MASTER

DUQUESNE LIGHT COMPANY
SHIPPINGPORT ATOMIC POWER STATION

TEST RESULTS

DLCS 1840402
T-612076

PERIODIC RADIATION SURVEY OF REACTOR PLANT
CONTAINER AND COMPONENTS AFTER SHUTDOWN
"F" Survey

CORE I SEED 1

Section 4 of 6 Sections

First Issue, October 17, 1960

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TEST RESULTS.

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Core I Seed 1

Purpose

To obtain readings of the radiation levels on the inside of the hemispherical heads of the 1-B heat exchanger.

Conclusions

The radiation level at the handholes in the hemispherical heads of the 1-B heat exchanger were from 700 mr/hr to 100 mr/hr at the inlet and 325 mr/hr to 350 mr/hr at the outlet when the handhole covers were removed. Prior to replacing handhole covers approximately 640 hours later, the radiation levels were from 2100 mr/hr to 2500 mr/hr at the inlet and 700 mr/hr to 800 mr/hr at the outlet of the 1-B heat exchanger. The only logical reason that can be given to explain the apparent increase in levels between the initial and final surveys is the fact that the survey points were probably not identical.

Description of Test Equipment and Test Procedure

The 1B reactor coolant loop was drained to permit a probolog of the heat exchanger tubes to be made; this offered an opportunity to obtain the radiation levels specified in DLCS 18404. Measurements were obtained inside the inlet and outlet ends of the heat exchanger. A Jordan "Radector" was used to obtain the radiation level measurements by extending the probe approximately three inches directly into the handholes immediately after they were removed. The subsequent radiation measurements were made as described below.

The outside readings were obtained by placing the end of the probe against the outside of the shell along the edge of each handhole every 90 degrees around its periphery. The inside readings were obtained by placing the probe through each handhole and then placing the side of the probe parallel to the central axis of the handhole and adjacent to the inside of the shell every 90 degrees so that these readings were directly below the points where the outside readings were taken.

Results

DLCS 1840402 (T-612076), Periodic Radiation Survey of Reactor Plant Container and Components After Shutdown, "F" Survey, was performed October 20, 1959 and February

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16, 1960. The reactor was shutdown at 0730 on October 7, 1959 after a total of 5806.1 effective full power hours (EFPH). The power history by the hour for the 24 hour period before the reactor shutdown is tabulated in Table III.

The total operational time (service time) for the 1B heat exchanger was 11,804 hours. The tube side of the 1B heat exchanger was drained at 2000 hours on October 19, 1959. The 1B reactor coolant loop was then flushed and drained again at 2230 hours on October 19, 1959. The steam side of the 1B heat exchanger was empty and was under a pressure of approximately 75 psig of air. The radiation levels inside and outside the inlet and outlet heads of the 1-B heat exchanger were measured when the handhole covers were removed, approximately 24 hours later and before the handhole covers were replaced. The positions where the radiation readings were taken are shown in Figure 1. Supplementary radiation readings were taken with a Cutie Pie radiation detector. The results of the radiation surveys are tabulated in Table I. The calibration data for the instruments used are tabulated in Table IV.

The inconsistency in the radiation levels between the surveys was probably caused by human error in positioning of the monitoring probe. There is no way of keeping the monitoring probe inserted into the handhole three inches and parallel to the central axis of the handhole, but still, in the same location for each survey. The extreme limits of human error in this situation are shown by the data in Table II. The radiation levels recorded on February 16, 1960, were checked by inserting a dosimeter (0-5R) approximately three inches in handhold number two. The radiation level obtained by this method over a half hour period was 1800 mr/hr.

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FIGURE 1

Survey Points

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TABLE I

RADIATION SURVEYS OF HEMISPHERICAL HEADS ON 1B HEAT EXCHANGER

Date	Meter	Handhole Position	Inlet Hemispherical Head						Outlet Hemispherical Head					
			Number One Handhole			Number Two Handhole			Number Three Handhole			Number Four Handhole		
			Time	Radiation Levels		Time	Radiation Levels		Time	Radiation Levels		Time	Radiation Levels	
				Inside (mr/hr)	Outside (mr/hr)		Inside (mr/hr)	Outside (mr/hr)		Inside (mr/hr)	Outside (mr/hr)		Inside (mr/hr)	Outside (mr/hr)
10-20-59	Jordon No. 728	A				1842	750	90						
10-20-59	Jordon No. 728	B				1842	750	110						
10-20-59	Jordon No. 728	C				1842	800	93						
10-20-59	Jordon No. 728	D				1842	950	80						
10-21-59	Jordon No. 728	A	1046	1000	150				1450	350	65	1100	300	75
10-21-59	Jordon No. 728	B	1046	1000	175				1450	340	72	1100	325	75
10-21-59	Jordon No. 728	C	1046	800	400				1450	340	90	1100	325	100
10-21-59	Jordon No. 728	D	1046	700	300				1450	340	80	1100	325	75
10-21-59	Cutie Pie No. 4093		1046	2200	250				1450	670	100	1100	900	150
10-22-59	Jordon No. 728	A	1000	225	30	1010	150	45	1020	70	15	1030	60	15
10-22-59	Jordon No. 728	B	1000	200	25	1010	150	55	1020	60	13	1030	54	22
10-22-59	Jordon No. 728	C	1000	225	54	1010	140	40	1020	58	22	1030	52	23
10-22-59	Jordon No. 728	D	1000	225	70	1010	140	35	1020	68	22	1030	50	22
10-22-59	Cutie Pie No. 4093		1000	800	220									
10-22-59	Cutie Pie No. 3436					1010	1250	300	1020	800	120	1030	800	130
2-16-60	Jordon No. 728	A	1115	2500	300	1120	2200	350	1125	800	150	1130	700	125
2-16-60	Jordon No. 728	B	1115	2500	225	1120	2100	450	1125	800	150	1130	700	125
2-16-60	Jordon No. 728	C	1115	2500	350	1120	2200	275	1125	800	150	1130	750	125
2-16-60	Jordon No. 728	D	1115	2500	500	1120	2300	350	1125	800	150	1130	700	125

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TABLE II

RADIATION SURVEY OF THE NUMBER TWO HANDHOLE

Date: February 16, 1960

Insertion Distance of Monitor Probe (Inches)	Radiation Levels			
	Probe Parallel to The Central Axis		Probe Rotated Approximately 15 Degrees from Being Parallel to Central Axis	
	"A" Position	"C" Position	"A" Position	"C" Position
			Maximum Minimum	Maximum Minimum
	(mr/hr)	(mr/hr)	(mr/hr) (mr/hr)	(mr/hr) (mr/hr)
0	550	450		
3	2250	2500	3750 3250	3750 3250
6	3250	3500		
10	3750	4250		

TABLE III

EFPH BY THE HOUR FOR 24 HOURS PRIOR TO REACTOR SHUTDOWN

Date	Time	EFPH	Gross Power Level*
10-6-59	0700	5789.3	23
10-6-59	0800	5789.7	23
10-6-59	0900	5790.0	23
10-6-59	1000	5790.8	46
10-6-59	1100	5791.6	46
10-6-59	1200	5792.3	46
10-6-59	1300	5793.0	45
10-6-59	1400	5793.9	46
10-6-59	1500	5794.7	45
10-6-59	1600	5795.4	46
10-6-59	1700	5796.2	46
10-6-59	1800	5796.9	46
10-6-59	1900	5797.6	46
10-6-59	2000	5798.3	46
10-6-59	2100	5798.9	46
10-6-59	2200	5799.7	46
10-6-59	2300	5800.4	46
10-6-59	2400	5801.0	46

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TABLE III (cont'd)

EFPB BY THE HOUR FOR 24 HOURS PRIOR TO REACTOR SHUTDOWN

Date	Time	EFPB	Gross Power Level*
10-7-59	0100	5801.6	45
10-7-59	0200	5802.4	45
10-7-59	0300	5803.1	45
10-7-59	0400	5803.7	45
10-7-59	0500	5804.4	46
10-7-59	0600	5805.1	46
10-7-59	0700	5805.8	47
10-7-59	0730	5806.1	46

* From Station Logs - MW.

TABLE IV

CALIBRATION OF SURVEY METERS
(Source: Co⁶⁰ 38 MC)

Meter	Calculated	Measured	Distance
	mr/hr	mr/hr	inches
Cutie Pie 3436	15	15	68.02
Calibrated	20	20.5	58.91
10-1-59	25	23.5	52.69
	100	94	26.35
	250	235	16.66
	500	450	11.78
	1000	850	8.33
	1500	1250	6.80
Cutie Pie 4093	50	60	37.26
Calibrated	100	100	26.35
10-1-59	500	600	11.78
	1000	1000	8.33
	1500	1800	6.80
Jordon No. 29-56-728	10	8	
Calibrated	100	100	26.35
10-16-59	250	250	16.66
	500	500	11.78
	1000	1000	8.33
	1500	1500	6.80
Jordon No. 29-56-728	5	5	115.3
Calibrated	100	100	25.8
2-16-60	250	250	16.3
	500	500	11.5
	1000	1000	8.2
	1500	1500	6.7

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Date

10-19-60

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