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DAVIS-BESSE NUCLEAR POWER STATION - UNIT 1

TEMPORARY MODIFICATION REQUEST

ED 6926

SECTION 1

PROCEDURE TITLE AND NUMBER

HIGH PRESSURE INJECTION SYS PROC

SP1104-07.6

REASON FOR CHANGE

DURING IMPLEMENTATION OF FCR 79-308, AN IMPROPERLY SIZED FLOW ELEMENT FE NP4B WAS INSTALLED, DUE TO A DESIGN ERROR. THE RESULTING ~~EXCESSIVE~~ DP ACROSS FISH NP4B CAUSES FISH NP4B TO READ OFF SCALE HIGH >1000 RPM WHEN NPI Pmp 1-1 IS RUNNING.

THEREFORE, FISH NP4B WILL BE DISCONNECTED FROM THE INSTRUMENT MANIFOLD & TEMPORARY DP INDICATION WILL BE INSTALLED TO MEASURE DP ACROSS FE NP4B.

THE ^{TEMP. DP INDICATION} ~~MANIFOLD~~ SHALL BE REMOVED FROM SERVICE EXCEPT DURING TESTING. CONTACT I&C TO PLACE DP INDICATION IN SERVICE & TO REMOVE FROM SERVICE.

CHANGE

VALVE VERIFICATION LIST A, Pg 14 Sheet 3 of 9
 TO REFLECT THE STATUS OF FISH NP4B AS FOLLOWS:

HPI Pmp 1-1 MIN. RECIRC FLOW INDICATING SWITCH	A-9	FISH NP4B	*** REMOVED FROM SERVICE (BY I&C)
--	-----	-----------	-----------------------------------

*** NOTE FISH NP4B SHOULD BE DISCONNECTED FROM THE INSTRUMENT MANIFOLD TO PREVENT OVERRANGING THE INDICATOR. TEMPORARY DP INDICATION MAY BE INSTALLED AT THE INSTRUMENT MANIFOLD. THE TEMP. INDICATION SHOULD ONLY BE ~~INSTALLED~~ IN SERVICE DURING TESTING.

IS PROCEDURE REVISION REQUIRED

Yes ☐No ☒If no, this modification is valid until REPLACEMENT OF IMPROPER FLOW ELEMENT IS COMPLETED

PREPARED BY

DATE

APPROVED BY

DATE

APPROVED BY

DATE

SUBMITTED BY (Section Head)

DATE

RECOMMENDED BY (SRS Chairman)

DATE

QA APPROVED BY (Manager of Quality Assurance)

DATE

APPROVED BY (Station Superintendent)

DATE

8507300254 850116
 PDR ADOCK 05000346
 P PDR

JAN 16 1985

DBAB

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DAVIS-BESSE NUCLEAR POWER STATION - UNIT 1
TEMPORARY MODIFICATION REQUEST
ED 6926

SECTION 1

PROCEDURE TITLE AND NUMBER

HPI SYSTEM OPERATING PROCEDURE SP 1104.07

REASON FOR CHANGE

FISHP4A HPI Pmp 1-2 MIN RELIRC FLOW INDICATION WAS REPAIRED & REINSTALLED. DUE TO LACK OF CERTIFICATION FOR PARTS USED DURING REPAIR THE PRESSURE BOUNDARY OF THE INTERNAL BELOWS CANT BE VERIFIED AS COMPLETELY ADEQUATE.

THIS MOD WILL CHANGE^{THE} STATUS OF FISHP4A TO "REMOVED FROM SERVICE" AND WILL ALLOW PLACING IT IN SERVICE, FOR TESTING IF NECESSARY, AS LONG AS THE PRESSURE INDICATOR HOUSING IS MONITORED FOR LEAKAGE. (REF. NCR 84-0231)

CHANGE

CHANGE Pg 18 (A-7 of 9) VALVE VERIF. LIST A TO REFLECT THE STATUS OF FISHP4A AS FOLLOWS:

HPI PUMP 1-2 MIN RELIRC FLOW (MR) IND. SWITCH	A-9	FISHP4A	REMOVED NOT FROM SERVICE
---	-----	---------	-------------------------------------

*** NOTE FISHP4A MAY BE PLACED INTO SERVICE FOR TESTING. WHEN FISHP4A IS IN SERVICE THE FISHP4A MUST BE MONITORED FOR LEAKAGE

IS PROCEDURE REVISION REQUIRED

Yes ☐No ☒If no, this modification is valid until RESOLUTION OF INADEQUATE DOCUMENTATION FOR FISHP4A

PREPARED BY

James W. Marley

DATE

1/4/85

APPROVED BY

James W. Marley

DATE

1/4/85

APPROVED BY

M. Dawson

DATE

1-4-85

SUBMITTED BY (Section Head)

J. L. J.

DATE

1/7/85

RECOMMENDED BY (SRB Chairman)

D. W. Briden

DATE

JAN 9 1985

QA APPROVED BY (Manager of Quality Assurance)

N/A

DATE

APPROVED BY (Station Superintendent)

[Signature]

DATE

JAN 9 1985

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SECTION 1

PROCEDURE TITLE AND NUMBER

HIGH PRESSURE INJECTION SYSTEM PROCEDURE SP 1104.07

REASON FOR CHANGE

WRONG VLV POSITION

CHANGE

ON VALVE VERIFICATION LIST A PAGE 16
 CHANGE DH 63 FROM "CLOSED" TO "LOCKED CLOSED"
 AS FOLLOWS:

DECAY HEAT Sys TO HPI XCONN (LINE 2)	C-11	DH 63**	LOCKED CLOSED
--------------------------------------	------	---------	------------------

ON PAGE 20 CHANGE DH 64 FROM "CLOSED" TO "LOCKED CLOSED"
 AS FOLLOWS:

DECAY HEAT SYSTEM TO HPI XCONN VLV	E-9	DH 64**	LOCKED CLOSED
------------------------------------	-----	---------	------------------

IS PROCEDURE REVISION REQUIRED

Yes ☒No ☐

If no, this modification is valid until _____

PREPARED BY

RA Ruiz

DATE

12/22/84

APPROVED BY

RA Ruiz

DATE

12/22/84

APPROVED BY

A. Acuna

DATE

12/22/84

SUBMITTED BY (Section Head)

[Signature]

DATE

12/29/84

RECOMMENDED BY (SRB Chairman)

[Signature]

DATE

JAN 3 1985

QA APPROVED BY (Manager of Quality Assurance)

NA

DATE

APPROVED BY (Station Superintendent)

[Signature]

DATE

JAN 3 1985

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ED 6926

SECTION 1

PROCEDURE TITLE AND NUMBER

HIGH PRESSURE INJECTION SYSTEM PROCEDURE SP1104.07.18

REASON FOR CHANGE

FCR 79-308 INSTALLED A REDUNDANT MINIMUM RECIRC FLOWPATH FOR HPI PUMP 1-1. ALSO INSTALLED WERE FISHP4A, FISHP4B, BW26 (CHECK VALVE) BW 27 (RECIRC TO BWSST DRAIN VALVE).

THIS MOD SUPERCEDES T-MOD T-8464 DATED 11/21/84

(NOTE: T-MOD T-8464 REFERENCED HP4AA & HP4AB. THESE VALVES WERE NOT INSTALLED)

CHANGE

CHANGE PAGES 14, 18, 21, 23 AND 28 PER THE ATTACHED SHEETS.

DELETE T-MOD T-8464 PREPARED 11/21/84.

IS PROCEDURE REVISION REQUIRED

Yes ☒

No ☐

If no, this modification is valid until _____

PREPARED BY

James W Marley

DATE

12/12/84

APPROVED BY

James W Marley

DATE

12/12/84

APPROVED BY

J. H. Michaels

DATE

12/12/84

SUBMITTED BY (Section Head)

[Signature]

DATE

12/12/84

RECOMMENDED BY (SRB Chairman)

D. W. Briden

DATE

DEC 19 1984

QA APPROVED BY (Manager of Quality Assurance)

[Signature]

DATE

DEC 19 1984

APPROVED BY (Station Superintendent)

[Signature]

DATE

DEC 19 1984

N/A

12/28

Sheet No. 3
of 9

14
VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.18

7-8559

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

18

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
HPI Line 1-1 Flow Source K1	D-6	HP3CA	Open	
HPI Line 1-1 Flow Source K2	D-6	HP3CB	Open	
HPI Line 1-1 & 1-2 Pressure Gauge	D-5	PI 2883B	In Service	
HPI Line 1-2 Vent Source	E-6	HP 72	Open	
HPI Line 1-2 Vent Isolation	E-6	HP 72A	Closed	
HPI Line 1-2 Vent Isolation	*	HP 72A1	Closed	
HPI Line 1-2 Flow Indicator	E-6	FYI HP3D	In Service	
HPI Line 1-2 Flow Source K1	E-6	HP 3DA	Open	
HPI Line 1-2 Flow Source K2	E-6	HP 3DB	Open	
HPI Line 1-2 Drain	E-5	HP 70	Closed	
HPI Line 1-2 Drain	*	HP 70A	Closed	
HPI Line 1-2 Iso Vlv Leak Test Conn	E-5	HP 45	Closed	
HPI Line 1-2 Iso vlv Leak Test Conn	*	HP 45A	Closed	
HPI Line 1-2 Iso Vlv LOCATED ABOVE TRANSFER TUBE SHIELD	E-5	HP 2D	Closed	
HPI to CF Tk 1-2 Fill LOCATED IN MECH PENETRATION ROOM #2	M-034 E-10	HP 61	Closed	
HPI Line 2-1 Iso Vlv	C-5	HP 2A	Closed	
HPI Line 2-1 Iso Vlv Leak Test Conn	C-5	HP 53	Closed	
HPI Line 2-1 Iso Vlv Leak Test Conn	*	HP 53A	Closed	
HPI Line 2-1 Drain	C-5	HP 67	Closed	
HPI Line 2-1 Drain	*	HP 67A	Closed	

*Double Isolation Valve - See note 8 on P&ID M-033.

LOCATED 56.5' NEAR #1 MECH. PENT CM.

HPI PUMP 1-1 MIN. RECIRC TO BWS T GATE VLV	A-9	HP 39	OPEN + 2	
HPI PUMP 1-1 MIN RECIRC FLOW SOURCE VLV	A-9	HP 4 BA	OPEN	
HPI PUMP 1-1 MIN RECIRC FLOW SOURCE VLV	A-9	HP 4 BB	OPEN	
HPI PUMP 1-1 MIN RECIRC FLOW IND. SWITCH	A-9	FSHP 4B	IN SERVICE	

** CONTROLLED PER AD 1239.02

Sheet No. 7
of 9

18
VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.18

T-8559

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
LOCATED IN #1 ECCS ROOM				
HPI Flow Test Line Reg Valve	C-7	HP 29	Closed	
HPI Pumps Recirc to BWST	A-8	HP 1556	Locked Open**	
HPI Pump 1-1 Flow Test Isolation	B-7	HP 32	Locked Open**	
HPI Recirc Line to BWST Gate	A-9	HP 35	Locked Open**	
HPI Pump 1-1 Flow Test Isolation	D-7	HP 26	Locked Closed**	
HPI Pumps Recirc Flow Source K1	A-9	HP 4A	Open	
HPI Pumps Recirc Flow Source K2	A-9	HP 4B	Open	
HPI Pump Recirc Flow Indicator	A-9	FIS HP 4	In Service	
HPI Pumps Recirc Line Drain	A-9	HP 38	Closed	
HPI Pumps Recirc Line Drain	A-9	HP 157	Closed	
HPI Pumps Recirc Line Drain	*	HP 157A	Closed	
HPI Pump 1-1 Disch Line Drain	E-7	HP 34	Closed	
HPI Pump 1-1 Disch Line Drain	*	HP 34A	Closed	
HPI Pump 1-1 Disch	D-7	HP 24	Locked Open**	
HPI to CF Tanks Fill Valve	D-7	HP 28	Closed	
HPI Pump 1-1 Disch Line Flush Conn	E-8	HP 20	Closed	
HPI Pump 1-1 Disch Line Flush Conn	*	HP 20A	Closed	
HPI Pump Disch Line Flush Conn	D-8	PI HP5B	In Service	
HPI Pump 1-1 Disch Press Source	D-8	HP 5B	Open	
HPI Pump 1-1 Disch Press Source	*	HP 5BB	Open	

*Double Isolation Valve - see Note 8 on P&ID M-033.

**Controlled per AD 1839.02.

HPI PUMP 1-2 M. IN RECIRC FLOW (MR) ^{SWITCH} IND	A-9	FIS HP4A	IN SERVICE	

	HPI Pump 1-1	HPI Pump 1-2	HPI to RCS C1 1-2-1 Iso Vly	HPI to RCS Cold Leg 1-2-2 Iso V	HPI to RCS CL 1-1-1 Iso Vly	HPI to RCS CL 1-1-2 Iso Vly	HPI Recirc to BWST
Equipment Identification Number	P58-1	P58-2	HP 2A	HP 2B	HP 2C	HP 2D	HP 1556
Control Switch (located on Panel C5716)	HIS-1524	HIS 1523	HIS-HP 2A	HIS-HP 2B	HIS-HP 2C	HIS HP 2D	HIS* 1556
Breaker Number	AC 111	AC 111	B F11 39	B F11 41	B E11 03	B E11 05	Air Sol- enoid
Breaker Location	4.16 KV Bus C1	4.16 KV Bus D1	MCC F11C	MCC F11C	MCC E11A	MCC E11A	
Local Control Switch	NP 0581	NP 0582	NV HP 02A	NV HP 02B	NV HP 02C	NV HP 02D	NV 01556
Flow Indication (Control Room)	FYI-HP3D+ FYI-HP3C	FYI-HP3B+ FYI-HP3A	FYI HP3A	FYI HP3B	FYI HP3C	FYI HP3D	Local FIHP4 ←
SFAS Actuation Channel	1	2	2	1	1	2	None
SFAS Incident Level	2	2	2	2	2	2	None

ADD FISHP4A &
FISHP4B

*HIS 1556 has its air supply permanently removed to protect from an electrical fault closing the minimum recirculation path for both HPI pumps. Therefore, this valve may only be operated manually and should not be closed.

Attachment 1 (Page 1 of 3)

78559

	HPI Pump 1-2 Minimum Recirc Iso*	HPI Pump 1-1 Minimum Recirc Iso*	
Equip No.	HP 31	HP 32	
Control Switch	HIS HP 31	HIS HP 32	
Breaker No.	BF 1194	BE 1286	
Breaker Location	F11E	E12E	
Flow Indication	FISHP4 AND FISHP4A (NR)	FISHP4 FISHP4B	
SFAS Actuation Channel	N/A	N/A	
SFAS Incident Level	N/A	N/A	

*NOTE: Motor operators added during first refueling outage.

COMPONENT INFORMATION

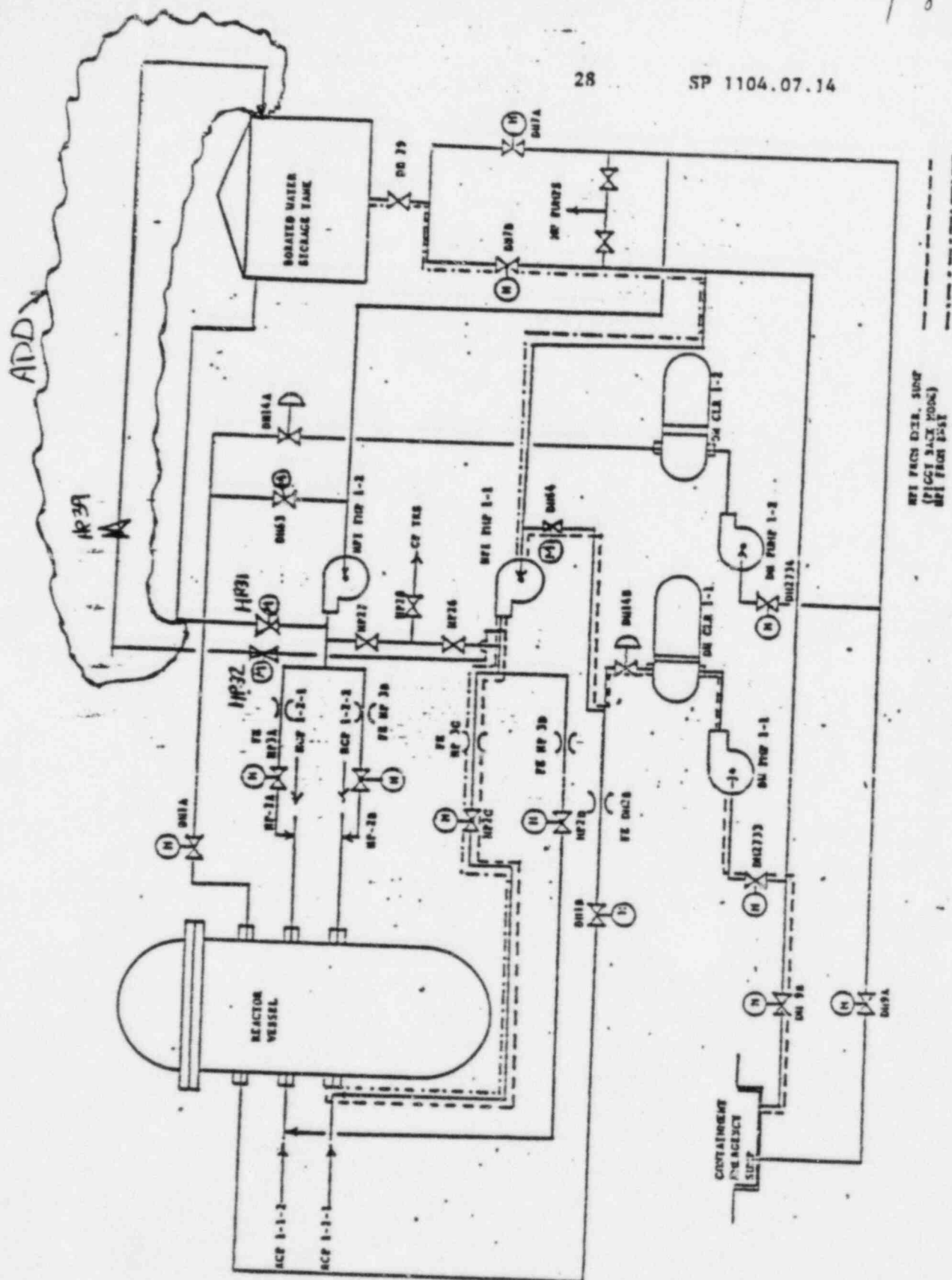
23

SP 1104.07.14

1-85549

Attachment 1 (Page 3 of 3)

14



REF FROM DIR, JUSG
(PICTY BACK MOON)
REF FROM DIR

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TEMPORARY MODIFICATION REQUEST

ED 6926

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SECTION 1

PROCEDURE TITLE AND NUMBER

HIGH PRESSURE INJECTION SYSTEM PROCEDURE SP 1104.07.12

REASON FOR CHANGE

TO CLARIFY + UPDATE SP 1104.07 ATTACHMENT 1

CHANGE

ATTACHMENT 1

PAGE 2 OF 3

COMPONENT INFORMATION

CHANGE :

	MPI 1-1		MPI 1-2	
	AC OIL PUMP	DC OIL PUMP	AC OIL PUMP	DC OIL PUMP
BREAKER LOCATION	E12 E	DC MCC 1	F12 A	DC MCC 2

IS PROCEDURE REVISION REQUIRED

Yes ☒No ☐

If no, this modification is valid until _____

PREPARED BY

George Durney

DATE

6-4-84

APPROVED BY

George Durney

DATE

6-4-84

APPROVED BY

W. H. Klyne

DATE

6-4-84

SUBMITTED BY (Section Head)

George Durney

DATE

6/11/84

RECOMMENDED BY (SRB Chairman)

George Durney

DATE

6/13/84

QA APPROVED BY (Manager of Quality Assurance)

N/A

DATE

APPROVED BY (Station Superintendent)

George Durney

DATE

6/13/84

Tech

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 TEMPORARY MODIFICATION REQUEST
 ED 6926

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SECTION 1

PROCEDURE TITLE AND NUMBER

High Pressure Injection System Procedure SP1104.07.18
 REASON FOR CHANGE

Flow Transmitters for the HPI Lines have double isolation valves. This is not reflected in Valve Verification List A.

CHANGE Add the following valves to Valve Verification List A:

1) On sheet #3 of 9, for valves located in Mech. Penet. Rm #1;

HPI Line 1-1 Flow Source K1	*	HP 3CA1	Open	
HPI Line 1-1 Flow Source K2	*	HP 3CB1	Open	
HPI Line 1-2 Flow Source K1	*	HP 3DA1	Open	
HPI Line 1-2 Flow Source K2	*	HP 3DB1	Open	

2) On sheet #4 of 9, for valves located in Mech. Penet. Rm #2;

HPI Line 2-1 Flow Source K1	*	HP 3AA1	Open	
HPI Line 2-1 Flow Source K2	*	HP 3AB1	Open	
HPI Line 2-2 Flow Source K1	*	HP 3BA1	Open	
HPI Line 2-2 Flow Source K2	*	HP 3BB1	Open	

IS PROCEDURE REVISION REQUIRED

Yes ☒No ☐

If no, this modification is valid until

PREPARED BY

Jeff Blay

DATE

2-24-84

APPROVED BY

Donald E. Hising

DATE

2-24-84

APPROVED BY

John Johnson

DATE

2/24/84

SUBMITTED BY (Section Head)

L. J. H. f. t.

DATE

2/25/84

RECOMMENDED BY (SRB Chairman)

[Signature]

DATE

3/2/84

QA APPROVED BY (Manager of Quality Assurance)

NA

DATE

APPROVED BY (Station Superintendent)

T. D. Murray

DATE

3/10/84

Davis-Besse Nuclear Power Station

Unit No. 1

System Procedure SP 1104.07

High Pressure Injection System Procedure

NUCLEAR SAFETY RELATED

Record of Approval and Changes

Prepared by	<u>Robert Jadgchew/Stan Batch</u>	<u>3/27/75</u>
		Date
Submitted by	<u>L. C. Stalter/JEO</u>	<u>12/30/75</u>
	Section Head	Date
Recommended by	<u>Jack Evans</u>	<u>1/6/76</u>
	SRB Chairman	Date
QA Approved	<u>N/A</u>	
	Manager of Quality Assurance	Date
Approved by	<u>Jack Evans</u>	<u>1/6/76</u>
	Station Superintendent	Date

Revision No.	SRB Recommendation	Date	QA Approved	Date	Sta. Supt. Approved	Date
11	<i>BRB</i>	4/8/80	N/A		<i>Tommy</i>	1/21/80
12	<i>BRB</i>	2/26/80	NA		<i>Tommy</i>	3/5/80
13	<i>BRB</i>	5/27/80	NA		<i>Tommy</i>	6/3/80
14	<i>BRB</i>	6/19/80	NA		<i>Tommy</i>	7/28/80
15	D.W. Braden	4/10/81	NA		<i>Tommy</i>	5/18/81
16	<i>sm</i>	9/4/81	NA		<i>Tommy</i>	9/25/81
17	<i>sm</i>	5/8/82	NA		<i>Tommy</i>	9/23/82
18	<i>sm</i>	6/21/83	NA		<i>Tommy</i>	7/5/83

1. PURPOSE

To provide procedures for operating the High Pressure Injection (HPI) System in each of the following modes:

<u>MODE</u>	<u>Section</u>
HPI Normal Lineup	4.0
High Pressure Injection Emergency Operation	5.0

System Description

The HPI System is designed to inject borated water into the Reactor Coolant System (RCS) to prevent the uncovering of the core in the case of a small reactor coolant piping leak (less than .5 ft² break size). Its automatic initiation is from a containment pressure exceeding 18.4 psia, or a RCS pressure of less than 1650 psig which initiates an SFAS incident level 2 signal to start the HPI pumps to open the HPI lines isolation valves, and to open the BWST outlet valves.

Upon receipt of the SFAS signal, the HPI pumps take suction from two separate supply lines from the BWST (see Attachment 5). If the RCS pressure is dropping slowly, low HPI flow will occur since the HPI pumps are started at 1650 psig RCS pressure and a 500 GPM flow rate does NOT occur until approximately 1300 psig reactor coolant pressure (see pump curve, Attachments 3 and 4). To protect the pump from overheating, a minimum flowpath is provided for each HPI pump to recirculate 35 GPM through restriction orifices ROHP6A (HPI Pump 1-2) and ROHP6B (HPI Pump 1-1) back to the BWST.

18 | The four inch discharge line from each HPI pump splits into two, two and one half inch lines which connect to the reactor vessel cold leg inlets near the reactor coolant pump discharge. HPI Pump 1-1 discharges to the reactor coolant pumps 1-1-1 and 1-1-2 discharge piping and HPI pump 1-2 discharges to reactor coolant pumps 1-2-1 and 1-2-2 discharge piping.

As RCS pressure drops, HPI flow will increase. If the flow increases to 475 GPM per line, the HPI high flow alarms will occur. (See Attachment 6) (see AP 3003.41-44.) The HPI pumps should not have to be throttled unless a pipe break occurs or the HPI pumps are "piggybacked".

If the flow rate between the two HPI lines for a HPI pump becomes unbalanced due to abnormally high flow in one line, the operator must throttle the HPI valve of the high flow line to split the flow between the injection lines. Do NOT throttle the line with the high flow below the flow rate shown on Attachment 8. If makeup pumps are running, the indicated flow on the injection lines for HPI Pump 1-2 may be misleading.

18 |

If the RCS pressure is too great to allow 1000 GPM flowrate per DH pump and the BWST level is low (less than 10 feet), the operator should decide if the motor operated crossover valves (DH63 and DH64) should be opened to allow for the low pressure injection (LPI) pumps to provide the suction for the HPI System. This "Piggyback Operation" (see Attachment 5) must be done to provide the net positive suction head required for the HPI pumps and to provide a means for the LPI to operate when RCS pressure is greater than the 200 psig discharge of the LPI pumps.

When BWST level reaches 8 feet as monitored on LI 1525A, B, C, or D, or upon receipt of the annunciator alarm BWST LOLO VLV, XFER TO EMER SUMP at 8 feet in the BWST, the operator must close the BWST outlet valves (DH7A and DH7B) and open the containment vessel emergency sump outlet valves (DH9A and DH9B). When HPI pump suction is switched from the BWST to the outlet of the decay heat coolers, the operator must close the minimum recirculation valves, HP 31 and HP 32 to prevent contamination of the BWST and loss of water from the containment building.

The HPI "Piggyback" mode of operation must continue until the RCS pressure drops to approximately 150 psig and the LPI pumps are supplying adequate flow, where the low pressure injection can be entirely transferred to direct injection into the reactor by shutting off the HPI pumps. The HPI pumps do NOT have to be shut off as long as they are throttled to less than 950 gpm flow.

If the break in the reactor coolant system is larger than 0.5 feet², the RCS will depressurize to less than 200 psig before the BWST is depleted. Therefore, "Piggyback" operation should NOT be necessary.

HPI pumps should only be secured after automatic actuation when the criteria of Section 2.7 are met. It should be noted that once the BWST is emptied to 8 feet, the pumps must be shut off or put into "Piggyback" operation since there is no direct supply to the HPI pumps from the containment vessel emergency sump.

The HPI pumps can be used to supply makeup to the core flood tanks. The flowrate from using one of the HPI pumps through restriction orifice RO HP 7 is approximately 43 gpm. Only one of the HPI pumps should be used at a time to fill the Core Flood Tank. It should be noted, however, that the suction of the HPI pump is normally the BWST which will be approximately 2000 ppm boron concentration. This will dilute the normal 3500 ppm boron concentration of the core flood tank. This mode of operation is detailed in Section 7 of SP 1104.01, "Core Flooding System Procedure".

Since the HPI pumps will normally be in emergency standby, if the isolation check valves leak, a computer alarm is supplied to detect this increase in the discharge pressure when the pump is off.

Computer point P465 actuates Q479, the alarm "HP INJ VLV LEAKING TRBL/NORM". The setpoint of the computer inputs PSH 2883A and PSH 2883B is 375 psig.

For test purposes, a 250 gpm recirculation line through RO HP 1 is provided. This line will be used from the Monthly Surveillance Test of the ECC System, ST 5051.01.

The HPI pumps flow test line valves HP 26 and HP 27 can be manually opened in the event of a small break in the RCS. This could allow the flow from one HPI pump to enter all four injection lines. If one of the cold legs is the break area, the isolation valve in that line (HP 2A, HP 2B, HP 2C, or HP 2D) could be closed and the flow split into the remaining three injection lines. This is NOT a required safety action.

The relaying for the HPI pump motors consists of four relays. The first of these relays is a long time relay with a setting of 105 amps primary current (to the motor). This actuates the overload indication in the control room only and does NOT trip the pump. The second relay is an instantaneous relay set at 210 amps that will trip the motor if the long time relay is tripped and motor current is greater than 210 amps. This is the thermal overload. The third relay is an instantaneous relay set at 990 amps which requires no other relay closure to trip. This is an overcurrent relay guarding against locked rotor current. The fourth relay is an instantaneous ground fault relay set at 4.75 amps to protect the circuit against a short to ground.

All trips will provide a white light at the control switch. It should be noted, however, that a white light does not necessarily mean the pump is tripped (see relay 1 description).

The Design characteristics for the HPI pumps and motors are as follows:

HPI Pump 1-1 (1-2)

Manufacturer:	Babcock & Wilcox Canada Ltd.
Serial No.	68981 (68980)
Size	4x6x9-11 Stage Centrifugal
Model	HMBS
Equip. No.	HP-P1B (HP-P1A) TECo No. 1-1 (1-2)
Capacity (USGPM)	500
Head (feet)	2600 (rated); 2900 (nameplate)
Pump Speed (RPM)	3600
NPSH (req'd)	15 feet
Design Press/Temp	2000 psig/300°F

HPI Pump Motor 1-1 (1-2)

Manufacturer	Westinghouse
Serial No.	2S-74 (1S-74)
Horsepower	600

Model	HSDP
Frame	5808-H
Volts	4000 ($\pm 10\%$)
Amps (full load)	77
Insulation Class	B
Motor Weight	3750 lbs.

All other information for the HPI pump and motor is given in the Limits and Precautions, Section 2.

7 | 2. PRECAUTIONS & LIMITATIONS

- 2.1 The number of allowed successive starts with motor initially at ambient temperature is two starts. The number of successive starts with motor initially at operating temperature is one start. In both cases, five minutes must elapse before an additional start.
- 2.2 THE RECIRCULATION FLOW PATH FOR EACH HPI PUMP THROUGH RESTRICTION ORIFICES RO6A AND RO6B MUST BE OPEN AT ALL TIMES EXCEPT WHEN WATER IS BEING SUPPLIED FROM THE EMERGENCY SUMP (piggyback mode).
- NOTE: THE VALVE POSITION WILL BE CHECKED ONCE A MONTH IN ST 5051.12.
- 2.3 Safety Tagging Procedure, AD 1803.00 will be in effect and followed throughout this procedure.
- 2.4 The following limits should not be exceeded:

HPI PMP 1-1 Computer Points	HPI PMP 1-2 Computer Points	Description	Limits
T462, T463	T466, T467	HPI PMP MTR BRG OIL TEMP	40°F <T <160°F
T464	T468	HPI MTR STATOR TEMP	40°F <T <266°F
T465	T469	HPI THR BRG OIL TEMP	40°F <T <165°F
F474	F474	HPI RECIRC FLOW SWITCH	65 GPM ¹
F460, F490	F488, F489	HPI LINE 1-1, 1-2, 2-1, 2-2 FLOW	75 GPM <950 GPM ²

¹Recirculation flow is stopped in the case of "piggyback" operation. Invalid alarm in this instance. Minimum recirc flow is 35 gpm per HPI Pump. The alarm is set at 65 gpm which indicates insufficient flow for two pump operation.

²950 GPM per pump which is 475 gpm per line. Pump runout (950 gpm) should never be allowed since the pumps can be throttled with the isolation valve. See AP 3003.41-44. Low flow could occur when RCS pressure is high. See AP 3003.51-54.

18

2.5 Deleted

2.6 Whenever the HPI system is inoperable because of failure, repair work in progress, or routine maintenance on the system, the operator is to turn IL 4803, "HPI Sys" on using HS 4803 on control room panel C-5717. this light is to remain illuminated as long as the system is inoperable.

2.7 If a SFAS actuation occurs the following requirements apply:

2.7.1 Do NOT override any safety equipment except as listed below:

1. High pressure injection may be stopped or throttled provided:
 - a) All hot and cold leg temperatures are at least 50 degrees below the saturation temperature for the existing RCS pressure and not more than 50°F above the secondary side saturation temperature. The degree of subcooling beyond 50°F by HPI shall be limited by normal pressure/temperature considerations for vessel integrity.

If LOCA conditions exist, the degree of subcooling beyond 50°F by HPI shall be limited by the emergency pressure/temperature limits as specified

in EP 1202.06, Loss of Reactor Coolant, and Reactor Coolant Pressure.

and

- b) Pressurizer level is being maintained.

CAUTION: Do not rely entirely on pressurizer level indication to determine the inventory of the RCS. If the RCS temperature is not 50 degrees below the saturation temperature for the RCS pressure, a steam void may exist in the RCS.

If both of these conditions are satisfied, the HPI may be stopped by blocking and stopping the pumps, or throttled using HP2A, B, C, and D.

CAUTION: If 50°F subcooling cannot be maintained after stopping HPI, the HPI shall be started.

HPI may also be throttled during piggyback operation to less than 950 gpm per pump or as required to balance flows. HPI flow may be stopped if both low pressure injection pumps are in operation with a flow of at least 1000 gpm per pump, and the RCS conditions have been stable for 20 minutes.

2. If plant conditions are stable at normal operating or hot standby conditions after a transient with no evidence of a RCS leak, systems may be bypassed with the Shift Supervisor'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 his designee).

2.7.2 IF AN SFAS SIGNAL TO SOME ESF EQUIPMENT IS "BLOCKED" (I.E. OVER-RIDDEN), THAT EQUIPMENT IS INCAPABLE OF RESPONDING TO EITHER ANY SUBSEQUENT AUTOMATIC ACTUATION SIGNAL OR THE SFAS SYSTEM-LEVEL MANUAL ACTUATE ("TRIP") PUSHBUTTON ON PANEL C5717. BEFORE AN OPERATOR "BLOCKS" ANY SFAS SIGNAL, HE MUST ASSURE THAT THE SAFETY FUNCTION OF THAT EQUIPMENT IS NO LONGER NEEDED. AFTERWORD, THE OPERATOR IS TOTALLY RESPONSIBLE FOR THE PROPER OPERATION OF THAT EQUIPMENT, INCLUDING REACTUA-

TION 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 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."

- 2.8 Requirements of AD 1839.02, Operation and Control of Locked Valves, must be satisfied in the performance of this test.

3. REFERENCES

- 18 | 3.1 Technical Specifications, 3.5.2, and 3.5.4
- 3.2 NSSS Limits and Precautions, PP 1101.01, Section 2.0
- 3.3 Deleted
- 3.4 Decay Heat Removal and Low Pressure Injection System Procedure, SP 1104.04
- 3.5 Station Startup, PP 1102.02
- 3.6 Station Shutdown and Cooldown, PP 1102.10
- 3.7 Loss of Reactor Coolant and Reactor Coolant Pressure, EP 1202.06
- 3.8 Operational Chemical Control Limits, PP 1101.04
- 3.9 Davis-Besse Unit 1 FSAR, Section 6.3, Questions and Answers, and Regulatory Position Sections
- 3.10 DH Removal System and ECCS P&ID M-033
- 18 | 3.11 Safety Tagging Procedure, AD 1803.00
- 3.12 TECo NQAM
- 3.13 Cleanliness Control Procedure, AD 1844.05
- 3.14 Bechtel Elementary Wiring Diagram, E52B, pages 5A, 5B, 20, 26A, 26B

3.15 Component Cooling Water System Procedure, SP 1104.12

3.16 HPI Low Flow Alarm Procedures, AP 3003.51, AP 3003.52, AP 3003.53 and AP 3003.54

3.17 HPI High Flow Alarm Procedures, AP 3003.41, AP 3003.42, AP 3003.43 and AP 3003.44

3.18 Operation and Control of Locked Valves, AD 1839.02

4. HPI NORMAL LINEUP

This section details the steps to be taken to prepare the HPI system so that it will be ready for SFAS ACTUATION.

4.1 Prerequisites

_____ 4.1.1 The HPI system is operable and no maintenance work is being done on any component in the HPI system.

4.2 Procedure

_____ 4.2.1 Verify that the HPI system is lined up in accordance with Valve Verification List A of this procedure.

4.2.2 Perform HPI pump check-off List Attachment 2 for both pumps and verify they are not running.

_____ 1. HPI pump 1-1.

_____ 2. HPI pump 1-2.

4.2.3 Verify that following breakers are closed and the valves are closed.

<u>Valve Number</u>	<u>Breaker Number</u>	<u>MCC</u>
_____ a. HP2A	_____ B F11 39	F 11C
_____ b. HP2B	_____ B F11 41	F 11C
_____ c. HP2C	_____ B E11 03	E 11A
_____ d. HP2D	_____ B E11 05	E 11A

_____ 4.2.4 Verify that the BWST contains at least 482,778 gallons of borated water. BWST level indicator LI 1525A, B, C, or D should read greater than 37' 4".

_____ 4.2.5 Verify that no SFAS signals to the HPI system components have been bypassed.

NOTE: 1. Block the SFAS signal prior to reaching the HPI actuation point when the RCS is being depressurized. Refer to "Station

Shutdown and Cooldown Procedure,"
PP 1102.10.

Blocking of SFAS components within this procedure is intended to prevent the failure or damage of the components. The operator must note that changes in plant conditions may warrant placing the component back in an SFAS incident condition.

2. No SFAS actuation signals to the HPI system are to be bypassed above an RCS pressure of 1800 PSIG.
3. The HPI lines 2-2 and 1-1 have pressure indicators and computer alarms to indicate if the isolation valves are leaking. Use computer points P465 and Q479.

____ 4.2.6 Notify the Shift Supervisor that the HPI system is in normal lineup.

5. HIGH PRESSURE INJECTION EMERGENCY OPERATION

No operator action is necessary to start the HPI system since it is automatically started from an SFAS incident level 2 signal (see Section 1). Abnormal flow conditions will be handled in the HPI line 1-1 (1-2, 2-1, 2-2) high flow alarm procedure AP 3003.41 (AP 3003.42, AP 3003.43, AP 3003.44) and Low Flow Alarm Procedures, AP 3003.51 (AP 3003.52, AP 3003.53, AP 3003.54). No operator sign off is required for Section 5.

5.1 Prerequisites

- 5.1.1 The HPI system is in normal lineup as per Section 4 of this procedure.

NOTE: The HPI system must be in normal lineup.

NOTE: Blocking of SFAS components within this procedure is intended to prevent the failure or damage of the components. The operator must note that changes in plant conditions may warrant placing the component back in an SFAS incident condition. This is the responsibility of the operator performing the block.

5.2 Procedure

5.2.1 If a RCS break occurs and containment pressure increases to 18.4 PSIA or RCS pressure decreases to 1650 psig, an SFAS incident level 2 will be initiated.

5.2.2 The SFAS will:

1. Ensure the BWST outlet valves DH7A and DH7B are open.
2. Open HPI isolation valves HP2A, HP2B, HP2C and HP2D.
3. Start the HPI pumps.

5.2.3 Verify that the SFAS has done what is required in Step 5.2.2.

NOTE: Any failure of equipment should cause an annunciator and/or computer alarm.

If the flow rate between the two HPI lines for a HPI pump becomes unbalanced due to abnormally high flow in one line, the operator must throttle the HPI valve of the high flow line to split the flow between the injection lines.

Do NOT throttle the line with the high flow below the flowrate shown on Attachment #8. If a makeup pump is running, the indicated flow in the injection lines for HPI Pump 1-2 may be misleading.

5.2.4 Monitor BWST level and RCS pressure using the computer and/or control room instrumentation in order to be prepared for "piggyback" operation. See Step 5.2.7.

Computer Points

BWST level - L062, L063, L064, and/or L065
RCS pressure - P721, P722, P729, and P730

Control Room Instruments on C5716

BWST level - LI-1525A, LI-1525B, LI-1525C, and LI-1525D
RCS pressure - PI-RC2B4, PI-RC2B3, PI-RC2A4, and PI-RC2A3

5.2.5 As RCS pressure decreases, verify that the LPI System is in operation within the guidelines of Step 2.7, then stop the HPI pumps. To stop the HPI Pump 1-1 (1-2), depress the BLOCK pushbutton HIS-1524A (HIS-1523A), and then turn HIS-1524 (HIS-1523) to the STOP position.

Switches are located on control room panel C5716 (Engineered Safety Features).

5.2.6

If the BWST reaches the low-low level alarm point of 8 feet and HPI is still in operation, water must be supplied to the HPI pump suction from the reactor building emergency sump v.a the Decay Heat pumps as per Section 11 of SP 1104.04, "Decay Heat Removal and Low Pressure Injection Operation Procedure" before the pump suction is switched to the emergency sump.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.18

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
LOCATED IN CONTAINMENT, 565' ELEV				
HPI Line 2-2 Iso Vlv Leak Test Conn	C-4	HP 54	Closed	
HPI Line 2-2 Iso Vlv Leak Test Conn	*	HP 54A	Closed	
HPI Line 2-1 Iso Vlv Leak Test Conn	C-4	HP 55	Closed	
HPI Line 2-1 Iso Vlv Leak Test Conn	*	HP 55A	Closed	
HPI Line 2-2 Vent	C-4	HP 81	Closed	
HPI Line 2-2 Vent	*	HP 81A	Closed	
HPI Line 2-2 Drain	C-4	HP 82	Closed	
HPI Line 2-2 Drain	*	HP 82A	Closed	
HPI Line 2-2 Stop Check	C-3	HP 56	Locked Open**	
HPI Line 2-1 Drain	C-4	HP 80	Closed	
HPI Line 2-1 Drain	*	HP 80A	Closed	
HPI Line 2-1 Stop Check	C-4	HP 57	Locked Open**	
HPI Line 1-2 Iso Vlv Leak Test Conn	E-4	HP 47	Closed	
HPI Line 1-2 Iso Vlv Leak Test Conn	*	HP 47A	Closed	
HPI Line 1-2 Vent	E-2	HP 75	Closed	
HPI Line 1-2 Vent	*	HP 75A	Closed	
HPI Line 1-2 Drain	D-2	HP 76	Closed	
HPI Line 1-2 Drain	*	HP 76A	Closed	
HPI Line 1-2 Stop Check	C-2	HP 49	Locked Open**	
HPI Line 1-1 Stop Check	C-2	HP 48	Locked Open**	

*Double Isolation Valve - See Note 8 on P&ID M-033.

**Controlled per AD 1839.02.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.18

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
HPI Line 1-1 Drain	D-2	HP 78	Closed	
HPI Line 1-1 Drain	*	HP 78A	Closed	
HPI Line 1-1 Vent	D-2	HP 77	Closed	
HPI Line 1-1 Vent	*	HP 77A	Closed	
HPI Line 1-1 Iso Vlv Leak Test Conn	D-4	HP 46	Closed	
HPI Line 1-1 Iso Vlv Leak Test Conn LOCATED OUTSIDE BY BWST	*	HP 46A	Closed	
BWST Outlet Isolation	B-12	DH 79	Locked Open**	
BWST Isolation for Line 1-2	C-12	DH 7A	Locked Open**	
BWST Isolation for Line 1-1 LOCATED IN #3 MECH PENETRATION ROOM	C-12	DH 7B	Locked Open**	
HPI to CF TK 1-1 Fill LOCATED IN #1 MECH PENETRATION ROOM	M-034 G-10	HP 60	Closed	
HPI Line 1-1 Iso Vlv	D-5	HP 2C	Closed	
HPI Line 1-1 Drain	D-5	HP 69	Closed	
HPI Line 1-1 Drain	*	HP 69A	Closed	
HPI Line 1-1 Iso Vlv Leak Test Conn	D-5	HP 44	Closed	
HPI Line 1-1 Iso Vlv Leak Test Conn	*	HP 44A	Closed	
HPI Line 1-1 & 1-2 Press Source	D-5	HP 2883B	Open	
HPI Lines 1-1 & 1-2 Press Source	*	HP2883B1	Open	
HPI Line 1-1 Flow Indicator	D-6	FYI HP3C	In Service	

*Double Isolation Valve - See Note 8 on P&ID M-033.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.18

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
HPI Line 1-1 Flow Source K1	D-6	HP3CA	Open	
HPI Line 1-1 Flow Source K2	D-6	HP3CB	Open	
HPI Line 1-1 & 1-2 Pressure Gauge	D-5	PI 2883B	In Service	
HPI Line 1-2 Vent Source	E-6	HP 72	Open	
HPI Line 1-2 Vent Isolation	E-6	HP 72A	Closed	
HPI Line 1-2 Vent Isolation	*	HP 72A1	Closed	
HPI Line 1-2 Flow Indicator	E-6	FYI HP3D	In Service	
HPI Line 1-2 Flow Source K1	E-6	HP 3DA	Open	
HPI Line 1-2 Flow Source K2	E-6	HP 3DB	Open	
HPI Line 1-2 Drain	E-5	HP 70	Closed	
HPI Line 1-2 Drain	*	HP 70A	Closed	
HPI Line 1-2 Iso Vlv Leak Test Conn	E-5	HP 45	Closed	
HPI Line 1-2 Iso Vlv Leak Test Conn	*	HP 45A	Closed	
HPI Line 1-2 Iso Vlv LOCATED ABOVE TRANSFER TUBE SHIELD	E-5	HP 2D	Closed	
HPI to CF Tk 1-2 Fill LOCATED IN MECH PENETRATION ROOM #2	M-034 E-10	HP 61	Closed	
HPI Line 2-1 Iso Vlv	C-5	HP 2A	Closed	
HPI Line 2-1 Iso Vlv Leak Test Conn	C-5	HP 53	Closed	
HPI Line 2-1 Iso Vlv Leak Tes Conn	*	HP 53A	Closed	
HPI Line 2-1 Drain	C-5	HP 67	Closed	
HPI Line 2-1 Drain	*	HP 67A	Closed	

*Double Isolation Valve - See note 8 on P&ID M-033.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.17

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
HPI Line 2-1 Flow Indicator	B-6	FYI HP3A	In Service	
HPI Line 2-1 Flow Source K1	B-6	HP 3AA	Open	
HPI Line 2-1 Flow Source K2	B-6	HP 3AB	Open	
HPI Line 2-2 Iso Vlv	C-5	HP 2B	Closed	
HPI Line 2-2 Iso Vlv Leak Test Conn	C-5	HP 52	Closed	
HPI Line 2-2 Iso Vlv Leak Test Conn	*	HP 52A	Closed	
HPI Line 2-1 & 2-2 Press Source	C-5	HP 2883A	Open	
HPI Line 2-1 & 2-2 Press Source	*	HP2883A1	Open	
HPI Line 2-1 and 2-2 Press Gauge	C-5	PI 2883A	In Service	
HPI Line 2-2 Drain	C-5	HP 68	Closed	
HPI Line 2-2 Drain	*	HP 68A	Closed	
HPI Line 2-2 Flow Indicator	C-6	FYI HP3B	In Service	
HPI Line 2-2 Flow Source K-1	C-6	HP 3BA	Open	
HPI Line 2-2 Flow Source K-2	C-6	HP 3BB	Open	
HPI Pump 1-2 Disch Line Vent	B-6	HP 66	Closed	
HPI Pump 1-2 Disch Line Vent	*	HP 66A	Closed	
LOCATED IN #2 ECCS ROOM				
HPI Pump 1-1 CCW Supply (Line 1)	M-036 J-11	CC 653	Locked Open**	
HPI Pump 1-1 CCW Supp'y (Line 2)	M-036 J-12	CC 655	Locked Closed**	
HPI Pump 1-1 CCW Return (Line 1)	M-036 B-9	CC 661	Locked Open**	
HPI Pump 1-1 CCW Return (Line 2)	M-036 C-9	CC 659	Locked Closed**	

*Double Isolation Valve - See note 8 on P&ID M-033.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.17

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

	VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
17	HPI Pump 1-2 Suction	C-10	HP 13	Locked Open**	
	HPI Pump 1-2 Suction Line Vent	C-11	HP 65	Closed	
	HPI Pump 1-2 CCW Supply Stop Check (Line 2)	M-036 H-11	CC 133	Locked Open**	
	HPI Pump 1-2 CCW Supply Stop Check (Line 1)	M-036 H-11	CC 134	Locked Closed**	
	HPI Pump 1-2 CCW Return Stop Check (Line 2)	M-036 G-10	CC 137	Locked Open**	
	HPI Pump 1-2 CCW Return Stop Check (Line 1)	M-036 G-10	CC 138	Locked Closed**	
	HPI Flow Test Line Vent	C-7	HP 83	Closed	
17	HPI Pump 1-2 Suction Line Flush Conn	C-9	HP 15	Closed	
	HPI Pump 1-2 Suction Strainer Delta P Source	C-10	HP 37	Closed	
	HPI Pump 1-2 Suction Press Source	C-9	HP 1520	Open	
	HPI Pump 1-2 Suction Press Gauge	C-9	PI 1520A	In Service	
	HPI Pump 1-2 Suction Press Gauge	C-9	PI 1520B	In Service	
	HPI Pump 1-2 Cyc Sep Inlet	See Attch 2	HP 86	Open	
	HPI Pump 1-2 Cyc Sep Outlet to Seal	See Attch 2	HP 88	Open	
	HPI Pump 1-2 Cyc Sep Outlet to Pump Suction	See Attch 2	HP 90	Open ¹	
	HPI Pump 1-2 Vent	B-9	HP 19	Closed	
	HPI Pump 1-2 Vent	*	HP 19A	Closed	
	Decay Heat Sys to HPI Xconn (Line 2)	C-11	DH 63	Closed	
	HPI Pump 1-2 Disch	C-8	HP 25	Locked Open**	
	HPI Pump 1-2 Flow Test Line	C-7	HP 27	Locked Closed**	

*Double Isolation Valve - see Note 8 on P&ID M-033.

**Controlled per AD 1839.02.

¹Open fully, then close one turn.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.18

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
HPI Pump 1-2 Recirc Stop Check	B-8	HP 31	Locked Open**	
HPI Pump 1-2 Disch Press Source	C-8	HP 5A	Open	
HPI Pump 1-2 Disch Press Source	*	HP 5AA	Open	
HPI Pump 1-2 Disch Press Gauge	C-8	PI HP 5A	In Service	
HPI Pump 1-2 Disch Flush Conn	C-8	HP 21	Closed	
HPI Pump 1-2 Disch Flush Conn	*	HP 21A	Closed	
HPI Pump 1-2 Drain	C-9	HP 17	Closed	
HPI Pump 1-2 Drain	*	HP 17A	Closed	
HPI Pump 1-2 Lube Oil System AC Pump Suction	J-8	HP 201	Locked Open**	
HPI Pump 1-2 Lube Oil System DC Pump Suction	J-8	HP 204	Locked Open**	
HPI Pump 1-2 Lube Oil System Press Switch Src	J-7	HP 4961	Open	
HPI Pump 1-2 Lube Oil System AC Pump Disch	J-7	HP 203	Locked Open**	
HPI Pump 1-2 Lube Oil System DC Pump Disch	J-8	HP 206	Locked Open**	
HPI Pump 1-2 Lube Oil System Press Gage Source	J-7	HP 4958	Open	
HPI Pump 1-2 Lube Oil System Filter Inlet	J-8	HP 207	Locked Open**	
HPI Pump 1-2 Lube Oil System Filter Outlet	J-8	HP 208	Locked Open**	
HPI Pump 1-2 Lube Oil System Sample/Drain	H-9	HP 200	Closed	
HPI Pump 1-2 CCW Supply (Line 1)	M-036 J-11	CC 652	Locked Closed**	
HPI Pump 1-2 CCW Supply (Line 2)	M-036 J-12	CC 654	Locked Open**	
HPI Pump 1-2 CCW Return (Line 1)	M-036 C-9	CC 662	Locked Closed**	
HPI Pump 1-2 CCW Return (Line 2)	M-036 C-9	CC 660	Locked Open**	

*Double Isolation Valve - see Note 8 on P&ID 1104.07.18.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.18

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
LOCATED IN #1 ECCS ROOM				
HPI Flow Test Line Reg Valve	C-7	HP 29	Closed	
HPI Pumps Recirc to BWST	A-8	HP 1556	Locked Open**	
HPI Pump 1-1 Flow Test Isolation	B-7	HP 32	Locked Open**	
HPI Recirc Line to BWST Gate	A-9	HP 35	Locked Open**	
HPI Pump 1-1 Flow Test Isolation	D-7	HP 26	Locked Closed**	
HPI Pumps Recirc Flow Source K1	A-9	HP 4A	Open	
HPI Pumps Recirc Flow Source K2	A-9	HP 4B	Open	
HPI Pump Recirc Flow Indicator	A-9	FIS HP 4	In Service	
HPI Pumps Recirc Line Drain	A-9	HP 38	Closed	
HPI Pumps Recirc Line Drain	A-9	HP 157	Closed	
HPI Pumps Recirc Line Drain	*	HP 157A	Closed	
HPI Pump 1-1 Disch Line Drain	E-7	HP 34	Closed	
HPI Pump 1-1 Disch Line Drain	*	HP 34A	Closed	
HPI Pump 1-1 Disch	D-7	HP 24	Locked Open**	
HPI to CF Tanks Fill Valve	D-7	HP 28	Closed	
HPI Pump 1-1 Disch Line Flush Conn	E-8	HP 20	Closed	
HPI Pump 1-1 Disch Line Flush Conn	*	HP 20A	Closed	
HPI Pump Disch Line Flush Conn	D-8	PI HP5B	In Service	
HPI Pump 1-1 Disch Press Source	D-8	HP 5B	Open	
HPI Pump 1-1 Disch Press Source	*	HP 5BB	Open	

*Double Isolation Valve - see Note 8 on P&ID M-033.

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.14

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M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
HPI Pump 1-1 CCW Supply Stop Check (Line 2)	M-036 H-10	CC 131	Locked Closed**	
HPI Pump 1-1 CCW Supply Stop Check (Line 1)	M-036 H-11	CC 132	Locked Open**	
HPI Pump 1-1 CCW Return Stop Check (Line 2)	M-036 G-9	CC 135	Locked Closed**	
HPI Pump 1-1 CCW Return Stop Check (Line 1)	M-036 G-10	CC 136	Locked Open**	
HPI Pump 1-1 Drain	E-9	HP 16	Closed	
HPI Pump 1-1 Drain	*	HP 16A	Closed	
HPI Pump 1-1 Vent	D-9	HP 18	Closed	
HPI Pump 1-1 Vent	*	HP 18A	Closed	
HPI Pump 1-1 Cyc Sep Inlet	See Attach 2	HP 85	Open	
HPI Pump 1-1 Cyc Sep Outlet to Seal	See Attach 2	HP 87	Open	
HPI Pump 1-1 Cyc Sep Outlet to Pmp Suction	See Attach 2	HP 89	Open ¹	
HPI Pump 1-1 Lube Oil System AC Pump Suction	M-033 J-8	HP 101	Locked Open**	
HPI Pump 1-1 Lube Oil System DC Pump Suction	J-8	HP 104	Locked Open**	
HPI Pump 1-1 Lube Oil System Press Switch Src	J-7	HP 4957	Open	
HPI Pump 1-1 Lube Oil System AC Pump Disch	J-7	HP 103	Locked Open**	
HPI Pump 1-1 Lube Oil System DC Pump Disch	J-8	HP 106	Locked Open**	
HPI Pump 1-1 Lube Oil System Press Gage Source	J-7	HP 4954	Open	
HPI Pump 1-1 Lube Oil System Filter Inlet	J-8	HP 107	Locked Open**	
HPI Pump 1-1 Lube Oil System Filter Outlet	J-8	HP 108	Locked Open**	
HPI Pump 1-1 Lube Oil System Sample/Drain	H-9	HP 100	Closed	
HPI Pump 1-1 Suction Press Source	E-9	HP 1519	Open	

*Double Isolation Valve - see Note 8 on P&ID M-033.

**Controlled per AD 1839.02.

¹Open fully, close 1 turn.

Sheet No. 9
of 9

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VALVE VERIFICATION LIST A
HPI System Normal Lineup

SP 1104.07.14

Verification List Only - Consult Shift Supervisor Prior to Repositioning Valve
M-033

VALVE DESCRIPTION	P&ID NO. Coord.	VALVE NUMBER	VALVE POSITION	VERIFY BY
HPI Pump 1-1 Suction Press Gauge	E-9	PI 1519A	In Service	
HPI Pump 1-1 Suction Press Gauge	E-9	PI 1519B	In Service	
HPI Pump 1-1 Suction Line Flush Conn	E-9	HP 14	Closed	
HPI Pump 1-1 Suction Strainer Delta P Source	E-9	HP 36	Closed	
HPI Pump 1-1 Suction	D-9	HP 12	Locked Open**	
Decay Heat System to HPI Xconn Vlv	E-9	DH 64	Closed	
HPI Flow Test Line Drain	C-7	HP 84	Closed	
HPI Flow Test Line Drain	*	HP 84A	Closed	

REVIEWED BY _____ Date _____
Shift Supervisor/Ass't Shift Supervisor

*Double Isolation Valve - see Note 8 on P&ID M-033.
**Controlled per AD 1839.02.

	HPI Pump 1-1	HPI Pump 1-2	HPI to RCS C1 1-2-1 Iso Vlv	HPI to RCS Cold Leg 1-2-2 Iso V	HPI to RCS CL 1-1-1 Iso Vlv	HPI to RCS CL 1-1-2 Iso Vlv	HPI Recirc to BWST
Equipment Identification Number	P58-1	P58-2	HP 2A	HP 2B	HP 2C	HP 2D	HP 1556
Control Switch (located on Panel C5716)	HIS-1524	HIS 1523	HIS-HP 2A	HIS-HP 2B	HIS-HP 2C	HIS HP 2D	HIS* 1556
Breaker Number	AC 111	AC 111	B F11 39	B F11 41	B E11 03	B E11 05	Air Sol- enoid
Breaker Location	4.16 KV Bus C1	4.16 KV Bus D1	MCC F11C	MCC F11C	MCC E11A	MCC E11A	
Local Control Switch	NP 0581	NP 0582	NV HP 02A	NV HP 02B	NV HP 02C	NV HP 02D	NV 01556
Flow Indication (Control Room)	FYI-HP3D+ FYI-HP3C	FYI-HP3B+ FYI-HP3A	FYI HP3A	FYI HP3B	FYI HP3C	FYI HP3D	Local FIHP4
SFAS Actuation Channel	1	2	2	1	1	2	None
SFAS Incident Level	2	2	2	2	2	2	None

*HIS 1556 has its air supply permanently removed to protect from an electrical fault closing the minimum recirculation path for both HPI pumps. Therefore, this valve may only be operated manually and should not be closed.

Attachment 1 (Page 1 of 3)

	HPI 1-1		HPI 1-2	
	AC OIL PMP	DC OIL PMP	AC OIL PMP	DC OIL PMP
Equip No.	P197-1	P197-2	P198-1	P198-2
Control Switch	Local Only NP 1971*	Local Only NP 1972*	Local Only NP 1981*	Local Only NP 1982*
Breaker No.	BE 1296	D106	BF 1231	D 206
Breaker Location	E12E	D1	F12A	D2
Flow Indication	PI >15 PSIG & Sight Glass	PI >15 PSIG & Sight Glass	PI >15 PSIG & Sight Glass	PI >15 PSIG & Sight Glass
SFAS Actuation Channel	*	*	*	*
SFAS Incident Level	*	*	*	*

*AC and DC pumps start when HPI Pump starts. DC shuts off after oil flow is established. If AC pump fails, DC pump would restart and alarm CPT Q472 (Q473). If the AC or DC Pump is started from the local switch, the pump will continue to run until stopped from the local switch since the switch is the rocker type and not the momentary contact type.

	HPI Pump 1-2 Minimum Recirc Iso*	HPI Pump 1-1 Minimum Recirc Iso*	
Equip No.	HP 31	HP 32	
Control Switch	HIS HP 31	HIS HP 32	
Breaker No.	BF 1194	BE 1286	
Breaker Location	F11E	E12E	
Flow Indication	FISHP4	FISHP4	
SFAS Actuation Channel	N/A	N/A	
SFAS Incident Level	N/A	N/A	

*NOTE: Motor operators added during first refueling outage.

HIGH PRESSURE INJECTION PUMP PRESTARTUP AND STANDBY CHECK-OFF LIST

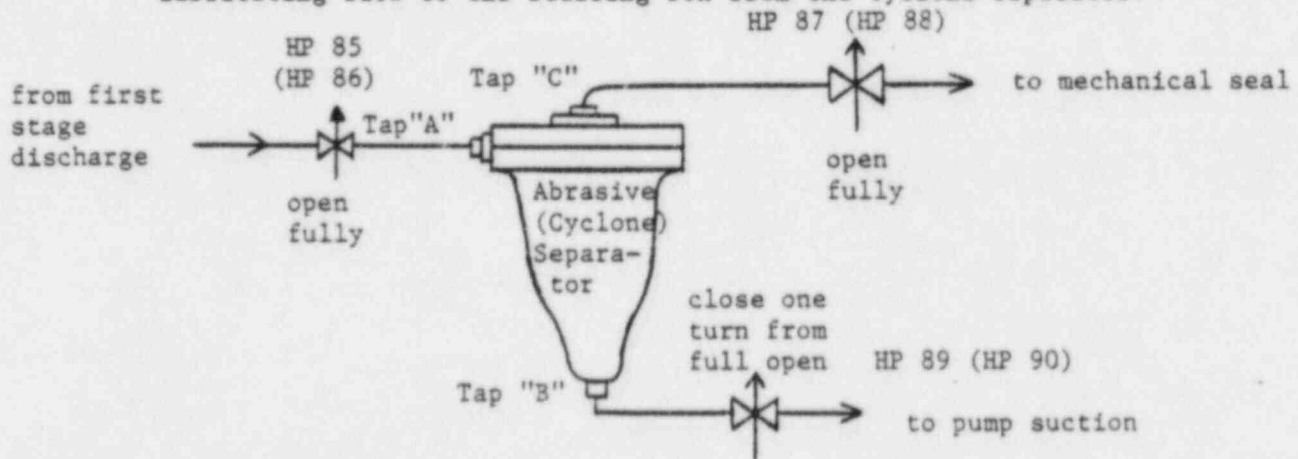
1. Verify proper oil level in the pump and motor sight indicators.

	<u>HPI Pump 1-1</u>	<u>HPI Pump 1-2</u>
Pump Inboard bearing oil reservoir	_____	_____
Motor Inboard bearing:	_____	_____
Motor Outboard bearing:	_____	_____

2. Verify Oil Circulation System is lined up and powered.

	<u>HPI Pump 1-1</u>	<u>HPI Pump 1-2</u>
All oil system valves open except sample/drain HP100 (HP200)	_____	_____
All oil pump breaker closed	(BE1296 on E12E)	(BF1231 on F12A)
DC oil pump breaker closed	(D106 on D1)	(D206 on D2)

3. Verify seal water piping is valved as follows to provide sealing and lubricating flow to the stuffing box from the cyclone separator.



<u>HPI Pump 1-1</u>	<u>HPI Pump 1-2</u>
_____	_____

- 10 | 4. Verify the Pump suction valves locked open:

<u>HPI Pump 1-1</u>	<u>HPI Pump 1-2</u>
HP 12 _____	HP 13 _____

5. Verify the pump discharge valves locked open:

<u>HPI Pump 1-1</u>	<u>HPI Pump 1-2</u>
HP 24 _____	HP 25 _____

- HPI Pump 1-2
HP 19

- HP 5A (AA) (Double Valve)
PI 1520 (>17 psig)

- HPI Pump 1-2
HP 31

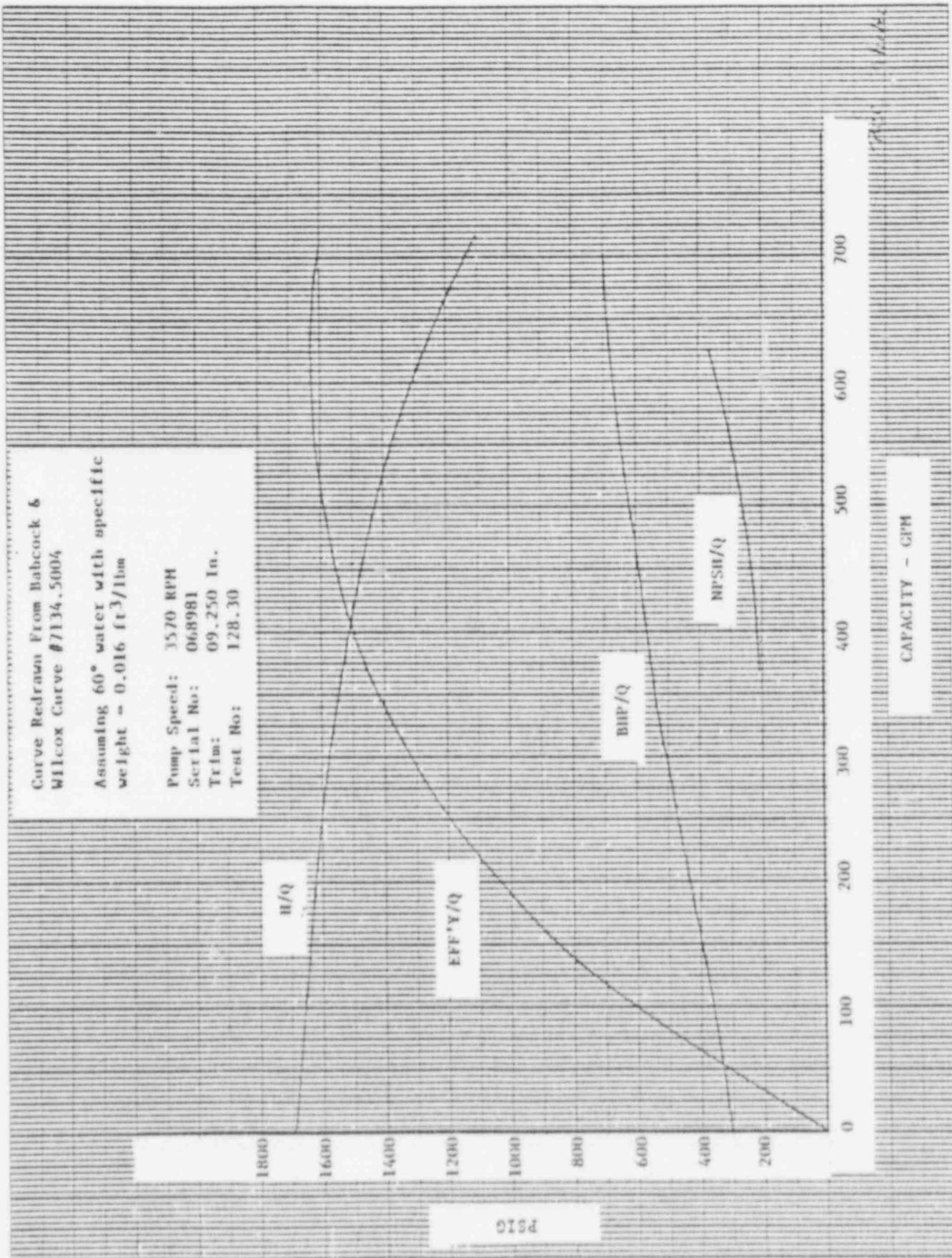
- HPI Pump 1-2
DH7A

- HP Pump 1-2
AD 111

- HPI Pump 1-2 CCW Supplied From
Essential Line 2

CC654 (L.O.)	CC652 (L.C.)
CC133 (L.O.)	CC134 (L.C.)
CC254 (L.O.)	
CC253 (L.O.)	
CC137 (L.O.)	CC138 (L.C.)
CC660 (L.O.)	CC662 (L.C.)

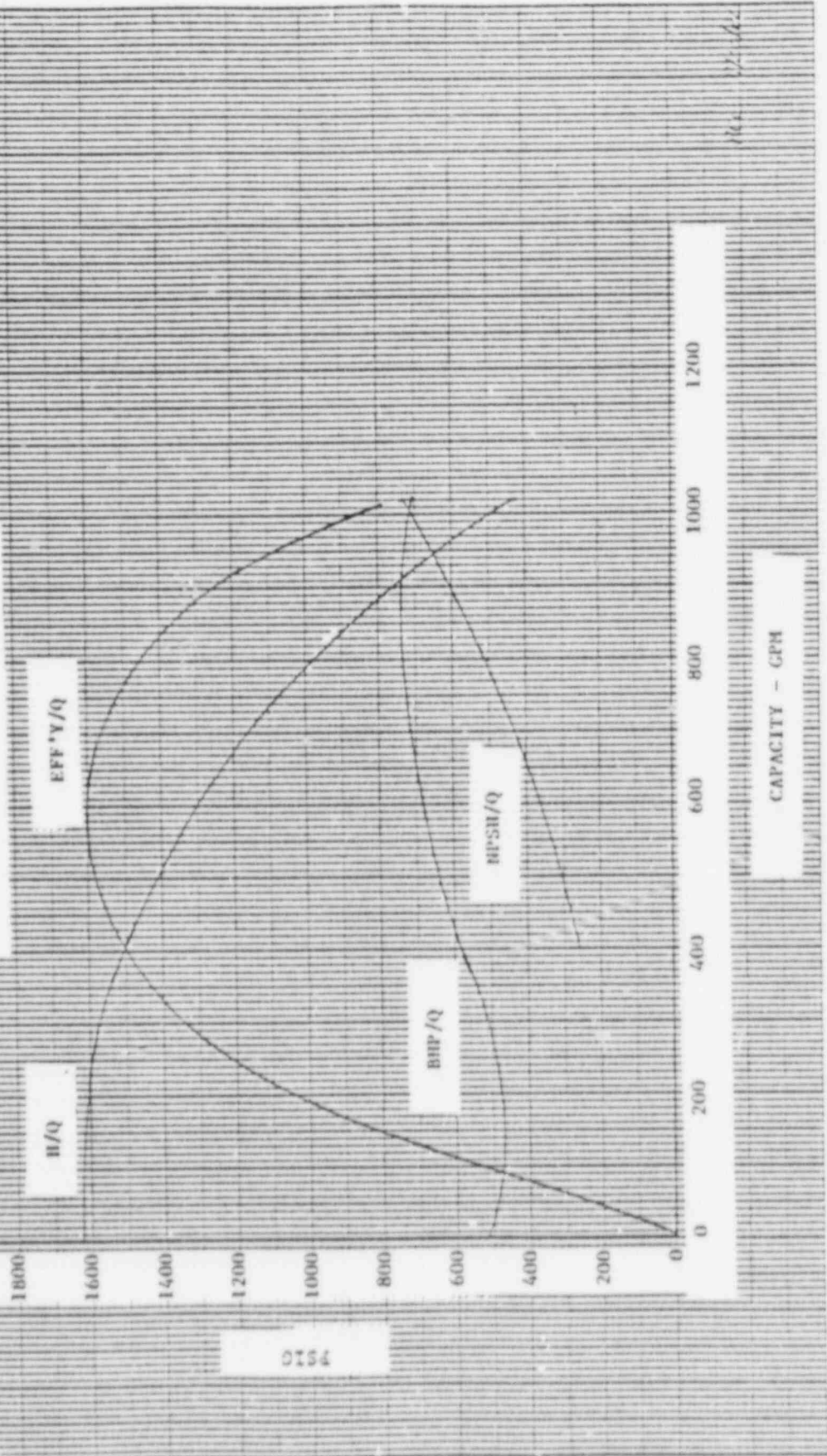
- Date _____

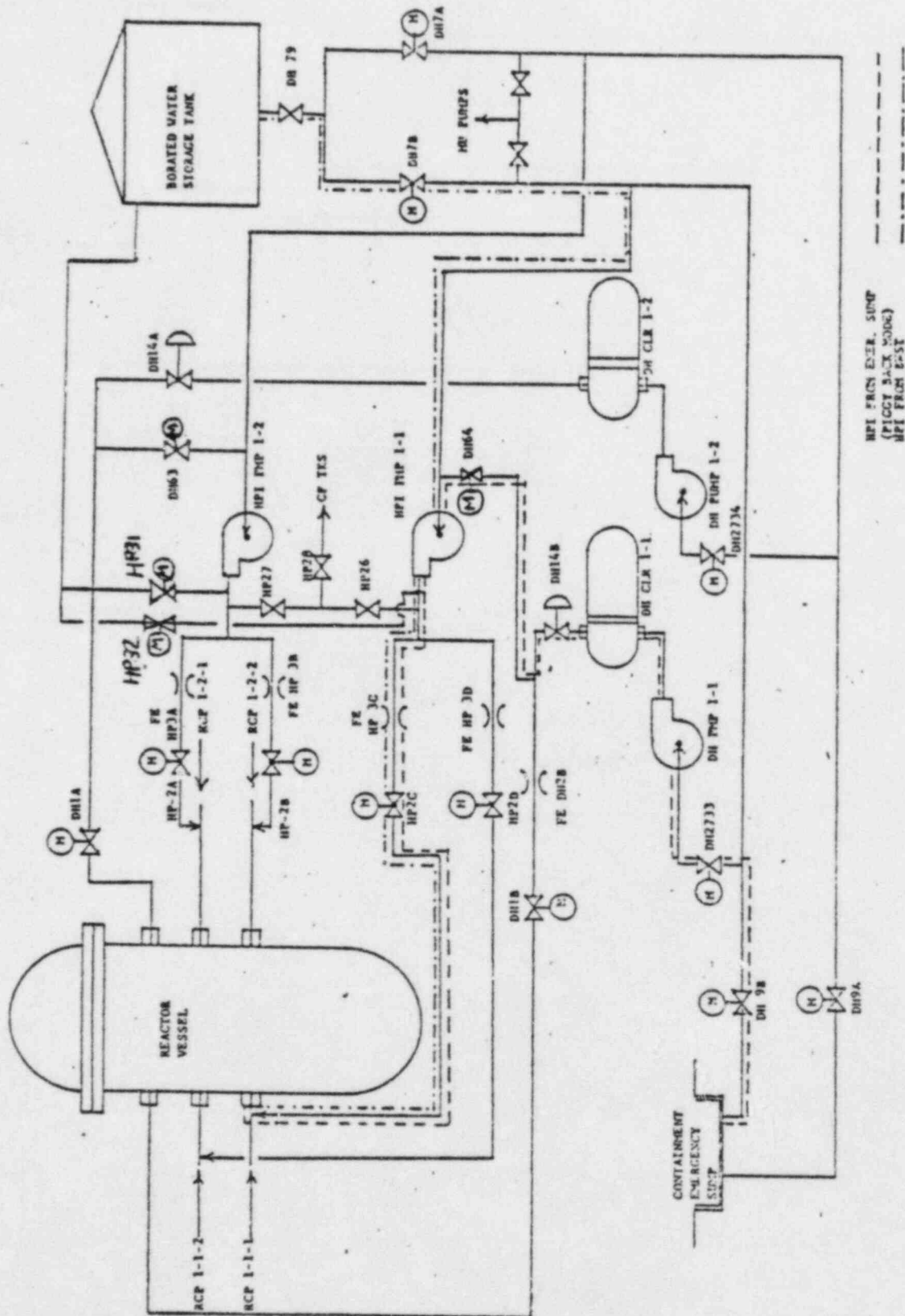


Curve Redrawn in Babcock and
Wilcox Curve #7134.5003

Assuming 60° water with specific
weight = 0.016 ft³/lbm

Pump Speed: 3570 RPM
Serial No: 068980
Trim: 09.250 In.
Test No: 132.02





HPI COMPUTER POINTS FOR HPI PUMPS

COMPUTER POINT	TITLE	TYPE	DESCRIPTION	ANN HORN	ANN WINDOW	ALARM TYPER	ALARM CRT
F460	HPI 1-1 Flow (GPM)	COMV	Computes flow rate in GPM from F461	X		X	X
F461	HPI 1-1 Flow (in ΔP)	A10	Analog Signal of Pressure Drop Across FTHP3C				
F462	HPI 1-1 Flow	SWS	High Flow In Line 1-1 Alarm Switch	X	X	X	
F463	HPI 1-1 Flow	SWS	Low Flow in Line 1-1 Alarm Switch	X	X	X	
F490	HPI 1-2 Flow (GPM)	COMV	Computes Flow Rate in GPM from F464	X		X	X
F464	HPI 1-2 Flow (in ΔP)	A10	Analog Signal of Pressure Drop Across FTHP3D				
F465	HPI 1-2 Flow	SWS	High Flow in Line 1-2 Alarm Switch	X	X	X	
F466	HPI 1-2 Flow	SWS	Low Flow in Line 1-2 Alarm Switch	X	X	X	
P465	HPI Vlv In Press	SWS	High Pressure in HPI Lines (>375 psig as read from PSH 2883A or PSH 2883B)			X	
Q474	HPI Pump 1	COMS	If SA signal and pump not on Alarm	X		X	X
Q478	HPI Pump Mtr Trbl	OPA	Tells one of the pump's motor has Trbl.	X		X	X
Q480	HPI 1-1 Vlv	COMS	Alarms when valve not closed and NO SA Signal	X		X	X
Q481	HPI 1-1 Valve	COMS	Alarms when valve closed and S.A. signal	X		X	X
Q482	HPI 1-2 Valve	COMS	Alarms when valve not closed and no SA signal	X		X	X
Q483	HPI 1-2 Vlv	COMS	Alarms when valve closed and SA signal	X		X	X
Q479	HPI Vlv Leaking	COMS	Alarms when high pressure exists on P465 and both HPI pumps off	X		X	X
T462	HPI Pmp 1 Mtr P/E OT.	TC2	Alarms if temp is not within normal oper limits	X		X	X
T463	HPI Pump 1 Mtr P/E Brg OT.	TC2	Alarms if temp is not within normal oper limits	X		X	X

Attachment 6 (Page 1 of 3)

HPI COMPUTER POINTS FOR HPI PUMPS

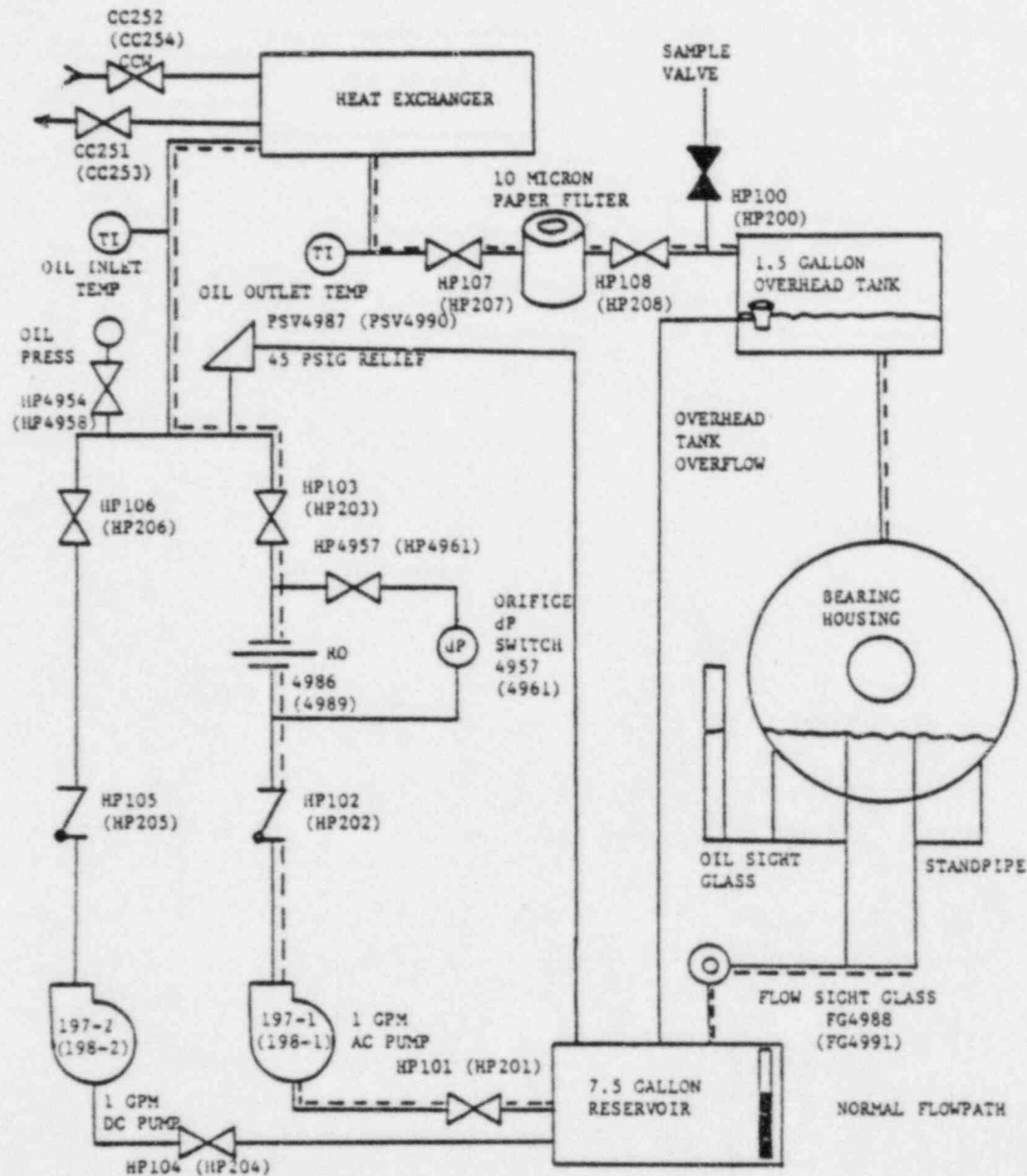
COMPUTER POINT	TITLE	TYPE	DESCRIPTION	ANN HORN	ANN WINDOW	ALARM TYPER	ALARM CRT
T464	HPI Pump 1 Mtr Stat Tp	RTD1	Alarms if temp is not within normal oper limits	X		X	X
T465	HPI Pmp 1 Thr Brg MT	TC2	Alarms if temp is not within normal oper limits	X		X	X
Z474	HPI Pmp 1	SWS	Switch Telling Motor Status			X	
Z480	HPI 1-1 Vlv	SWS	Switch Telling Valve Status			X	
Z482	HPI 1-2 Vlv	SWS	Switch Telling Valve Status			X	
Q472	HPI 1-1 DC Oil Pmp On	OPA	Alarms if DC Oil Pump is on	X		X	X
F488	HPI 2-1 Flow (GPM)	COMV	Computes flow rate in GPM from F467	X		X	X
F467	HPI 2-1 Flow (in ΔP)	A10	Analog Signal of Pressure Drop Across FTHP3A				
F468	HPI 2-1 Flow	SWS	High Flow in Line 2 Alarm Switch	X	X	X	
F469	HPI 2-1 Flow	SWS	Low Flow in Line 2-1 Alarm Switch	X	X	X	
F489	HPI 2-2 Flow (GPM)	COMV	Computes flow rate in GPM from F470	X		X	X
F470	HPI 2-2 Flow (in ΔP)	A10	Analog Signal of Pressure Drop Across FTHP3B				
F471	HPI 2-2 Flow	SWS	High Flow in Line 2-2 Alarm Switch	X	X	X	
F472	HPI 2-2 Flow	SWS	Low Flow in Line 2-2 Alarm Switch	X	X	X	
F473	HPI Pump Recirc Flow	COMS	Alarms if flow is <65 GPM	X		X	X
F474	HPI Pump Recirc Flow	SWS	Alarms if recirc flow is less than 65 gpm	X	X	X	
Q477	HPI Inj Pump 2	COMS	If SA signal, and pump not on, Alarm	X		X	X
Q484	HPI 2-1	COMS	Alarms when valve not closed and no SA signal	X		X	X

HPI COMPUTER POINTS FOR HPI PUMPS

COMPUTER POINT	TITLE	TYPE	DESCRIPTION	ANN HORN	ANN WINDOW	ALARM TYPER	ALARM CRT
Q485	HPI 2-1	COMS	Alarms when valve closed and SA signal	X		X	X
Q486	HPI 2-2	COMS	Alarms when valve not closed and no SA signal	X		X	X
Q487	HPI 2-2	COMS	Alarms when Valve closed and SA signal	X		X	X
T466	HPI Pmp 2 Mtr O/B Brg OT	TC2	Alarms if temp is not within normal oper limits	X		X	X
T467	HPI Pmp 2 Mtr P/E Brg OT	TC2	Alarms if temp is not within normal oper limits	X		X	X
T468	HPI Pmp 2 Mtr Stator Temp	RTD1	Alarms if temp is not within normal oper limits			X	X
T469	HPI Pmp 2 Thr Brg Temp	TC2	Alarms if temp is not within normal oper limits	X		X	X
Z477	HPI Pump 2	SWS	Switch Telling Motor Status			X	
Z484	HPI Valve 2-1	SWS	Switch Telling Valve Status			X	
Z486	HPI Valve 2-2	SWS	Switch Telling Valve Status			X	
Q473	HPI 1-2 DC Oil Pmp On	OPA	Alarms if DC Oil Pump on	X		X	X

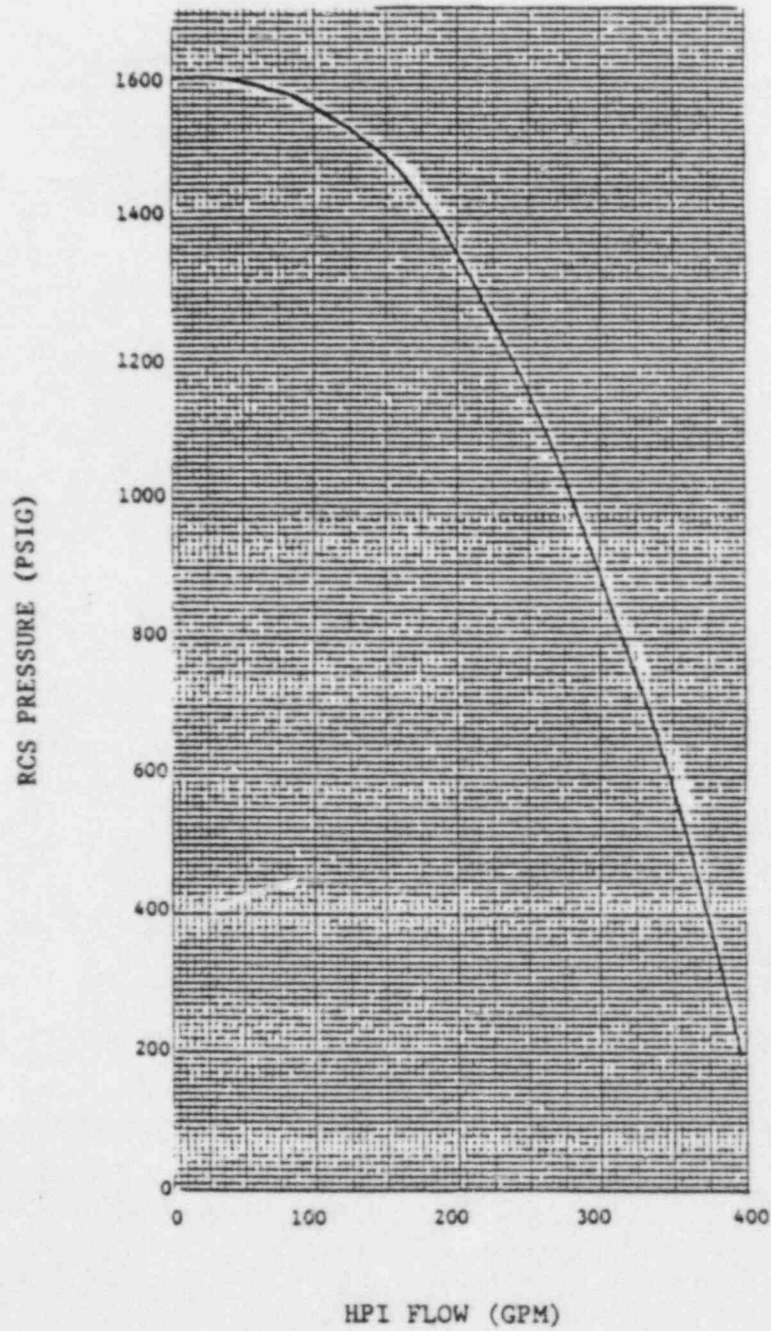
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AC & DC Pumps start when HPI Pump starts. DC shuts off when oil flow is established as read by the orifice dP switch on the AC Pump discharge. If AC Pump fails, DC Pump would restart and alarm CPT Q472 (Q473). For power supply information, see Attachment #1. For oil specifications, see Section 2.7.

MINIMUM REQUIRED HPI FLOW vs. RCS PRESSURE

ENDATTACHMENT 8
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