MASTER

DUQUESNE LIGHT COMPANY
SHIPPINGPORT ATOMIC POWER STATION

TEST RESULTS

DLCS 3190101
T-643705

RADIATION SURVEY OF SHROUD ASSEMBLIES

REFUELING - CORE I, SEED 1

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REFUELING - CORE I, SEED 1

Purpose

To determine the total activity of the shroud assemblies due to induced activity and crud deposition after their removal from the reactor during Core I, Seed 1 refueling operations.

Conclusion

The radiation levels obtained approximately 75 days after reactor shutdown at Location I (one foot from the surface and three feet down from the top) for the eleven shroud assemblies surveyed varied from 12 mr/hr to 150 mr/hr.

The radiation levels obtained approximately 75 days after reactor shutdown at Location II (one foot from the surface and five inches up from the bottom) for the eleven shroud assemblies surveyed varied from 1.9 R/hr to 32 R/hr.

The actual level was below the predicted level of 200 R/hr for Location II. The predicted level is, however, calculated for a distance of one foot from the centerline of the shroud assembly. The diameter of the shroud assembly is 3.937 inches. The predicted level would therefore be slightly lower at the distance at which our measurements were taken but would still be substantially greater than the actual measured levels.

All radiation measurements were made in water as described below.

Description of Test Equipment and Test Procedure

The eleven shroud assemblies, which were to be monitored for DLCS 3190101 in conjunction with Refueling Procedure, SPS-R1-108, "Disassembly, Inspection, and Re-assembly of the Shroud and Scram Shaft Assemblies," were transported from the reactor vessel to the Underwater Radiation Probe Assembly. The shroud was placed next to the probe assembly so that the top of the shroud was even with the top of the canal water level and against the positioning rings.

The radiation probe was lowered into the guide tube, and the radiation levels at Locations I and II were monitored and recorded. The radiation monitors used during the test were Riggs Remote Area Monitors, Model FA-3BA. Prior to the test the Riggs High Level Monitors were taken to the General Electric Laboratory in Schenectady, New York for calibration. Shortly after this calibration the high range monitors began to function erratically and data taken with these instruments are questionable.

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RADIATION SURVEY OF SHROUD ASSEMBLIES (cont'd)

Both low range monitors (A and B) were calibrated at the Shippingport Site According to the instruction manual prior to testing. After monitoring four shrouds, the "A" low range monitor began to operate erratically and was not used for further testing.

Results

DLCS 3190101, Refueling - Core I, Seed 1, Radiation Survey of Shroud Assemblies, was performed December 21-29, 1959.

The eleven selected shroud assemblies were removed from the reactor vessel 71 days after the reactor was shut down. The shroud assemblies were then monitored four to eight days later in conjunction with Refueling Procedure, SPS-R1-108. The data obtained for Locations I and II are tabulated in Table I. The values varied from 1.2 mr/hr to 150 mr/hr for Location I and from 1.9 R/hr-32 R/hr for location II.

The predicted radiation levels of the shrouds were computed by considering the shroud as a line source for a period covering up to six months after the end of Seed 1 life. These calculations and Figure I were obtained from Westinghouse's letter, WAPD-PWR-RD-771 dated May 6, 1959. The equivalent source strength was computed from the amount of particular isotopes in each component.

The measured lower end levels ranged from 1.9 R/hr to 32 R/hr 75 days after shutdown while the predicted level was 200 R/hr for the same time. The reactor was shutdown at 0731 hours on October 7, 1959 after completing 5806.1 EFPH.

The calibration data for the Riggs Remote Area Radiation Monitors are tabulated in Table II.

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TABLE I
RADIATION SURVEY OF SHROUD ASSEMBLIES

Shroud Assembly	Date	Time	Location I		Time	Location II	
			Reading	Meter		Reading	Meter
			R/hr			R/hr	
E-4	12/21/59	0620	0.015	A-Low Range	0625	7.0	A-Low Range
L-5	12/22/59	0955	0.017	A-Low Range	1005	5.0	A-Low Range
K-4	12/22/59	2139	0.032	A-Low Range	2141	8.8	A-Low Range
K-4	12/22/59	2145	0.090	B-Low Range	2147	Off Scale	B-Low Range
*L-11	12/23/59	2155	0.012	A-Low Range	2203	1.9	A-Low Range
L-11	12/23/59	2156	0.150	B-Low Range	2208	Off Scale	B-Low Range
L-11	12/23/59	2121	Off Scale	A-High Range	2122	12.0	A-High Range
J-12	12/24/59	0535	0.050	B-Low Range	0540	12.0	A-High Range
D-8	12/28/59	1310	0.052	B-Low Range	1315	17.0	A-High Range
E-11	12/28/59	1527	0.044	B-Low Range	1533	24.0	A-High Range
K-11	12/28/59	1727	0.050	B-Low Range	1734	32.0	A-High Range

* At this time A-Low Range would not calibrate correctly and was assumed to be inaccurate.

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TABLE II
CALIBRATION DATA FOR THE RADIATION DETECTOR

Date	Meter	R ₁ Scale		R ₂ Scale	
		Source	Monitor	Source	Monitor
		mr/hr	mr/hr	R/hr	R/hr
12/23/59	"A" Low Range	0.1	0.12	0.3	0.3
		50	53	1.0	1.0
		100	100	10.0	10.0
12/22/59	"B" Low Range 50	0.1	0.1	0.3	0.3
		50	47	5.0	5.5
		100	100	10.0	9.5
		R/hr	R/hr	R/hr	R/hr
12/22/59	"A" High Range	10	10	* Not Operative	
		32	28		
		1	1		
12/22/59	"B" High Range	OOS	OOS	OOS	OOS

* The R₂ scale was inoperative due to the unavailable high energy source at the Shippingport site.

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