

# LICENSEE EVENT REPORT

Event #2 Update

CONTROL BLOCK: 1 2 3 4 5 6

(PLEASE PRINT ALL REQUIRED INFORMATION)

LICENSEE NAME 01 C O F S V 1														LICENSE NUMBER 00-000000-000										LICENSE TYPE 41120					EVENT TYPE 01														
7	8	9	14	15	25	26	30	31	32	CATEGORY 01 CONT										REPORT TYPE T		REPORT SOURCE L		DOCKET NUMBER 050-0267										EVENT DATE 072676					REPORT DATE 071377				
7	8	9	57	58	59	60	61	68	69	74	75	80	7	8	9	57	58	59	60	61	68	69	74	75	80																		

## EVENT DESCRIPTION

02 Operator was removing recirculator from service improperly failed inlet valve and opened														80
03 drain valve. Tripped IC circulator and allowed primary coolant into reactor building.														80
04 Closed valve and building access restricted until below permissible levels.														80
05														80
06														80
(AO 76/24, #2)														80

SYSTEM CODE 07 C B		CAUSE CODE D		COMPONENT CODE X X X X X X X				PRIME COMPONENT SUPPLIER N		COMPONENT MANUFACTURER K 1 2 5				VIOLATION N									
7	8	9	10	11	12	13	17	43	44	47	48	7	8	9	10	11	12	13	17	43	44	47	48

## CAUSE DESCRIPTION

08 Operator did not follow established clearance procedure. Operator reprimanded and														80
09 procedure changed. Manual isolation valve added to inlet.														80
10														80

FACILITY STATUS 11 B		% POWER 011		OTHER STATUS N/A		METHOD OF DISCOVERY A		DISCOVERY DESCRIPTION N/A									
7	8	9	10	12	13	44	45	46	7	8	9	10	12	13	44	45	46
FORM OF ACTIVITY RELEASED 12 G		CONTENT OF RELEASE N		AMOUNT OF ACTIVITY Not Measured		LOCATION OF RELEASE Vent to Reactor Building											
7	8	9	10	11	44	45	7	8	9	10	11	44	45				

## PERSONNEL EXPOSURES

NUMBER 13 004		TYPE I		DESCRIPTION Not detectable by Whole Body Counts									
7	8	9	11	12	13	7	8	9	11	12	13		

## PERSONNEL INJURIES

NUMBER 14 000		DESCRIPTION N/A									
7	8	9	11	12	7	8	9	11	12		

## OFFSITE CONSEQUENCES

15 None														80
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## LOSS OR DAMAGE TO FACILITY

TYPE 16 Z		DESCRIPTION N/A									
7	8	9	10	7	8	9	10				

## PUBLICITY

17 N/A														80
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8311110097 770713  
PDR ADOCK 05000267  
S PDR

## ADDITIONAL FACTORS

18 Airborne activity in reactor building increased but value not measured. This updated														80
19 Event no. 2 of this report.														80

NAME: H. W. Hillyard, Jr.

PHONE: (303) 785-2253

REPORT DATE: July 13, 1977

ABNORMAL OCCURRENCE 76-24A

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OCCURRENCE DATE: July 26, 1976

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

REPORT NO. 50-267/76-24A

Final

IDENTIFICATION OF  
OCCURRENCE:

On July 26, 1976, two unexpected trips of circulator 1C occurred as follows:

- 1) Repressurizing shutdown buffer recirculator 1D, upset buffer helium control of the Loop 2 primary coolant circulators.
- 2) After placing clearance to remove 1D buffer recirculator from service, suction valve HV-21214 went wide open which again upset buffer helium control of primary coolant Loop 2 circulators.

In the case of the second trip, 1D recirculator drain valve was opened as a requirement of clearance. As a result, some primary coolant was released to the Reactor Building before an alarm was received and condition corrected. There was no unmonitored release of radioactivity outside the Reactor Building, nor any excessive exposure to personnel.

This has been determined to be reportable as an abnormal occurrence per the Fort St. Vrain Technical Specifications, Section 2.1, Part F.

CONDITIONS PRIOR  
TO OCCURRENCE:

Steady State Power

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

	(1)	(2)	
Reactor Power	98.2 (11.6%)	94.7 (11.2%)	MWth
Electric Power	0.0	0.0	MWe
Secondary Coolant Pressure	1,980	1,990	psig
Secondary Coolant Temperature	588	587	°F
Secondary Coolant Flow	733,300	698,900	#/hr.

CONDITIONS PRIOR  
TO OCCURRENCE (continued):

	(1)	(2)	
Primary Coolant Pressure	460	450	psia
Primary Coolant Core Inlet Temperature	350	347	°F
Primary Coolant Core Outlet Temperature	741	737	°F
Primary Coolant Flow	725,000	727,000	#/hr.
Circulator 1A	2,100	2,100	RPM
Circulator 1B	2,100	2,100	RPM
Circulator 1C	2,000	2,100	RPM
Circulator 1D	2,000	2,100	RPM

DESCRIPTION OF  
OCCURRENCE:

First Event

An equipment operator was directed to return C-2106S, one of two Loop 2 recirculators, to service, by performing the following valve operations (see attached PI 21-3):

<u>Valve Number</u>	<u>Function</u>	<u>Operator Action</u>
V-21250	Recirculator drain.	Close
V-21254	Recirculator drain.	Close
V-21246	Water to heat exchanger.	Open
V-21511	Drain to surge tank.	Open
V-21231	Water from heat exchanger.	1/2 Turn Open
HV-21214	Helium inlet valve.	Removed Tag

The equipment operator then slowly opened V-21382, the recirculator discharge valve. This action caused high buffer-mid-buffer differential pressure on 1C circulator, which resulted in a circulator trip.

Second Event

Plant conditions had been returned to normal following the previous circulator trip. The equipment operator was directed to isolate recirculator 1D as described by a clearance procedure, by performing the following valve operations (see attached PI-21-3):

DESCRIPTION OF  
OCCURRENCE (continued):

<u>Valve Number</u>	<u>Function</u>	<u>Operator Action</u>
V-21382	Recirculator discharge.	Closed
V-21511	Drain to surge tank.	Closed
V-21246	Seal water discharge.	Closed
V-21231	Seal water inlet.	Closed
V-21254	Drain valve.	1/2 Turn Open
V-21250	Drain valve.	1/2 Turn Open

The equipment operator then isolated and removed the control air from suction valve HV-21214 and proceeded to other duties. Approximately two hours later he returned to the recirculator and helium was still venting from the drain line. He fully opened the drain valve which caused high buffer-mid-buffer differential pressure and circulator 1C trip. He then closed the valve and returned to the control room. The reactor operator notified him that the recirculator suction valve was open. The equipment operator then returned to the recirculator, restored air to the inlet valve, and closed the other drain valve. He was then told to leave the Reactor Building because airborne radiation levels were high.

APPARENT CAUSE  
OF OCCURRENCE:

First Event - Design

Second Event - Operator

ANALYSIS OF  
OCCURRENCE:

First Event

The recirculator (C-2106S) had been isolated and depressurized. When being returned to service the operator properly positioned all of the appropriate valves. He then started to pressurize the recirculator containment tank, T-2103S, by slowly opening V-21382. When V-21382 was opened slightly, the helium flow increased rapidly, slightly depressurizing the high pressure separator of 1C circulator. The helium supply pressure remained constant. The pressure decrease increased the buffer-mid-buffer differential pressure to more than +90" water (see #1 on attached curves). This high differential pressure persisted for more than three seconds, which caused the circulator trip. The buffer-mid-buffer pressure differential increased on circulator 1D, but did not reach the trip point.

ANALYSIS OF  
OCCURRENCE (continued):

Second Event

The recirculator containment tank pressures are normally between 10 and 15 psi above reactor pressure and are at 25 psi above the bearing water surge tank pressure (reference attached Figure 1). The equipment operator did not fully understand or follow the clearance procedure. When the operator removed the air from the inlet valve, it allowed the valve to open. Opening the recirculator containment tank drain valve allowed the water to drain and began venting the tank. The open suction valve, and fully opening the drain valve resulted in a high buffer helium flow rate from the buffer return piping, reducing buffer helium return pressures, the Loop 2 bearing water surge tank pressure, and increasing the circulator 1C buffer-mid-buffer differential pressure to more than +90" water. When this persisted for more than three seconds, the circulator tripped (see attached curves for 1C and 1D circulators). Circulator 1D also had high buffer-mid-buffer differential pressure but the trip of 1C circulator occurred first, which inhibited the trip of circulator 1D, a design feature of the Plant Protective System.

The lowered pressure in the buffer return line of the Loop 2 circulators was of sufficient magnitude to reduce buffer supply pressure below primary coolant pressure, allowing primary coolant to flow down both Loop 2 circulator shafts, into the bearing water and also out of the open containment tank drain valve. The radioactivity in the bearing water reached the low pressure separator and caused a high radioactivity trip of RIS-21251, which monitors the low pressure separator drain. A Health Physics technician reported the portable airborne activity monitors went off scale high at approximately the time circulator 1C tripped. Analysis of primary coolant showed an activity of  $2.3 \times 10^{-3}$   $\mu\text{Ci/cc}$ . This activity was primarily due to the presence of Kr and Xe. Reactor Building access was restricted until levels returned to normal. The Reactor Building exhaust fans operated normally and discharged to the plant stack throughout this incident. None of the four exhaust stack monitors showed any increase in radioactivity.

CORRECTIVE  
ACTION:

First Event

A small bypass valve, to allow slow pressurizing of the tank, has been added to each tank. A pressure gauge has been added to each containment tank. No other corrective action is anticipated or required.

Second Event

All personnel that were in the Reactor Building during the occurrence were given whole body counts at the Colorado Department of Health. No measurable increase in radioactive body burdens was indicated. The operator has been admonished for failure to follow the clearance procedure. The recirculator clearance has also been revised and should prevent future misunderstandings.

CORRECTIVE  
ACTION (continued):

A manual isolation valve, at the suction of each recirculator, has been added.

No other corrective action is anticipated or required.

FAILURE DATA/  
SIMILAR REPORTED OCCURRENCES:

First Event

Unusual Event Report No. 50-267/75-03A reported a similar occurrence.

Second Event

None

PROGRAMMATIC IMPACT:

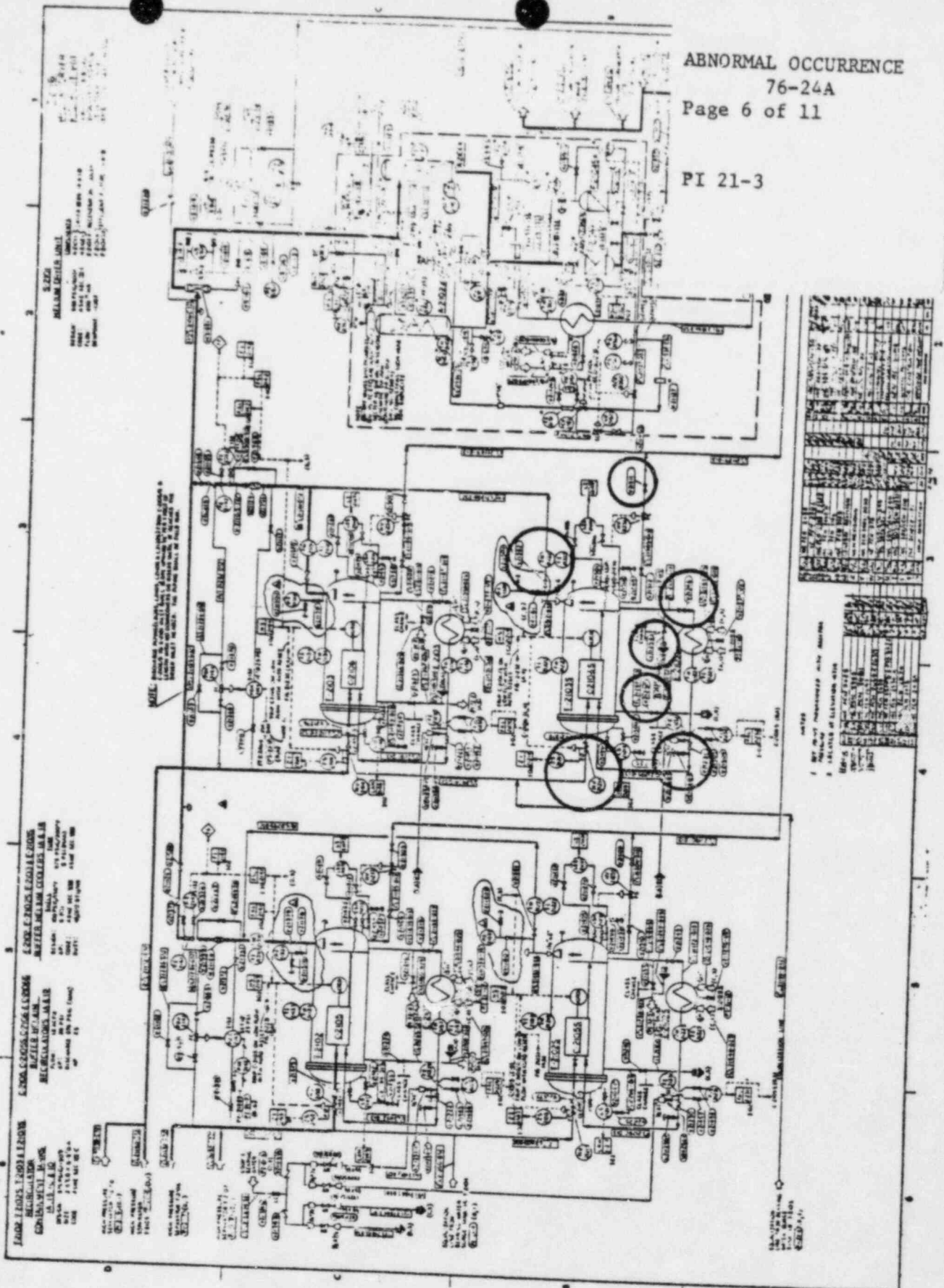
None

CODE IMPACT:

None



PI 21-3



01:40  
7/26/76

00:26  
7/26/76

-14  
Butt-HIO Butt

He Butts  
supply

He RETURN CIRC TRAP

NORMAL BRG  
WATER supply

12000  
RPM  
CIRC IC speed

CIRCULATOR IC PARAMETERS @ 7/26/76, 0026

CIRCULATOR IC		DATE	07-26-76
TEST PART		TIME	01:40
CHART SPEED 1MM/MIN		RANGE	
ALL CHAN 10 MV/MM S		100-500 MV	
CHANNEL & SIGNAL		ENG. UNITS	
1	BUFF MID BUFF AD	10 → 90	"H2O
2	BUFF HE SUP FLOW	0 → 10	ACFM
3	BUFF HE RET FLOW	0 → 6	ACFM
4	HP SEPARATOR LEV	0 → 70	"H2O
5	BRG H2O SUP FLOW	0 → 200	GPM
6	CIRCULATOR SPEED	0 → 2000	RPM

EVENT 1

ABNORMAL OCCURRENCE  
76/24A  
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INSTRUMENT NUMBERS



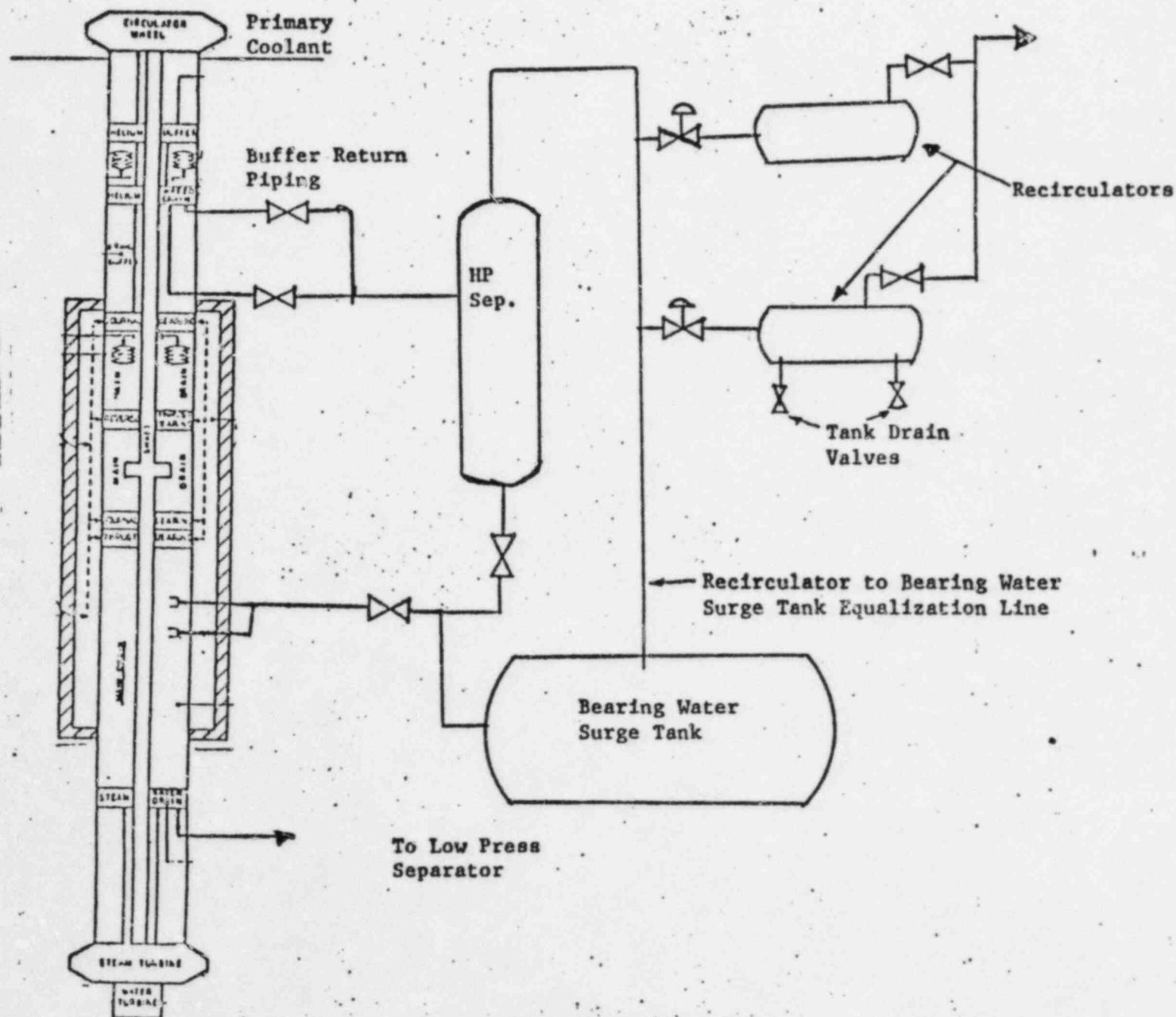


FIGURE 1

EVENT #2

05:02

12000

RPM

CIRC SPEED

0

210

GPM

NORMAL BRD

Water Flow

70"

INCHES

H.P. SEP LEAD

CIRC 1C

41:50

7/17/76

Goold Inc., Instrument Systems Division

Printed in U.S.A.

Cleveland Ohio

BRUSH ACCUCHART

ACFM

He Retain

Flow

10

ACFM

He Builer

Supply

+90

INCLD

MID Duct

-10

Butt

CIRCULATOR 1C  
PARAMETERS

CIRCULATOR 1C TRIP

ABNORMAL OCCURRENCE

76/24A

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EVENT NO. 2

12000  
RPM  
CIRC SPED  
0  
GPM  
NORM AT 13ND  
WATER FLOW

05:10  
7/26/76

78°  
SEP LEV  
H.P.

FIRE 1D

INC. INSTRUMENT SYSTEMS DIVISION  
Printed in USA  
Id Ohio

HE RETURN  
Flow

ACFM  
He supply  
Flow

CIRCULATOR 1D  
PARAMETERS

498  
-10  
Butt - MID/BWH

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