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SUBJECT:
REQUESTING NRC APPROVAL TO EMPLOY THE EXISTING COOLING SYSTEM FOR THE FULL CORE DISCHARGE SCHEDULE FOR EARLY SPRING 1979 AT SUBJECT FACILITY; ~~W/~~ trans Discussion RE EXPANSION OF THE SPENT FUEL COOLING... W/ATT SUPPORTING INFO & DIAGRAMS.

PLANT NAME: RE GINNA - UNIT 1

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LEON D. WHITE, JR.
VICE PRESIDENT

TELEPHONE
AREA CODE 716 546-2700

August 3, 1978

Director of Nuclear Reactor Regulation
Attention: Mr. D.L. Ziemann, Chief
Operating Reactor Branch #2
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Spent Fuel Pool Cooling
R.E. Ginna Nuclear Power Plant, Unit No. 1
Docket No. 50-244

Dear Mr. Ziemann:

In early 1977, Rochester Gas and Electric Corporation (RG&E) expanded the fuel storage capacity of the Ginna spent fuel pool from 210 fuel assembies to 595 assembies. This modification was performed in order to provide storage through the late 1980's. Amendment No. 17 to the Ginna Operating License, issued on November 17, 1976, included a discussion of the present spent fuel cooling system. The attachment to this letter enlarges upon the discussion presented by RG&E in its requests for storage capacity expansion (see RG&E letters of January 26, 1976 and June 3, 1976).

The purpose of this letter is to request approval by the NRC to employ the existing cooling system for the full core discharge schedule for early Spring 1979 at Ginna.

Very truly yours,

L.D. White, Jr.

A001 S/1

Spent Fuel Pool Cooling

August 1978

In early 1977, Rochester Gas and Electric Corporation (RG&E) expanded the fuel storage capacity of the Ginna spent fuel pool from 210 fuel assemblies to 595 assemblies. This modification was performed in order to provide storage through the late 1980's. Ammendment No. 17 to the Ginna Operating License, issued on November 17, 1976, included a discussion of the present spent fuel cooling system. The purpose of this attachment is to enlarge upon the discussion presented by RG&E in its requests for storage capacity expansion (see RG&E letters of January 26, 1976 and June 3, 1976) and to describe how the existing cooling system will be used for the full core discharge schedule for early Spring 1979 at Ginna.

It was recognized that increasing the number of fuel assemblies stored in the spent fuel pool would increase the loading on the spent fuel pool cooling system (SFPCS). The modification was approved by the NRC with the Technical Specification limit that the pool temperature remain below 150°F during normal operation and that, if the pump or heat exchanger in the cooling system were to fail, sufficient time would be available to bring backup equipment into service so that the pool temperature would not exceed 180°F. Estimates provided by RG&E indicated that, in all cases, backup equipment could be installed in 7 hours and it was determined that in 7 hours, the pool temperature would not exceed 180°F. The NRC Staff found this acceptable. All the design basis analyses performed to obtain these results were performed assuming a conservatively high service water (Lake Ontario) temperature of 80°F.

Analyses for a normal, nominally one-third core, refueling showed and continue to show that the pool temperature will remain below 150°F even with 80°F service water and that sufficient time (at least 7 hours) is available to bring backup equipment into service in the event of a pump or heat exchanger failure.

In the event of a full core discharge, a substantial length of time, approximately 30 days assuming full power operation prior to shutdown, is required between plant shutdown and the completion of the full core discharge if the service water is at 80°F in order to maintain the pool temperature below 150°F. For general design purposes, it remains appropriate to consider the situation of 80°F service water. In this regard, RG&E is in the process of developing design criteria for a new spent fuel pool cooling system which will meet these and other requirements. We expect to submit the details of this system to the NRC for approval in the next few months. Installation of this new system could not be accomplished prior to the 1979 shutdown.

The reactor vessel inservice inspection for 1979 requires a full core discharge. Because the time of year of this full core discharge is preplanned, it is not necessary to assume the service water temperature will be 80°F and require, therefore, the extra critical path time for decay heat reduction. Rather, the full core discharge can be accomplished earlier in the shutdown, with

direct shortening of the entire outage, if the historical records of intake temperature (service water) are used to develop a conservative upper limit of service water temperature for the time of year that the full core discharge will take place.

The following paragraphs describe the SFPCS and backup systems with detailed justification of service water temperature and spent fuel pool temperature if portions of the SFPCS become inoperable.

The SFPCS is illustrated on Figure 1. The system consists of a single loop containing a pump and heat exchange. Water is drawn from the spent fuel pool (SFP) by the SFP pump, forced through the heat exchanger, and returned to the SFP. The heat exchanger is cooled by service water. Approximately 10% of the water from the SFP bypasses the heat exchanger and is passed through a demineralizer and filter.

The temperature of the service water going into the SFP heat exchanger is a controlling factor in determining the heat transfer capability of the SFP cooling system. The service water temperature is the same as the intake (lake) water temperature except during the winter months when recirculation is used as necessary to maintain a water temperature of approximately 37°F.

The 1979 refueling outage is tentatively scheduled for March 2, 1979. Based on this shutdown date, and on full power operation up to this point, by April 1, the full core discharge could be completed and the SFP would not exceed 150°F even with 80°F service water. For completion of the full core discharge prior to April 1, credit must be taken for lower lake temperature.

Table 1 illustrates the monthly average of the daily minimum, average, and maximum intake water temperatures for the first four months of the year.

Table 2 presents lists of the minimum and maximum intake water temperatures that occur at any time during those month.

The intake water temperature has been recorded since December 1969. The data show the following:

1. the monthly average of the daily average temperature has not exceeded 43°F from January through April.

2. the monthly average of the daily maximum temperature has not exceeded 44°F from January through April.

3. the instantaneous daily maximum temperature has not exceeded 56°F from January through April. The temperature exceeded 50°F for only two days, April 18 and 19, 1974 during this period.

4. the instantaneous daily maximum temperature has not exceeded 50°F from January through March.

Therefore, a conservative service water temperature for January through March would be 50°F and for January through April would be 60°F. (The May temperature also has not exceeded 60°F.)

The design capacity of the SFPCS was calculated to be 9.3×10^6 BTU/hr with a SFP temperature of 150°F and a service water temperature of 80°F. If the service water temperature is 50°F, the design capacity is calculated to be approximately 13.2×10^6 BTU/hr. If the service water temperature is 60°F the design capacity is calculated to be 12.0×10^6 BTU/hr.

Figure 2 illustrates the decay heat generated by the 1979 Full Core Discharge and the decay heat generated by the fuel assemblies stored in the SFP. The decay heat was calculated using the equations presented in the Branch Technical Position APCSB 9-2, "Residual Decay Energy for Light Water Reactors for Long Term Cooling." The calculations were done assuming finite assembly burnup based on actual group average burnups.

Based on Figure 2 and a 12.0×10^6 BTU/hr heat removal capacity, approximately 15 days of cooling is required before the entire core can be placed in the SFP. (Fuel movement can begin prior to 15 days as long as the 12.0×10^6 BTU/hr limit is maintained.) At 12.0×10^6 BTU/hr the SFP will go from 150 to 180°F in approximately 5.4 hours versus the 7 hours if the SFPCS is lost. If the 13.2×10^6 BTU/hr heat removal capacity is used from Figure 2, approximately 12 days of cooling is required before the entire core can be placed in the SFP.

The SFPCS is designed such that backup equipment can be used should the normal components not be operable. A portable pump is available should the SFP pump not be operable. In the event the SFPCS heat exchanger is lost, cooling can be provided using temporary connections to one of the component cooling heat exchangers. Since the component cooling system contains chromated water, the heat exchanger must be isolated and drained before it can be used for spent fuel pool cooling.

Figure 3 illustrates the connection of the portable pump to the SFPCS. The dashed lines indicate the portable pump and temporary connections. The following steps would be employed in connecting the portable pump:

1. Stop SFPCS pump
2. Close valves 781, 782, 789, 790, 804, 787, 785
3. Drain system
4. Close SFPCS pump spectacle flange
5. Remove blind flanges ECC1 and ECC2
6. Connect hose from ECC2 to suction side of portable pump
7. Connect hose from ECC1 to discharge side of portable pump

8. Open valves 781 and 785
9. Start portable pump

It is estimated that approximately 45 minutes would be required to position the portable pump and approximately 45 minutes to install the pump.

Figure 4 illustrates the connection of the "A" Component Cooling heat exchanger to the SFPCS. The dashed lines indicate the temporary connections to the heat exchanger. The following steps would be employed in connecting the heat exchanger:

1. Place "A" Component Cooling heat exchanger in standby
2. Stop SFPCS pump
3. Isolate SFP purification loop by closing valves 789, 790, 804
4. Close valves 733A and 734A
5. Drain Component Cooling heat exchanger by opening valve 806C
6. Close valves 787 and 785
7. Remove blind flanges ECC3, ECC4, ECC5
8. Connect temporary hoses between ECC3 and ECC5, between ECC4 and SFP
9. Close valve 806C
10. Start SFPCS pump
11. Maintain SFP temperature by throttling valve 4619

It is estimated that 2 to 3 hours would be required before the component cooling heat exchanger would be operational in the SFPCS. The following table provides the SFP temperature after 1.5 hours in the case of the portable pump and after 3 hours for the component cooling heat exchanger for a service water temperature of 80°, 60°, and 50°F.

Condition	Service Water Temperature °F	Initial SFP Temperature °F	Heat Up Rate °F/hr	SFP Temp. when Backup Becomes Operational °F
Portable Pump	80	150	4.4	157
CCHE	80	150	4.4	163
Portable Pump	60	150	5.6	158
CCHE	60	150	5.6	167
Portable Pump	50	150	6.2	159
CCHE	50	150	6.2	169

As can be seen, the increased heat load has negligible effect on the SFP temperature when backup cooling is available.

In addition to the conservatism found in the decay heat calculation, margin is available in other areas. First, the refueling shutdown is scheduled for March. The expected service water temperature is less than 40°F, rather than the 50°F or 60°F assumed in the analysis. The spent fuel pool cooling system cleanup system removes 10% of the water before the heat exchanger. If required, and for a short period of time, the cleanup system could be isolated with the result that additional cooled water would be discharged to the pool.

Based on these results, we request approval to use the existing SFPCS for the Spring 1979 shutdown. Because we cannot predict, at this time, the exact shutdown time or the power level for the balance of the cycle, we propose that decay heat levels be calculated using BTP APCSD 9-2. For shutdowns on or before March 2, 1979, we would propose using a SFPCS capability of 13.2×10^6 BTU/hr (i.e., 50°F) and for shutdowns on or before May 2, 1979, a SFPCS capability of 12.0×10^6 BTU/hr (i.e., 60°F).

TABLE 1

MONTHLY AVERAGE INTAKE WATER TEMPERATURE (°F)

GINNA STATION

	1970			1971			1972		
	min	avg	max	min	avg	max	min	avg	max
Jan	34.3	35.0	35.5	32.4	32.9	34.3	32.8	33.6	35.1
Feb	31.4	31.8	32.5	32.7	33.2	34.1	32.0	32.1	32.8
Mar	32.3	32.8	33.2	NR	NR	NR	32.7	32.9	33.8
Apr	40.7	42.1	43.3	NR	NR	NR	35.5	36.0	37.0
May	41.8	42.8	43.7	42.5	43.1	44.2	NR	NR	NR

	1973			1974			1975		
	min	avg	max	min	avg	max	min	avg	max
Jan	33.3	33.7	34.6	35.0	35.8	37.9	36.7	37.7	39.2
Feb	33.1	33.3	33.8	32.6	33.0	33.3	36.2	36.9	37.9
Mar	35.2	35.8	36.7	35.0	35.1	36.2	36.5	36.7	37.0
Apr	38.8	39.3	40.1	40.0	41.4	43.5	39.1	39.6	40.3
May	42.8	43.4	44.0	45.2	46.2	47.1	49.4	51.1	52.2

	1976			1977			1978		
	min	avg	max	min	avg	max	min	avg	max
Jan	35.1	35.9	36.8	34.0	34.6	35.4	34.4	34.7	35.4
Feb	35.4	35.6	36.0	34.0	34.5	35.7	33.9	34.3	35.1
Mar	37.7*	38.2*	39.2*	35.8	36.2	37.9	34.9	35.6	36.8
Apr	42.2	43.0	44.0	38.1	39.0	41.0	38.8	39.6	40.5
May	46.4	47.5	48.6	45.6	47.1	48.7	43.9	44.7	46.2

NR = data not recorded
* = data taken for only 12 days

TABLE 2

MINIMUM AND MAXIMUM MONTHLY INTAKE WATER TEMPERATURE (°F)

GINNA STATION

	1970		1971		1972		1973		1974		1975		1976		1977		1978	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
Jan	30	39	32	43	32	40	32	39	33	53	35	42	34	40	33	40	34	39
Feb	31	35	32	37	32	37	32	37	32	36	34	43	34	39	33	39	34	37
Mar	31	35	NR	NR	32	39	33	41	34	48	34	39	35*	42*	33	44	34	42
Apr	39	45	NR	NR	33	42	36	45	36	56	34	47	40	48	37	45	37	47
May	40	46	40	48	NR	NR	40	48	42	52	43	64	43	53	39	59	41	58

NR = data not recorded
* = data taken for only 12 days

Figure 1

Spent Fuel Pool Cooling System

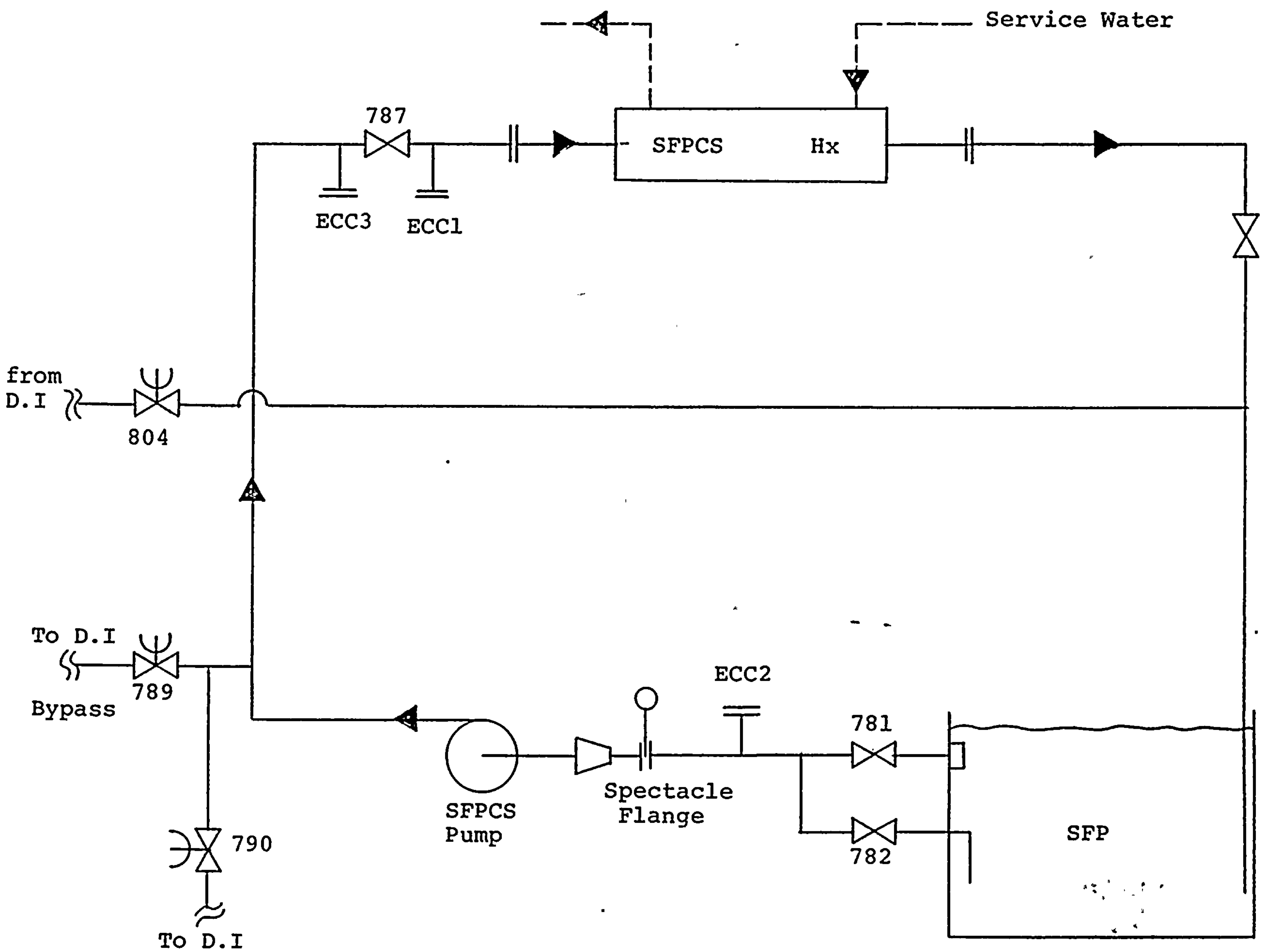

FIGURE 2

SFP Heat Load - 1979 Full Core Discharge

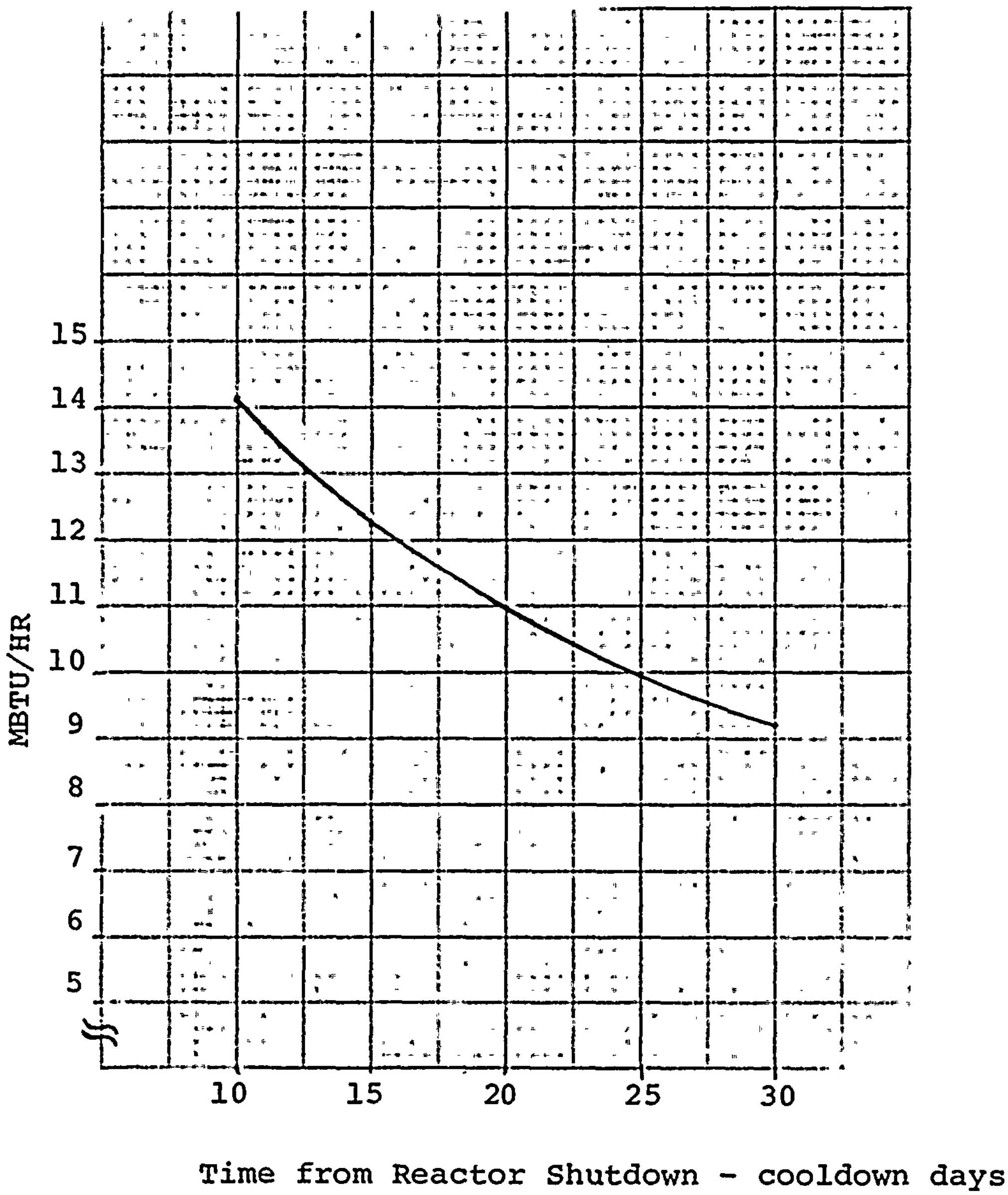

Figure 3

Connection of Portable Pump to SFPCS

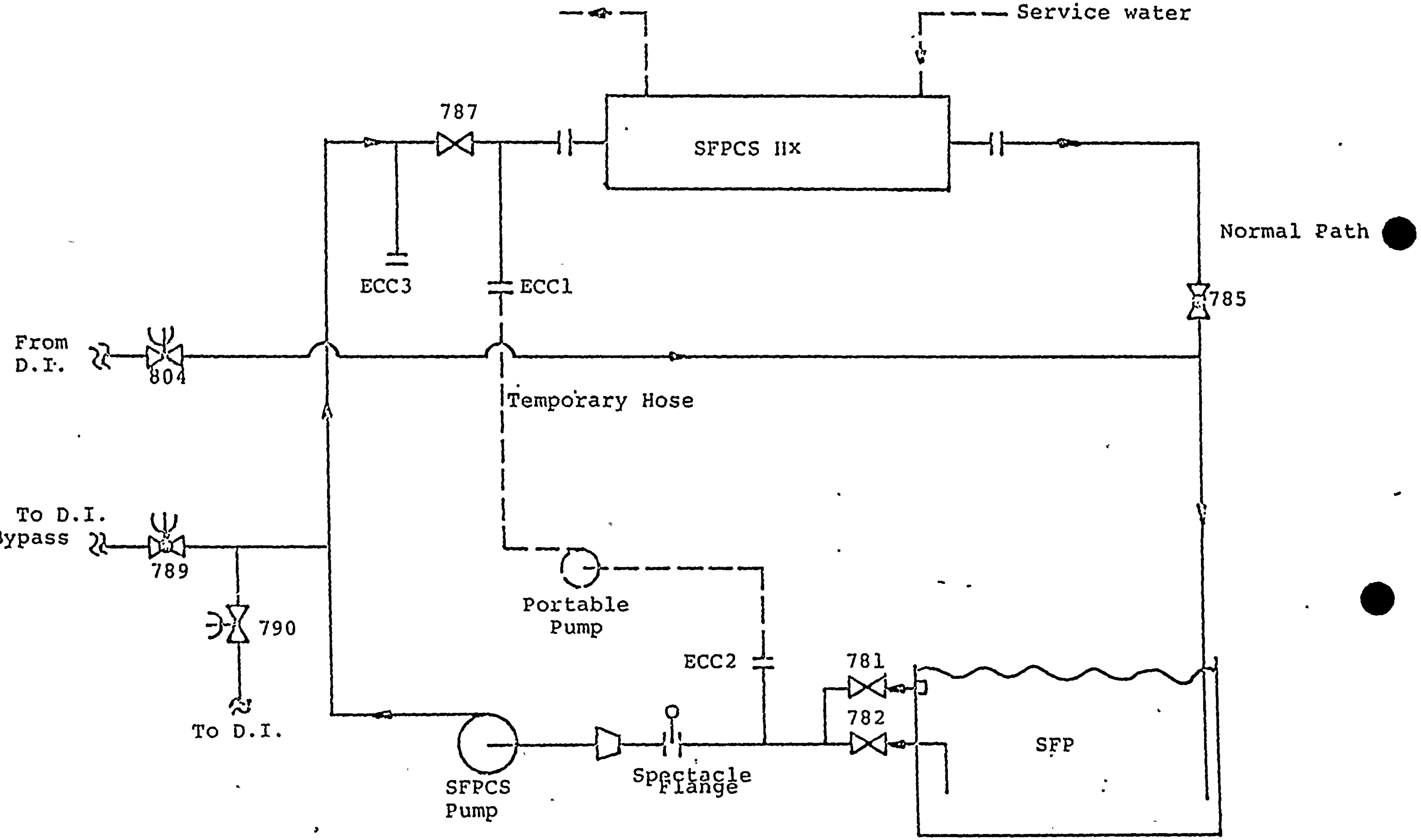

Figure 4

Connection of "A" CC Hx to SFPCS