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DUQUESNE LIGHT COMPANY

SHIPPINGPORT ATOMIC POWER STATION

TEST RESULTS

DLCS 1840311

T-612076

PERIODIC RADIATION SURVEY OF REACTOR PLANT
CONTAINER AND COMPONENTS AFTER SHUTDOWN

CORE I SEED 1

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CORE I-SEED 1

Purpose

To periodically determine the changes in radiation level in the hairpin loops resulting from continued operation of the reactor at power.

Conclusions

The radiochemical analyses indicate that Co^{60} was the major contributor to the gamma activity present on the 1BD Hairpin Loop. A quantitative analysis of part 1B of the pipe section showed that the loose scale plus the tightly adherent crud added up to approximately the same activity as the activity of each of the other two sections analyzed. The deposition of the loose scale on part 1B of the 1B Hairpin Loop was 0.104 mg/cm^2 .

Description of Test Equipment and Test Procedure

The 1BD Hairpin Loop section of piping was isolated, drained and removed in accordance with the approved procedure for this test on October 7, 1959.

A radiation survey was performed with a Jordan probe. This was the only survey, of the many required in the test procedure, that was performed on this piping.

The required radiochemical analyses were made of crud samples collected from this piping.

Results

DLCS 1840311 was initiated on October 7, 1959 with the isolation of the 1BD Hairpin Loop. A section of the loop was removed, cut into 4 parts and sent to Chemistry on October 19, 1959. At this time a radiation survey was performed on each part and the data are shown in Table I. The EFPH on the 1BD Hairpin Loop when removed was 3403.5 and the total service time was 9,162 hours. The way the pipe from the Hairpin Loop was cut into parts is shown in Figure 1 and location of the sections in the Hairpin Loop are shown in Figure 2.

A loosely adherent deposit was noted on the surfaces of the 1A and 1B parts of the pipe section. This is the first time such a loose deposit has been seen on a Hairpin Loop section. Part 1B was brushed to remove this loose deposit using

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a nylon brush. The loose material from part 1B was treated as a separate sample as was the activity remaining on part 1B of the pipe. All the samples were then analyzed radiochemically and the results are shown in Table II.

From Table II it can be seen that part 1B tightly adherent crud plus part 1B loose scale added up to approximately the activity of part 1A. Part 1A was analyzed without brushing off the loose scale. It can also be seen that the total activity of part 1B was also approximately equal to the activity of part 3A.

The deposition of the loose scale on part 1B was 0.104 mg/cm^2 . This was 10 milligrams of loose scale over 96.4 cm^2 of area.

Table III lists the radiochemical analysis for the LAC Hairpin Loop. This piping is subjected to the same type of conditions as the LBD Hairpin Loop except it is located in the LAC purification loop. The time in service listed in Table III means the number of EFPH the pipe was in service not the number of EFPH accumulated on the reactor. The data listed in Table III is the available data from past performances that can be used for comparison purposes. All the data for a specific isotope appear to be of the same order of magnitude for all the test sections.

FIGURE 1

Sections of the BD Hairpin Loop

FIGURE 2

Location of Sample in the
BD Hairpin Loop

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TABLE I

Radiation Survey of Sectioned BD Hairpin Loop		
Radiation Survey 1BD Hairpin Loop *		
Section	Outside mr/hr	Inside mr/hr
1	25	100
2	35	90
3	25	100

* All readings were taken with a Jordan Probe on October 19, 1959. Calibration data and number of Jordan probe used in survey are unavailable.

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TABLE II

RADIOCHEMICAL ANALYSIS DATA

Section Number	DPM/dm ² x 10 ⁴ on 10/7/59							Gamma Activity Accounted for %	Specific γ^* Activity CPM/cm ² x 10 ⁵
	Fe ⁵⁹	Co ⁵⁸	Co ⁶⁰	Mn ⁵⁴	Cr ⁵¹	Hf ¹⁸¹	Zr ⁹⁵		
3A	2.69	4.74	23.0	1.32	2.70	0.921	0.441	70	1.67
1A	2.54	6.48	33.6	1.72	3.04	0.910	0.465	76	2.14
1B Tightly Adherent	1.80	4.98	22.5	1.20	1.99	0.350	0.350	80	1.38
1B Loose Scale 10 mgs.	0.850	2.30	13.4	1.03	2.34	0.916	0.391	84	0.84**
1B Total Loose + Tightly Adherent	2.65	7.28	35.9	2.23	4.33	1.27	0.741	--	2.22

* All samples were dissolved and diluted to 100 ml for analysis. This is the specific γ activity of a 2 ml aliquat of the 100 ml stock sample as counted in a well counter biased at 30 KEV.

** Specific activity of loosely adherent crud - 8.15×10^5 cpm/mg.

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TABLE III

RADIOCHEMICAL ANALYSIS FOR
 1AC HAIRPIN LOOP

Date of Isolation	Result Number	Time In Service EFPH	Co ⁶⁰	Fe ⁵⁹	Mn ⁵⁴	Zr ⁹⁵	Hs ¹⁸¹
8/18/58	DLCS 1840302	1700	2.1×10^5	1.7×10^5	1.2×10^3	6.8×10^2	6.0×10^3
Vertical Leg							
5/21/59	DLCS 1840307	1000	7.82×10^4	9.69×10^3	1.14×10^4	-----	-----
Horizontal Leg							
5/21/59	DLCS 1840307	4180	2.18×10^5	1.56×10^4	2.8×10^4	-----	-----

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