthquake loads.

The FPCDS equipment is arranged in such a way as to provide a system with two independent means of cooling the spent fuel pool.

Normal spent fuel pool cooling and cleanup is provided by using the Normal Fuel Pool Cooling Subsystem. This subsystem consist of Pumps P-9-1A and 1B and Heat Exchangers E-19-1A and 1B which are arranged in two parallel trains with one train normally lined up and operating during plant operation. This subsystem of the FPCDS is used to provide pool water filtration and demineralization to maintain proper pool water clarity and cleanliness for refueling operations. The Normal Fuel Pool Cooling Subsystem also provides sufficient pool cooling to maintain pool temperatures within specified limits during normal refuelings (nominal one-third core discharge) and plant operations.

However, should an unusually high spent fuel decay heat load be placed in the pool, or a seismic event occur, the Emergency Standby Subsystem can be utilized to maintain pool temperatures within specified limits. The Emergency Standby Subsystem of the FPCDS consists of Pumps P-19-2A and 2B and Heat Exchangers E-19-2A and 2B which are normally lined up as two parallel trains in a standby mode to the Normal Fuel Pool Cooling Subsystem. Each train of the Emergency Standby Subsystem can be placed in service remotely.

Calculations of expected decay heat loads from normal refuelings and from a full core discharge both with previous cycles of spent fuel in the racks were performed in accordance with the guidance provided in NRC Standard Review Plan 9.1.3, Revision 1, dated July 1981. The normal discharges were assumed discharged to the pool at six days and ten days following shutdown from normal operation. The full core discharge was assumed discharged to the pool ten days following shutdown from normal operation for refueling. Six days following shutdown for a normal refueling is derived from the guidance provided in NRC Standard Review Plan 9.1.3. Ten days following shutdown for a normal refueling or a full core discharge is the earliest time at which the refueling cavity gates could be replaced isolating the reactor vessel from the spent fuel pool. The transfer of the spent fuel assemblies from the reactor vessel to the spent fuel pool is assumed to occur instantly at the six-day or ten-day time period providing a conservative fuel decay heat load in the spent fuel pool. Data from these analyses are provided in Table A.2. Examination of this data shows that while the Normal Fuel Pool Cooling Subsystem heat exchanger capacity may be exceeded for relatively short spent fuel decay times, the backup capability of the Emergency Standby Subsystem of the FPCDS is more than sufficient and can be placed in service until the fuel decay heat load is reduced.

The operating temperature of the fuel pool is permitted to rise up to 25°F above the administrative temperature limit (125°F) when the circulation flow is temporarily interrupted or when larger than normal batches of spent fuel are placed in the pool.

Emergency Standby Subsystem

The Emergency Standby Subsystem (ESS) of the FPCDS is shown in Figure A-1.

The Emergency Standby Subsystem of the FPCDS is a two train, Seismic Class I, Safety Class 3 System designed to prevent a single active failure from disabling both trains. It is designed as a standby system that can remotely be placed in operation from the Control Room. This portion of the system cools the fuel storage pool by transferring the spent fuel decay heat (see Table A.2) to the Service Water System. The pumps circulate the pool water in a closed loop, taking suction from the spent fuel storage pool through the heat exchangers and discharging it back into the fuel pool.

The emergency standby heat exchangers are of the shell and tube design, with all parts in contact with the pool water being corrosion resistant material. These heat exchangers are each sized to maintain the fuel pool water temperature below 150°F after a normal refueling. Considering one train (one heat exchanger and one pump), this heat removal capability encompasses the normal maximum heat load from completely filling the pool with 2,870 spent fuel assemblies from the last normal discharge. The combined heat removal capability considering both trains (two heat exchangers and two pumps) operating encompasses a full core discharge heat load completely filling the pool with 2,870 spent fuel assemblies. This provides sufficient heat removal capacity to preclude any impact on plant operation due to insufficient spent fuel pool cooling.

The heat exchangers are cooled by the seismically qualified safety-related Service Water System (SWS). The design of the system places the heat exchangers on the suction side of the pumps. In order to protect against fuel pool water leakage into the Service Water System, a positive differential pressure is maintained. The fuel pool water side of the heat exchangers has a maximum operating pressure equivalent to the static pressure head from the pool surface to the heat exchanger. The Service Water System side of the heat exchangers has a minimum operating pressure which is greater than the maximum pressure on the fuel pool side of the heat exchangers. By providing a positive differential pressure under all conditions of Service Water System operation, leakage of fuel pool water to the environment is prevented. The differential pressure across each heat exchanger is monitored by a differential pressure indicator in the Control Room.

The Emergency Standby Subsystem of the FPCDS includes two centrifugal pumps each with a design flow of 700 gpm. All the parts of the pump in contact with the pool water are corrosion-resistant material. The pumps are Seismic Class I and environmentally qualified to ensure operability after exposure to a harsh environment. The pumps are located within the FPCDS cubicle in such a manner to prevent common mode failure from fire, flooding, or missiles. A low discharge pressure alarm indicates in the Control Room, plus, the pumps are automatically tripped on a low suction pressure condition. One pump alone is designed to provide sufficient flow for the maximum normal heat load from a normal refueling discharge. For an abnormal heat load, such as full core discharge, two pumps can be running concurrently (one in each train) (reference Table A-1).

Four Motor-Operated Valves (MOVs) provide isolation from the nonseismic Normal Fuel Pool Cooling Subsystem and isolation and throttling of the service water through the heat exchangers. Each heat exchanger service water outlet MOV is powered by the same electrical source as its respective Emergency Standby Subsystem pump. These two MOVs V-19-J and K are throttling-type valves providing service water flow control through its respective heat exchanger, and thereby controlling both pool temperature and service water to fuel pool cooling differential pressure.

The two Normal Fuel Pool Cooling Subsystem Isolation Valves V-19-H and I are nonthrottling MOVs, each powered by a different safety-related electrical power supply. These isolation valves receive a signal to close on low pool level, providing automatic pool isolation from the Normal Fuel Pool Cooling Subsystem in case of a line break in this nonseismic portion of the FPCDS. In conjunction with the two Normal Fuel Pool Cooling Subsystem isolation MOVs in the supply line, there are two discharge line check valves. These Check Valves V-19-18 and V-19-G provide isolation of the nonseismic Normal Fuel Pool Cooling Subsystem from the

Emergency Standby seismic portion of the system. Thus, isolation of the nonseismic portions of the Normal Fuel Pool Cooling Subsystem is assured.

Piping associated with the Service Water supply and discharge to the heat exchangers and the fuel pool water piping will be of corrosion resistant material. The piping is designed and constructed in accordance with the requirements of ANSI B31.1-77. Valves in the fuel pool water piping are chosen considering their propensity not to collect corrosion products, pressure tight sealing capability, and ease of maintenance.

Indication is provided in the Control Room and/or locally near the equipment. Control Room indication for each train includes direct pool temperature, fuel pool water temperature out of the heat exchangers, pump run lights, pump discharge pressures, service water flow, SWS to ESS heat exchanger DP and valve position lights. Local indication includes fuel pool water temperature into the heat exchangers, pump discharge pressures, and heat exchanger DP. Pool temperature is provided by redundant thermocouples located within the pool. All other transmitters and sensors are located in or near the Fuel Pool Cooling System cubicle.

Control for the two pumps and four MOVs is provided in the Control Room. Control Room controls include pump on/off switches, service water throttle valves control switches, and Normal Fuel Pool Cooling Subsystem isolation valves control switches. These remote controls and instrumentation are provided to detect and control pump operation, pool temperature, and system flow, thereby ensuring operability of the Emergency Standby Subsystem of the FPCSD.

Normal Fuel Pool Cooling Subsystem

The Normal Fuel Pool Cooling Subsystem (NFPCS) is shown in Figure A-1. The system cools the fuel storage pool by transferring the spent fuel decay heat (see Table A.2) through heat exchanger(s) to the Reactor Building Closed Cooling Water System. Water purity and clarity in the storage pool, reactor well, and dryer-separator storage pit are maintained by filtering and demineralizing the pool water through filter-demineralizer(s), which is shown in Figure A-2.

The system consists of two circulating pumps connected in parallel, two heat exchangers, two filter-demineralizers, and the required piping, valves and instrumentation. Each pump has a design capacity equal to a filter-demineralizer design flow rate (450 gpm) and is capable of simultaneous operation. Two filter-demineralizers are provided. The pumps circulate the pool water in a closed loop, taking suction from the spent fuel storage pool, circulating the water through the heat exchanger(s) and filter demineralizer(s), and returning it to the fuel pool and reactor well.

The fuel pool filter demineralizers are located in the Radwaste Building.

The pools (dryer-separator storage pit, reactor well, and fuel storage pool) are filled from the Condensate Transfer System. Make-up to the pools is supplied by the Condensate Transfer System or the Demineralized Water System. Water is removed from the pools via the fuel pool pumps through the fuel pool filter-demineralizer units to the condensate storage tank.

Fuel pool water is continuously recirculated except during the temporary periods when the reactor well and dryer-separator pit are being drained. The Normal Fuel Pool Cooling Subsystem is capable of removing the decay heat load of the normal discharge batch of spent fuel with sufficient decay heat reduction. The Emergency Standby Subsystem can be used in lieu of the Normal Fuel Pool Cooling Subsystem to increase pool cooling in the event that a larger than normal amount of fuel is discharged into the pool or the normal fuel pool cooling heat transfer capacity is exceeded. During refueling, when the reactor well is flooded and the gates between the well and the pool are removed, the RHR System is also available to cool the fuel pool in concert with reactor vessel core cooling. The RHR System has more than enough capacity to cool the reactor vessel core plus the entire inventory in the spent fuel pool.

Two small skimmer pumps are provided which take suction from the top of the pool to remove surface debris. These pumps pump this water through cartridge filters then back to the pool through the service boxes located around the pools.

Pool water clarity and purity are maintained by a combination of filtering and ion exchange processes. The filter-demineralizer maintains total heavy element content (Cu, Ni, Fe, Hg, etc.) at 0.1 ppm or less, with a pH range of 5.8 to 8.0 for compatibility with the fuel racks and other equipment. Particulate material is removed from the circulated water by the pressure precoat filter-demineralizer unit in which a finely divided disposable filter medium is supported on permanent filter elements. The filter medium is replaced when the pressure drop is excessive or the ion exchange resin is depleted. Backwashing and precoating operations are manually controlled from the Radwaste Building. The spent filter medium is flushed from the elements and transferred to the condensate phase separator tanks by backwashing with air and condensate. The new filter medium is mixed in a precoat tank and transferred as a slurry by a precoat pump to the filter where the solids deposit on the filter elements. The holding pump maintains circulation through the filter in the interval between the precoating operation and the return to normal system operation to hold the precoat on the elements. The pump starts automatically on loss of system flow to maintain sufficient flow through the filter media to retain it on the filter elements.

A post-strainer is provided in the effluent stream of the filter-demineralizer to limit the migration of the filter material. The filter holding element is capable of withstanding a differential pressure greater than the developed pump head for the system. The maximum pressure drop across the filter and associated process valves and piping should not exceed 25 psid at the time of filter media replacement. The Backwash System is used to completely remove resins and accumulated sludge from the filter demineralizers with a minimum volume of water. Backwash slurry drains to a phase separator. The Precoat System is designed to rapidly apply a uniform precoat of filter media to the holding elements of a filter demineralizer. One centrifugal precoat pump and associated piping and valves are provided to precoat either filter-demineralizer and recirculate the water to the precoat tank or suction side of the precoat pump. The filter-demineralizer units are located separately in shielded rooms. Each room contains only the filter-demineralizer and piping. All inlet, outlet, recycle, vent, drain, and other valves are located on the outside of one shielding wall of the room, together with necessary piping and headers, instrument elements, and controls. Penetrations through shielding walls are located so as not to compromise radiation shielding requirements.

The fuel pool filter-demineralizers are also used to process liquid radioactive wastes. See Chapter 9 of the Vermont Yankee FSAR for details.

The system instrumentation is provided for both automatic and remote manual operations. Instrumentation and controls are provided to detect, control and record pump operation, pool temperature, and system flow. A pool Leak Detection System has been provided to monitor leakage and thus indicate pool integrity.

The pumps can be controlled locally or at Panel 20-22 in the Radwaste Control Room. Pump low suction pressure automatically trips the pumps. A pump low discharge pressure alarm indicates in the Radwaste Control Room and a common trouble alarm in the Main Control Room.

The flow rate through each of the filter-demineralizers is indicated by a flow indicator on the Pump Room panel and in the Radwaste Control Room. The flow indicators can be seen by the operators from the vicinity of the Fuel Pool Cooling System control valves.

A high rate of leakage through the refueling bellows assembly, drywell to reactor seal, or the fuel pool gates is indicated by lights on the operating floor instrument racks and is alarmed in the Main Control Room.

The filter-demineralizers are controlled from a local panel in the Radwaste Building. Differential pressure and conductivity instrumentation are provided for each filter-demineralizer unit to indicate when backwash is required.

Suitable alarms, differential pressure indicators, and flow indicators are provided to monitor the condition of the filter-demineralizers.

A.6 Safety Evaluation

Maximum normal heat load in the pool will be the sum of the heat from all previous batches plus that just discharged from the current refueling. The Normal Fuel Pool Cooling Subsystem of the Fuel Pool Cooling and Demineralizer System is used normally to maintain the pool water temperature below administrative limits during refuelings and plant operation. The Emergency Standby Subsystem is available to provide additional cooling, if needed, to ensure that the pool temperature does not exceed 150°F.

Maximum possible heat load would be the sum of the heat from all previous batches plus the heat from a full core discharge. If such a situation arose, the Emergency Standby Subsystem would be used to provide the cooling capacity needed under these conditions, or other high heat load conditions, to maintain the pool water temperature less than 150°F. Also, as an additional means of cooling the spent fuel pool during refueling operations, when the fuel pool and the refueling cavity are connected and filled with water, the Residual Heat Removal (RHR) System can be utilized to provide concurrent cooling to the core and spent fuel pool by circulating the water from the core to the pool and back to the core. In this mode, the RHR System will be in operation providing cooling to the core and can be shifted to provide concurrent reactor core and spent fuel pool cooling. The RHR System has more than enough capacity to cool both the reactor core and the entire inventory of stored spent fuel in the spent fuel pool.

The Emergency Standby Subsystem is designed to provide pool cooling under all licensed plant conditions. This portion of the system is designed as Seismic Class I using the Seismic Class I Service Water System to remove spent fuel decay heat to the ultimate heat sink (Connecticut River). Essential electrical components in this portion of the system are also environmentally qualified to ensure operability under design basis accident conditions. In addition, the equipment is located in such a manner as to prevent common mode failure from fire, flooding, or missiles. Providing sufficient pool cooling and environmental qualification, assures that the spent fuel will be cooled and boiling will not occur in the spent fuel pool. Therefore, the Reactor Building environment will not be subject to the consequences of a boiling spent fuel pool.

Leakage of potentially radioactive water from the Emergency Standby Subsystem through the heat exchanger into the Service Water System is prevented by providing a higher service water pressure than the Emergency Standby Subsystem pressure. This differential pressure ensures that leakage, if any, will go into the pool. Indication of this differential pressure is provided in the Control Room along with the controls for initiating the emergency standby portion of the system.

Leakage of the potentially radioactive water from the Normal Fuel Pool Cooling Subsystem to the Service Water System is prevented by using an intermediate closed loop cooling system, Reactor Building Closed Cooling Water (RBCCW), which transfers the heat from the Normal Fuel Pool Cooling Subsystem to the Service Water System. This Closed Loop System arrangement ensures that fuel pool water leakage, if any, is contained within the RBCCW System and not released into the Service Water System.

The normal fuel pool cooling flow rate is designed to be larger than that required of two complete water changes per day of the fuel pool, or one change per day of the fuel pool, reactor well, and dryer-separator pit. The Emergency Standby Subsystem flow rate (700 gpm) is approximately 50% greater than the normal fuel pool cooling flow rate (450 gpm). The maximum Normal Fuel Pool Cooling Subsystem flow rate is twice the flow rate needed to maintain the specified water quality.

An analysis has been made to determine the consequences of dropping a fully loaded spent fuel shipping cask into the fuel storage pool. The results of that analysis showed that the bottom of the pool would lose its water-tight integrity, thereby making it difficult to maintain adequate shielding and cooling of the stored spent fuel. To prevent any load-drop occurrence, the

Reactor Building crane is designed to be single-failureproof. (See Section 12.2.2.2. of the Vermont Yankee FSAR)

A.7 Inspection and Testing

No special tests are required of the Normal Fuel Pool Cooling Subsystem because at least one pump, heat exchanger, and filter-demineralizer are normally in operation while fuel is stored in the pool. Redundant units are operated periodically to handle abnormal heat loads or to replace a unit for servicing. Routine visual inspection of the system components, pumps, heat exchangers, instrumentation, and trouble alarms are adequate to verify system operability.

The redundant units of the Emergency Standby Subsystem are periodically operated to ensure that the active components of the subsystem can isolate and provide pool cooling by remote manual initiation. Routine visual inspections of the system components, pumps, heat exchangers, instrumentation, and alarms are adequate to verify system operability.

TABLE A.1

FUEL POOL COOLING AND DEMINERALIZER SYSTEM -
SYSTEM SPECIFICATIONS

System Function	System Specification
Normal Fuel Pool Cooling Subsystem	
Total pool, well, and pit volume	81,500 ft^3
Fuel storage pool volume	41,600 ft^3
System design flow	450 gpm
Maximum flow	900 gpm
Pump characteristics	450 gpm, 225 feet TDH, 25 feet NPSH
Heat exchanger - Capacity each	2.23 x 10^6 Btu/hour, FPC temperature 125°F, RBCCW temperature 100°F, RBCCW flow 350 gpm
Filter-demineralizer	267 square feet, 450 gpm, 25 psi maximum differential pressure (dirty)
Emergency Standby Subsystem	
System design flow	700 gpm
Maximum flow	1400 gpm
Pump characteristics	700 gpm, 80 feet TDH, 24 feet NPSH
Heat exchanger - Capacity each	11.0 x 10^6 Btu/hour, FPC temperature 150°F, SW temperature 90°F, SW flow 700 gpm

TABLE A.2

FUEL DECAY HEAT (ESTIMATED), AFTER OPERATION OF 18 MONTHS

- NORMAL REFUELING, 136 ASSEMBLIES DISCHARGED
- FULL CORE DISCHARGE, 368 ASSEMBLIES DISCHARGED

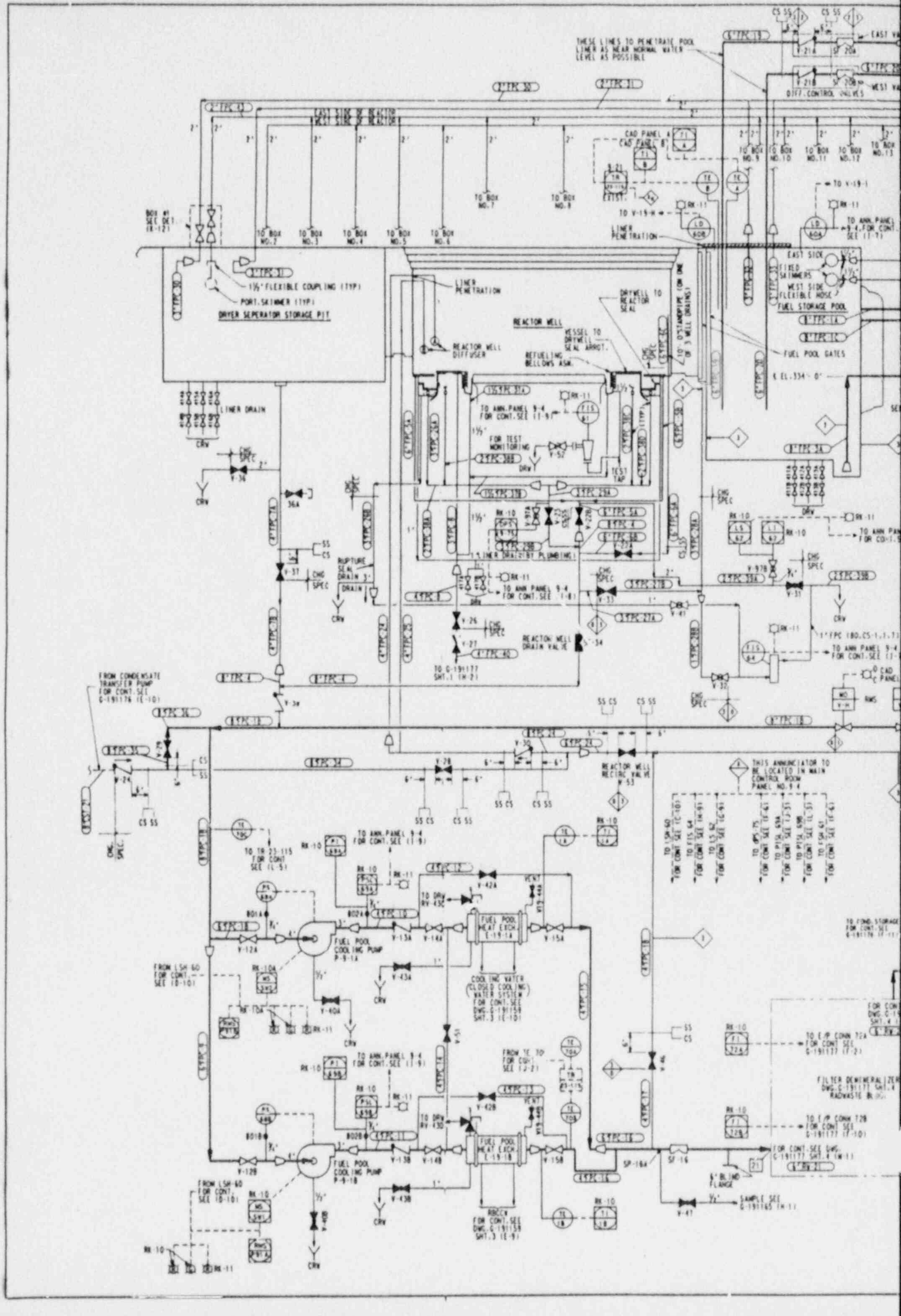
	Decay Heat (10^6 Btu/hr)				
	Normal Refueling Discharge			Full Core Discharge	
Cycle Discharged	Number of Bundles In Pool	6 Days After Shutdown	10 Days After Shutdown	Number of Bundles In Pool	10 Days After Shutdown
13 (1)	1,586	8.75	7.59	1,818	16.84
14	1,722	9.00	7.79	1,954	17.18
15	1,858	9.18	7.96	2,090	17.37
16	1,994	9.35	8.12	2,226	17.53
17	2,130	9.50	8.28	2,362	17.69
18	2,266	9.65	8.42	2,498	17.84
19	2,402	9.80	8.57	2,634	17.99
20 (2)	2,538	9.94	8.71	2,770	18.13
21	2,674	10.07	8.84	2,906 (3)	18.26
22	2,810	10.20	8.97		N/A
23	2,946 (3)	10.33	9.10		N/A

NOTE: The decay heat from the previous cycle discharges is included in the above-estimated heat loads.

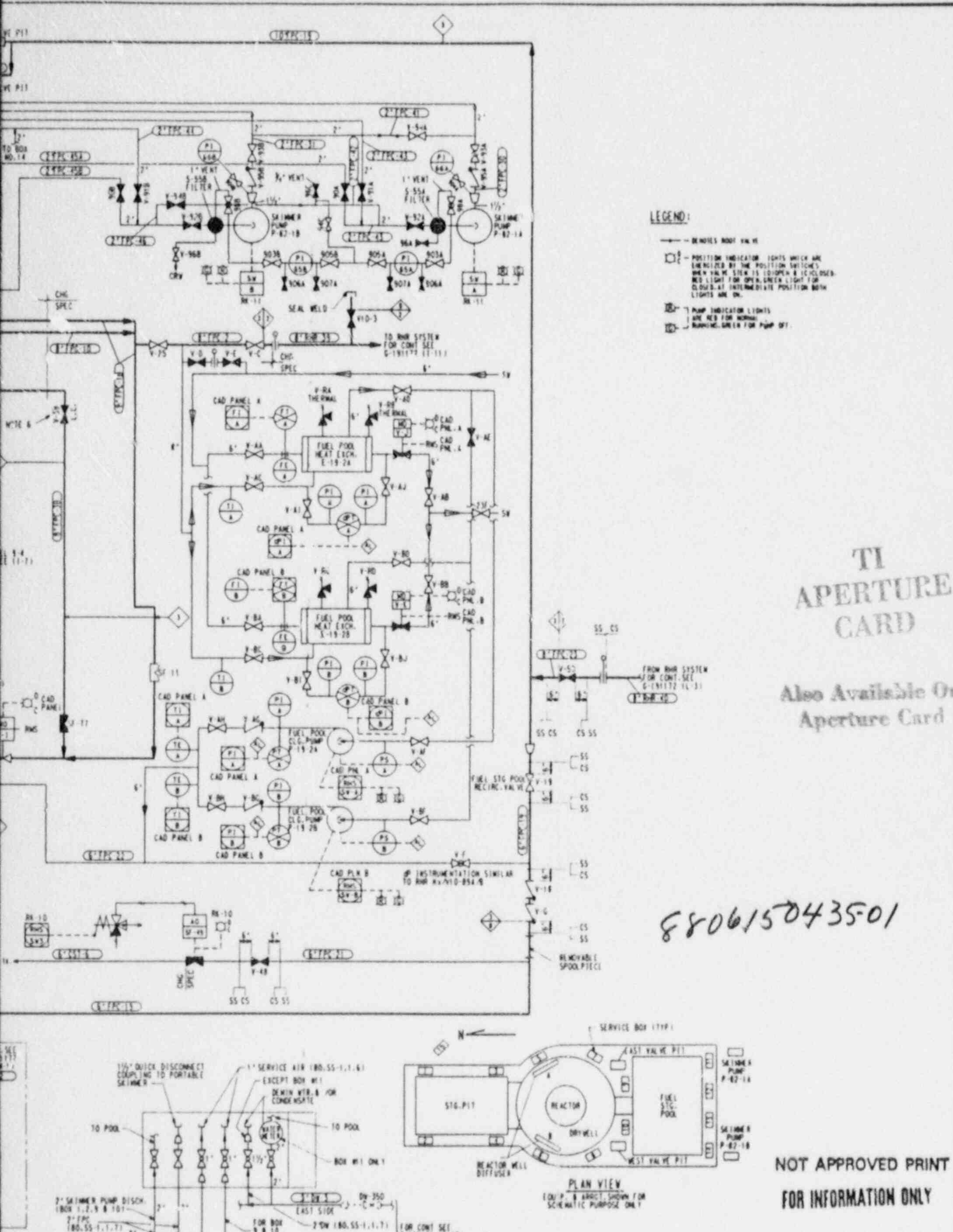
1. Vermont Yankee is currently in Cycle 13; estimated shutdown is 2/1989.

2. Loss of full core reserve discharge capability.

3. Exceeds capacity of reracked fuel pool.



THESE LINES TO PENETRATE POOL LINER AS NEAR NORMAL WATER LEVEL AS POSSIBLE
EAST SIDE OF REACTOR
WEST SIDE OF REACTOR
DIFF. CONTROL VALVES
1½" FLEXIBLE COUPLING (TYP)
PORT. SKIMMER (TYP)
DRYER SEPERATOR STORAGE PIT
LINER DRAIN
LINER PENETRATION
REACTOR WELL
REACTOR WELL DIFFUSER
VESSEL TO DRYWELL SEAL ARRGT.
REFUELING BELLOWS ASM.
DRYWELL TO REACTOR SEAL
FUEL STORAGE POOL
FUEL POOL GATES
RUPTURE SEAL DRAIN
REACTOR WELL DRAIN VALVE
REACTOR WELL RECIRC VALVE
FROM CONDENSATE TRANSFER PUMP FOR CONT. SEE G-191176 (E-10)
THIS ANNUNCIATOR TO BE LOCATED IN MAIN CONTROL ROOM PANEL NO. 9-4
FUEL POOL COOLING PUMP P-9-1A
FUEL POOL HEAT EXCH E-19-1A
FUEL POOL COOLING PUMP P-9-1B
FUEL POOL HEAT EXCH E-19-1B
FILTER DEMINERALIZER DWG. G-191177 SHT.4 RADWASTE BLDG
6" BLIND FLANGE
SAMPLE SEE G-191165 (H-11)



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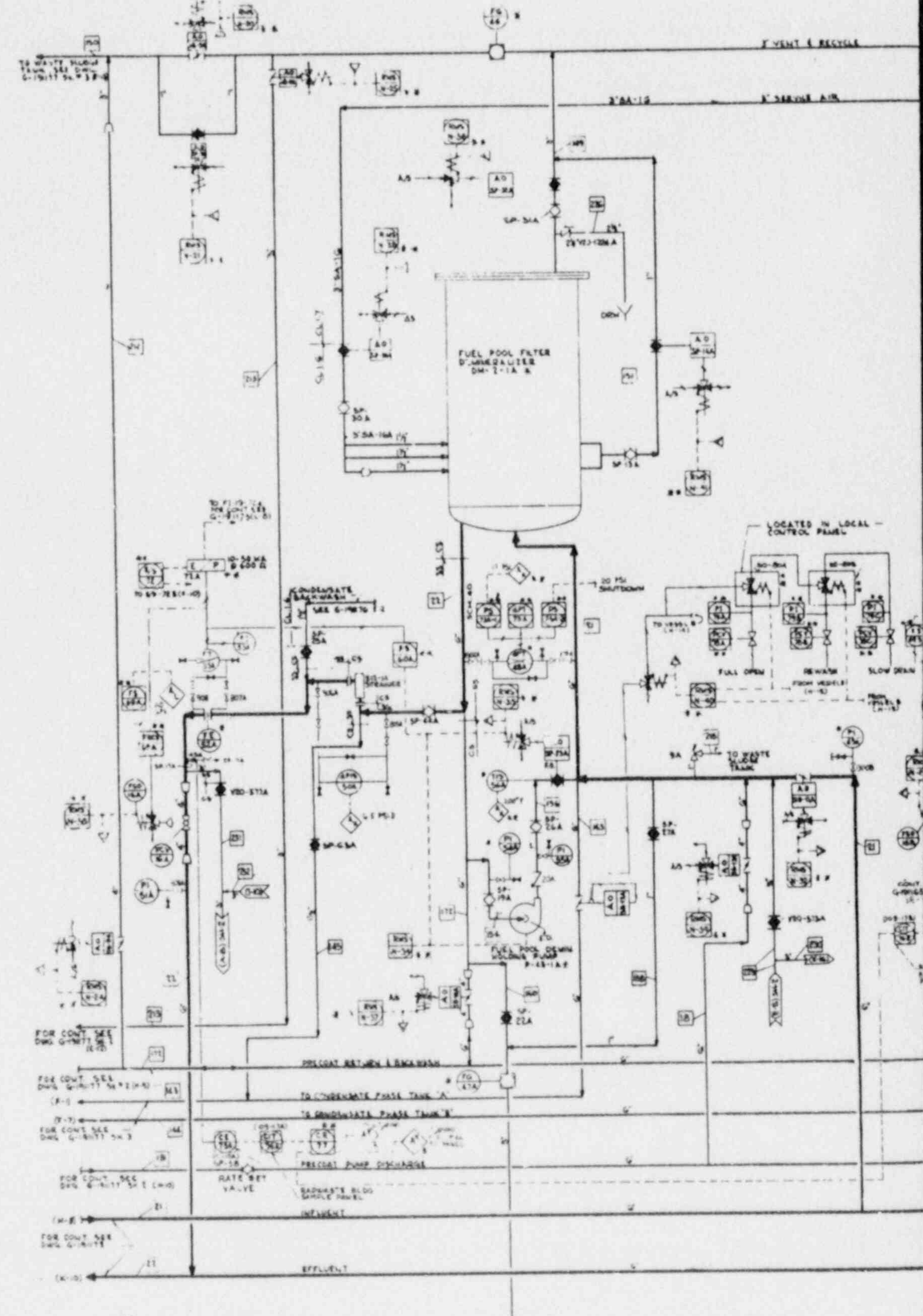
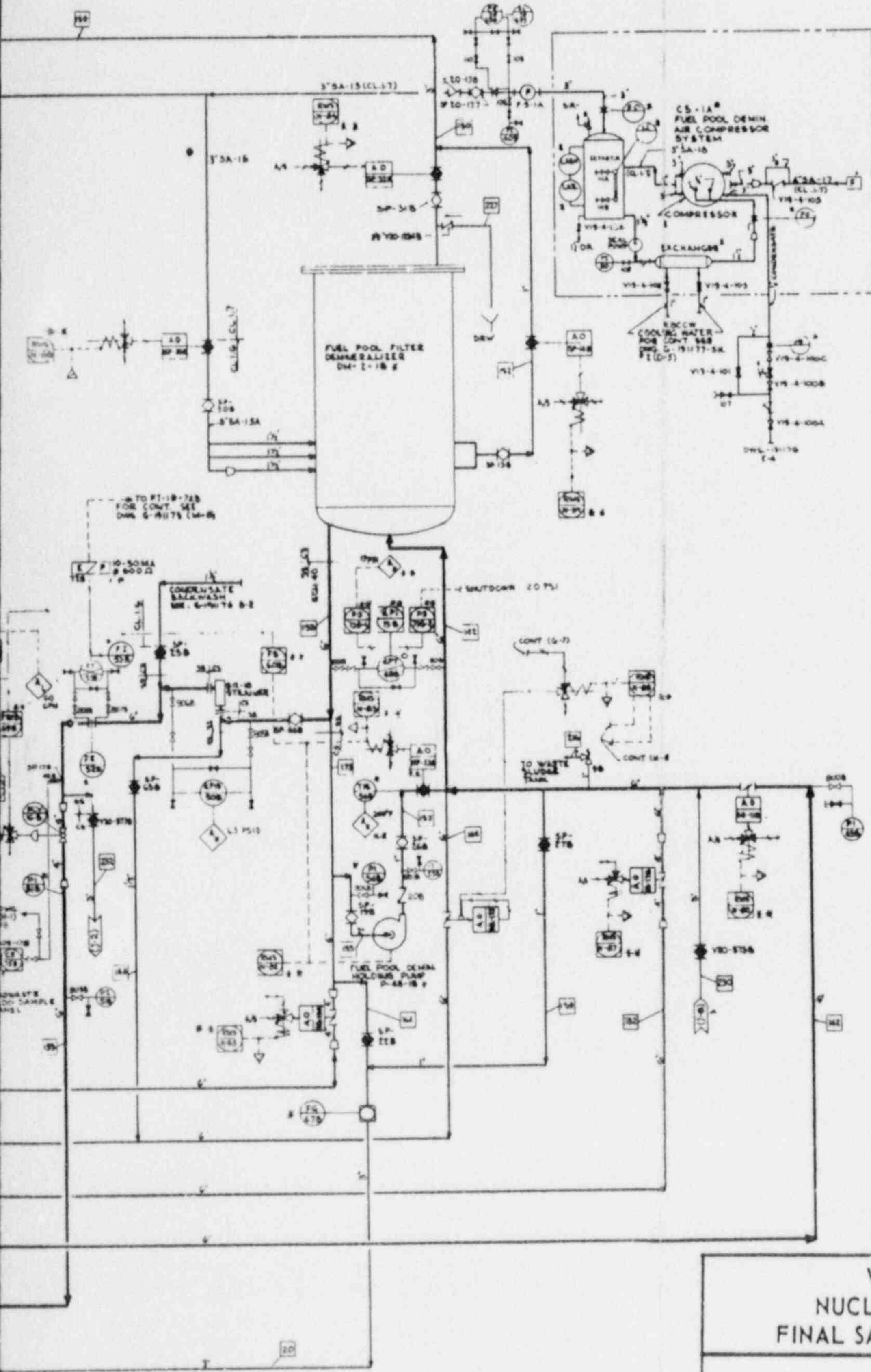
FINAL SAFETY ANALYSIS REPORT

FUEL POOL COOLING SYSTEM
FIGURE A-1


3" VENT & RECYCLE
3" SERVICE AIR
FUEL POOL FILTER
LOCATED IN LOCAL CONTROL PANEL
20 PSI SHUTDOWN
FULL OPEN
REWASH
SLOW DRAIN
FOR CONT SEE
PRECOAT RETURN & BACKWASH
TO CONDENSATE PHASE TANK "A"
TO CONDENSATE PHASE TANK "B"
PRECOAT PUMP DISCHARGE
RATE SET VALVE
INFLUENT
EFFLUENT
TO CHEMICAL WASTE TANK



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FINAL SAFETY ANALYSIS REPORT

Fuel Pool Filter Demineralizer System

Figure A-2