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SECTION 1

PROCEDURE TITLE AND NUMBER
SP 1104.04 DH System Operating Procedure

REASON FOR CHANGE
Procedure lists wrong section to be done

CHANGE
Page 23, Step 6.1.1 to say

Make up and Purification system is shutdown in accordance with section 6 .....

IS PROCEDURE REVISION REQUIRED Yes ☒ No ☐ If no, this modification is valid until: _____

PREPARED BY D.A. Wise	DATE 3/23/85
APPROVED BY D.A. Wise	DATE 3/23/85
APPROVED BY J. Hildebrandt	DATE 3/23/85
SUBMITTED BY (Section Head)	DATE 3/25/85
RECOMMENDED BY (SRB Chairman)	DATE APR 3 1985
QA APPROVED BY (Manager of Quality Assurance) N/A	DATE
APPROVED BY (Station Superintendent)	DATE APR 3 1985

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SECTION 1

PROCEDURE TITLE AND NUMBER
Decay Heat and LPI Operating Procedure SP 1104.04.21

REASON FOR CHANGE
Valve No's for the CFT (1-1) Check Valve Leak Test Incl. are incorrect.

CHANGE
On Sh. 11 of 14 of Vlv Verif List A change:
CF 34 to CF 39
CF 35 to CF 38

IS PROCEDURE REVISION REQUIRED Yes [X] No [ ] If no, this modification is valid until: _____

PREPARED BY Jeff Blay	DATE 12/8/84
APPROVED BY Jeff Blay	DATE 12/8/84
APPROVED BY John Johnson	DATE 12/8/84
SUBMITTED BY (Section Head)	DATE 12/12/84
RECOMMENDED BY (SRB Chairman)	DATE DEC 12 1984
QA APPROVED BY (Manager of Quality Assurance) N/A	DATE
APPROVED BY (Station Superintendent)	DATE DEC 12 1984

Task

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ED 6926

SECTION 1

PROCEDURE TITLE AND NUMBER
Decay Heat and Low Pressure Injection Operating Procedure SP1104.04

REASON FOR CHANGE

To clarify Sect. 12 for using Decay Heat to cool the Spent Fuel Pool.

CHANGE

Replace the existing Sect. 12 with the attached Sect. 12.

IS PROCEDURE REVISION REQUIRED Yes ☑ No ☐ If no, this modification is valid until _____

PREPARED BY	D. Lamman	DATE 10/4/84
APPROVED BY	Scott Wise	DATE 10/4/84
APPROVED BY	D. Lamman	DATE 10/4/84
SUBMITTED BY (Section Head)		DATE 10/4/84
RECOMMENDED BY (SRG Chairman)		DATE 10/10/84
QA APPROVED BY (Manager of Quality Assurance)	N/A	DATE
APPROVED BY (Station Superintendent)		DATE 10/10/84

Tech

12. DECAY HEAT SYSTEM COOLING OF THE SPENT FUEL POOL

If both SFP pumps or heat exchangers of the spent fuel pool cooling system are unavailable or if the heat load exceeds the SFP cooling system capacity the Decay Heat System can be used to cool the SFP water.

12.1 Prerequisites

_____ 12.1.1 Decay heat pump 1-1(1-2) and decay heat cooler 1-1(1-2) is available for cooling the spent fuel pool. Identify the desired Pump and Cooler to be used for SFP Cooling.

_____ DH Train 1

_____ DH Train 2

_____ 12.1.2 Depending upon the condition of the RCS, the DH System will either be lined up for decay heat removal as per Section 4, or lined up in Normal Lineup as per Section 13 of this procedure.

_____ 12.1. 3 SFP Cooling and Cleanup System lined up normally in accordance with Valve Verification List A of SP 1104.06, "SFP Cooling and Cleanup System Procedure".

12.2 Procedure

_____ 12.2.1 Stop or verify that DH Pump 1-1(1-2) is stopped prior to aligning it to the Spent Fuel Pool.

_____ 12.2.2 Close Decay Heat Pump 1-1(1-2) suction valve DH 1517 (DH 1518), the Decay Heat Cooler Discharge Valve DH 14B (DH 14A) and DH 2733*(DH 2734)* the DH pump suction from the BWST valves if they are open.

_____ 12.2.3 Close DH 10* (DH 26)*

_____ 12.2.4 ~~Shut~~ Close the Decay Heat Cooler Bypass Valve DH 13B (DH 13A) if it is open.

_____ 12.2.5 ~~Shut~~ Close the Decay Heat System discharge valve to the Reactor Coolant System DH 1B*(DH 1A)*if it is open.

_____ 12.2.6 Stop the running Spent Fuel Pool Pumps.

_____ 12.2.7 Open SFP to Decay Heat System Valve SF 115.

_____ 12.2.8 Open SFP to DH Pump 1-1 (1-2) valve DH 31* (DH 30)*

_____ 12.2.9 Open DH Cooler 1-1 (1-2) discharge to SFP valve DH 66* (DH 65)*and open DH 69.

*Controlled per AD 1839.02.

_____ 12.2.10 Establish component cooling water to DH Cooler 1-1 (1-2) if not already being supplied by opening DH Cooler 1-1 (1-2) CCW outlet isolation valve CC 1467 (CC1469). Use control room switch HIS-1467 (HIS-1469) located on panel C5716 (Engineered Safety Features Panel).

_____ 12.2.11 Perform decay heat removal pump 1-1 (1-2) Pre-Startup Check-off List, Enclosure 7 of this procedure, except Step 5.

_____ 12.2.12 Start DH Pump 1-1 (1-2).

_____ 12.2.13 Open and throttle DH 14B (DH 14A) and DH 13B (DH 13A) to maintain adequate NPSH (> 3.7 psig) and cooling. Use DH pump suction pressure gauge PI 1507 for DH pump 1-1 and PI 1538 for DH Pump 1-2.

_____ 12.2.14 Monitor DH cooler 1-1 (1-2) to SFP flow using flow indicator FI DH2B (FI-DH2A). ~~Do not exceed~~ Keep flow less than 3000 GPM, (for DH pump runout protection).

SRB 10/1/84

Section 12 Completed _____ Date_____

13. NORMAL LINEUP

During normal operation, the Decay Heat System will be lined up to provide Low Pressure Injection if it is needed. This lineup is the "Normal Lineup".

No operator sign off is required for this section of the test.

13.1 Prerequisites

_____ 13.1.1 Decay Heat System filled and vented.

_____ 13.1.2 Safety Features Actuation System is in service per "Safety Features Actuation System Procedure," SP 1105.03.

_____ 13.1.3 Verify power is supplied to the motor operated valves and pumps listed in Enclosure 1. Verify control power is removed from DH1A and DH1B from indicating lights DH1A-2 and DH1B-2 on C5716.

Davis-Besse Nuclear Power Station

Unit No. 1

Operating Procedure SP 1104.04

Decay Heat and Low Pressure Injection Operating Procedure

NUCLEAR SAFETY RELATED

Record of Approval and Changes

Prepared by Robert Jadgchew and Bill Nissen — 6/10/75 (Date)

Submitted by Larry Stalter (Section Head) — 6/13/75 (Date)

Recommended by Larry STalter (SRB Chairman) — 7/22/75 (Date)

QA Approved N/A (Manager of Quality Assurance) — (Date)

Approved by Jack Evans (Station Superintendent) — 10/13/75 (Date)

Revision No.	SRB Recommendation	Date	QA Approved	Date	Sta. Supt. Approved	Date
11	S.R. Boyer	3/27/79	NA		T.D. Murray	3/30/79
12	S.R. Boyer	4/17/79	NA		T.D. Murray	4/25/79
13	T.M. Quinn	7/10/79	NA		T.D. Murray	7/24/79
14	S.R. Boyer	1/8/80	NA		T.D. Murray	1/14/80
15	S.R. Boyer	9/3/80	NA		T.D. Murray	10/2/80
16	D.W. Braden	4/10/81	NA		T.D. Murray	5/10/81
17	T.M. Quinn	12/18/81	NA		T.D. Murray (SNG)	1/7/82
18	T.M. Quinn	6/24/82	NA		T.D. Murray	8/4/82
19	S.R. Boyer	3/29/83	NA		T.D. Murray	4/11/83
20	S.R. Boyer	11/15/83	NA		T.D. Murray/DWB	12/2/83
21	T.M. Quinn	7/25/84	NA		S.M. Quennoz/DWB	8/23/84

1. PURPOSE

To provide procedures for the operation of the Decay Heat Removal System during the following normal and Safety Features Actuation modes: (these modes may be performed independently)

Mode	Section
Decay heat removal during RCS cooldown	4
Decay heat removal during RCS component repair	5
Decay heat coolant purification	6
Decay heat removal during refueling	7
Decay heat removal during RCS heatup	8
Low pressure injection from the borated water storage tank	9
Recirculation of containment vessel emergency sump fluid	10
Decay heat system supply of containment vessel emergency sump water to the high pressure injection pumps	11
Decay heat system cooling of the spent fuel pool	12
Normal Lineup	13
Recirculation of the BWST with a D.H. pump	14

The decay heat removal system removes decay heat from the core and sensible heat from the reactor coolant system during the later stages of cooldown. The system also provides auxiliary spray to the pressurizer for complete depressurization, maintains the reactor coolant temperature during refueling, and provides a means for filling and partial draining of the refueling canal.

Two pumps and two coolers perform the decay heat cooling function. After the steam generators have reduced the reactor coolant temperature to 280F, decay heat cooling is initiated. Normally two pumps will take suction from the reactor coolant outlet line and discharge through the coolers into the reactor vessel. To control the decay heat return temperature a portion of the reactor coolant must be bypassed around the decay heat coolers. If only one pump or one cooler is available, the reactor coolant temperature is reduced at a lower rate. The equipment utilized for decay heat cooling is also used for low pressure injection during loss-of-coolant accident conditions.

15 During refueling, the decay heat from the reactor core is rejected to the decay heat removal coolers in the same manner as it is during cooldown to 140F.

The refueling canal can be filled by switching the suction of the decay heat pumps from the reactor outlet to the borated water storage tank. As the borated water passes through the reactor vessel into

the refueling canal it absorbs the decay heat from the core. This procedure is NOT normally used in order to minimize the contamination of the refueling canal. When the refueling canal is filled, suction to the pumps is switched back to the reactor outlet pipe. The refueling canal may be drained after refueling by switching the discharge of one of the pumps from the reactor injection nozzle to the borated water storage tank. The other pump will continue the recirculation mode of decay heat removal.

After the Decay Heat Removal System has been brought on line, the Reactor Coolant Pumps are secured. This results in the loss of normal spray to the pressurizer. An auxiliary spray connection from the Decay Heat Removal System to the pressurizer is provided in order to continue Reactor Coolant System depressurization. The auxiliary spray connection originates downstream of Decay Heat Removal Cooler 1-2, penetrates the Containment Vessel, and connects to the normal spray line between the pressurizer and the normal spray line throttle valve. A remote operated throttle valve (DH 2736) is provided in the auxiliary spray line for flow control.

The Decay Heat Removal System is connected to the Loop 2 reactor outlet line on the suction side and through the core flooding lines on the discharge side. The system is isolated from the Containment Vessel on the suction side by two electric motor operated stop valves in series (DH 11 and DH 12) located inside the Containment Vessel. The isolation valves DH1A and DH1B can be throttled from their Control Room switch. Throttling with DH1A and DH1B should be done only under emergency conditions or well into long term cooling (after a LOCA). The isolation valve DH1A (DH1B) has switch DH1A-2 (DH1B-2) to disconnect control power to the valves during normal
20 | operation. During plant startup when entering Mode 3 control power from DH11 and DH12 is removed by tripping their circuit breakers. After the normal DH Cooldown valves, DH11 and DH12, are energized and are opened, Control Power to DH11 and DH12 is removed at C 5704 using HIS DH11A and HIS DH12A, to prevent inadvertent closure while on D.H. The Blue "CTRL PWR OFF" light on HIS DH11A and DH12A will illuminate indicating control power has been removed from DH11 and DH12. If DH11 (DH12) is open and control power has NOT been removed at HIS DH11A (HIS DH12A), computer alarm Q694 (Q695) will occur.

20 | The relief capacity of the decay heat removal system relief valve PSV4849 is adequate to relieve any overpressure condition which could occur during shutdown. In the event that this relief valve is not OPERABLE, reactor coolant system pressure, pressurizer level and make up water inventory has to be limited and the capability of the high pressure injection system to inject water into the reactor coolant system must be disabled to ensure operation within reactor coolant system pressure - temperature limits.

The Decay Heat Removal Suction Line Isolation Bypass Valves DH21 and DH23 are normally lock closed and controlled per AD 1839.02, "Operation and Control of Locked Valves". However they have unique locks (this is specified in PT 5186.01) as a license condition

to decrease the likelihood of the bypass path being opened inadvertently during periods when isolation of the decay heat removal loop is required (RCS overpressure).

18 If the D.H. System is recirculating a partially drained RCS with a suction through the bypass line (through DH21 and DH23), do NOT increase flow above 4000 GPM. The flowpath through the smaller bypass line does not provide adequate NPSH to allow for two D.H. pump operation.

The DH System is also used for a Low Pressure Injection (LPI) System which supplies water from the BWST to the core in the event of a loss of coolant accident (LOCA). At least one of the LPI pumps must supply BWST water to cool the core. In the worst case of a LOCA (*8.55 ft^2 double ended break at the RC pump discharge) at approximately 19 seconds after the break, the RCS pressure would be down to approximately 450 psig and the LPI pumps would be started by the SFAS signal. At approximately 25 seconds after the break, the RCS pressure would be down to approximately 40 psig and LPI flow should be well eastablished.

Since manual stops are installed on the cooler outlet valves, no throttling of the cooler outlet valves DH14A and DH14B should be done.

If the cooler outlet valves are not open and the SFAS module has tripped a computer alarm will occur. This computer alarm, Z323 (Z326) is actuated off an independent position switch on DH14B (DH14A).

During normal operation if power is not removed from the solenoid on DH14B (DH14A) by pushing the open button on HISDH14B (HISDH14A) computer alarm Q318 (Q319) will occur.

The times given are for the worst case of a LOCA and would vary as to the smaller the break, the longer would be the times. A simultaneous loss of offsite power would delay the LPI System response no more than six seconds since the pumps and valves would be sequenced at a maximum of 25 seconds after the RCS break.

The LPI lines discharge into the Core Flood (CF) Injection Lines and the flow must go through the core flood nozzles into the reactor. The case of a CF line break downstream of the LPI tie-in would render one LPI string inoperable. If the diesel generator supplying the second LPI pump failed, the second LPI string would also be inoperable (single failure). For this size break, one High Pressure Injection Pump and one Core Flood Tank is sufficient for immediate cooling. The operator must establish LPI flow for long term cooling by first
18 closing the suction valve on the disabled pump and then opening the motor operated LPI cross over valve DH830 or DH831 to maintain 1500 gpm per line until the location of the RCS break is known. Failure to close the suction valve on the disabled pump would pressurize

the pump suction piping to pump discharge pressure and lift the emergency sump relief valve DH1508 or DH1509.

If no air supply is available to DH14A or DH14B, in order to throttle to 1500 GPM per line, throttle the DH injection valve DH1B (1A) under emergency conditions. The controls for this motor operated valve allow the valve to be throttled since the motor operator only moves while the control switch is held.

Local LPI/DH flow indicators are located at elevation 555' of the Auxiliary Building, above the DH cooler room outside of the negative pressure boundary door 105. These flow indicators were installed for local flow indication while throttling the DH cooler outlet valves (DH14A and B) with portable air tanks if the air supply had failed. This air tank method of throttling has been replaced with the throttling of DH1A and B, but the flow meters can still be used by personnel in the Auxiliary Building to monitor DH/LPI flow.

The normal cooldown motor operated isolation valves DH11 and DH12 are protected in a waterproof pit since they are below the level of water after a LOCA. These valves will be used well into long-term cooling and, therefore, must be protected through the LOCA. Whenever the waterproof seal is broken on the pit, it must be retested as per "DH Valve Pit Leak Test", ST 5051.07. This requires sealing the vent on the pit which cannot be done during power operation. Therefore, the plant must be shutdown before the pit seal is broken. 19

During long term cooling within 7 days after a L.O.C.A., the operator must establish a second flowpath through the core to provide mixing for Boron Concentration Control. (See "Loss of RC and RC Pressure EP 1202.06.). One flowpath could be to open the normal cooldown isolation valves (DH11 and DH12) to get 40 gpm through the minimum cooldown flowpath (2 1/2" GCB-7) around the DH pumps suction to RCS valves (DH1517 and DH1518). Control Room mounted (on C5716) flow indicators have been installed solely for the purpose of verifying 40 gpm through these minimum cooldown lines for boron dilution. A second flowpath would be to the pressurizer auxiliary spray line from the outlet of DH Cooler 1-2 through the 1 1/2" cross connect. A flow indicator with local indication is installed on the auxiliary spray line. The local indicator is located at elevation 565' in the Auxiliary Building in the hallway across from the Makeup Pump Room between the BA Evaporator Room doors (close to the floor). The flowpath used would be decided by the location of the break in the RCS piping.

A crosstie is available to supply power for establishing a second flowpath. The crosstie can be accomplished by installing draw out units into the breaker cubicles. These are located in the Maintenance Shop storage bin and are "yellow" tagged. Breaker cubicle BE 1153 (E11B) is located on Elev. 585' outside #3 Mech. Pent. Room. Breaker cubicle BF 1135 (F11A) is located on Elev. 603' in the North end of #2 Elec. Pent. Room. MCC E11B can be crosstied with F11A if one MCC 19

is de-energized. This is to assure both Boron Concentration Control Flowpaths Double Isolation Valves (DH11 and DH12; DH2735 and DH2736) can be operated even if the MCC that normally supplies power to the valve is de-energized. See EP 1202.06, Loss of R.C. and R.C. Pressure, for specific steps.

To prevent thermal expansion pressurization of the piping between DH11 and DH12, a thermal expansion flowpath is now provided through DH24, DH49 and DH20 (See P&ID M-033, H-2).

Design characteristics for the DH pumps, motors, and coolers are as follows:

17 To prevent an inadvertent transfer of water, the D.H. minimum cooldown deboration flowpath isolation valves DH10 and DH26 will be closed just prior to placing the Decay Heat System in recirculation.

DH Pump 1-1 (1-2)

Manufacturer	Babcock & Wilcox Canada Ltd.
Serial No.	67791 (67790)
Size	10 x 12 x 21
Model	KMSk
Equipment. No.	P42-1 (P42-2)
Capacity (gpm)	3000
Head (feet)	350
Pump Speed (rpm)	1750
NPSH (req'd)	8.5
Design Press/Temp	520 psig/350°F

DH Pump Motor 1-1 (1-2)

Manufacturer	Westinghouse
Serial No.	2S-72 (1S-72)
Equipment No.	MP 0421 (MP 0422)
Horsepower	400
Model	HSDP
Frame	5010-S
Volts	4000
Amps (full load at rated voltage)	50
Insulation Class	B
Motor Weight (lbs)	3420

DH Cooler 1-1 (1-2)

Manufacturer	Atlas Industrial Mfg. Co.
Equipment No.	E27-1 (E27-2)
Serial No.	1592 (1591)
Type	Shell and Tube
Performance Heat Load (@ 140°F	30 x 10^6 BTU/hr
(Emergency Condition)	105 x 10^6 BTU/hr
Reactor Coolant Flow (gpm)	3000
Component Cooling Water flow (gpm)	6000
Material shell/tube	CS/SS
Design Pressure shell/tube (psig)	150/450
Design Temperature shell/tube (°F)	250/350

Pressure Drop shell/tube (psi)	13.3/3.2
Heat transfer area (ft^2)	3250

System Design Operating Conditions:

1. DHR - Initiate decay heat removal when RCS is ≤280°F and 296 PSIG at the D.H. Cooldown Line or 266 PSIG as read on PIRC2A6.

2. LPI - SFAS starts LPI pump when RCS decreases to 450 PSIG or containment pressure increases to 18.4 psia.

3. Pressure Relief Valve Setpoints:

   DH 1508 and DH 1509 = 75 psig

   DH 1529 and DH 1550 = 450 psig

   DH 4849 = 320 psig at centerline of DH11 & DH12 (DH 4849 has a thermocouple installed in the discharge of the valve which actuates a computer alarm T362 "D.H. Norm Suct Rlf Vlv Out Temp", to sense when the relief has lifted).

   DH 2797 = 125 psig

2. PRECAUTIONS AND LIMITATIONS

2.1 When the Reactor Coolant System (RCS) has been shutdown and depressurized, isolate the Borated Water Storage Tank (BWST) from the Decay Heat Removal System (DH) to prevent the possibility of the RCS being flooded from the BWST due to the elevation differences by closing DH7A and DH7B, BWST Outlet Isolation Valves.

2.2 Decay heat System shall be isolated from the RC System when:

   a. RC pressure at the centerline of DH11 and DH12 piping (elev. 559) is above 296 psig (PIRC2A6 reading 266 psig, elev. 633') and/or

   b. The RC temperature is above 350°F.

   NOTE: The isolation of the DH system from the RCS when the RCS pressure ≥266 psig indicated on PIRC2A6 prevents the lifting of PSV4849.

   The DH system is protected from overpressurization by:

   a. PSV4849 set to relieve at 320 psig at the centerline of DH11 and DH12 (290 psig as read on PIRC2A6).

b. An SFAS signal (PSH7531A) closes DH11 at 331 psig at the centerline of DH11 and DH12 (301 psig as read on PIRC2A6).

c. A pressure switch PSHRC2B4 closes DH12 at 296 psig at the centerline of DH11 and DH12 (266 psig as read on PIRC2A6).

NOTE: The autoclosure of DH11 and DH12 is defeated when control power is removed from DH11 and DH12.

18 DH11 and DH12 or DH21 and DH23 must be open to provide overpressure protection to the RCS whenever RCS temperature is less than 280°F.

The pressurizer heater control circuit is interlocked to prevent energization of the pressurizer heaters if (1) either DH11 or DH12 are not closed (MOV limit switches and stem mounted limit switches) and (2) RCS pressure is above the setpoint for the autoclosure of DH11 (331 psig at the centerline of DH11 and DH12, 301 psig as read on PIRC2A6). See SP 1103.05, Pressurizer Operation System Procedure for a detailed description of the pressurizer heater interlock.

For allowable RCS pressure during simultaneous DH and RC pump operation, see Figure numbers 15A and 15B of the Plant Limits and Precautions Procedure, PP 1101.01.

2.3 The Decay Heat System is put in service during RCS cooldown, and RC pumps started during heatup only within the pressure ranges allowed by required RC pump NPSH and allowable Decay Heat System Pressure, Figure 1 and 2 (Enclosures 2 and 3).

2.4 Maintain RC level high enough to prevent DH suction line vortex formation and provide required NPSH. See Section 5.

2.5 During the operation or testing of the DH System, chemical samples should be taken from the cooler discharge and checked in accordance with "Operational Chemical Control Limits", PP 1101.04, Section 4.

2.6 When using the Spent Fuel Pool Cooling and Demineralizer System, or the Makeup and Purification System for purification, care should be taken to prevent overpressurization to the systems (>150 psig) and/or high temperatures (>130°F) that may damage demineralizer resins.

2.7 During normal decay heat removal from 280°F to 140°F, the reactor coolant pressure must be maintained sufficiently above saturation pressure to avoid formation of steam pockets in the Reactor Coolant System high points which would prevent recirculation through the steam generators. See Enclosure 2.

2.8 When using the Decay Heat System for Spent Fuel Pool cooling monitor pool level to maintain level at 601' 6" ± 4" (23 feet - 6 inches on LI-1600) as per SP 1104.06, Spent Fuel Pool Cooling and Cleanup Operating Procedure, and do not exceed an indicated
21| flow of 3750 GPM per pump.

2.9 To insure proper emergency operation, decay heat pump suctions must be filled with borated water. The head of water from the BWST will keep the emergency sump lines filled.

2.10 Decay Heat Removal Pumps:

2.10.1 Maximum allowable pump bearing oil temperature (motor end) is 170°F. See CPT T364 (T371) for DH Pump 1-1 (1-2).

2.10.2 Maximum allowable pump bearing oil temperature (pump end) is 170°F. See CPT T368 (T375) for DH Pump 1-1 (1-2).

2.10.3 Minimum Allowable Flow per DH Pump is 80 GPM.

Minimum Allowable Continuous Flow per DH Pump is 80 gpm.

2.10.4 Maximum allowable flow per DH pump is 4000 GPM.

2.10.5 When operating the pumps a high flow alarm (FAH-600 or FAH-595) will annunciate at 3750 gpm. At this point, the flow should be throttled (DH 14A and/or DH14B) to
21| 3000 GPM to limit the flow thru the DH cooler when on decay heat. When on LPI from BWST no throttling should be done since mechanical stops have been installed.

2.11 Decay Heat Removal Pump Motors:

2.11.1 Maximum allowable outboard and pump end bearing oil temperature is 190°F. See CPT T365, T366 (T372, T373) for DH Pump 1-1 (1-2).

2.11.2 Maximum allowable stator temperature is 266°F. See CPT T367 (C374) for DH Pump 1-1 (1-2).

2.11.3 Maximum time for locked rotor, without damage at 100% voltage is 12 seconds.

2.11.4 Number of allowed successive starts with motor initially at ambient temperature is two starts. Number of allowed successive starts with motor initially at rated temperature is one start.

NOTE: An interval of five minutes with motor running or not running must elapse before an additional start.

2.12 Decay Heat Removal Coolers:

2.12.1 Cooling water flow (shell side) to each DH Cooler is limited to a maximum of 6000 GPM. This is accomplished by the restricting orifices RO 3979 and RO 3980.

2.12.2 Maximum allowable tube side flow per cooler is 4000 GPM with no instrument error allowed. Throttle to 3000 GPM using DH14A and/or DH14B for decay heat operation.

2.12.3 Decrease in the cooler heat transfer indicates fouling and is cause to initiate cleaning.

2.12.4 Before initiating flow on either side of the cooler, both sides must be filled and vented, including connecting piping (preferably by gravity flow).

2.13 The following is an explanation of the controls for the Decay Heat Cooler 1-1 (1-2) Outlet Valve DH14B (DH14A).

2.13.1 Upon receipt of SFAS signal SA 311 (SA 312) or upon receiving an "OPEN" signal from HIS DH 14B (DH 14A) located on Safety Features Actuation Panel C 5717, the valve will travel to its full open position and remain there.

2.13.2 In order for the operator to manually throttle the Decay Heat Cooler 1-1 (1-2) Outlet Valve DH 14B (DH 14A), he must perform the following:

1. Ensure that the setpoint of the Decay Heat Cooler 1-1 (1-2) Outlet Flow Controller HIC DH 14B (DH 14A), located on the RC Makeup and Pressurizer Control Console (C5704), is set at the disired setpoint.

2. If the Decay Heat Cooler 1-1 (1-2) Outlet Valve DH 14B (DH 14A) was automatically opened by SFAS signal SA 311 (SA 312), depress the "BLOCK" pushbutton on HIS DH 14B (DH 14A). If there was no tripping of the valve by the SFAS, proceed to Step 3.

19

3. Depress the "AUTO" pushbutton on HIS DH 14B (DH 14A). The valve will close to the position specified by the setpoint of the Decay Heat Cooler 1-1 (1-2) Outlet Flow Controller HIC DH 14B (DH 14A).

4. The position of Decay Heat Cooler 1-1 (1-2) Outlet Valve DH 14B (DH 14A) can now be manually throttled if needed by adjusting the setpoint of the Decay Heat Cooler 1-1 (1-2) Outlet Flow Controller HIC DH 14B (DH 14A).

2.14 The following is an explanation of the controls for the Decay Heat Cooler 1-1 (1-2) Bypass Valve DH 13B (DH 13A).

2.14.1 Upon receipt of SFAS signal SA 311 (SA 312) or upon receiving a "CLOSE" signal from HIS-DH 13B (DH 13A) located on Safety Features Actuation Panel C5717, the valve will travel to its full closed position and remain there.

2.14.2 In order for the operator to manually throttle the Decay Heat Cooler 1-1 (1-2) Bypass Valve DH 13B (DH 13A), he must perform the following:

1. Ensure that the setpoint of the Decay Heat Cooler 1-1 (1-2) Bypass Flow Controller HIC DH 13B (DH 13A) located on the RC Makeup andPressurizer Control Console (C5704) is set at the desired setpoint.

2. If the Decay Heat Cooler 1-1 (1-2) Bypass Valve DH 13B (DH 13A) was automatically closed by SFAS signal SA 311 (SA 312) depress the "BLOCK" pushbutton on HIS-DH 13B (DH 13A). If there was no tripping of the valve by the SFAS, proceed to Step 3.

3. Depress the "OPEN" pushbutton on HIS-DH 13B (DH 13A). The valve will open to the position specified by the setpoint of the Decay Heat Cooler 1-1 (1-2) Bypass Flow Controller HIC-DH 13B (DH 13A).

4. The Decay Heat Cooler 1-1 (1-2) Outlet Valve DH 13B (DH 13A) can now be manually throttled if needed by adjusting the setpoint of the Decay Heat Cooler 1-1 (1-2) Bypass Flow Controller HIC-DH 13B (DH 13A).

2.15 Whenever the Low Pressure Injection System is inoperable because of failure, repair work in progress or routine maintenance on the system, the operator is to turn IL 4804 "LPI SYS" on using HS 4804 on Panel C5717. This light is to remain illuminated as long as the system is inoperable.

20 2.16 In Modes 4 or 5 with the decay heat suction line relief valve PSV4849 not operable:

1) The capability of both high pressure injection (HPI) pumps to inject water into the reactor coolant system must be disabled. This is done by racking out the pump breakers and placing an information tag on them.

2) The automatic transfer of makeup pump suction to the borated water storage tank on low makeup tank level must be disabled. This could be done by positioning MU3971 to the MU tank and de-energizing it. An information tag should then be placed on the valve and breaker.

3) Makeup tank level is reduced to $\leq$73 inches, and the RCS pressure and pressurizer level is reduced to within the acceptable region of Figure 3.4.2-a (Mode 4) and Figure 3.4.2-b (Mode 5) of Technical Specifications.

2.17 Isolation switch DH 1A-2 (DH 1B-2) must be used to disconnect the control power to the isolation valve DH1A (DH1B) and the valve must be open during normal operation.

2.18 Whenever the D.H. crossover line is used, the suction valve to the disabled pump must be closed to prevent overpressurization of the pump suction and lifting of relief valves DH 1508 or DH 1509.

20 2.19 While in Modes 4 and 5, isolation valves DH11 and DH12 should be open with control power removed from their valve operators; or valves DH21 and DH23 are open. During unit startup and power operation control power is also removed from DH11 and DH12.

2.20 Whenever the waterproof seal is broken on the pit for DH11 and DH12, ST 5051.07, "DH Valve Pit Leak Test" must be run. This test requires sealing the vent on the pit which cannot be done during power operation. Therefore, the plant must be shutdown before the seal is broken. Also, the applicable portion of PT 5186.01 must be completed prior to closing the DH valve pit.

2.21 When changing flowpaths from recirculating the B.W.S.T. to recirculating the R.C.S., care must be taken to avoid inadvertent flowpaths from a pressurized R.C.S. to the discharge back to the B.W.S.T. After the recirculation of the B.W.S.T. is completed,

the discharge to the B.W.S.T. DH65 (DH66) and DH68 should be closed before further valve position changes are made.

2.22 Whenever possible prior to the removal of both D.H. pumps from service, the operability of both D.H. strings should be confirmed. Therefore, with only one D.H. string operable, no actions should be taken to remove the lone operable pump from service if possible.

2.23 Whenever possible prior to removing the DH system from service with the RCS filled and pressure boundary intact, (Modes 4 & 5), the following should be accomplished in addition to Step 2.22.

2.23.1 A water level of at least 10 feet maintained in the secondary side of each steam generator.

2.23.2 Main condenser in operation with a vacuum of at least 25" Hg.

2.23.3 All condenser dump valves in the full open position.

2.23.4 RCS pressure maintained above 200 psig using pressurizer heaters.

2.24 Whenever possible prior to removing the DH System from service with the RV head removed and the refueling canal filled (Mode 6), the following should be accomplished in addition to 2.22:

2.24.1 Provisions should be made to monitor the temperature of the water above the reactor vessel.

2.24.2 The rate of temperature increase of the refueling canal should be monitored to allow adequate time to restore cooling prior to reaching saturation temperature.

20 2.25 At least one decay heat removal loop shall be in operation in Mode 6 when the water level above the top of the irradiated fuel assemblies seated within the reactor pressure vessel is ≥23 feet. Two independent decay heat removal loops shall be operable when this level is less than 23 feet.

2.26 Whenever possible, the DH System should NOT be removed from service with the RCS partially or fully drained.

2.27 The DH System is required to circulate the RCS in Modes 3, 4 or 5 whenever the RC Pumps are not in operation. However, all reactor coolant pumps and decay heat removal train pumps may be de-energized for up to one hour to accommodate decay heat removal pump switching operations, surveillance testing, and pre-operational testing, provided no operations are permitted which could cause dilution of the reactor coolant system boron

20 concentration and core outlet temperature is maintained at least 10°F below saturation temperature.

2.28 If an SFAS actuation occurs, the following requirements apply:

2.28.1 DO NOT OVERRIDE ANY SAFETY EQUIPMENT EXCEPT AS LISTED BELOW:

1. Decay Heat (DH) Cooler Outlet Valves - The DH cooler outlet valves may be throttled in the event of a failure of one DH pump which then requires the remaining pump feed through both Low Pressure Injection (LPI) lines.

2. IF PLANT CONDITIONS ARE STABLE AT NORMAL OPERATING OR HOT STANDBY CONDITIONS AFTER A TRANSIENT WITH NO EVIDENCE OF AN RCS LEAK, SYSTEMS MAY BE BYPASSED WITH THE SHIFT FOREMAN'S PERMISSION.

3. IF THERE ARE ANY QUESTIONABLE CONDITIONS OR ANY SIGN OF AN RCS LEAK, NO SAFETY SYSTEM SHOULD BE BYPASSED WITHOUT APPROVAL OF STATION MANAGEMENT (STATION SUPERINTENDENT OR DESIGNEE).

2.28.2 If an SFAS signal to some ESF equipment is "Blocked" (i.e. overridden), that equipment is incapable of responding to either any subsequent automatic actuation signal or the SFAS system-level manual, actuate ("Trip") pushbuttons on Panel C5717. Before an operator "Blocks" any SFAS signal, he must assure that the safety function of that equipment is no longer needed. Afterward the operator is totally responsible for the proper operation of that equipment, including reactuation if required, until the "Block" is removed.

Reactuation, subsequent to a "Block", can be accomplished two ways. First, at the equipment level, "Blocked" equipment will respond to the individual control switches for that piece of equipment. Second at the SFAS system level, operation of the system-level "Reset" pushbutton on Panel C5717 will clear any output logic blocks in the system (output logic "Blocks" are the block switches next to the sam lights and on the output modules). The equipment will then respond to the system-level manual, actuate ("Trip") pushbutton and to automatic actuation signals. For guidance on resetting the SFAS after a real or erroneous trip see Section 4 of EP 1202.06, Loss of RC and RC Pressure.

2.29 DURING THE PERFORMANCE OF SOME PORTIONS OF THE SP, THE TRAIN FOR WHICH THE SP IS BEING PERFORMED WILL NOT PERFORM ITS SAFETY FUNCTION. IF THE SYSTEM IS NEEDED FOR SAFETY FUNCTIONS, IT IS THE RESPONSIBILITY OF THE OPERATOR PERFORMING THE PROCEDURE TO RESTORE THE SYSTEM TO NORMAL.

3. REFERENCES

3.1 Technical Specifications, Sections 3.5.2, 3.5.3, 3.5.4, 3.9.8, 4.3.9.1, 3.1.2.5, 3.1.1.2, 3.4.8, and 3.4.1

3.2 NSSS Limits and Precautions, PP 1101.01

3.3 NSSS Setpoints, PP 1101.02, Section 3

3.4 Plant Shutdown and Cooldown, PP 1102.10

3.5 Plant Startup, PP 1102.02

3.6 Decay Heat Removal by the Steam Generators, SP 1102.13

3.7 Nuclear Chemical Addition System Operating Procedure, SP 1104.03

3.8 Draining and Nitrogen Blanketing of the Reactor Coolant System Procedure, SP 1103.11

3.9 Safety Features Actuation System Procedure, SP 1105.03

3.10 Fill and Drain and Purification of the Refueling Canal, SP 1102.15

3.11 High Pressure Injection System Operating Procedure, SP 1104.07

3.12 Makeup and Purification System Operating Procedure, SP 1104.02

3.13 Operational Chemical Control Limits, PP 1101.04, Section 4

3.14 Component Cooling Water System Procedure, SP 1104.12

3.15 Spent Fuel Pool Cooling System Procedure SP 1104.06

3.16 Decay Heat Removal System and Emergency Core Cooling System P&ID - Bechtel Drawing M-033

3.17 Makeup and Purification System P&ID - Bechtel Drawing M-031

3.18 Spent Fuel Pool Cooling System P&ID - Bechtel Drawing M-035

3.19 Davis-Besse Unit 1 FSAR - Section 6.3, 9.3.5, 17.2, Questions and Answers, 6.33, and Regulatory Positions 5.5.1, 6.3.1, 6.3.2, 6.3.3, 7.6.1, 7.6.3, 10-1, 12-1

21 3.20 TED NQAM

3.21 D.H. Valve Pit Leak Test, ST 5151.07

3.22 Loss of RC and RC Flow, EP 1202.06,

3.23 Pressurizer Operation, SP 1103.05

4. DECAY HEAT REMOVAL DURING REACTOR COOLANT SYSTEM COOLDOWN

No operator sign off is required for Section 4.

4.1 Prerequisites

_____4.1.1 The plant has been shutdown in accordance with PP 1102.10, "Plant Shutdown and Cooldown," and cooldown is in progress utilizing the steam generators as heat sinks per SP 1102.13, "Decay Heat Removal by the Steam Generator".

_____4.1.2 Component cooling water flow has been established in the header supplying the decay heat pumps and decay heat coolers in accordance with the Component Cooling Water Operating Procedure, SP 1104.12.

_____4.1.3 Power is available to the Decay Heat Pumps and all controls and instrumentation associated with the Decay Heat System are functional. See Attachment No. 1.

_____4.1.4 Reactor Coolant System temperature is less than 280°F and RCS pressure is less than 266 psig as read on PIRC2A6.

NOTE: DH11 is interlocked and cannot be operated above 301 psig as read on PIRC2A6. DH12 is interlocked and cannot be operated above 266 psig as read on PIRC1A6. See Step 2.2.

_____4.1.5 The DH System is in the Normal Lineup Mode per Section 13 of this procedure and SFAS blocked.

_____4.1.6 Pressurizer filled to a high level (approximately 290") to reduce the amount of water to be added to the system during cooldown.

4.2 Procedure

_____4.2.1 Shut DH pump suction valves from the BWST or Emergency Sump DH 2733 and DH 2734 from Control Room Panel C5717 using switches HIS 2733 and HIS 2734 and open DH pump suction valves from the RC System, DH 1517 and DH 1518 from Control Room Panel C 5704 using switches HIS 1517

and HIS 1518. To prevent an inadvertent transfer of water, close DH10 and DH26.

20 | ____4.2.2 Close BF1130 (F11A) for DH11 and BE1183 (E11B) for DH 12. When Reactor Coolant System temperature reaches 280°F, open the RC loop normal cooldown isolation valves to DH pump suction DH 11 and DH 12 from Control Room Panel C5704 using switches HIS-DH11 and HIS-DH12.

____4.2.3 Remove Control Power from DH 11 and DH 12 at C 5704 using HIS DH 11A and HIS DH 12A. Note that DH 11 (DH 12) is interlocked and cannot be operated above an RCS pressure of 331 (296) psig at the D.H. centerline or 301 (266) psig as indicated on PIRC2A6.

NOTE: The pressurizer heater circuit is interlocked to prevent energization of pressure heaters if either DH11 or DH12 is not closed and RCS pressure is above the setpoint for the autoclosure of DH11, 331 psig at the centerline of DH11 and DH12 (301 psig as read on P1RC2A6). See SP 1103.05, Pressurizer Operation System Procedure for details on the pressurizer heater interlock.

____4.2.4 Perform decay heat removal pump 1-1 and/or 1-2 checkoff list, Enclosure 7 of this procedure.

____4.2.5 Establish component cooling water through DH Cooler 1-1 and/or 1-2 by opening DH Cooler 1-1 (1-2) CCW outlet isolation valve CC 1467 (CC 1469). Use Control Room switch HIS1467 (HIS1469) located on Panel C5716 (Engineered Safety Features Panel).

____4.2.6 Start decay heat pumps 1-1 and/or 1-2 as desired from the Control Room on Panel C5716 using switch HIS-DH6B and/or HIS-DH6A and ensure that flow has been established as indicated on FI DH2B or FI DH2A on Panel C5716.

NOTE: See Steps 2.22 through 2.26 for special limitations on removal of both D.H. pumps from service.

____4.2.7 Position Decay Heat Cooler outlet valves DH 14A and B, and decay heat cooler bypass valves DH 13A and B, to prevent pump runout (>4000 gpm/pump), and control cooldown rates. Monitor DH Pump 1-1 and 1-2 suction temperature to regulate cooldown rate, use TI-DH8B and TI-DH8A.

19 Open sample valves for the D.H. Train just put in service. DH 59* for Cooler 1-1 or DH60* for Cooler 1-2. Inform C&HP that D.H. cooler sample source valve has been opened.

____4.2.8 To add borated water to the RCS through the DH System from the BWST proceed as follows:

____1. Stop DH Pump 1-1 (1-2) using HIS DH6B (HIS DH6A) located on C5716 (ESF Panel).

____2. Close DH14B and DH13B (DH14A and DH13A) DH Clr 1-1 (1-2) outlet and bypass valves using HIC DH14B and HIC DH13B (DH14A and DH13A) located on C5704 (left console).

____3. Close DH1517 and DH10 (DH1518 and DH26) DH Pump 1-1 (1-2) suction valve from RCS and the bypass, using HIS 1517 (HIS 1518) located on C5704 (left console).

____4. Open DH2733 (DH2734) DH Pump 1-1 (1-2) suction valve from BWST using HIS 2733 (HIS 2734) located on C5717 (ESF Panel).

____5. Open DH7B (DH7A), BWST outlet isolation valve, using HIS DH7B (HIS DH7A) located on C5716 (ESF Panel).

____6. Start DH Pump 1-1 (1-2) using HIS DH6B (HIS DH6A).

____7. Open DH13B (DH13A) slowly using HIC DH13B (DH13A) and throttle to add the desired amount of water to the RCS.

____8. After completing the addition, stop DH Pump 1-1 (1-2) and leave system lined up for possible future additions, or change system as directed by the Shift Supervisor.

4.2.9 To terminate decay heat removal, stop DH Pump 1-1 and/or 1-2 using Control Room hand switches HIS-DH6B and/or HIS-DH6A. Leave the DH System lined up so that the system can be put back in operation as desired by just restarting DH Pump 1-1 and/or 1-2.

4.2.10 If the running DH Pump suction pressure is less than about 85 to 90 psig, borated water from the BWST can be added to the RCS using the BWST Recirc Pump via the Decay Heat Pump Suction. This method cannot be used if the Spent Fuel Pool System is in operation or if the Decay Heat System is lined up through the Spent Fuel Pool Purification System for coolant purification.

19 *Controlled as per AD 1839.02

____1. Close and tag with a "Do Not Operate" tag PW35 Primary Water to the BW Recirc Pmp Suct and DW70 Demin Water to the BW Recirc Pmp Suct to prevent an inadvertent dilution of the RCS.

____2. If the BW Recirc Pmp is on, turn it off.

____3. Perform Valve Verification List B. Perform all valves which require a close position prior to repositioning any valves requiring an open position.

____4. Open BWST Recirc. Pump to SFP purification valve BW16 one turn and start the BWST Recirc. Pump.

____5. Now throttle open BW16 to get as much flow as possible but keeping the BW Recirc Pmp Disch Press as indicated on PI1614 above 65 psig. This puts the BWST on recirc through the SFP Purification System bypassing the SFP Purification Demin to assure proper boron concentration in the lines prior to adding to the RCS.

____6. After running in this manner for at least one half hour, shutdown the BW Recirc Pmp.

____7. Close SF98, SFP Cleanup Sys to BWST Vlv.

____8. If DH Pmp 1-1 is on, recirculating the RCS, open DH29, DH Pmp 1-1 Suct from SFP Purif Vlv. If DH Pmp 1-2 is on, recirculating the RCS, open DH28, DH Pmp 1-2 Suct from SFP Purif Vlv.

NOTE: Only one of these valves is to be opened at any one time.

____9. Establish communications between the Control Room and the operator at the BW Recirc Pmp. Throttle BW 16 to one turn open and start the BW Recirc Pmp. The Reactor Operator will monitor the Przr Level.

____10. Open BW16 to get the desired flow rate indicated on FIS1616 SFP Purif Flow Ind Sw, normally about 80-100 gpm. The time to fill the Przr to the desired level should be timed for a quick double check on water added to the RCS.

____11. When the desired Przr Level is reached, stop the BW Recirc Pmp and close BW16, DH28 or DH29 depending on which was opened, and SF2656.

____12. Notify Chem Lab that borated water from the BWST was added to the RCS. Do Not Operate tags can be removed from DW70 and PW35.

4.2.11 To shift from the operating DH Pump to the idle DH Pump (which is assumed to be in a standby lineup to recirc the RCS) proceed as follows:

_____1. Perform the Decay Heat Pump Pre Startup, Checklist, Enclosure 7 of this procedure, for the DH Pump to be started.

_____2. Establish component cooling water flow through the DH cooler to be put inservice by opening the CCW outlet isolation valve, CC1467 for cooler 1-1 or CC1469 for cooler 1-2 using switches HIS 1467 or HIS 1469.

_____3. If the Spent Fuel Pool Purification System is in use, perform Valve Lineup List B to stop purification flow from the DH loop being taken out of service, then perform Valve Lineup List A to line up the SFP Purification to the DH Loop being put in service.

_____4. If the Makeup and Purification System is in use, shift it to the DH loop being put in service as follows:

16 _____4.1 Close DH62* (or DH61*), for the DH loop being removed from service.

_____4.2 Open DH33* (or DH32*) to line up to the DH loop being put in service.

_____5. Switch the DH Pumps by performing the following:

_____5.1 Press the "AUTO" on the DH Cooler Outlet & Bypass Valves for the DHR Train to be started. Insure both of these valves are closed or close them using their hand controllers.

_____5.2 Verify the control power is removed from DH11 and DH12 or that DH21 and DH23 are open. Make appropriate entry of verification in the RO Log.

_____5.3 Start the DH Pump to be put in service.

_____5.4 Start increasing flow on the DHR Train being put in service using the DH Cooler Outlet and/or Bypass Valves. When a flow increase is seen on the DHR Train being put in service, start reducing flow on the DHR Train being taken out of service until both the DH Cooler Outlet and Bypass Valves for this train are closed. Do NOT allow the total DH flow to go below 2800 gpm.

*Controlled as per AD 1839.02

____5.5 Stop the DH Pump being removed from service.

____5.6 If desired place the idle DHR train in standby by opening the DH Cooler Outlet Valve and verifying its position within 4 hours.

21

____6. Close DH 32* (or DH33*) to isolate the DH loop being removed from service. (If valve was open for Boric Acid flowpath or for MU & Purification System use.)

____7. Control MU & Purification System Flow between 25-70 gpm, and less than or equal to 150 psig by throttling DH61* (or DH62*) and monitoring flow on Control Room indicator FI-MU7 or computer point F719, and pressure on computer point P719. Maintain temperature <130°F.

____8. Control cooling and decay heat removal flow by throttling the Decay Heat Cooler Discharge Valve DH14B (or DH14A), and cooler bypass valve DH13B (or DH13A).

____9. Stop CCW flow through the DH cooler taken out of service by closing CC 1467 for cooler 1-1, or CC 1469 for cooler 1-2.

Section 4 Completed_____Date_____

5. DECAY HEAT REMOVAL DURING RCS COMPONENT REPAIR

There are five maintenance water levels to repair RCS components. They are:

	Distance Above 36" $\frac{C}{L}$	Components
1)	56'	Pressurizer Relief Removal Hot Leg RTD Thermowell Removal
2)	25'	Pressurizer Heater Removal
3)	18" ± 2"	OTSG Lower Tube Sheet Plugging RCP Internals Removal
4)	14" ± 2"	CF Check Valve Repair
5)	11" ± 2"	Cold Leg RTD Thermowell Removal

The first two do not present any problems with DH Pump NPSH or vortexing. The next two are at much lower water levels and both pump NPSH and cavatation from vortexing require careful pump observation. The last maintenance water level was not adequate for even 400 GPM decay heat flow during preoperational testing and consideration should be given to core removal if decay heat cannot be secured.

*Controlled as per AD 1839.02

Enclosures 4 and 5 are provided for guidance while operating DH at low water levels. Enclosure 4 shows the minimum suction pressure that should be maintained on the suction gage. This was derived from taking the B&W Pump Curve and modifying it with vapor pressure to provide a low pressure limit for the established flowrate and RC temperature at the time of the maintenance. This is only a guide. As long as the pump performance for the flowrate is consistent with the pump curve and no unusual noise or discharge pressure variation is observed, pump operation can continue.

Enclosure 5 can be used to estimate the total decay heat flow vs. reactor water level. It is believed vortexing is the major restraint when below 18". This enclosure is only a guide to show what flowrate was possible at various levels during preoperational testing.

Technical Specifications must also be considered. Technical Specification 3.9.8 requires at least one decay heat pump to be in
(TS) operation circulating reactor coolant at >2,800 GPM while in Mode 6. Technical Specification 3.4.1 requires at least one reactor coolant pump or decay heat pump in operation while in Modes 3, 4 and 5. Preoperational testing results show 2800 GPM may be just reached at 18" and probably is not possible at 14" or 11". Therefore, if this work is desired to be performed in Mode 6, a Technical Specification change may be required.

This procedure will consist of:

Step 1: Lower RCS temperature to maintain level

Step 2: Throttle DH flow to maintain desired temperature

Step 3: While dividing flow evenly between DH Pumps, lower water level. Throttle the DH flow but maintain RCS temperature constant. This may require waiting to allow the core decay heat to be reduced to the amount that can be handled by the flowrate possible at the required water level.

No operator sign off is required for Section 5.

5.1 Prerequisites

_____5.1.1 Reactor coolant level instrumentation LI 214 is in service by opening valves RC214A, RC214B and RC214C, or TYGON tubing is installed to monitor level.

18 _____5.1.2 Normal Decay Heat Removal has been established for one DH Pump per Section 4 of this procedure.

18 If the D.H. system is recirculating a partially drained RCS with a suction through the bypass line (through DH22 and DH23), do NOT increase flow above 4000 GPM. The flowpath through the smaller bypass line does not provide adequate NPSH to allow for the D.H. pump operation.

5.2 Procedure

(TS 3.4.8) _____5.2.1 If C&HP determine that the coolant activity is excessive ($\geq$1.0 µCi/gram dose equivalent I-131 or $\geq 100/\bar{E}\mu Ci$/gram) purify per Section 6 of this procedure.

_____5.2.2 Lower RCS temperature to 140° (or other chosen RCS repair temperature) following Section 4 of this procedure.

_____5.2.3 Throttle the DH Pump in operation while monitoring RCS temperature. The DH Pump suction temperature indicators TIDH8B and A are the best indication of RCS temperatures. If during the throttling, the DH suction temperature rises, increase DH flow to return the RCS to the desired temperature. Do not throttle to allow a decay heat flow of less than 2800 gpm.

_____5.2.4 Lower RCS water level slowly. If RCS level is reduced to less than 36" above the centerline of the hot leg outlet, then locally observe suction and discharge pressure on decay heat pump. Use Enclosure 4 for a guide on minimum suction pressure.

_____5.2.5 Throttle the DH Pump as necessary to maintain proper suction pressure. If RCS temperature increases, the reduction of level may have to be stopped to allow the core decay heat to reduce to the amount that can be handled by the flowrate possible at the required water level. Use Enclosure 5 for guidance.

CAUTION: Technical Specifications may not allow flow reduction. See Section 5.

_____5.2.6 At this low a water level and flow rate vortexing is more restrictive than NPSH. The other decay heat pump should be lined up to supply low pressure injection from the BWST if the pump in operation should fail and could not be reestablished prior to core heatup. Water from the BWST should be added to assure decay heat letdown can be established.

NOTE: Since maintenance will probably be accomplished at a low RCS temperature, the DH System may be throttled thus minimizing the possibility of vortexing. If suction is lost due to air entrainment, the decay heat pump may be momentarily secured and the line vented with the high point vent valve DH 173. Also, the DH Pump suction valve from the BWST (DH2733 or DH2734) must be opened to allow back flow through the suction from the BWST and out of the high point vent.

_____5.2.7 Once the desired water level is established, maintenance can proceed to remove the component.

_____5.2.8 As soon as maintenance work is completed, raise the water level to at least 36" above the centerline of the hot leg outlet. When possible, refill the RCS and return to normal decay heat removal.

6. DECAY HEAT REMOVAL COOLANT PURIFICATION

The Spent Fuel Pool Cleanup System or the Makeup and Purification (MU) System filters and demineralizers are used to purify the reactor coolant when the Decay Heat System is in use by directing a portion of the coolant through the demineralizers.

No operator signoff is required for Section 6.

6.1 Prerequisites

_____6.1.1 Makeup and Purification system is shutdown in accordance with Section 7 (Shutdown and Makeup and Purification System) of SP 1104.02, "Makeup and Purification System"; or the SFPL cleanup system is available and lined up normally in accordance with Valve Verification List A of SP 1104.06, "SFP Cooling System Operational Procedure".

_____6.1.2 Decay heat removal has been established as per Section 4 of this procedure, and the decay heat cooler outlet temperature is below 130°F. RCS pressure <100 psig.

6.2 Procedure

6.2.1 Purification via the spent fuel pool cleanup system.

_____1. Complete Valve Lineup List A, "Coolant Purification Via SFP Cleanup System," of this procedure. This will establish purification flow.

____2. Control flow at 100 gpm, and at a pressure less than 100 psig in the spent fuel pool cleanup system by throttling the decay heat system discharge valve DH 61 (DH 62) and monitor purification flow locally on FIS-1616 and pressure on PI-1634.

15| NOTE: Continue to monitor and maintain temp <130°F. PSV DH2797 is set at 125 psig. Do not exceed 100 psig.

____3. Control cooling and decay heat removal flow by throttling decay heat cooler discharge DH 14B (DH14A) and cooler bypass valve DH 13B (DH 13A).

____4. Stop purification flow by completing Valve Lineup List B, "Post Purification Lineup - SFP Cleanup System," of this procedure.

6.2.2 Purification via the Makeup and Purification System.

NOTE: Observe limits of PP 1101.01, Section 2.5.1, Purification Demineralizer.

____1. Complete Valve Lineup List C, "Coolant Purification Via MU Purification System," of this procedure. This will establish purification flow.

____2. Control flow (between 25-70 GPM) and pressure ($\leq$150 psig) in the MU & P System by throttling the Decay Heat System discharge to MU & P system valves DH 61 (DH 62). Monitor purification flow using control room indicator FI-MU7 or computer point F719, and pressure using computer point P719.

____3. Control cooling and decay heat removal flow by throttling Decay Heat Cooler Discharge Valve DH 14B (DH 14A) and cooler bypass valve DH 13B (DH 13A). Monitor and maintain temperature $\leq$130°F.

____4. When using purification demineralizer 1-1 (1-2) and it has to be removed from service, put the other purification demineralizer 1-2 (1-1) in service by opening inlet valve MU 10B (MU 10A) and close MU 10A (MU 10B).

NOTE: If it is desired to cleanup the RCS faster both purification demineralizers can be placed in service. Maintain the flow <140 gpm. The cation bed can also be placed in service when instructed by C&HP section.

_____5. Stop purification flow by completing Valve Lineup List D, "Post Coolant Purification Lineup - MU Purification System," of this procedure.

NOTE: The Boric Acid flowpath from the BAAT to DH Suction is isolated by Valve Lineup List D.

7. DECAY HEAT REMOVAL DURING REFUELING

The normal decay heat removal lineup will be used throughout a refueling outage with the exception of filling and draining the refueling canal. Other minor exceptions to the normal lineup including purification of the reactor coolant or operation with a low RCS level.

For procedure on filling and draining the refueling canal, see SP 1102.15, "Filling and Draining the Refueling Canal."

No operator sign off is required for Section 7.

7.1 Prerequisites

_____7.1.1 The Decay Heat System is arranged for normal Decay Heat removal as per Section 4 of this procedure.

7.2 Procedure

_____7.2.1 Operate the Decay Heat Removal System to obtain or control the desired coolant temperature as specified in Section 4 of this procedure.

8. DECAY HEAT REMOVAL DURING REACTOR HEATUP

No operator sign off is required for Section 8.

8.1 Prerequisites

_____8.1.1 Decay Heat Removal System lineup and operating in accordance with Section 4 of this procedure.

_____8.1.2 Refueling or maintenance requiring plant shutdown is complete.

8.2 Procedure

_____8.2.1 Decay heat removal may be reduced by bypassing decay heat cooler 1-1 (1-2) through valves DH 13B (DH 13A).

_____8.2.2 Stop the decay heat pumps after an RCP has been started as per Plant Startup Procedure, PP 1102.02.

_____8.2.3 Line up the Decay Heat Removal System for normal lineup to provide LPI as per Section 13 of this procedure except DH 11 and DH12 which cannot be closed
20 | until RCS temperature exceeds 280°F.

NOTE: DH11 (DH12) are interlocked and cannot be operated above an RCS pressure of 331 (296) psig at the D.H. centerline or 301 (266) psig as indicated on PIRC2A6.

9. LOW PRESSURE INJECTION FROM THE BORATED WATER STORAGE TANK

No operator signoff is required for Section 9.

_____9.1.1 The Decay Heat Removal System is lined up per Valve Verification List A of this procedure.

_____9.1.2 A Safety Features Actuation System Incident Level #3
20 | signal is present from low reactor pressure of 450 psig or high containment vessel pressure of 18.4 psig.

9.2 Procedure

_____9.2.1 On receipt of a Safety Features Actuation Signal, verify the following (use the indicating lights on the associated HIS):

_____1. Decay Heat System discharge to the RCS valves DH1A and DH1B are open as indicated HIS DH1A and HIS DH1B, respectively. Both switches are located on Control Room panel C5716.

_____2. Decay Heat Pumps 1-1 and 1-2 have started as indicated on HIS DH6B and HIS DH6A, respectively. These switches are located on Control Room panel C5716.

_____3. Decay Heat Cooler discharge valves DH14B and DH14A are open as indicated on HIC DH14A and HIC DH14B, respectively. These controllers are located on Control Room panel C5704.

_____4. Decay Heat Cooler Bypass Valves DH13A and DH13B are closed as indicated on HIC DH13A and HIC DH13B, respectively. These controlers are located on Control Room panel C5704.

_____5. Borated Water Storage Tank outlet valves DH7A and DH7B are open as indicated on HIS DH7A and HIS DH7B, respectively. These switches are located on Control Room panel C5716.

_____6. Component Cooling Water Outlet from Decay Heat Cooler Valves, CC1467 and CC1469 are open as indicated on HIS 1467 and HIS 1469, respectively. These switches are located on Control Room panel C5716.

_____7. Decay Heat Pump 1-1 and 1-2 suction valves DH2733 and DH2734 are open as indicated on HIS 2733 and HIS 2734, respectively. These switches are located on Control Room panel C5717.

9.2.2 The flow rate of low pressure injection system will depend on the RCS pressure and the position of the DH cooler outlet valves DH14A and DH14B. The DH pumps are started and the valves opened at 450 psig (RCS pressure). However, there will not be any flow into the RCS at this point. When the RCS pressure drops to approximately 215 psig, then LPI flow will start and continue to increase as the RCS pressure decreases. 15

No throttling of the DH pumps should be done.

NOTE: If one DH pump is disabled, close the suction valve on the disabled pump and then open the cross-connect isolation valve next to the line with the higher flow. Open DH System cross-connect valve DH 831 (DH 830) when Dh Pump 1-1 (1-2) line flow is higher. Then balance the flow to 1500 gpm per line by adjusting the flow control valves DH 14A and DH 14B. If no air is available to DH 14A and DH 14B, the DH injection valve DH1B (DH1A) can be throttled under emergency conditions. This motor operated valve only moves while control switch is held.

10. RECIRCULATION FROM THE CONTAINMENT VESSEL EMERGENCY SUMP

Following a LOCA, the BWST level will decrease until at the 8 feet level the operator must manually transfer the suction of the DH and CS Pumps to the emergency sump. The operator will open the emergency sump outlet valves DH9A and DH9B which will automatically close the BWST outlet valves DH7A and B. Note that SFAS incident level 5 must

be actuated before the transfer can occur; this requires any two channels of SFAS logic to reach the low level setpoint of 8 feet. The annunciator "BWST LOLO LVL, XFER TO EMER SUMP" will indicate that the incident level 5 logic has been actuated and that the transfer is possible. The annunciator does not meet safety grade specifications however and therefore must NOT be relied upon to indicate the incident level 5 trip. When the 8 feet level is reached (as indicated on LI1525A, B, C, and D), the annunciator should be received and the transfer should be initiated. Considering the worst case instrument tolerances, the SFAS incident level 5 actuation will occur by the
17 time the indicated BWST level reaches 8 feet.

If a medium size LOCA exists and one D.H. pump is recirculating the RCS in the DHR mode through DH11 and DH12 per EP 1202.06 "Loss of RC and RC Pressure", the transfer should be completed per the following section with the exception that the suction valve (DH2733 or DH2734) should remain closed on the pump recirculating the RCS.

No operator signoff is required for Section 10.

10.1 Prerequisites

_____10.1.1 Recirculation from the emergency sump is required to supply water to the LPI, HPI (Piggyback), or C.S. pumps.

17 _____10.1.2 Borated Water Storage Tank water level approaching the low level transfer setpoint (8 feet) as read on LI1525A, B, C, and D.

_____10.1.3 The makeup pump will have to be shutdown or operated with its suction aligned to the makeup tank since the
17 supply from the BWST will be lost when DH7B and DH7A are closed. The makeup pump cannot be supplied from the emergency sump and the tank level must be maintained above 10 inches if pump operation is to continue to avoid an automatic transfer of MU 3971.

10.2 When the BWST level reaches 8 feet, attempt to transfer the suction of the DH and CS Pumps to the emergency sump as described below. Continue the attempts until the transfer is complete. The annunciator "BWST LOLO LVL, XFER TO EMER SUMP" provides assurance to the operator that the transfer can be completed.

_____10.2.1 Block SFAS incident level 2 on DH9A and DH9B.

_____10.2.2 Open DH9A and DH9B using HISDH9A and HISDH9B.

17 _____10.2.3 Verify that DH7A and DH7B start to close as DH9A and DH9B start to open. If an auto closure did not occur, do not manually close DH7B (DH7A) until DH9B (DH9A) is open.

_____10.2.4 Verify that the transfer is complete by checking the indicating lights on DH9A and B and DH7A and B and by checking that the low pressure injection flow was not significantly changed.

17 _____10.2.5 Continue recirculation from the emergency sump to the LPI, HIP (Piggyback), or C.S. pumps as required.

NOTE: Long term cooling is covered in EP 1202.06, "Loss of RC and RC Pressure Emergency Procedure".

11. DECAY HEAT SUPPLY OF HIGH PRESSURE INJECTION PUMP SUCTION - "PIGGYBACK" OPERATION

This section specifies the necessary line-ups to supply suction to the HPI pumps from the DH pump discharge. This "piggyback" operation may be required for two reasons; 1) if makeup to the RCS is required at a pressure higher than HPI discharge pressure the additional head of the DH pumps can raise the injection pressure, or; 2) if, in the event of a small RCS leak, the RCS pressure is greater than the discharge pressure of the DH pumps such that HPI is required, and the BWST is nearing its low level setpoint, (8 feet), HPI suction must be supplied from the emergency sump through the DH pumps. The lineup for both of these operations is the same except that the first will use water from the BWST while the second will start with BWST water and switch to the containment emergency sump.

11.1 Prerequisites

_____11.1.1 Decay heat removal system lineup is normal lineup as per Valve Verification List A of this procedure.

_____11.1.2 Either:

1. RCS Pressure is too high to achieve 2000 gpm total decay heat flow (FI DH2A, B) and the BWST level is approaching 8 feet, or

17 2. Makeup to the RCS is required at a pressure higher than HPI discharge pressure or additional flow is required.

11.2 Procedure

_____11.2.1 Start the HPI pump(s) if not already running and open the associated discharge valves HP2A(C) and HP2B(D) for HPI Pump 1-2 (1-1).

____11.2.2 Open the decay heat pump discharge valves to the HPI pumps, DH63 (DH64) for HPI pump 1-2 (1-1).

____11.2.3 Start DH Pump 1-2 (1-1) and verify HPI pump 1-2 (1-1) flow does not decrease. Leave DH 14A (DH 14B) open and throttle with HP2A(C) and HP2B(D) if necessary.

NOTE: The preceding three steps establish the "piggyback" mode of operation. If this operation is being formed to provide RCS makeup at high pressure, no further action is required until makeup is no longer needed at which time the pumps may be stopped and DH 63 and DH 64 closed. If this operation is the result of an RCS leak and the BWST level is approaching 8 feet, continue with the remaining steps.

____11.2.4 Close the high pressure injection pump minimum recirculation valves to the BWST. This is to minimize the contamination of the BWST and maintain off site radiation levels as low as possible.

NOTE: If, DH 64 (DH 63) and HP 32 (HP 31) are both open, computer alarm Q488 (Q489) will occur. Close HP 32 (HP 31).

CAUTION: If the high pressure injection flowrate drops to <35 GPM per pump due to an increase in RCS pressure, stop the high pressure injection pumps 1-1 and 1-2 so as not to damage them.

17 ____11.2.5 When the BWST level reaches eight feet, transfer pump suction to the emergency sump per Section 10.

____11.2.6 When Reactor Coolant Pressure is low enough for the Decay Heat Pumps to discharge directly to the Reactor Coolant System at a flow of 2000 gpm, begin Decay Heat System recirculation of the Containment Vessel Emergency Sump as follows:

____11.2.6.1 Stop the High Pressure Injection Pumps 1-1 and 1-2 if their flow is not needed.

17 ____11.2.6.2 Shut the Decay Heat Pump discharge valves to the High Pressure Injection Pump Suction DH 63 and DH 64.

Section 11 Completed_____Date_____

12. DECAY HEAT SYSTEM COOLING OF THE SPENT FUEL POOL

If both SFP pumps or heat exchangers of the spent fuel pool cooling system are unavailable or if the heat load exceeds the SFP cooling system capacity the Decay Heat System can be used to cool the SFP water.

12.1 Prerequisites

_____12.1.1 Both SFP pumps or heat exchangers are not available for cooling required.

_____12.1.2 One decay heat pump and one decay heat cooler available for cooling the spent fuel pool.

_____12.1.3 Depending upon the condition of the RCS, the DH System will either be lined up for decay heat removal as per Section 4, or lined up in Normal Lineup as per Section 13, of this procedure.

_____12.1.4 SFP Cooling and Cleanup System lined up normally in accordance with Valve Verification List A of SP 1104.06, "SFP Cooling and Cleanup System Procedure".

12.2 Procedure

_____12.2.1 Stop Decay Heat Pump 1-1 (1-2) if running.

_____12.2.2 Close Decay Heat Pump 1-1 (1-2) suction valve DH 1517 (DH 1518), the Decay Heat Cooler Discharge Valve DH 14B (DH 14A) and DH 2733 (DH 2734), the DH pump suction from the BWST valves if they are open.

_____12.2.3 Shut the Decay Heat Cooler Bypass Valve DH 13B (DH 13A) if it is open.

_____12.2.4 Shut the Decay Heat System discharge valve to the Reactor Coolant System DH 1B (DH 1A) if it is open.

_____12.2.5 Close the SFP outlet valve, SF 6, to the SFP pumps.

_____12.2.6 Close the SFP HX 1-1 and 1-2 outlet valves SF 45 and 46.

_____12.2.7 Open SFP to Decay Heat System Valve SF 115.

_____12.2.8 Open SFP to DH Pump 1-1 (1-2) valve DH 31 (DH 30).

_____12.2.9 Open DH Cooler 1-1 (1-2) discharge to SFP valve DH 66 (DH 65) and unlock and open DH 69.

_____12.2.10 Establish component cooling water to DH Cooler 1-1 (1-2) if not already being supplied by opening DH Cooler 1-1 (1-2) CCW outlet isolation valve CC 1467 (CC1469). Use control room switch HIS-1467 (HIS-1469) located on panel C5716 (Engineered Safety Features Panel).

_____12.2.11 Start DH Pump 1-1 (1-2) as per section 4.2.4 and 4.2.6 of this procedure.

_____12.2.12 Open and throttle DH 14B (DH 14A) and DH 13B (DH 13A) to maintain adequate NPSH (>3.7 psig) and cooling. Use DH pump suction pressure gauge PI 1507 for DH pump 1-1 and PI 1538 for DH Pump 1-2.

_____12.2.13 Monitor DH cooler 1-1 (1-2) to SFP flow using flow indicator FI DH2B (FI-DH2A). Do not exceed 3000 GPM, (for DH pump runout protection).

_____12.2.14 The SFP purification system can be used to clean up the water during the cooling operation by opening DH 70, DH29 (DH28) and SF2656 and throttling DH61 (DH62).

_____12.2.15 Regulate cleanup flow through SFP Cleanup System to approximately 100 GPM as monitored on local flow indicator FIS-1616.

Section 12 Completed_____Date_____

13. NORMAL LINEUP

During normal operation, the Decay Heat System will be lined up to provide Low Pressure Injection if it is needed. This lineup is the "Normal Lineup".

No operator sign off is required for this section of the test.

13.1 Prerequisites

_____13.1.1 Decay Heat System filled and vented.

_____13.1.2 Safety Features Actuation System is in service per "Safety Features Actuation System Procedure," SP 1105.03.

_____13.1.3 Verify power is supplied to the motor operated valves and pumps listed in Enclosure 1. Verify control power is removed from DH1A and DH1B from indicating lights DH1A-2 & DH1B-2 on C5716.

13.2 Procedure

_____13.2.1 Line up the Decay Heat System per Valve Verification List A, normal lineup for Decay Heat System," of this procedure.

15 NOTE: In this mode of operation, the Decay Heat System will operate as Low Pressure Injection on a loss of Reactor Coolant System Pressure (≤450 psig) or high containment vessel pressure (≥18.4 psig).

Delete

_____13.2.2 Perform Decay Heat Pump Checkoff List for both pumps. (Enclosure 7)

_____a. DH Pump 1-1

_____b. DH Pump 1-2

14. RECIRCULATION OF BWST WITH A DECAY HEAT PUMP
(No operator sign off is required for Section 14)

14.1 Prerequisites

14.1.1 It is desired to recirculate the BWST with a Decay Heat Pump.

CAUTION: Be sure that DH Pump Suction Valves from RCS are closed before opening test flow valves to BWST if DH11 and DH12 are open. Specifically, insure DH1517 (DH1518) and DH10 (DH26) are closed before opening DH66 (DH65) and DH68, and when restoring the system be sure that DH66 (DH65) and DH68 are closed before reopening DH1517 (DH1518) and DH10 (DH26). This is required to prevent forcing water from RCS into BWST.

14.2 Procedure

15 14.2.1 Perform Valve Verification List B1 to recirculate with Decay Heat Pump 1-1. (Unless otherwise directed by the Shift Supervisor.)

15 14.2.2 Perform Valve Verification List B2 to recirculate with Decay Heat Pump 1-2. (Unless otherwise directed by the Shift Supervisor.)

15 | 14.2.3 Place DH Pump in operation as per Steps 4.2.4 thru 4.2.7 of this procedure or as directed by the Shift Supervisor. If CCW is not required to the D.H. cooler, Step 4.2.5 need not be completed.

15 | 14.2.4 When recirculation is complete, close DH66 (DH65) and DH68 and return system to control of Shift Supervisor.

14.2.5 Independently reverify DH 66 (DH 65) and DH68 are closed.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
LOCATED 585' LVL. MECH. PENETRATION ROOM NUMBER FOUR				
DH Cooler 1-2 Outlet to Press Aux. Spray Line Leak Test	B5	DH 100	Closed	
DH Disch to SFP Vent	M-035 D11	DH 101	Closed	
DH Cooler 1-2 Outlet to Press Aux. Spray Line Leak Test	B5	DH99	Closed & Capped	
DH Cooler 1-2 Outlet to Press. Aux. Spray Line Leak Test	B5	DH99A	Closed	
DH Aux. Spray Throttle Valve	B5	DH2736	Locked Closed (1)	
DH Suction From SPF Vent	G5	DH 51	Closed	
Located 585' Lvl in SFP Cooling Room				
D.H. Disch to SPF Drain	M-035 D11	DH 102	Closed	
LOCATED 565' LVL., MECH. PENETRATION ROOM NUMBER ONE				
DH Pmp 1-1 Disch PS-2882B Source	E6	DH 2882B	Open	
DH Pmp 1-1 Disch Line Leak Test Conn.	E6	DH 73	Closed	
DH PMP 1-1 Disch PI	E5	PI 2882B	In Service	
DH PMP 1-1 Disch to RCS Iso	E5	DH 1B	Locked Open (1) (cntrl pwr off)	
DH Sys Disch/Return for Refueling Canal Leak Test	F5	DH 85	Closed	
DH Sys Disch/Return for Refueling Canal Leak Test	F4	DH 86	Closed & Capped	
DH Sys Disch/Return for Refueling Canal Iso	F5	DH 87	Locked Closed (1)	
Refueling Canal Drain to BWST Recirc PMP	F5	DH 84	Sealed Closed	
Refueling Canal Drain to BWST Recirc Vent	F5	DH 133	Closed	
LOCATED IN DECAY HEAT PUMP 1-1 ROOM				

(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

	VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
15	CFT Return Valve to BWST	A-11	SS 159	Closed	
15	DH PMP 1-1 Suction (BWST or Emer. Sump)	J6	DH 2733	Open(1)	
	PP 9824 Source Valve	G-6	DH 9824	Closed	
	DH PMP 1-1 Suction Flush Conn.	H7	DH 37	Closed	
	DH PMP 1-1 Suction Press Source	G7	DH 1507	Open	
	DH PMP 1-1 Suction Gage	G7	PI 1507	In Service	
	DH PMP 1-1 Suction Low Press Gage Source	G7	DH1507A	Closed*	
	DH PMP 1-1 Vent	G7	DH 57	Closed	
	DH PMP 1-1 Drain	H7	DH 39	Closed	
	DH PMP 1-1 Drain	H7	DH 15	Closed	
	DH PMP 1-1 Drain	H7	DH 16	Closed	
	DH PMP 1-1 CCW Supply Stop Check (Line 1)	M036 F10	CC 148	Locked Open (1)	
	DH PMP 1-1 CCW Supply Stop Check (Line 2)	M036 F10	CC 147	Locked Closed (1)	
	DH PMP 1-1 CCW Return Stop Check (Line 1)	M036 E10	CC 151	Locked Open (1)	
	DH PMP 1-1 CCW Return Stop Check (Line 2)	M036 E10	CC 152	Locked Closed (1)	
	DH PMP 1-1 Disch Flush Conn.	G7	DH 41	Closed	
	DH PMP 1-1 Disch Press Source	G7	DH 5B	Open	
	DH PMP 1-1 Disch Press Gage	G8	PI DH5B	In Service	
	DH PMP 1-1 Disch Isolation	G8	DH 45	Locked Open (1)	
	DH PMP 1-1 Recirc Line Shut Off	G7	DH 55	Locked Open (1)	

*The low pressure gage should remain isolated except when the suction pressure is too low to use normal suction gage.

(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH PMP 1-1 Outlet to PHI PMP 1-1 Suction	E9	DH 64	Locked Closed (1)	
DH PMP 1-1 Disch to BWST/Refuel Canal/SFPL Clng Sys	E7	DH 66	Locked Closed (1)	
DH PMP 1-1/1-2 Disch to BWST	C10	DH 68	Closed	
DH PMP 1-1/1-2 Disch to BWST (Throttle)	C10	DH 67	Closed	
DH PMP 1-1/1-2 Disch to BWST Leak Test	B11	DH 124	Closed	
DH System Disch/Return for Refueling Canal	E7	DH 83	Closed	
DH System Cross-Connect Line Drain	C9	DH 169	Closed	
DH PMP 1-1 Outlet to HPI PMP Vent	E9	DH 166	Closed	
DH PMP 1-1 Flow Transmitter Source K1	E7	DH 2BA	Open	
DH PMP 1-1 Flow Transmitter Source K2	E7	DH 2BB	Open	
DH PMP 1-1 Flow Transmitter	E7	FT DH2B	In Service	
DH Sys Disch/Return for Refueling Canal Ln Vent	E7	DH 167	Closed	
DH Sys Disch/Return for Refueling Canal Line Drain	E7	DH 168	Closed	
Emerg. Sump Line Jacket Drain & Test	J5	DH 152	Closed & Capped	
Emerg. Sump Line Jacket Drain & Test	K5	DH 153	Closed Capped	
LOCATED IN DECAY HEAT PUMP 1-2 ROOM				
DH PMP 1-1 CCW Supply (Line 1)	M036 J11	CC 653	Locked Open (1)	
DH PMP 1-1 CCW Supply (Line 2)	M036 J12	CC 655	Locked Closed (1)	
DH PMP 1-1 CCW Return (Line 1)	M036 B9	CC 661	Locked Open (1)	
DH PMP 1-1 CCW Return (Line 2)	M036 C9	CC 659	Locked Closed (1)	

(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH PMP 1-2 Supply (Line 2)	M036 J12	CC 654	Locked Open (1)	
DH PMP 1-2 CCW Return (Line 2)	M036 C9	CC 660	Locked Open (1)	
DH PMP 1-2 CCW Supply (Line 1)	M036 J12	CC 652	Locked Closed (1)	
DH PMP 1-2 CCW Return (Line 1)	M036 C9	CC 662	Locked Closed (1)	
DH PMP 1-2 Suction Line Flush Conn.	H10	DH 36	Closed	
PP 9825 Source Valve	H10	DH 9825	Closed	
DH PMP 1-2 Suction Press Source	G10	DH 1538	Open	
DH PMP 1-2 Suction Press Gage	G10	PI 1538	In Service	
DH PMP 1-2 Suction Low Press Gage Source	G10	DH1538A	Closed*	
DH PMP 1-2 Casing Vent	G10	DH 56	Closed	
DH PMP 1-2 Casing Drain	H10	DH 38	Closed	
DH PMP 1-2 Drain	H10	DH 17	Closed	
DH PMP 1-2 Drain	H10	DH 18	Closed	
DH PMP 1-2 CCW Supply Stop Check (Line 2)	M036 F11	CC 149	Locked Open (1)	
DH PMP 1-2 CCW Supply Stop Check (Line 1)	M036 F11	CC 150	Locked Closed (1)	
DH PMP 1-2 CCW Supply Stop Check (Line 2)	M036 E10	CC 153	Locked Open (1)	
DH PMP 1-2 CCW Return Stop Check (Line 1)	M036 C9	CC 154	Locked Closed (1)	
DH PMP 1-2 Disch Press Source	G10	DH 5A	Open	
DH PMP 1-2 Disch Press Gage	G10	PIDH5A	In Service	

*The low pressure gage should remain isolated except when the suction Pressure is too low to use normal suction gage.
(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH PMP 1-2 Disch Line Flush Conn.	H10	DH 40	Closed	
DH PMP 1-2 Disch Isolation	G11	DH 44	Locked Open (1)	
DH PMP 1-2 Disch to HPI PMP 1-2 Suction	C11	DH 63	Locked Closed (1)	
DH PMP 1-2 Disch Line Vent	G11	DH 161	Closed	
DH Clr 1-2 CCW Outlet Iso for CC 1469	M036 A11	CC 174	Locked Open (1)	
DH PMP 1-2 Recirc Line Stop Valve	G10	DH 54	Locked Open (1)	
LOCATED IN DECAY HEAT COOLER ROOM				
BWST Line 1 to MU PMP Suction Iso.	J11	DH 129	Open	
BWST Supply to MU PMP Suction Vent	J11	DH 136	Closed	
BWST Line 1 to MU PMP Suction Iso.	J11	DH 130	Open	
BWST Supply to MU PMP Suction Drain	J11	DH 135	Closed	
DH PMP 1-1 Recirc Line Press Test Tap	G8	DH 1506	Closed	
DH PMP 1-1 Recirc Line Press Test Tap	G7	DH 1504	Closed	
DH Cooler 1-1 Inlet Flush Conn.	G8	DH 47	Closed	
DH Cooler 1-1 Inlet Press Test Tap	G8	DH 1317	Closed	
DH Cooler 1-1 Outlet Press Source	G8	DH 1553	Open	
DH Cooler 1-1 Outlet Press Gage	G8	PI 1553	In Service	
DH Cooler 1-1 CCW Inlet Press Test Tap	M036 B11	CC 3717	Closed	
DH Cooler 1-1 CCW Drain	M036 B10	CC 167	Closed	
DH Cooler 1-1 CCW Drain	M036 B10	CC 169	Closed	

(1) Controlled per AD 1839.02

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
PP 948 Source Valve	M036 B11	CC 4948	Closed	
DH Cooler 1-1 CCW Inlet Iso.	M036 B11	CC 165	Locked Open (1)	
DH Cooler 1-1 CCW Outlet Press Test Tap	M036 B11	CC 3718	Closed	
DH Cooler 1-1 CCW Inlet Iso for CC 1467	M036 A10	CC 171	Locked Open (1)	
DH Cooler 1-1 CCW Outlet Iso for CC 1467	M036 A10	CC 172	Locked Open (1)	
DH Cooler 1-1 CCW Outlet Iso (Sol)	M036 A10	CC 1467	Closed	
DH Cooler 1-1 Outlet Line Flush Conn.	F8	DH 53	Closed	
DH Cooler 1-1/1-2 Cross-Connect	F9	DH 831	Locked Closed (1)	
DH Cooler 1-1/1-2 Cross-Connect	F10	DH 830	Locked Closed (1)	
DH Cooler Cross-Connect Bypass Stop Check	F9	DH 127	Locked Open (1)	
DH Cooler Cross-Connect Bypass Stop Check	F10	DH 125	Locked Open (1)	
DH Cooler 1-1 Outlet Line Drain	F8	DH 80	Closed	
DH Cooler 1-1 Outlet Flow Control	F8	DH 14B	Open	
DH Cooler 1-1 Bypass Flow Control	G9	DH 13B	Closed	
21 DH Cooler 1-1 Outlet Line Sample Iso	E9	DH 59	Open	
BWST Line 2 to MU PMP Suction Iso	J11	DH 131	Closed	
BWST Supply to MU PMP Suction Drain	K11	DH 134	Closed	
BWST Line 2 to MU PMP Suction Iso	J11	DH 132	Closed	
DH PMP 1-1 Disch to MU&P SFPL Demin Iso	E9	DH 61	Locked Closed (1)	
DH CLR 1-2 CCW Inlet Iso	M036 B12	CC 166	Locked Open (1)	

(1) Controlled per AD 1839.02

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH CLR 1-2 CCW Outlet Press Test Tap	M036 B11	CC 3715	Closed	
DH CLR 1-2 CCW Inlet Iso for CC 1469	M036 A11	CC 173	Locked Open (1)	
DH CLR 1-2 CCW Outlet Iso for CC 1469	M036 A11	CC 174	Locked Open (1)	
DH CLR 1-2 CCW Outlet Iso (Sol)	M036 A11	CC 1469	Closed	
DH PMP 1-1/1-2 Disch to MU &P Demin	E10	DH 71	Closed	
DH CLR 1-1/1-2 Outlet Line Sample Iso	F10	SS 14	Open	
21 DH CLR 1-2 Outlet Line Sample Iso	F11	DH 60	Open	
DH PMP 1-2 Disch to MU &P and SFPL Demin	E11	DH 62	Locked Closed (1)	
DH PMP 1-1/1-2 Disch to SFPL Demin	E10	DH 70	Closed	
DH PMP 1-1/1-2 to Purif. Demin Drain Line	D10	DH 96	Closed	
DH PMP 1-2 Suction (BWST or Emer. Sump)	J9	DH 2734	Locked Open (1)	
DH System Disch to SFPL Cooling System	C10	DH 69	Closed	
DH PMP 1-2 Disch Line Flush Conn.	G11	DH 46	Closed	
DH Cooler 1-2 Inlet Press Test Tap	G11	DH 1555	Closed	
DH Cooler 1-2 Outlet Press Source	G11	DH 1551	Open	
DH Cooler 1-2 Outlet Press Gage	G11	PI 1551	In Service	
PP 4947 Source Valve	M036 B11	CC 4947	Closed	
DH CLR 1-2 CCW Inlet Press Test Tap	M036 B11	CC 3714	Closed	
DH CLR 1-2 CCW Drain	M036 B11	CC 168	Closed	
DH CLR 1-2 CCW Drain	M036 B11	CC 170	Closed	

(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH CLR 1-2 Outlet Line Drain	G11	DH 160	Closed	
DH CLR 1-2 Outlet Flush Conn.	F11	DH 52	Closed	
DH PMP 1-2 Recirc Line Press Test Tap	G10	DH 1514	Closed	
DH PMP 1-2 Recirc Line Press Test Tap	G10	DH 1516	Closed	
DH CLR 1-2 Outlet Flow Control	F11	DH 14A	Open	
DH CLR 1-2 Bypass Flow Control	H11	DH 13A	Closed	
DH PMP 1-2 Aux. Spray Iso	G12	DH 178	Sealed Open	
DH PMP 1-1 Disch Line Vent	G8	DH 165	Closed	
DH PMP 1-1 Suction from Purif. Demin	H6	DH 33	Locked Closed (1)	
DH PMP 1-2 Suction from MU &P Sys Demin	H6	DH 32	Locked Closed (1)	
DH PMP 1-2 Suction from MU &P Sys Demin Vent	H6	DH 175	Closed	
DH PMP 1-2 Suction from NaOH Mix Tank	H6	DH 34	Locked Closed (1)	
DH PMP 1-1 Suction from NaOH Mix Tank	H6	DH 35	Locked Closed (1)	
DH PMP 1-1 Suction from Emer. Ctmt. Leak Test	J5	DH 163	Closed	
DH PMP 1-1 Suction from Ctmt. Emer. Sump Leak Test	K6	DH 162	Closed	
DH PMP 1-2 Suction from Ctmt. Emer. Sump Vent	K6	DH 164	Closed	
DH PMP 1-2 Aux Spray FI Source Valve	G12	DH4999A	Open	
DH PMP 1-2 Aux Spray FI Source Valve	G12	DH4999B	Open	
LOCATED 565' LVL., PENETRATION ROOM NUMBER TWO				
DH PMP 1-2 Disch Line Vent	B11	DH 158	Closed	

(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH PMP 1-2 Flow Transmitter K1 Source	B10	DH 2AA	Open	
DH PMP 1-2 Flow Transmitter K2 Source	B10	DH 2AB	Open	
DH PMP 1-2 Flow Transmitter	B10	FTDH2A	In Service	
DH PMP 1-2 Disch to Cross-Connect/ BWST/Refueling Canal/SFPL Cooling System	B10	DH 65	Locked Closed (1)	
DH PMP 1-2 Disch Press Switch Source	B6	DH2882A	Open	
DH PMP 1-1 Suct. from RCS Vent	H4	DH 173	Capped & Closed	
DH PMP 1-2 Disch Press Gage	B6	PI 2882	In Service	
DH PMP 1-2 Disch Line Leak Test Conn	B6	DH 72	Closed	
DH PMP 1-2 Disch to RCS Iso	B6	DH 1A	Locked Open & Cntrl Pwr Off (1)	
DH PMP 1-2 Disch to RCS Drain	B5	DH 156	Closed & Capped	
DH PMP 1-2 Disch to RCS Drain	B5	DH 156A	Closed	
RCS to DH Sys Leak Test	H4	DH 25	Closed & Capped	
19 Deleted				
DH PMP 1-1 Suction from RCS	G5	DH 1517	Closed	
DH PMP 1-1 Suction from RCS Leak Test	G6	DH 27	Closed	
DH PMP 1-1 Suction from SFPL Purif. Sys	H5	DH 29	Locked Closed (1)	
DH PMP1-1 Suction from SFPL Cooling Sys	H6	DH 31	Locked Closed (1)	
DH PMP 1-2 Suction from RCS	H5	DH 1518	Closed	
DH PMP 1-2 Suction from RCS Leak Test	H5	DH 174	Closed	

(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH PMP 1-2 Suction from SFPL Purif. Sys	H6	DH 28	Locked Closed (1)	
DH PMP 1-2 Suction from SFPL Cooling Sys	H6	DH 30	Locked Closed (1)	
DH PMP 1-1 Min. Cooldown Isolation	H4	DH 10	Locked Open (1)	
DH PMP 1-2 Min. Cooldown Isolation	H4	DH 26	Locked Open (1)	
DH PMP 1-2 Min. Cooldown F.E. Source	H4	DH4908A	Open	
DH PMP 1-2 Min. Cooldown F.E. Source	H5	DH4908B	Open	
DH PMP 1-2 Min. Cooldown Flow Transmitter	J4	FT 4908	In Service	
DH PMP 1-1 Min. Cooldown F.E. Source	G4	DH4909A	Open	
DH PMP 1-2 Min. Cooldown F.E. Source	G5	DH4909B	Open	
DH PMP 1-1 Min. Cooldown Flow Transmitter	G4	FT 4909	In Service	
CORRIDOR TO MECH PENT ROOM # 3 and #4				
BWST Heater to SFP Pumps		BW 29	Closed	
LOCATED IN MAKEUP PUMP ROOM				
15 DH PMP 1-1 Suction from Emer. Sump	J5	DH 9B*	Locked Closed (1)	
15 DH PMP 1-2 Suction From Emer. Sump	K5	DH 9A*	Locked Closed (1)	
DH Sys to MU&P Sys	M-031 B8	DH 123	Closed	
DH Sys to MU&P Sys Vent	M-031 B7	DH 121	Closed	
LOCATED IN CTMT. 565' LVL NEAR CORE FLOOD TANK #1				
DH PMP 1-2 Disch to RCS Vent	B4	DH 74	Closed & Capped	
DH PMP 1-2 Disch to RCS Vent	B4	DH 74A	Closed & Capped	

(1) Controlled per AD 1839.02.
15 * In Modes 5 and 6 This Valve Will be Deenergized (Breaker Open)

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH PMP 1-2 Disch to RCS Leak Test Conn	B4	DH 155	Closed*	
DH PMP 1-2 Disch to RCS Leak Test Conn	B4	DH 155A	Closed & Capped	
DH PMP 1-2 Disch to RCS Stop Check	B4	DH 76	Locked Open (1)	
CFT 1-1 Check Valve Leak Test PP Isol	A2	CF 4866	Closed	
CFT 1-1 Disch Line Leak Test	A2	CF 27	Closed	
CFT 1-1 Check Valve Leak Test Throttle	A2	CF 37	Closed	
CFT 1-1 Check Valve Leak Test Isol	B2	CF 34	Closed	
CFT 1-1 Check Valve Leak Test Isol	B2	CF 35	Closed	
CFT 1-1 Disch Line Drain Valve	B2	CF 33	Closed	
LOCATED IN CTMT ON 565' LVL NEAR CORE FLOOD TANK #2				
DH PMP 1-1 Disch to RCS Vent	E4	DH 177	Closed & Capped	
DH PMP 1-1 Disch to RCS Vent	E4	DH 177A	Closed & Capped	
DH PMP 1-2 Disch to RCS Leak Test Conn	E3	DH 75	Closed & Capped	
DH PMP 1-1 Disch to RCS Leak Test Conn	E3	DH 75A	Closed & Capped	
DH PMP 1-1 Disch to RCS Stop Check	B1	DH 77	Locked Open (1)	
Refueling Canal Drain to Reactor Cavity	G3	DH 92	Open	
Refueling Canal Drain to Normal Sump (#1)	G2	DH 94	Closed	
Refueling Canal Drain to Normal Sump (#2)	G2	DH 95	Closed	
19 Refueling Canal Drain Pump Line Vent	G-3	DH 140	Closed	

(1) Controlled per AD 1839.02.

*THESE VALVES ARE TO BE VERIFIED CLOSED IMMEDIATELY PRIOR TO INSTALLATION OF INSULATION ON DH 76 ONLY

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

	VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
19	Refueling Canal Drain Pump Suction	G-3	DH 141	Closed	
	Refueling Canal Drain Pump Discharge	G-3	DH 144	Closed	
	CFT 1-2 Check Valve Leak Test Throttle	A4	CF 45	Closed	
	CFT 1-2 Check Valve Leak Test PP Isol	B4	CF 4867	Closed	
	CFT 1-2 Check Valve Leak Test Isol	B3	CF 46	Closed	
	CFT 1-2 Check Valve Leak Test Isol	B4	CF 47	Closed	
	CFT 1-2 Disch Line Drain Valve	B3	CF 32	Closed	
	LOCATED IN CONTAINMENT NEAR EMERGENCY SUMP				
	DH Aux Spray Stop Valve	A4	DH 2735	Locked Closed (1)	
	DH Clr 1-2 Outlet to PZR Aux Spray Ln Leak Test	A4	DH 98	Closed	
	DH Clr 1-2 Outlet to PZR Aux Spray In Leak Test	A4	DH 98A	Closed	
	DH Sys Disch/Return for Refueling Canal Iso	F4	DH 88	Locked Closed (1)	
	DH Sys Disch/Return for Refueling Canal Leak Test	F4	DH 89	Closed	
	DH Sys Disch/Return for Refueling Canal Iso	F4	DH 90	Closed	
	Emerg. Sump Flange Test Conn.	J3	DH 150	Closed*	
	Emerg. Sump Flange Test Conn.	K3	DH 151	Closed*	
	CTMT Emerg. Sump	J3	(2)	Flanges Removed*	
	RCS to DH System Leak Test Conn	H2	DH 50**	Closed	

*USE FOR TESTING DURING REFUELING. VALVES TO BE VERIFIED ONLY IF FLANGES ARE INSTALLED.

**NOTE: To be check only at times when DH11/DH12 valve pit is open

(1) Controlled per AD 1839.02.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

	VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
20	RCS to DH System Iso	H2	DH 12	Closed & Ctrl pwr off	
	RCS to DH System Leak Test Conn	H3	DH 48**	Closed	
	RCS to DH System Thermal Expansion Isolation	H2	DH 20** (3)	Locked Open (1)	
	RCS to DH System Leak Test Conn	H2	DH 50A**	Closed	
	RCS to DH System Thermal Expansion Isolation	H2	DH 24** (3)	Locked Open (1)	
	RCS to DH System Leak Test Conn	H2	DH 48A**	Closed	
	RCS to DH System Drain	H2	DH 170**	Closed	
	RCS to DH System Drain	H2	DH 170A**	Closed	
20	RCS to DH System Isolation	H3	DH 11	Closed & Ctrl Pwr Off	
	RCS to DH System Isolation Bypass	H2	DH 21	Locked Closed (1)	
	RCS to DH System Isolation Bypass	H3	DH 23	Locked Closed (1)	
	RCS to DH System Isolation Bypass Leak Test	H3	DH 22	Closed	
	RCS to DH System Isolation Bypass Leak Test	H3	DH 22A	Closed	
	DH Sys Disch/Return for Incore Instr Tk Iso	G2	DH 91	Closed	
	DH Sys Disch/Return for Incore Instr Tk Drn	G3	DH 97	Closed	
	Incore Inst. Tank Drain To Normal Sump	G2	DH 93	Open	

(1) Controlled per AD 1839.02.

(3) PT 5186.01 must be completed for DH 20 and DH 24 prior to the closing of the DH valve pit. The applicable ST valve lineup sheet shall be filled out for DH 20 and DH 24 and should be submitted with a Data Cover Sheet for PT 5186.01. Also, an entry into the unit log shall be made verifying the completion of the applicable section of PT 5186.01 per AD 1839.02.

**NOTE: To be checked only at times when DH11/DH12 valve pit is open.

Valve Verification List A
Normal Lineup for
Decay Heat Removal System

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
Pressurizer Auxiliary Spray Isolation Valve	A-3	DH 159	Open	
LOCATED OUTSIDE IN BWST VALVE PIT				
BWST Outlet Isolation	B12	DH 79	Locked Open (1)	
BWST Outlet Sample	B12	SS 13	Open	
BWST Isolation Valve (Iine 1)	C12	DH 7B	Locked Open (1)	
BWST Isolation Valve (Line 2)	G12	DH 7A	Locked Open (1)	
BWST to SPF or BW Recirc Pump Vent	B12	BW 30	Closed	
BWST to SPF or BW Recirc Pump	B13	BW 7	Open/ Closed (5)	

Reviewed by_____Date_____

(1) Controlled per AD 1839.02.
(5) Proper position to be determined by the Shift Foreman.

Valve Lineup List A

COOLANT PURIFICATION VIA THE SFP PURIFICATION SYSTEM

1. Open DH 70, Decay Heat to SFP Purification System Valve.

   Initial_____Date_____

2. Open DH 29*, SFP Purification to DH Pump Suction 1-1, if using DH Pump 1-1 and Cooler 1-1 or Open DH 28* if using DH Pump 1-2 and Cooler 1-2.

   Initial_____Date_____

3. Open SF 2656, the SFP Purification to Decay Heat Valve.

   Initial_____Date_____

4. Open and throttle DH 61*, the DH to Purification Systems valve, if using DH Pump and Cooler 1-1 or DH 62* if using DH Pump and Cooler 1-2. While opening the valve, the SFP purification system pressure should be monitored and maintained at less than 150 psig. This will require two people with an appropriate means of communication. If necessary, the purification flow can be monitored on FIS 1616 located downstream of SFP Filter 1-1. The flow should be controlled at approximately 100 GPM.

   Initial_____Date_____

*Controlled per AD 1839.02.

Valve Lineup List B

POST PURIFICATION LINEUP - SFP PURIFICATION SYSTEM

1. Close DH 61* if DH Pump and Cooler 1-1 was used or DH 62* if DH Pump and Cooler 1-2 was used.

   Initial_____Date_____Indep Ver_____Date_____

2. Close DH 29* if DH Pump and Cooler 1-1 was used or DH 28* if DH Pump and Cooler 1-2 was used.

   Initial_____Date_____Indep Ver_____Date_____

3. Close DH 70, Decay Heat to SFP Purification Valve.

   Initial_____Date_____Indep Ver_____Date_____

4. Close SF 2656, the SFP Purification to Decay Heat Removal System Valve.

   Initial_____Date_____Indep Ver_____Date_____

*Controlled per AD 1839.02.

Valve Lineup List C

COOLANT PURIFICATION VIA MU PURIFICATION SYSTEM

1. Open DH 123 (to the wide open position), DH to MU Purification System.

   Initial_____Date_____

2. Open DH 71 (to the wide open position), DH to MU Purification System.

   Initial_____Date_____

3. Open DH 33* (to the wide open position), to DH suction if using DH pump 1-1 and DH cooler 1-1 or DH 32,* if using DH pump 1-2 and DH cooler 1-2.

   Initial_____Date_____

4. Close MU 182,* MU tank inlet valve.

   Initial_____Date_____

5. Open MU 274 makeup to DH Valve.

   Initial_____Date_____

*Controlled per AD 1839.01.

Valve Lineup List D

POST COOLANT PURIFICATION LINEUP - MU PURIFICATION SYSTEM

1. Close DH 61,* the DH to Purification System Valve if DH Pump and Cooler 1-1 was used or DH 62* if DH Pump and Cooler 1-2 was used.

   Initial_____Date_____Indep Ver_____Date_____

2. Close DH 71, Decay Heat to MU Purification.

   Initial_____Date_____Indep Ver_____Date_____

3. Close DH 123, Decay Heat to MU Purification.

   Initial_____Date_____Indep Ver_____Date_____

4. Close DH 33,* the MU Purification to DH Suction, if DH Pump and Cooler 1-1 was used or DH 32* if DH Pump and Cooler 1-2 was used.

   Initial_____Date_____Indep Ver_____Date_____

5. Open MU 182,* the MU Tank Inlet Valve.

   Initial_____Date_____Indep Ver_____Date_____

6. Close MU 274, the MU to DH Valve.

   Initial_____Date_____Indep Ver_____Date_____

*Controlled per AD 1839.02.

Valve Verification List B
Adding Borated Water to the RCS from the BWST Via BW Recirc and DHR Pmps

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
BWST to SPF Pmps Suct	M035 E-3	BW21	Closed	
BWST to SFP Pmp Vent	D-3	BW20	Closed	
BAAT(s) to BWST Recirc Line	M-045 E-3	MU360	Closed	
BWST Htr Iso Out	M-035 F-3	BW19	Closed	
17 BWST Recirc Pmp Suct from Refueling Canal	M-033 F-6	DH84	Closed	
BWST Htr to SFP Pmps	M-035 E-4	BW29	Closed	
BWST Htr Out Vent	F-4	BW23	Closed	
Flush Conn	G-5	BW10	Closed	
BWST Recirc Pmp 1-1 Casing Drn	G-6	BW11	Closed	
Flush Conn	G-6	BW13	Closed	
BWST Htr Out Drn	F-5	BW18	Closed	
BWST Recirc Pmp to SFP Purification Valve	G-7	BW16	Closed	
SPF Pmps Disch to SFP Cleanup Sys	G-7	SF78	Closed	
DH Sys to SFP Purif Sys	M-033 E-10	DH70	Closed	
SFP Demin In	M-035 H-6	SF80	Closed	
SFP Demin OUt	J-7	SF88	Closed	
SFP Fltr In Line Vent	J-8	SF91	Closed*	
SFP Fltr In	H-8	SF92	Closed	
SFP Fltr Out	H-9	SF93	Closed	
SFP Demin Fltr Out Smpl Conn	H-11	SS29	Closed	

*Inaccessible - Need not be checked unless maint. has just been performed on the system.

Valve Verification List B
Adding Borated Water to the RCS
from the BWST Via BW Recirc and DHR Pmps

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
SFP Cleanup Sys to SFP	F-11	SF2653	Closed	
DH Pmp 1-2 Suct from SFP Purif Sys	M-033 H-5	DH28	Locked (1) Closed	
DH Pmp 1-1 Suct from SPF Purif Sys	H-5	DH29	Locked (1) Closed	
BWST to BW Recirc Pmp	M-035 G-2	BW8	Open	
BWST Recirc Pmp Disch	G-6	BW15	Open	
BWST Recirc Pmp Disch Press Source	M-035 G-6	BW1614	Open	
BWST Recirc Pmp Disch Press Ind	G-6	PI1614	In Service	
BWST to BWST Recirc Pmp Mtr Suct	G-5	BW2688	Open	
SFP Demin Bypass	H-7	SF79	Open	
SFP Fltr Bypass	J-9	SF94	Open	
SFP Purif Flow Xmtr Source (K1)	G-10	SF1616A	Open	
SFP Purif Flow Xmtr Source (K2)	G-10	SF1616B	Open	
SFP Purif Flow Ind Sw	G-10	FIS1616	In Service	
SFP Cleanup Sys to BWST	F-11	SF98	Open	
SFP Purif to DH Sys or BWST	F-11	SF2656	Open	

Reviewed by _____ Date _____

(1) Controlled per AD 1839.02.

Valve Verification List B1
Recirculation of BWST with
Decay Heat Pump 1-1

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
LOCATED 565' LVL, MECH PEN ROOM ONE				
DH Pmp 1-1 Disc to RCS Iso	M-033 E-5	DH1B	See Below 1*(2)(3)	
DH Pmp 1-1 Disch Line Leak Test Conn	E-6	DH73	Closed	
DH Pmp 1-1 Disch PI and PSH 2882 B Source	E-6	DH2882B	Open	
LOCATED IN DECAY HEAT PUMP 1-1 ROOM				
DH Pmp 1-1 Disch to BWST/Refuel Canal/SFPL Clng Sys	E-7	DH66	Open(2)(3)	
DH System Disch/Return for Refueling Canal	E-7	DH83	Closed	
DH System Cross-Connect Line Drain	C-9	DH169	Closed	
DH Pmp 1-1/1-2 Disch to BWST (Throttle)	C-10	DH67	Closed	
DH Pmp 1-1/1-2 Disch to BWST	C-10	DH68	Open(3)	
DH Pmp 1-1/1-2 Disch to BWST Leak Test	B-11	DH124	Closed	
DH Pmp 1-1 Flow Transmitter Source K1	E-7	DH2BA	Open	
DH Pmp 1-1 Flow Transmitter Source K2	E-7	DH2BB	Open	
DH Pmp 1-1 Flow Transmitter	F-7	FTDH2B	In Service	
DH Pmp 1-1 Outlet to PHI Pmp Vent	E-9	DH166	Closed	
DH Pmp 1-1 Outlet to HPI Pmp 1-1 Suction	E-9	DH64	Locked (2) Closed	
DH Pmp 1-1 Recirc Line Shut Off	G-7	DH55	Locked Open (2)	
DH Pmp 1-1 Disch Isolation	G-8	DH45	Locked Open (2)	

1* Valve must not be closed (and does not need to be closed) in Modes 1 thru 4. Valve must be closed for test in Modes 5 and 6.

(2) Controlled per AD 1839.02.
(3) These valves are not positioned in accordance with the normal valve lineup. These valves must be repositioned to return to normal lineup.

Valve Verification List B1
Recirculation of BWST with
Decay Heat Pump 1-1

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH Pmp 1-1 Disch Flush Conn	G-7	DH41	Closed	
DH Pmp 1-1 Disch Press Source	G-7	DH5B	Open	
DH Pmp 1-1 Disch Press Gage	G-8	PIDH5B	In Service	
DH Pmp 1-1 Drain	H-7	DH15	Closed	
DH Pmp 1-1 Drain	H-7	DH16	Closed	
DH Pmp 1-1 Drain	H-7	DH39	Closed	
DH Pmp 1-1 Vent	G-7	DH57	Closed	
DH Pmp 1-1 Suction Press Source	G-7	DH1507	Open	
DH Pmp 1-1 Suction Press Gage	G-7	PI1507	In Service	
DH Pmp 1-1 Suction Flush Conn	M-033 H-7	DH37	Closed	
Spray Pump 1-2 Recirc Drain Valve	B-7	CS25	Closed	
DH Pmp 1-1 Suction (BWST or Emerg. Sump)	J-6	DH2733	Locked Open(1)	
PP 9824 Source Valve	G-6	DH9824	Closed	
Located in Decay Heat Cooler Room DH System Disch to SFPL Cooling System	C-10	DH69	Closed	
DH Pmp 1-1 Disch to MU&P & SFPL Demin Iso	E-9	DH61	Locked(1) Closed	
21 DH Cooler 1-1 Outlet Line Sample Iso	E-9	DH59	Open	
DH Cooler 1-1 Outlet Flow Control	F-8	DH14B	In Service	
DH Cooler 1-1 Bypass Flow Control	G-9	DH13B	In Service	
DH Cooler 1-1 Outlet Line Drain	F-8	DH80	Closed	
DH Pmp 1-1 Recric Line Press Test Tap	G-7	DH1504	Closed	

(1) Controlled per AD 1839.02

Valve Verification List B1
Recirculation of BWST with
Decay Heat Pump 1-1

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH Cooler 1-1 Outlet Line Flush Conn	F-8	DH53	Closed	
DH Cooler 1-1/1-2 Cross-Connect	F-9	DH831	Locked(1) Closed	
DH Cooler Cross-Connect Bypass Stop Check	F-9	DH127	Locked Open(1)	
DH Cooler 1-1 Outlet Press Source	G-8	DH1553	Open	
DH Cooler 1-1 Outlet Press Gage	G-8	PI1553	In Service	
DH Cooler 1-1 Inlet Press Test Tap	G-8	DH1317	Closed	
DH Cooler 1-1 Inlet Flush Conn	G-8	DH47	Closed	
DH Pmp 1-1 Disch Line Vent	G-8	DH165	Closed	
DH Pmp 1-1 Suction from NaOH Mix Tank	H-6	DH35	Locked(1) Closed	
DH Pmp 1-1 Suction from Purif Demin	H-6	DH33	Locked(1) Closed	
SH Pmp 1-1 Suction from Emer Ctmt Leak Test	J-5	DH163	Closed	
Located in Makeup Pump Room DH Pmp 1-1 Suction from Emer Sump	J-5	DH9B	Locked(1) Closed	
LOCATED 565' VLV, MECH PEN ROOM TWO				
DH Pmp 1-1 Disch to Cross-Connect/ BWST/Refueling Canal/SFPL Cooling System	M-033 B-10	DH65	Locked(1) Closed	
DH Pmp 1-1 Suction from SFPL Cooling Sys	H-6	DH31	Locked(1) Closed	
DH Pmp 1-1 Suction from RCS Leak Test	G-6	DH27	Closed	
DH Pump 1-1 Suction from SFPL Purif Sys	H-5	DH29	Locked(1) Closed	
DH Pmp 1-1 Suction from RCS	G-5	DH1517	Closed	
DH Pmp 1-1 Min Cooldown Isolation	H-4	DH10	Closed(1)	
DH Pmp 1-1 Min Cooldown F.E. Source	G-4	DH4909A	Open	

(1) Controlled per AD 1839.02

Valve Verification List B1
Recirculation of BWST with
Decay Heat Pump 1-1

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH Pmp 1-1 Min Cooldown F.E. Source	G-5	DH4909B	Open	
LOCATED OUTSIDE IN BWST VALVE PIT				
BWST Outlet Isolation	B-12	DH79	Locked Open(1)	
BWST Isolation Valve (Line 1)	G-12	DH7B	Locked Open(1)	
LOCATED 585' LVL MECH PEN ROOM THREE				
Spray Pmp 1-1 Recirc Vent Vlv	M-034 G-6	CS23	Closed	
Spray Pmp 1-1 Recirc Iso Valve	D-6	CS36	Closed	
LOCATED 585' LVL MECH PEN ROOM FOUR				
Spray Pump 1-2 Recirc Vent Vlv	M-034 B-6	CS24	Closed	
Spray Pmp 1-1 Recirc Iso Valve	C-6	CS33	Closed	

Reviewed by_____ Date_____

(1) Controlled per AD 1839.02

Valve Verification List B2
Recirculation of BWST with
Decay Heat Pump 1-2

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
LOCATED 585' LVL, MECH PEN ROOM 4				
DH Cooler 1-2 Outlet to Press Aux Spray Line Leak Test	M-033 B-5	DH100	Closed	
DH Aux Spray Throttle Valve	B-5	DH2736	Locked(2) Closed	
LOCATED 565' LVL, MECH PEN ROOM 2				
DH Pump 1-2 Disch to RCS Iso	B-6	DH1A	See Below 1*(2)(3)	
DH Pump 1-2 Disch Line Leak Test Conn	B-6	DH72	Closed	
DH Pmp 1-2 Disch Press Switch & PI2882A Source	B-6	DH2882A	Open	
DH Pump 1-1 Disch to Cross-Connect/ BWST/Refueling Canal/SFP Cooling System	B-10	DH65	Open(2)(3)	
DH Pmp 1-2 Flow Transmitter K1 Source	B-10	DH2AA	Open	
DH Pmp 1-2 Flow Transmitter K2 Source	B-10	DH2AB	Open	
DH Pmp 1-2 Flow Transmitter	B-10	FTDH2A	In Service	
DH Pmp 1-2 Disch Line Vent	B-11	DH158	Closed	
DH Pmp 1-2 Suction from RCS Leak Test	H-5	DH174	Closed	
DH Pmp 1-2 Suction from SFPL Cooling Sys	H-6	DH30	Locked(2) Closed	
DH Pmp 1-2 Suction from SFPL Purif Sys	H-5	DH28	Locked(2) Closed	
DH Pmp 1-1 Suction from RCS	H-5	DH1518	Closed	
DH Pmp 1-2 Min Cooldown F.E. Source	H-4	DH4908A	Open	
DH Pmp 1-2 Min Cooldown F.E. Source	H-5	DH4908B	Open	

*Valve must not be closed (and does not need to be closed) in Modes 1 thru 4. Valve must be closed for test in Modes 5 and 6.

(2) Controlled per AD 1839.02

Valve Verification List B2
Recirculation of BWST with
Decay Heat Pump 1-2

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH Pmp 1-2 Min Cooldown Flow Transmitter	J-4	FT4908A	In Service	
DH Pmp 1-1 Min Cooldown Isolation	H-4	DH26	Closed(1)	
Located in Decay Heat Pump 1-1 Room DH System Cross-Connect Line Drain	C-9	DH169	Closed	
DH System Disch/Return for Refueling Canal	E-7	DH83	Closed	
DH Pmp 1-1 Disch to BWST/Refuel Canal/SFPL Clng Sys	E-7	DH66	Locked(1) Closed	
DH Pmp 1-1/1-2 Disch to BWST (Throttle)	C-10	DH67	Closed	
DH Pmp 1-1/1-2 Disch to BWST	C-10	DH68	Open(3)	
DH Pmp 1-1/1-2 Disch to BWST Leak Test	M-033 B-11	DH124	Closed	
Located in Decay Heat Pump 1-2 Room PP9825 Source Valve	H-10	DH9825	Closed	
DH Pmp 1-2 Disch to HPI Pmp 1-2 Suction	C-11	DH63	Locked(1) Closed	
DH Pmp 1-2 Recirc Line Stop Vlv	G-10	DH54	Locked Open(1)	
DH Pmp 1-2 Disch Line Vent	G-11	DH161	Closed	
DH Pmp 1-2 Disch Iso	G-11	DH44	Locked Open(1)	
DH Pmp 1-2 Disch Line Flush Conn	H-10	DH40	Closed	
DH Pmp 1-2 Disch Press Src	G-10	DH5A	Open	
DH Pmp 1-2 Drain	H-10	DH17	Closed	
DH Pmp 1-2 Drain	H-10	DH18	Closed	
DH Pmp 1-2 Casing Drain	H-10	DH38	Closed	
DH Pmp 1-2 Casing Vent	G-10	DH56	Closed	

(1) Controlled per AD 1839.02
(3) These valves are not positioned in accordance with the normal valve lineup. These valves must be repostioned to return to normal lineup.

Valve Verification List B2
Recirculation of BWST with
Decay Heat Pump 1-2

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH Pmp 1-2 Suction Press Src	G-10	DH1538	Open	
DH Pmp 1-2 Suction Press Gage	H-10	PI1538	In Service	
DH Pmp 1-2 Suction Line Flush Conn	H-10	DH36	Closed	
Located in Decay Heat Cooler Room DH System Disch to SFPL Cooling System	C-10	DH69	Closed	
DH Pmp 1-2 Disch to MU&P and SFPL Demin	E-11	DH62	Locked(1) Closed	
21 DH Cooler 1-2 Outlet Line Sample Iso	E-11	DH60	Open	
DH Cooler 1-2 Outlet Flow Control	F-11	DH14A	In Service	
DH Cooler 1-2 Bypass Flow Control	H-11	DH13A	In Service	
DH Cooler 1-2 Outlet Line Flush Conn	F-11	DH52	Closed	
DH Pmp 1-2 Recirc Line Press Test Tap	G-10	DH1514	Closed	
DH Pmp 1-2 Recirc Line Press Test Tap	G-10	DH1516	Closed	
DH Cooler 1-1/1-2 Cross connect	F-10	DH830	Locked(1) Closed	
DH Cooler Cross-Connect Bypass Stop Check	M-033 F-10	DH125	Locked Open(1)	
DH Pmp 1-2 Aux. Spray F.I. 4999 Source	G-12	DH4999A	Open	
DH Pmp 1-2 Aux. Spray F.I. 4999 Source	G-12	DH4999B	Open	
DH Pmp 1-2 Aux. Spray Iso	G-12	DH178	Open	
DH Cooler 1-2 Outlet Line Drain	G-11	DH160	Closed	
DH Cooler 1-2 Outlet Press Source	G-11	DH1551	Open	
DH Cooler 1-2 Outlet Press Gage	G-11	PI1551	In Service	
DH Cooler 1-2 Inlet Press Test Tap	G-11	DH1555	Closed	

(1) Controlled per AD 1839.02

Valve Verification List B2
Recirculation of BWST with
Decay Heat Pump 1-2

15 Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve

VALVE DESCRIPTION	P&ID No. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
DH Pmp 1-2 Disch Line Flush Conn	G-11	DH46	Closed	
DH Pmp 1-2 Suction from MU&P Sys Demin Vent	H-6	DH175	Closed	
DH Pmp 1-2 Suction from MU&P Sys Demin	H-6	DH32	Locked(1) Closed	
DH Pmp 1-2 Suction from NaOH Mix Tank	H-6	DH34	Locked(1) Closed	
DH Pmp 1-2 Suction (BWST or Emer. Sump)	J-9	DH2734	Locked(1) Open	
DH Pump 1-2 Suction from Ctmt Emer Sump Leak Test	K-6	DH162	Closed	
DH Pmp 1-2 Suction from Emer Sump Vent Valve	K-6	DH164	Closed	
Located in Make-Up Pump Room DH Pmp 1-2 Suction from Emer. Sump	K-5	DH9A	Locked(1) Closed	
LOCATED OUTSIDE IN BWST VALVE PIT				
BWST Outlet Isolation	B-12	DH79	Locked Open(1)	
BWST Isolation Valve (Line 2)	G-12	DH7A	Locked Open(1)	

Reviewed by_____ Date_____

(1) Controlled per AD 1838.02

Breakers & Switches for DH System

Equipment Ident. No.	P42-1	P42-2	DH7B	DH7A	DH9B	DH9A	DH12*	DH11*
Equipment Name	DH Pump 1-1	DH Pump 1-2	BWST Outlet to DH Sys	BWST Outlet to DH Sys	Emerg. Sump to DH Pumps	Emerg. Sump to DH Pumps	RC Normal Cooldown to DH	RC Normal Cooldown to DH Sys
Control Room Switch/Panel #	HIS-DH6B C-5716	HIS-DH6A C-5716	HIS-DH7B C-5716	HIS-DH7A C-5716	HIS-DH9B C-5716	HIS-DH9A C-5716	HIS-DH12 C-5704	HIS-DH11 C-5704
Breaker No. & MCC	AC 112 BUS "C1"	AD 112 BUS "D1"	BE 1157 E 11A	BF 1148 F11B	BE 1112 E11A	BF 1142 F 11C	BE 1183 E11B	BF 1130 F11A
Local Control Switch No.	NP 0421	NP0422	NVDH07B	NVDH07A	NVDH09B	NVDH09A	No Switch	No Switch
S.A. Signals	311A	312A	281G 511B	282G 512B	281A 511A	282E 512A	None	None
MCC Location: (Elev)	Not MCC	Not MCC	585'	603'	565'	565'	585'	603'
Emergency Cntl Transfer Switch Location	On	On Brkr	585'	603'	585'	565'	585'	603'

15 * If restoring the DH System to the normal lineup for low pressure injection per Section 8, following Decay Heat Removal, control power to DH11 and DH12 will be restored using HIS DH11A and HIS DH12A on C5704 just prior to the closing of DH11 and DH12 when RCS temperature >280°F.

Breakers & Switches for DH System

Equipment Ident. No.	DH 1517	DH 1518	DH 2733	DH 2734	DH 14B	DH 14A	DH 13B	DH 13A	DH 1A	DH 1B
Equipment Name	RC Normal Cooldown to DHP1-1	RC Normal Cooldown to DH P2	DH Pump 1-1 Suction	DH Pump 1-2 Suction	DH Cooler 1-1 Discharge	DH Cooler 1-2 Discharge	DH Cooler 1-1 Bypass	DH Cooler 1-2 Bypass	DH to RCS	DH to RCS
Control Room Switch/Panel#	HIS 1517 C-5704	HIS 1518 C-5704	HIS 2733 C5717	HIS 2734 C5717	HIC DH14B C5704	HIC DH14A C5704	HIC DH13B C5704	HIC DH13A C5704	HIS DH1A C5716	HIS DH1B C5716
Breaker No. & MCC	BE 1126 E11D	BF 1129 F11C	BE 1121 E11A	BF 1134 F11C	125 VDC Essential Instr Bus	125 VDC Essential Instr Bus	125 VDC Essential Instr Bus	125 VDC Essential Instr Bus	BF 1136 F11C	BE 1106 F11C
Local Control Switch No.	NV15170	NV15180	NV27330	NV27340	NV014B	NV014A	NV013B	NV013A	NVDH01A	NVDH01B
S.A. Signals	Inter-locked SA 311D With	Inter-locked SA 312D With	SA 311D	SA 312D	SA 311E	SA 312E	SA 311F	SA 312F	SA 312	SA 311B
MCC Location (Area & Elev)	565'	565'	565'	565'	Pneumatic Operators----------				565'	565'
ECTS Location	565'	565'	585'	565'	Pneumatic Operators----------				565'	585'

9

64

Breakers & Switches for DH System

Equipment Ident. No.	DH 830	DH 831	DH 2735	DH 3736
Equipment Name	DH Removal Clr 2 Out Xover	DH Removal Clr 1 Out Xover	DH Aux Spary Stop Valve	DH Aux Spray Throttle Valve
Control Room Switch/Panel No.	HIS 830 C 5704	HIS 831 C 5704	HIS 2735 C 5705	HIS 2736 C 5705
Breaker No. and MCC	BF 1185 F 11D	BE 1195 E 11D	BE 1155*1 E 11B	BF 1125*1 F 11A
Local Control Switch No.	NV DH 830	NV DH 831	On Breaker	NV 2736
S.A. Signals	None	None	None	None
MCC Location (Elevation)	565'	565'	585'	603'
ECTS Location	565'	565'	585'	603'

*1 E11B can be crosstied with F11A if one MCC is deenergized. See EP 1202.06, Loss of R.C. or R.C. Pressure, for details.

Equipment Ident No.	DH 63	DH 64	CC 1467	CC 1469
Equipment Name	LPI to HPI Xover 2	LPI to HPI Xover 1	DH Removal Cooler 1-1 Outlet Iso Valve	DH Removal Cooler 1-2 Outlet Iso Valve
Control Room Switch/Panel #	HIS DH 63	HIS DH64	HIS 1467 C5716	HIS 1469 C5716
Breaker No. & MCC	BF 1195/ F11E	BE 1187/ E11E	125 VDC Essen. Instrument Bus	124 FCD Essen. Instrument Bus
Local Control Switch No.	NV DH63	NV DH64	NV 1467	NV 1469
S.A. Signals	None	None	SA311C	SA312C
MCC Location (Elevation)	545 (tunnel)	603 (CRD Rm)	Pneumatic Operator	Pneumatic Operator
ECTS Location	CDF11E	CDE11E	Pneumatic Operator	Pneumatic Operator

PRESSURE and TEMP. LIMITATIONS FOR COOLDOWN

Enclosure 2

Curve

A-B-C-D-E-F Maximum pressure for cooldown based on DTT-170°F

... Maximum RCS pressure for water back system operation with RC pump combinations as follows: (Note: Loop 1 designated B, Loop 2 designated A).

G-H No RC Pumps

J RC pump combinations (0-A,1-B), (0-A,2-B), (1-A,0-B), (1-A,1-B) and (1-A,2-B)

K RC pump combinations (2-A,0-B) and (2-A,1-B)

Required RC pump suction for combinations:

L RC pump combinations (0-A,2-B), (1-A,2-B), and (1-A,2-B)

M RC pump combinations (2-A,0-B) and (2-A,1-B)

O-P-N RC pump combinations (0-A,1-B), (1-A,1-B), and (1-A,0-B)

P-R Minimum NPSH for RC pumps - all combinations

R-S-T Minimum pressure vs. temp. to maintain fuel in compression

V-W Minimum pressure vs. temp. to prevent boiling at top of hot leg.

X-Y Minimum pressure vs. temp. to maintain fuel in compression with no RC pumps running and without the decay heat system in operation.

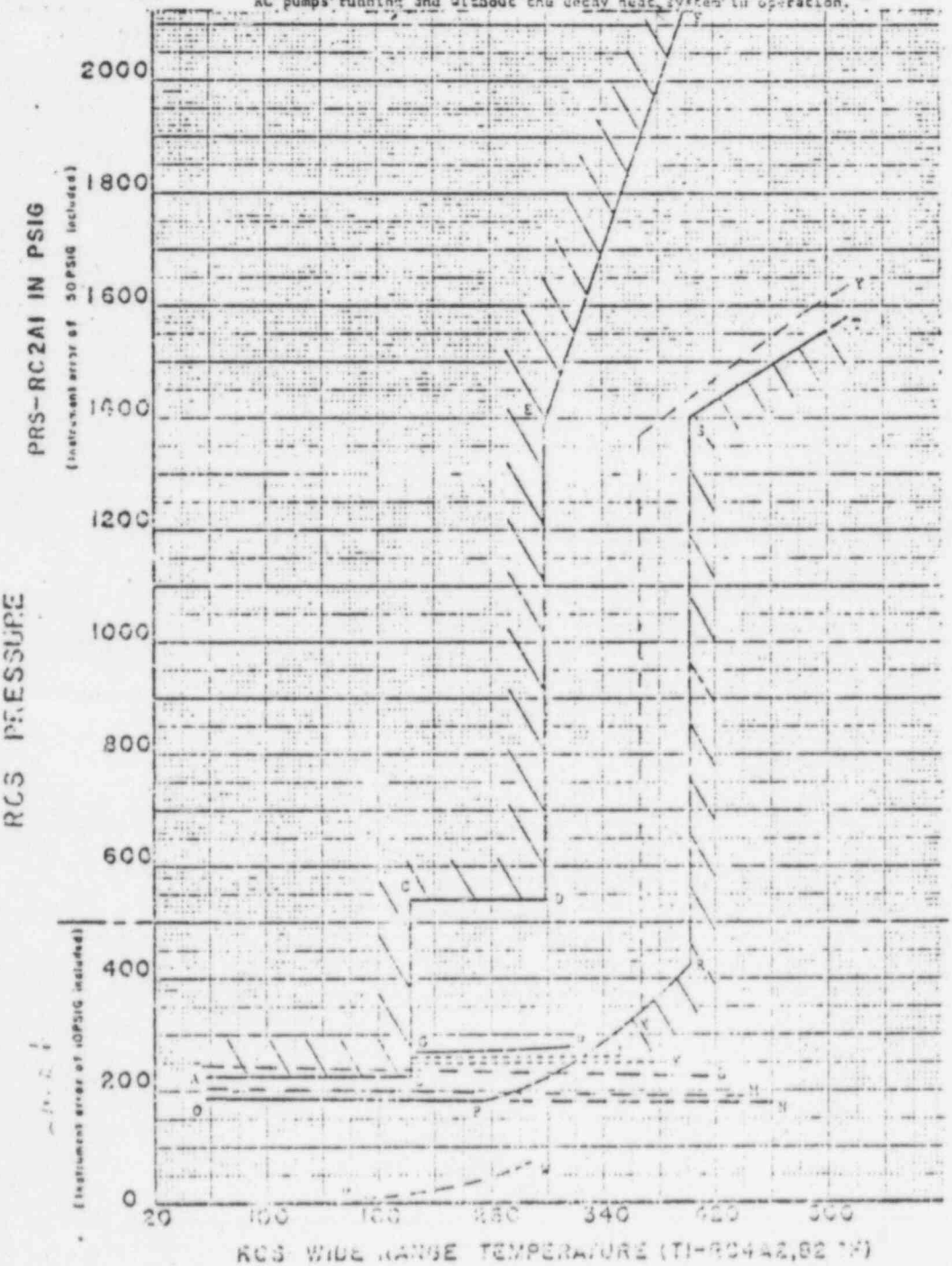


Figure 2

PRESSURE and TEMP LIMITATIONS FOR HEATUP

Enclosure 3

Curve	
A-D-E-F	Maximum pressure for heatup based on [illegible] °F.
	Minimum RCS pressure for decay heat system operation with RC pump combinations as follows: (note: Loop 1 designated B, Loop 2 designated A).
G-H	No RC pumps
J	RC pump combinations (0-A,1-B), (0-A,2-B) (1-A,0-B), (1-A,1-B), and (1-A,2-B)
K	RC pump combinations (2-A,0-B) and (2-A,1-B)
	Required RC pump section for combinations:
L	RC pump combinations (0-A,2-B), (1-A,2-B), and (1-A,2-B)
M	RC pump combinations (2-A,0-B) and (2-A,1-B)
G-P-N	RC pump combinations (0-A,1-B), (1-A,1-B), and (1-A,0-B)
P-R	Minimum NPSH for RC pumps - all combinations
L-S-T	Minimum pressure vs. temp. to maintain fuel in compression.
V-W	Minimum pressure vs. temp to prevent boiling at top of hot leg.

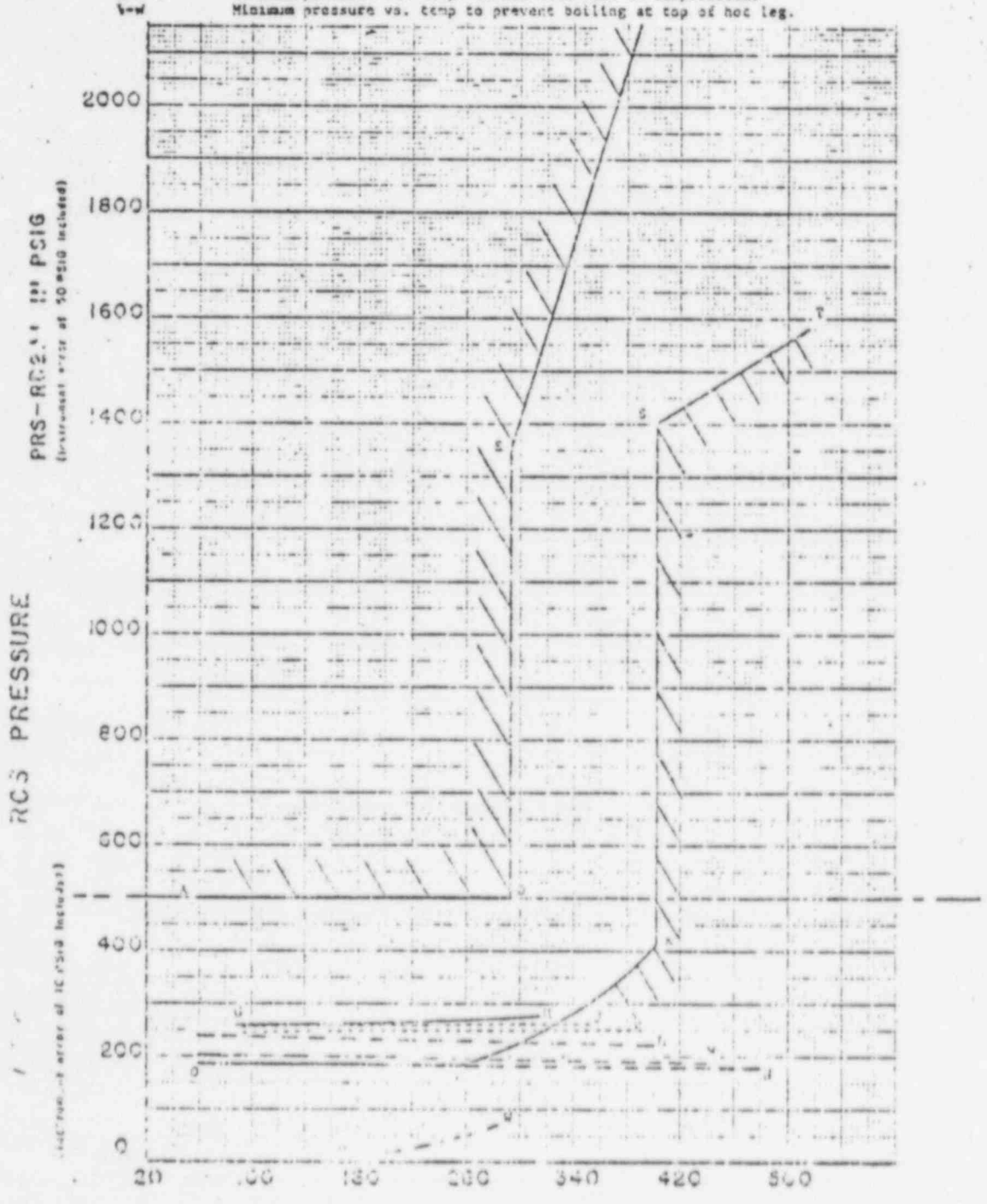
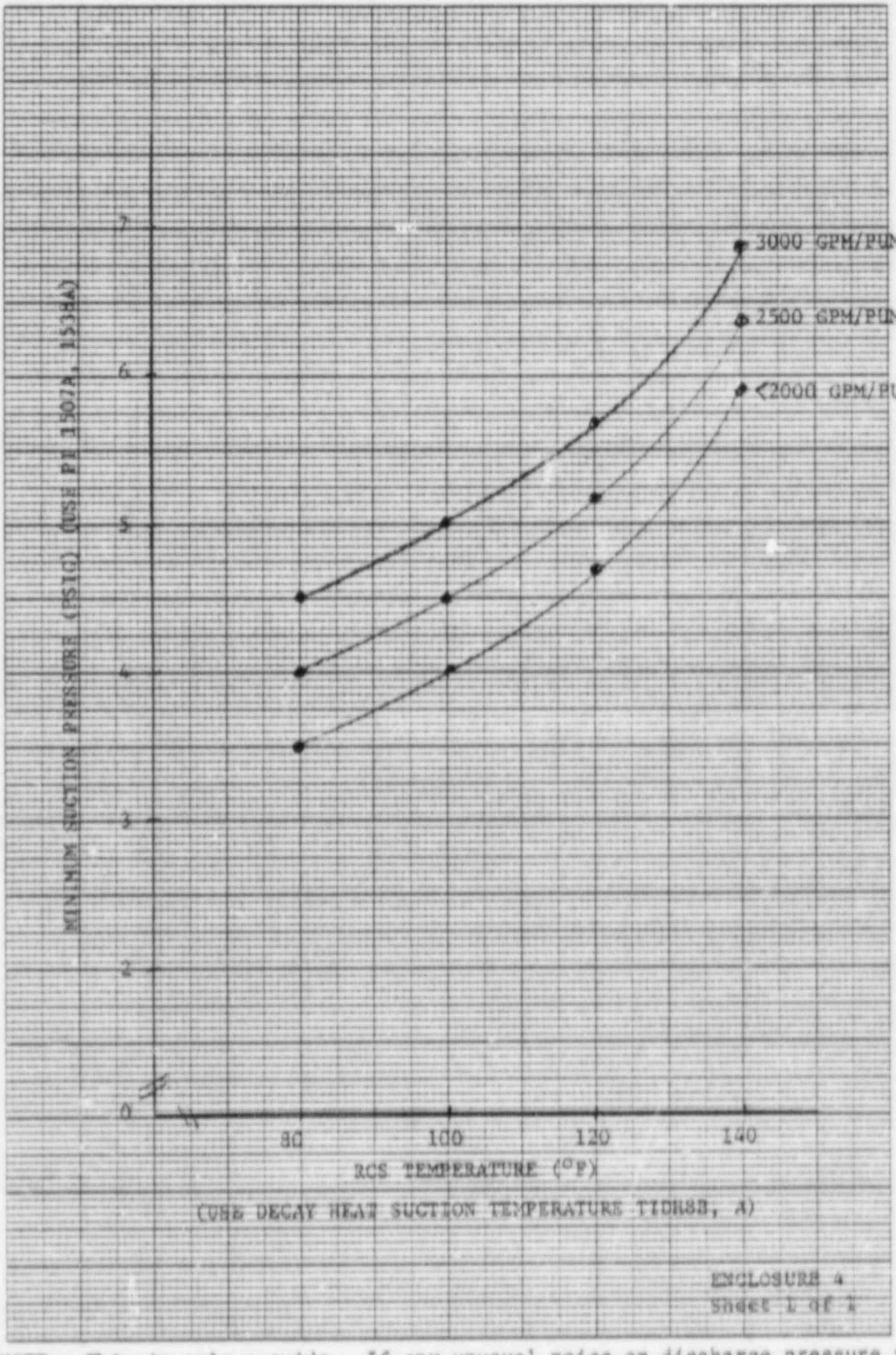


Figure 1

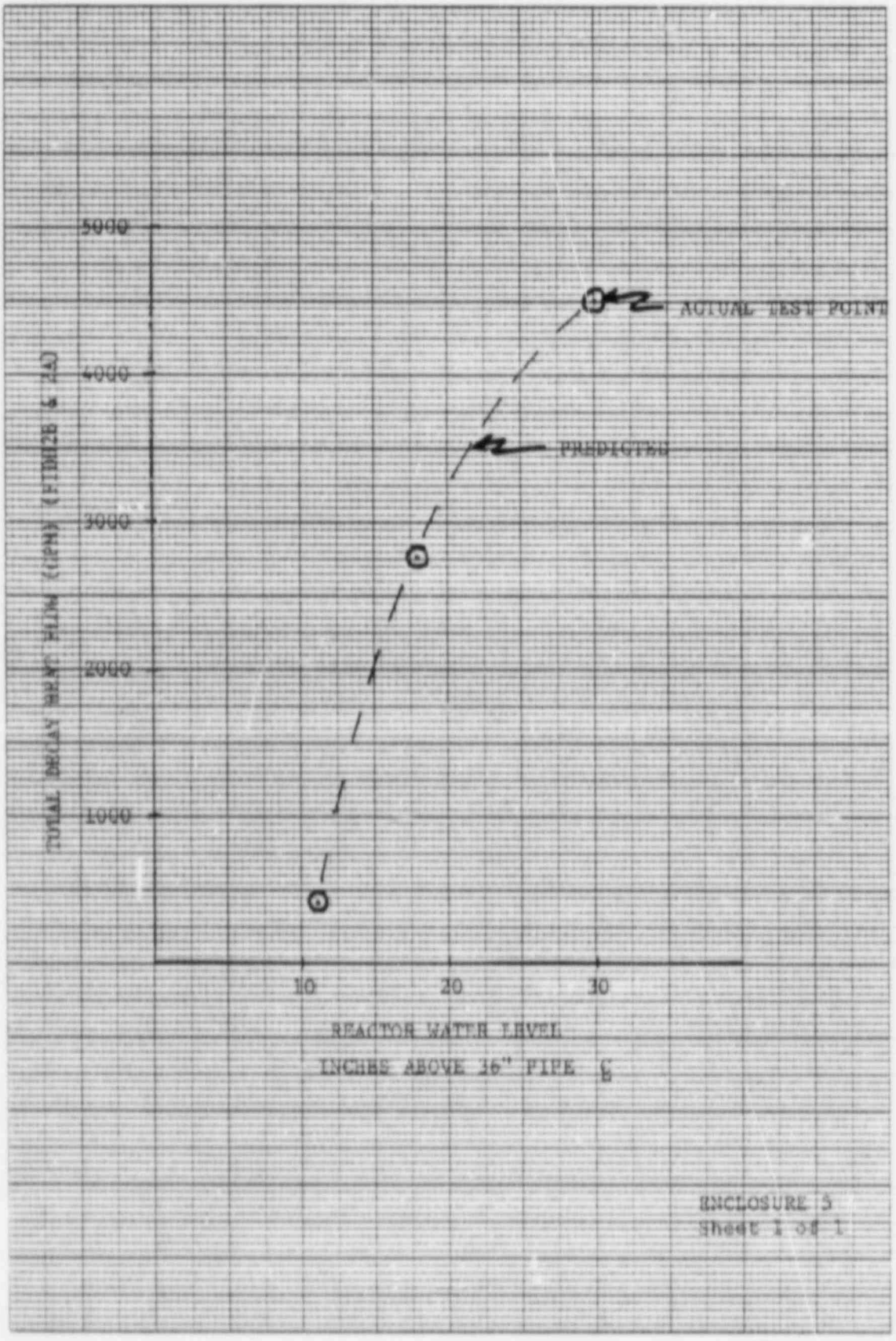
MINIMUM SUCTION PRESSURE
VS
RCS TEMPERATURE



ENCLOSURE 4
Sheet 1 of 1

NOTE: This is only a guide. If any unusual noise or discharge pressure variation occurs the suction pressure should be raised, the flowrate reduced, or the pump tripped. Pump performance should still follow pump head curve. No instrument error was included.

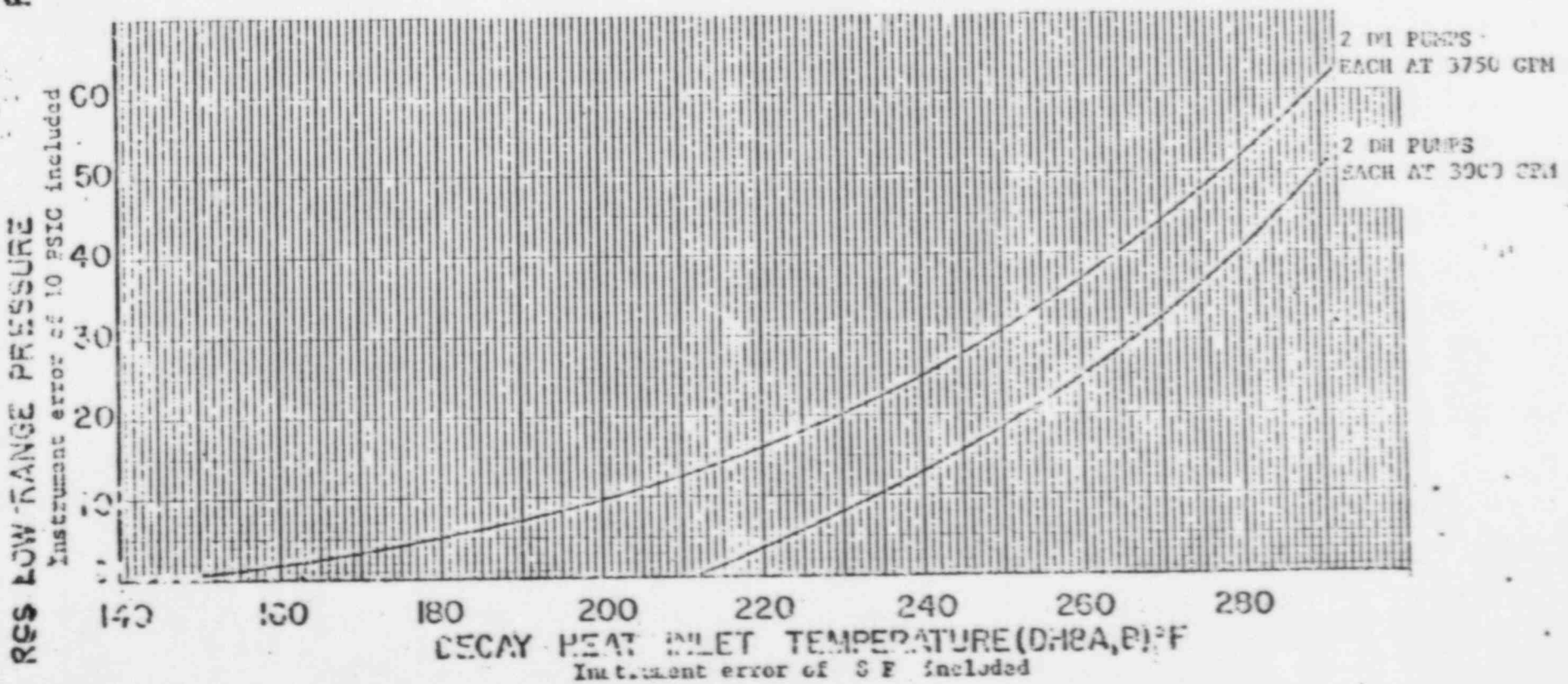
PREDICTED TOTAL DECAY HEAT FLOW VS REACTOR WATER LEVEL



NOTE: This is to be a guide only.

Figure 21

MINIMUM RC PRESSURE vs DH INLET TEMP FOR DH PUMP NPSH



Decay Heat Pump Pre-Startup and Standby Check-off List

1. Decay Heat Pump motor breaker is racked in:

DH Pump 1-1	DH Pump 1-2
AC 112____	AD 112____

2. Check for proper oil level in the pumps and motor sight indicators:

	DH Pump 1-1	DH Pump 1-2
Pump outboard bearing	_____	_____
Pump inboard bearing	_____	_____
Motor inboard bearing	_____	_____
Motor outboard bearing	_____	_____

3. Line up component cooling water by opening the following valves (1)

DH Pump 1-1	DH Pump 1-2
CC 653____	CC 654____
CC 148____	CC 149____
CC 151____	CC 153____
CC 661____	CC 660____

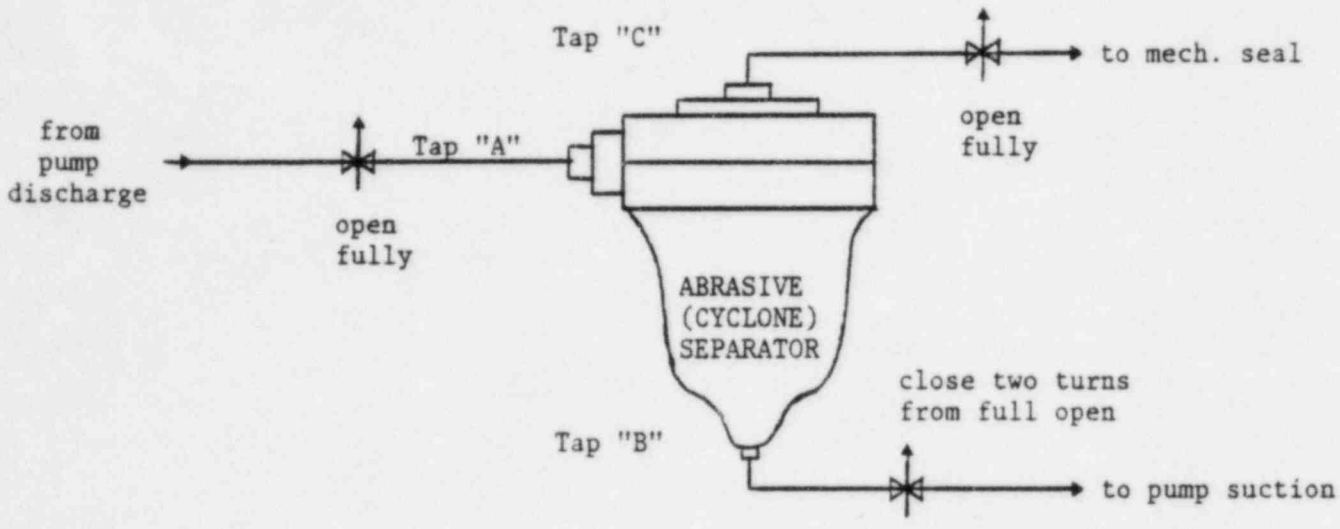
NOTE: This lineup is for DH Pump 1-1 being supplied from CCW Essential Line 1 and DH Pump 1-2 supplied from CCW Essential Line 2.

2. Valving exists to have DH Pump 1-1 (1-2) supplied from CCW Essential Line 2 (1).

4. Seal water piping is valved as follows to provide sealing and lubricating flow to the stuffing box from the cyclone separator:

DH Pump 1-1	DH Pump 1-2
_____	_____

(1) Controlled per AD 1839.02.



5. Open the pump suction valve:

For Emergency Standby:	DH Pump 1-1	DH Pump 1-2
	DH 2733____*	DH 2734____*
For D.H. Cooldown	DH11, DH12, DH1517____	DH11, DH12, DH1518____
Other:	____ ____	Other _____ ____

If the DH pump is to be started for DH removal, warn C&HP of impending changes in radiation levels for the DH loop to be started.

6. Verify that the pump discharge valve is locked open.

DH Pump 1-1	DH Pump 1-2
DH 45_____*	DH 44_____*

7. Open the vent valve to prime the pump and then close the vent valve:

DH Pump 1-1	DH Pump 1-2
DH 57_____	DH 56_____

8. Open the suction and discharge pressure gage source valves and check that the suction pressure is at least 3.7 psig.

DH Pump 1-1	DH Pump 1-2
DH 1507___	DH 1538___
18 DH 1507A__**	DH 1538A__**
DH 5B_____	DH 5A_____
PI 1507 ≥3.7 psig___	PI 1538 ≥3.7 psig___

**The low range suction pressure gages should not be cut in if the DH pump is to be used for decay heat removal. These are only used for DH pump surveillance test while recircing the BWST.

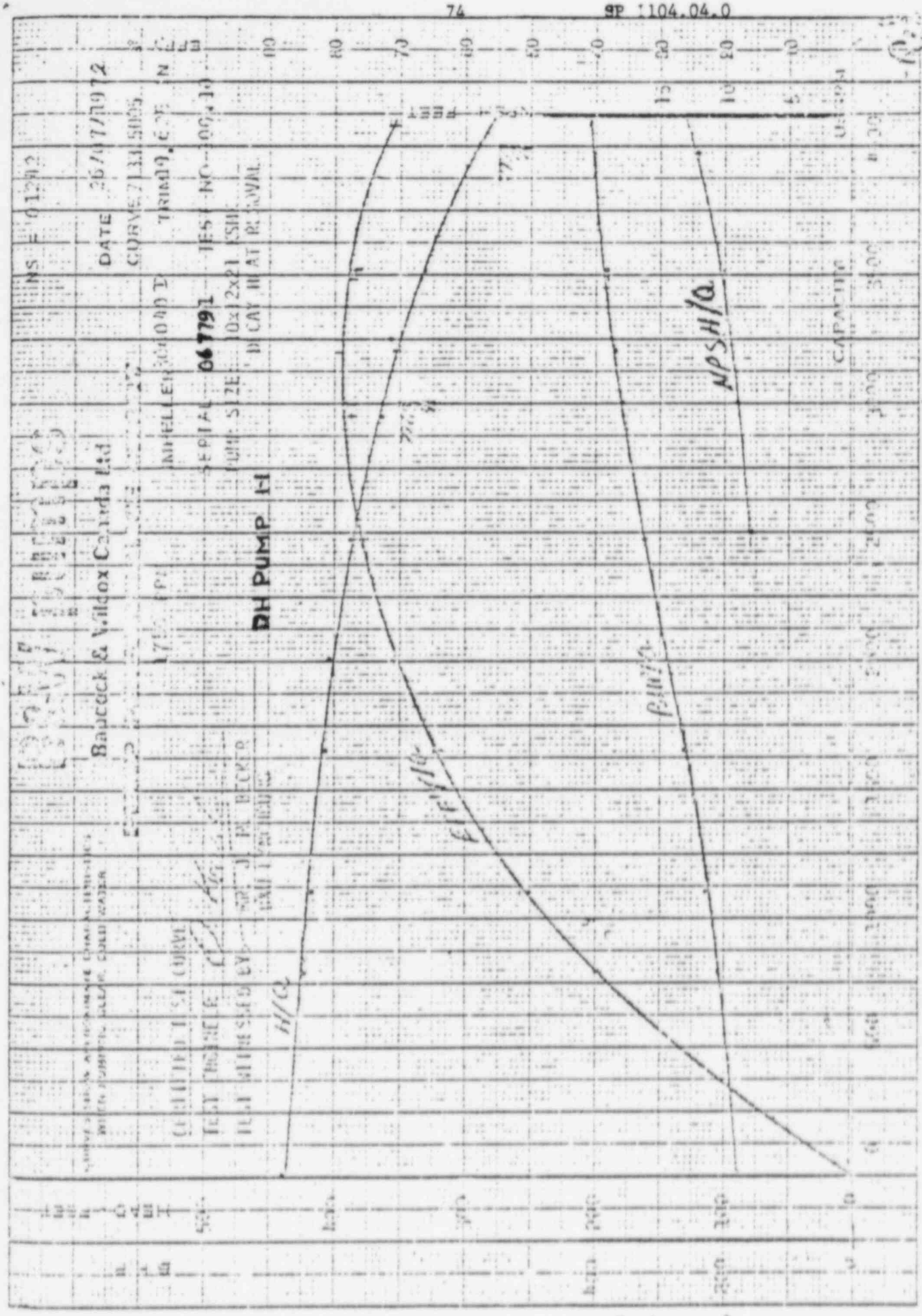
*Controlled per AD 1839.01

9. Verify that the recirculation line valve is locked open.

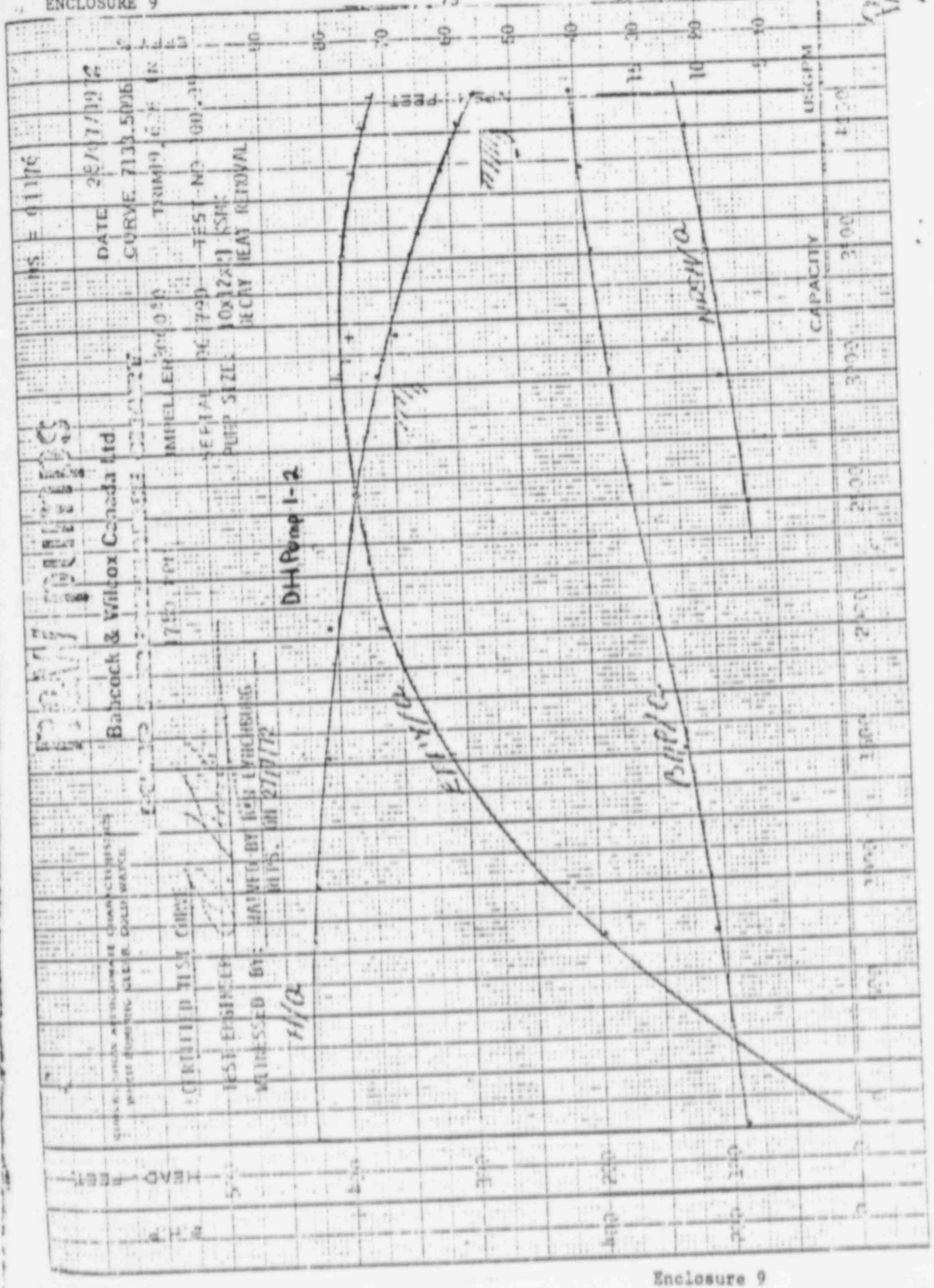
DH Pump 1-1	DH Pump 1-2
DH 55_____*	DH 54_____*

Performed by_____Pump_____Date_____

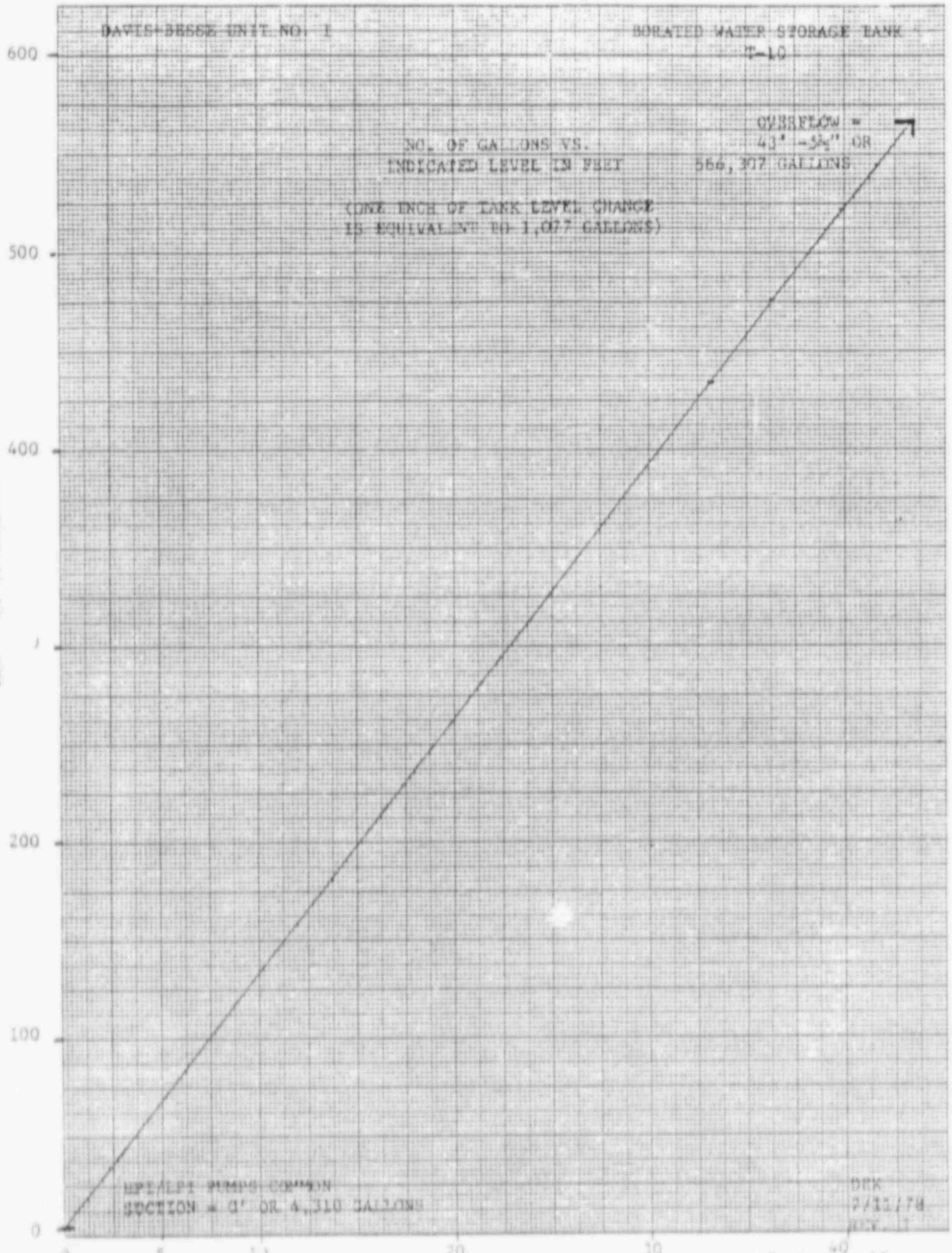
*Controlled per AD 1839.01



Enclosure 8
Page 1 of 1



Enclosure 9
Page 1 of 1



Enclosure 10
Page 1 of 1