MASTER

DUQUESNE LIGHT COMPANY

SHIPPINGPORT ATOMIC POWER STATION

TEST RESULTS

DLCS 2110132

PERIODIC REACTOR PLANT LEAK RATE TEST

CORE I SEED 2

Section 1 of 1 Section

First Issue, January 20, 1961

DISCLAIMER

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Purpose

To determine the magnitude and location of the Reactor Coolant System leakage.

Conclusion

The data obtained from the collection vessel measurements on April 30, 1960, indicate a combined pressurizer and reactor relief valve leakage of 2.84 gal/hr for the six valves tested.

The Reactor Coolant System was checked for leakage on May 10, 1960, and was found to have a total leak rate of 5.65 gal/hr of which, 1.17 gal/hr was "accounted for."

Description of Test Equipment and Test Procedure

With the Reactor Plant operating at a temperature and pressure of 500 F and 1785 ± 20 psig, respectively and the reactor at power, data for all Plant parameters which are indicative of Reactor Coolant System leakage were taken over a 6 1/2 hour period. These parameters were pressurizer level, flash tank level, blowoff tank level, valve operating water flask level, charging pump integrator, sample train flow, and all associated temperatures as well as the average coolant temperature.

The "total" Plant leakage was indicated by the pressurizer level change since no make up was added during the test. The "accounted for" leakage was indicated by the flash tank level change and the blowoff tank level change since the sample trains were isolated during the test. The changes in these levels were corrected for temperature variation and used to calculate the leakage; both "total" and "accounted for."

The relief valves from the pressurizer and reactor were checked for leakage individually by allowing the leakage flow from only one relief valve to flow into the collection vessel (See figure 1) for a definite period of time or until the level in the collection vessel approached the upper limit on the guage glass. Other relief valves associated with the Reactor Plant, but not connected to the collection vessel, were checked for leakage by measuring temperatures on both sides of the valve with a hand pyrometer. Any leakage was indicated by high temperatures on the outlet nipple and associated piping.

Results

DLCS 2110132, Periodic Reactor Plant Leak Rate Test, was performed from April 29, 1960, through May 10, 1960. The results of the pressurizer and reactor relief valve leakage check is shown in Table I. Figure 1 shows the relief valve piping arrangement along with the collection vessel. A one inch increase in the collection vessel level is equivalent to 0.246 gallons.

Relief valve and pipe temperatures are presented in Table II. Due to a similarity in the nomenclature of the valves the data was incorrectly obtained for pressurizer relief valve (06-H15-1) instead of pressurizer pilot relief valve (06-H18-1).

The Reactor Coolant System leakage is tabulated in Table III and the corresponding data is listed in Table IV. Leak rates were calculated as outlined in the approved procedure.

The 1A, 1B, 1C and 1D loop hydraulic and motor-operated stop valves were in the open position. The 1A, 1B, 1C and 1D loop by-pass and loop drain valves were in the closed position. The reactor and pressurizer relief valves transfer control switches were in the "A" and "B" positions, respectively.

The combined pressurizer and reactor relief valve leakage was 2.84 gal/hr with the highest leakage, 1.08 gal/hr, through pressurizer relief valve 06-H15-10. An examination of the temperatures obtained in checking the 1A, 1B, 1C and 1D loop relief valves and the 1AC and 1BD purification loop relief valves indicated that none of these valves were leaking.

The total Reactor Coolant System leakage detected was 5.65 gal/hr of which 1.17 gal/hr was "accounted for." However, this figure was questionable since the pressurizer and reactor relief valves were observed to be leaking, yet no increase in the blowoff tank level was detected. This was possible since a leak rate of 1.18 gal/hr for the three relief valves (06-H15-10), (06-H15-2) and (06-H15-3) in operation at that time over the 6 1/2 hour period of the test represented approximately 0.1 inch change in the blowoff tank level. Accuracy of 0.1 of an inch is not feasible when reading the sight glass on the flash or blowoff tanks.

The leak rate test was terminated after 6 1/2 hours in order to perform DLCS 35401, Determination of Radionuclide Base Levels.

FIGURE 1

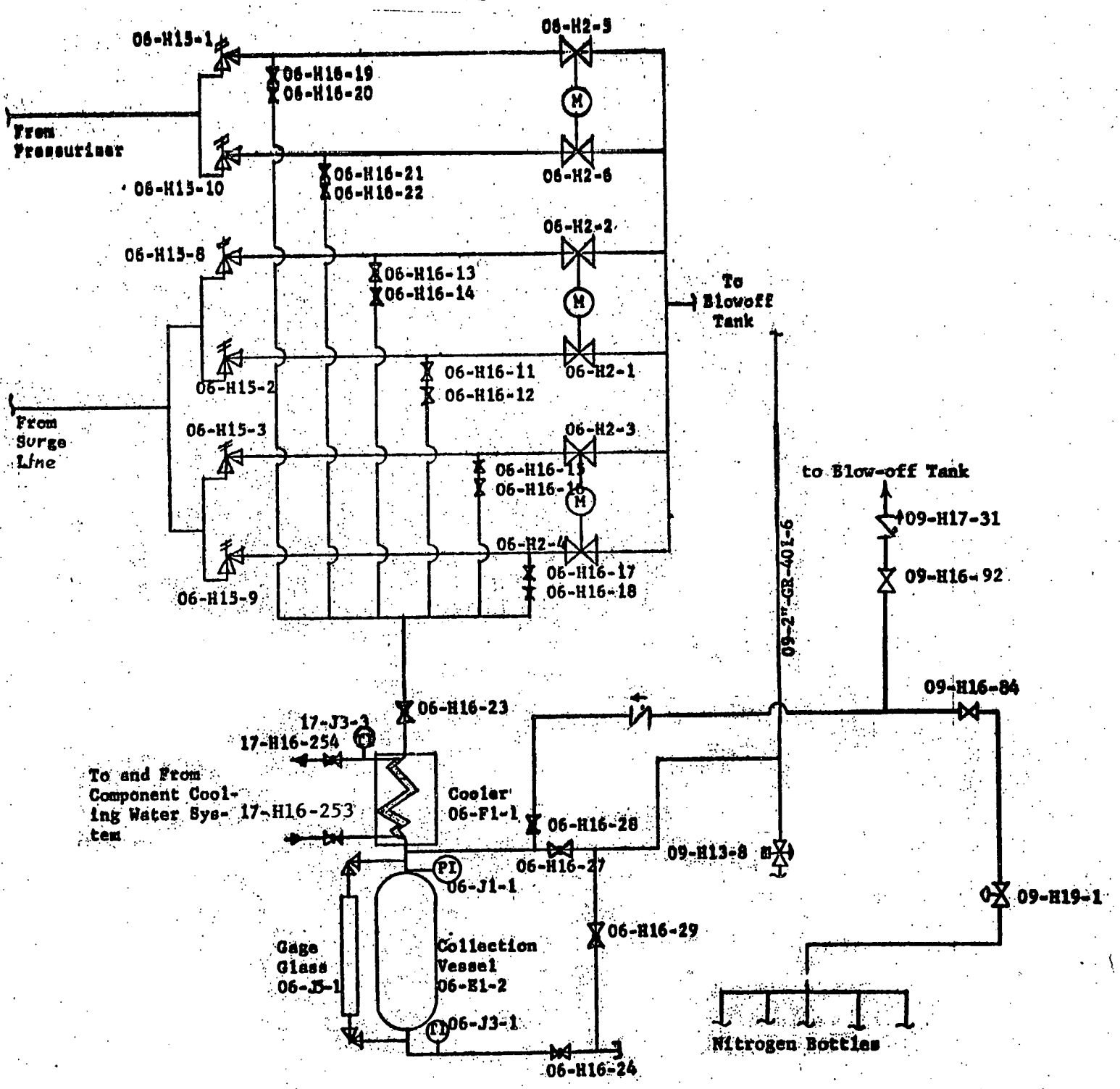
06-H15-1
06-H2-5
06-H16-19
06-H16-20
From Pressurizer
06-H15-10
06-H16-21
06-H16-22
06-H2-6
06-H2-2
06-H15-8
06-H16-13
06-H16-14
To Blowoff Tank
06-H15-2
06-H16-11
06-H16-12
06-H2-1
From Surge Line
06-H15-3
06-H2-3
06-H16-15
06-H16-16
to Blow-off Tank
09-H17-31
06-H2-4
09-H16-92
06-H16-17
06-H16-18
06-H15-9
09-27-GR-401-6
09-H16-84
06-H16-23
17-J3-3
17-H16-254
To and From Component Cooling Water System
17-H16-253
Cooler 06-F1-1
06-H16-28
09-H13-8
06-H16-27
PI
06-J1-1
09-H19-1
06-H16-29
Gage Glass 06-J5-1
Collection Vessel 06-E1-2
LI
06-J3-1
Nitrogen Bottles
06-H16-24

TABLE I

RELIEF VALVE LEAK RATES

Date 4-29-60			
Valve Name and Number	Time	Leak Rate gal/hr	Change in Collection Vessel (in.)
Pressurizer Relief Valve (06-H15-1)	1515-1615	4.67	19
	1815-1915	5.60	22 3/4
	2150-2250	2.09	8 1/2
Pressurizer Relief Valve (06-H15-10)	1930-2030	.95	3 7/8

Date 4-30-60		
Valve Name and Number	Leak Rate gal/hr	Change Collection Vessel Level (in.)
Pressurizer Relief Valve (06-H15-1)	0.57	2 5/16
Pressurizer Relief Valve (06-H15-10)	1.08	4 3/8
Reactor Relief Valve (06-H15-2)	0.015	1/16
Reactor Relief Valve (06-H15-3)	0.092	3/8
Reactor Relief Valve (06-H15-8)	0.92	3 3/4
Reactor Relief Valve (06-H15-9)	0.17	11/16

TABLE II

RELIEF VALVE TEMPERATURES

5-9-60

Valve Name and Number	Valve Inlet Nipple	Valve Outlet Nipple	Distance Down-Stream 1 ft.	2 ft.
1A Loop Relief 06-H15-4	89	88	86	84
1B Loop Relief 06-H15-5	104	97	94	94
1C Loop Relief 06-H15-6	82	82	82	82
1D Loop Relief 06-H15-7	95	90	90	90
Pressurizer Pilot Relief 06-H18-1	Omitted from Test			
1AC Purification Loop Relief 07-H15-1	84	83	83	82
1BD Purification Loop Relief 07-H15-2	104	100	96	95

TABLE III

LEAK RATE RESULTS

5-10-60

Total Leakage	LB/HR	47.1
Total Leakage	GAL/HR	5.65
Leakage Accounted For	LB/HR	9.78
Leakage Accounted For	GAL/HR	1.17
Leakage Unaccounted For	LB/HR	3.73
Leakage Unaccounted For	GAL/HR	4.48
Coolant System Make-up	LB/HR	0
Pressurizer Level Change	LB/HR	42.4
Blow-off Tank Level Change	LB/HR	0
Flash Tank Level Change	LB/HR	9.78
Change in Volume Due to Tavg.	LB/HR	4.67

TABLE IV

LEAK RATE TEST DATA

5-10-60

Time		0230	0300	0400	0900
Valve Position Control Switch					
No. 1 Reactor Relief Valves Transfer		A	A	A	A
No. 2 Reactor Relief Valves Transfer		A	A	A	A
Pressurizer Relief Valves Transfer		B	B	B	B
Tavg. (MCC-RS)	°F	499.9	500.2	500.0	500.1
Blow-off Tank Temp.	°F	93	93	94	95
Blow-off Tank Level	in.	67.5	67.5	67.5	67.5
Flash Tank Temp.	°F	98	98	98	93
Flash Tank Level	in.	30.25	30.25	30.25	30.375
1A Radioactive Waste Disposal Surge and Decay Tanks	%		8.0	8.0	8.0
1B Radioactive Waste Disposal Surge and Decay Tanks	%		10.5	10.5	10.5
1C Radioactive Waste Disposal Surge and Decay Tanks	%		74.0	74.0	77.0
1D Radioactive Waste Disposal Surge and Decay Tanks	%		0	0	0
Pressurizer Level (MCC-RS)	in.	95.0	95.0	95.0	88.5
Pressurizer Level (Narrow Range)	in.	93.8	93.7	93.5	88.5
Pressurizer Temp.	°F	622.3	622.3	622.3	623.5
VOS Flask Level	in.	261	261	261	261
Reactor Plant Container Gravity Drain Tank Level	in.		40.7	40.7	40.7
Charging Pump Integrator	lb/hr	OOS	OOS	OOS	OOS

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Results Prepared By *Jay F Wanamaker RLL* Date *8-1-60*

Results Reviewed By *Roger J Lawrence* Date *8-1-60*

Approved (Duquesne Light Company) *George A Santel* Date *1-20-61*

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