LICENSEE EVENT REPORT

CONTROL BLOCK: (1–6)

(PLEASE PRINT ALL REQUIRED INFORMATION)

	LICENSEE NAME	LICENSE NUMBER	LICENSE TYPE	EVENT TYPE
01	COFSVI	00-0000-00	4112	03
(7–8 / 9–14)		(15–25)	(26–30)	(31–32)

	CATEGORY	REPORT TYPE	REPORT SOURCE	DOCKET NUMBER	EVENT DATE	REPORT DATE
01 CON'T	P0	0	L	050-0267	020976	051376
(7–8)	(57–58)	(59)	(60)	(61–68)	(69–74)	(75–80)

EVENT DESCRIPTION

02 Equipment operator was returning a Loop 2 recirculator to service, opened discharge
03 valve. Loop 1 circulator buffer supply decreased. Reactor operator set circulator
04 brake and seal but circulator tripped. Reported as Supplement A to UE 75/03.
05
06 (UE 75/03A)

	SYSTEM CODE	CAUSE CODE	COMPONENT CODE	PRIME COMPONENT SUPPLIER	COMPONENT MANUFACTURER	VIOLATION
07	CB	B	VALVEX	Z	R340	N
(7–8 / 9–10)	(10–11)	(11)	(12–17)	(43)	(44–47)	(48)

CAUSE DESCRIPTION

08 Check valve on helium supply to one circulator caused abnormal operation which was
09 near unstable condition. Spring was removed from check valve.
10

	FACILITY STATUS	% POWER	OTHER STATUS	METHOD OF DISCOVERY	DISCOVERY DESCRIPTION
11	G	000	N/A	A	N/A
(7–8 / 9)	(10–12)	(13–44)	(45)	(46–80)	

	FORM OF ACTIVITY RELEASED	CONTENT OF RELEASE	AMOUNT OF ACTIVITY	LOCATION OF RELEASE
12	Z	Z	N/A	N/A
(7–8 / 9)	(10)	(11–44)	(45–80)	

PERSONNEL EXPOSURES

	NUMBER	TYPE	DESCRIPTION
13	000	Z	N/A
(7–8 / 9–11)	(12)	(13–80)	

PERSONNEL INJURIES

	NUMBER	DESCRIPTION
14	000	N/A
(7–8 / 9–11)	(12–80)	

OFFSITE CONSEQUENCES

15 N/A

LOSS OR DAMAGE TO FACILITY

	TYPE	DESCRIPTION
16	Z	N/A
(7–8 / 9)	(10–80)	

PUBLICITY

17 N/A

ADDITIONAL FACTORS

18

19

NAME: [signature] . PHONE: 571-7511, Ext. 1455

GPO 881-667

REPORT DATE: May 13, 1976

OCCURRENCE DATE: February 9, 1976

FORT ST. VRAIN NUCLEAR GENERATING STATION
PUBLIC SERVICE COMPANY OF COLORADO
P. O. BOX 361
PLATTEVILLE, COLORADO 80651

REPORT NO. 50-267/75/03A

SUPPLEMENT

IDENTIFICATION OF OCCURRENCE:

On February 9, 1976, while opening a valve on a Loop 2 buffer helium recirculator, Loop 1 circulator 1B tripped. This is being submitted as a supplemental report to Unusual Event Report No. 50-267/75/03, dated February 22, 1975.

CONDITIONS PRIOR TO OCCURRENCE:

	Steady State Power		Routine Shutdown
	Hot Shutdown		Routine Load Change
X	Cold Shutdown		Other (specify)
	Refueling Shutdown		
	Routine Startup		

The major plant parameters at the time of the event were as follows:

Power	RTR	0	MWth
	ELECT	0	MWe
Secondary Coolant	Pressure	1,387	psig
	Temperature	217	°F
	Flow	125,000	#/hr.
Primary Coolant	Pressure	102	psig
	Temperature	202	°F Core Inlet
		202	°F Core Outlet
	Flow	59,000	#/hr.

1A circulator was shutdown, 1B circulator was at 3,300 RPM, 1C circulator was self-turbining, and 1D circulator was self-turbining.

DESCRIPTION OF OCCURRENCE:

Loop 2 circulators 1C and 1D were self-turbining and Loop 1 circulator 1B was operating at 3,300 RPM when the operator was directed to return Loop 2 recirculator, C-2106, to service. The recirculator had been shutdown and isolated in an attempt to determine the source of a water leak. The operator opened V-21507 (reference PI-21-3, attached), then slowly "cracked" open V-21380. Opening V-21380 allowed helium from 1 1/2" L-21286 to flow into and pressurize C-2106 containment tank. The operator in the control room noted that circulator 1B buffer helium supply flow had decreased to one (1) ACFM and immediately reduced speed to self-turbining, initiated the signal to set circulator 1B brake and static seal, and via the plant communications system, told the operator to return C-2106 to its previous status. A time delay relay (28 seconds ± 2 seconds) prevents the seal from setting immediately following actuation of the brake in order to allow sufficient time for circulator speed to reach zero rpm. During the 28 seconds time delay, circulator 1B was tripped by the Plant Protection System due to a negative buffer-mid-buffer differential pressure.

APPARENT CAUSE OF OCCURRENCE:

X Design	____ Unusual Service Cond. Including Environ.
____ Manufacture	____ Component Failure
____ Installation/Const.	____ Other (specify)
____ Operator	____
____ Procedure	____

ANALYSIS OF OCCURRENCE:

Prior to February 9, 1976, circulator 1B buffer helium supply line (1" L-21122) had been altered by field change notice 2512A/2910, which installed a check valve upstream of HV-2189-3 (reference PI-21-8, attached). This check valve is part of a modification to facilitate opening the circulator mechanical shaft seal with the bearing water surge tank depressurized to less than primary loop pressure. Similar check valves were to be installed on the remaining three circulators, pending completion of tests to determine that the installation would facilitate opening of the mechanical shaft seal.

The check valve (Figure 1) was selected on the basis of availability at the plant site. Note that it is a spring loaded check valve.

ANALYSIS OF
OCCURRENCE (continued):

In order to overcome the flow resistance of the check valve, added to 1B circulator, the buffer helium supply pressure had to be increased. This increase in buffer header pressure was accomplished by raising the purified helium header pressure, which caused an increase in bearing water surge tank pressure equal to the increase in buffer header pressure.

The increase in surge tank pressure decreased the differential pressure between the circulator helium-water drain and the surge tank. This differential pressure maintains buffer helium return flow to the buffer recirculator suction which is at the same pressure as the bearing water surge tank.

In this occurrence, the operator was directed to return recirculator C-2106 to service. The operator opened V-21507, then slowly "cracked" open V-21380 (reference PI-21-3, attached). Opening V-21380 allowed helium from 1 1/2" L-21286 to flow into and pressurize T-2103. The helium flow into T-2103 reduced the pressure in 1 1/2" L-21106 and therefore in 2" L-21116, which is the buffer supply header to the circulators.

The effect of losing buffer helium supply flow to 1B circulator was to decrease the pressure in the buffer seal cavity. The pressure decrease reduced the buffer cavity to surge tank differential pressure, which is the driving force for buffer helium return flow. This was followed by a flow reversal from the helium water drain to the buffer supply. This flow reversal caused a negative buffer-mid-buffer pressure which was sensed by PDIS-21155, PDIS-21157, and PDIS-21159 (reference PI-21-8, attached). When this flow reversal reached a negative pressure differential of 9" water, the PDIS instrument outputs tripped after which the Plant Protective System tripped the circulator.

This pressure reduction could not be immediately restored by the purified helium header and as a result, the helium supply flow to 1B circulator was reduced. When the pressure decreased to the point that it could not overcome the check valve resistance, 1B circulator buffer helium supply flow decreased to zero.

CORRECTIVE
ACTION:

The spring in the check valve was removed, after it was determined that the valve would perform its function without the spring. As a result of removing the spring system operating pressures returned to near normal values. The check valve (without spring) is being added to the remaining circulator buffer helium supply lines.

CORRECTIVE
ACTION (continued):

Approved test, RT-377, was written to verify that, with the spring removed from the check valve and the check valve installed on all circulators, a depressurized recirculator could be returned to service without tripping an operating circulator. This test was performed, with conditions similar to the conditions that existed at the time of this event. The test was successfully completed on both loops without any circulator trips. No further corrective action is required.

FAILURE DATA/SIMILAR REPORTED OCCURRENCES:

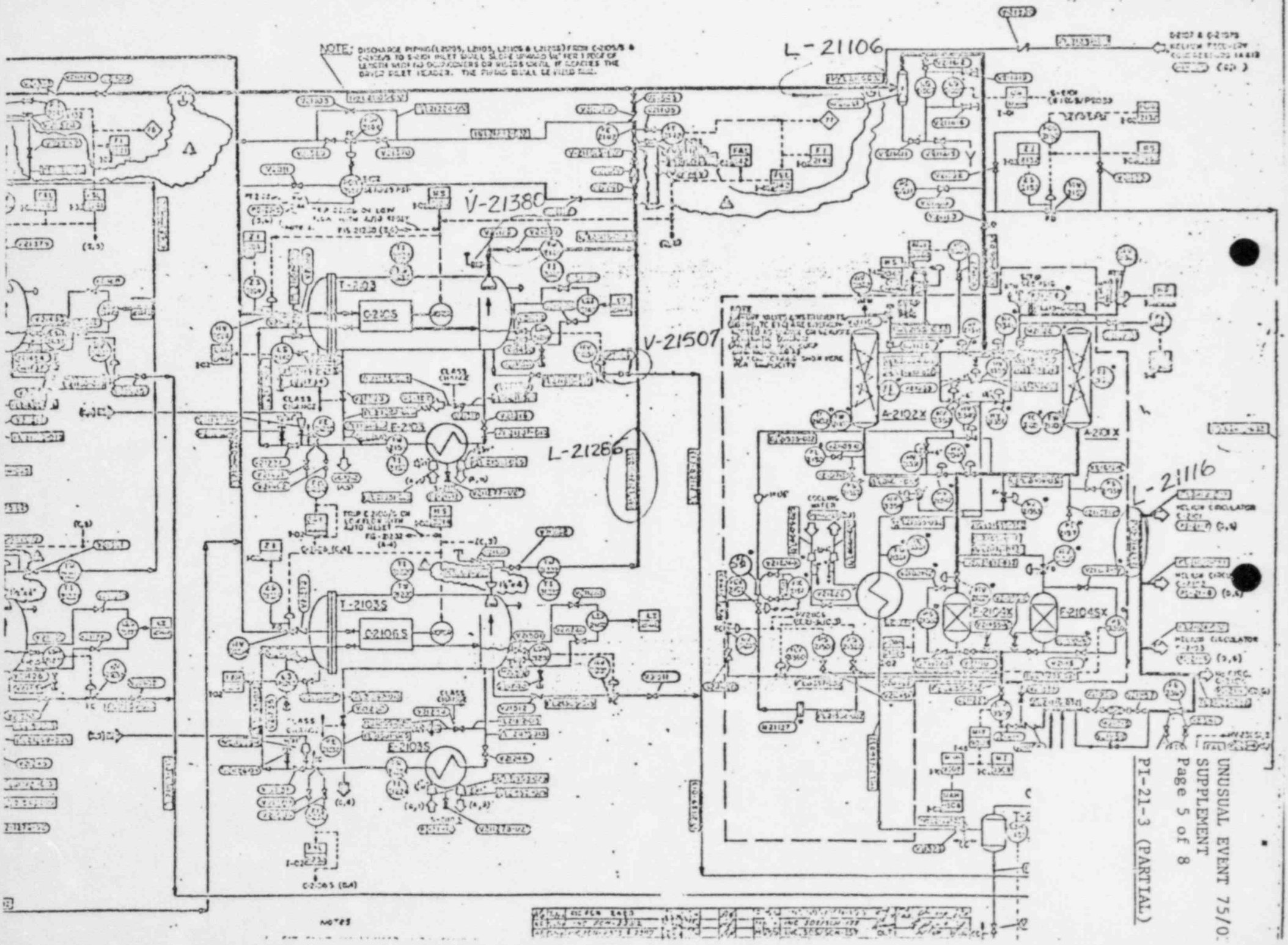
None

PROGRAMMATIC IMPACT:

None

CODE IMPACT:

None



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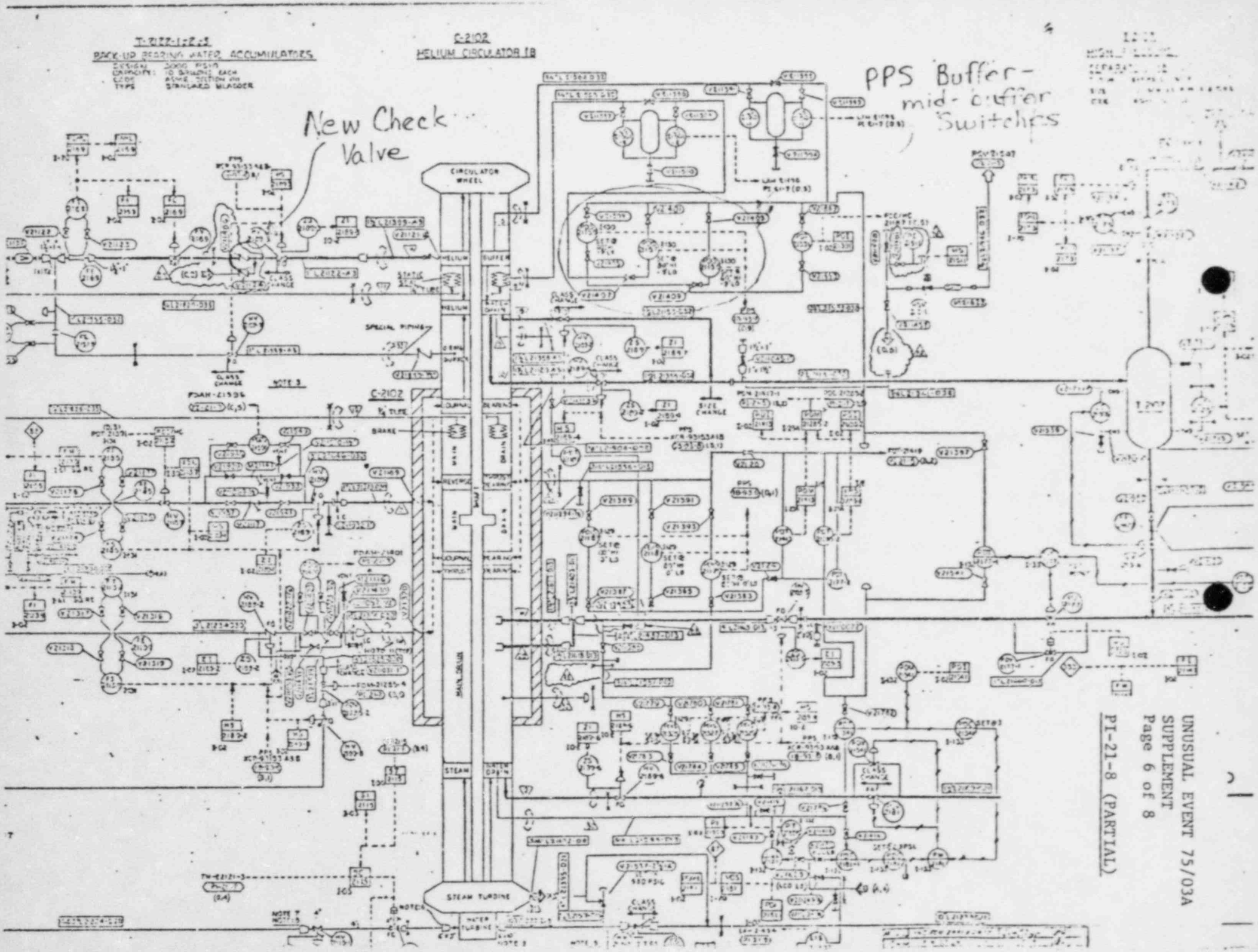
PI-21-3 (PARTIAL)



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PI-21-8 (PARTIAL)

FIGURE 1

ROCKWELL EDWARD FORGED STEEL CHECK VALVES

PISTON CHECK VALVES

HORIZONTAL OR VERTICAL

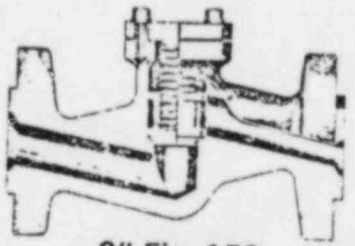
600 lb, 2000 psi CWP (Screwed or Socket Welding)

600 lb, 1440 psi CWP (Flanged)

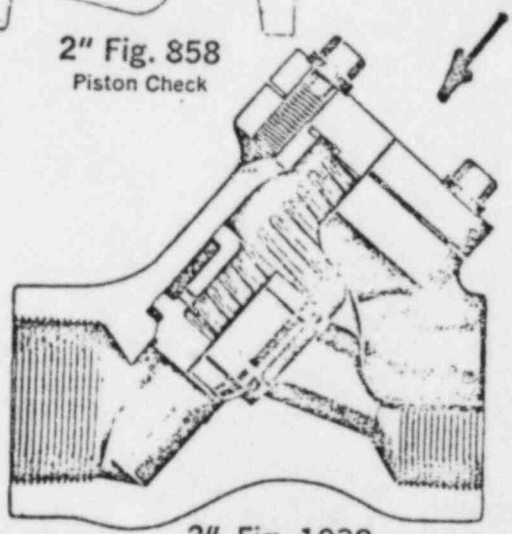
1500 lb, 3600 psi CWP

Bolted Bonnet, Screwed, Socket Welding or Flanged Ends.

STANDARD MATERIALS—Bodies and covers are of forged carbon steel or chromium-molybdenum F11 alloy steel. Piston disks for 1" size and smaller are of cobalt-chromium-tungsten stainless steel. Piston disks for 1¼" and larger are of F11 alloy steel hardfaced with projection welded Stellite. Spring is of stainless steel to insure fast piston-check action. See material specifications on pages 48 & 49.



2" Fig. 858
Piston Check



2" Fig. 1038
Piston Check

DESCRIPTION —

Sizes (Inches) ¼, ⅜, ½, ¾, 1, 1¼, 1½, 2

Pressure Class	Fig. No.	Type	Ends
600 lb.	838 838Y 858	Horizontal or Vertical Horizontal or Vertical Horizontal Only (Note ½" to 2" only)	Screwed Socket Welding Flanged
1500 lb.	1038 1038Y 1058	Horizontal or Vertical Horizontal or Vertical Horizontal Only (Note ½" to 2" only)	Screwed Socket Welding Flanged

RATINGS

Ratings below are for screwed and socket welding end valves only. For flanged end ratings, see page 17.

600 lb. Primary Service . . . 3000 psi Hydrostatic Shell Test Pressure

Maximum Non-Shock Service Pressure Ratings Psi													
Service Temp. Deg. F.	100	200	300	400	500	600	700	750	800	850	900	975	1038
Mat'l, Carbon Steel*	2000	1940	1895	1850	1735	1540	1305	1180	1015	800	600		
Mat'l, Grade F11	Same Ratings As Carbon Steel						1340	1250	1160	1065	970	810	600

1500 lb. Primary Service . . . 5400 psi Hydrostatic Shell Test Pressure

Maximum Non-Shock Service Pressure Ratings Psi													
Service Temp. Deg. F.	100	200	300	400	500	600	700	750	800	850	900	950	975
Mat'l, Carbon Steel*	3600	3510	3420	3330	3130	2770	2350	2130	1830	1500			
Mat'l, Grade F11	Same Ratings As Carbon Steel						2420	2255	2085	1920	1750	1585	1500

FIGURE NUMBERS	838—838Y								858					
DIMENSIONS SIZE (Inches)	¼	⅜	½	¾	1	1¼	1½	2	½	¾	1	1¼	1½	2
A—End to End	3.00	3.00	3.00	3.63	4.25	5.75	5.75	6.50						
C—Contact Face to Contact Face									6.50	7.50	8.50	9.50	9.50	11.50
E—Center to Top	2.75	2.75	2.75	3.25	3.75	4.56	4.56	5.13	2.25	2.69	3.13	4.19	4.19	4.69
Weight lbs.	2	2	2	3.5	5	11	10	14	6.5	11	13	21	26	29

FIGURE NUMBERS	1038—1038Y								1058					
DIMENSIONS SIZE (Inches)	¼	⅜	½	¾	1	1¼	1½	2	½	¾	1	1¼	1½	2
A—End to End	3.00	3.00	3.00	3.63	4.25	5.75	5.75	6.50						
C—Contact Face to Contact Face									8.50	9.00	10.00	12.00	12.00	14.50
E—Center to Top	2.75	2.75	2.75	3.25	3.75	4.56	4.56	5.13	2.69	3.13	3.13	4.19	4.19	4.69
Weight lbs.	2.5	2.5	2.5	3.5	5.5	11	11	15	14	17	24	32	41	69

*Upon prolonged exposure of welding end valves to temperatures above 800 F, the carbide phase of carbon steel may be converted to graphite — F11 material is recommended.

For Valve End Preparation see pages 50 & 51

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