

MASTER

BUQUESNE LIGHT COMPANY
SHIPPINGPORT ATOMIC POWER STATION

TEST RESULTS

BLCS 1550105
T-612080

EXAMINATION OF COMPONENTS FOR CRUD AND CORROSION
1B HEAT EXCHANGER MANHOLE AREA

CORE I SEED 1

Section 1 of 1 Section

First Issue, October 16, 1960

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EXAMINATION OF COMPONENTS FOR CRUD AND CORROSION
1-B HEAT EXCHANGER HANHOLE AREA
CORE I SEED 1

Purpose

To determine the extent and location of corrosion, crud deposits and defects in the ends of the 1-B heat exchanger after removing the handhole covers.

Conclusions

There was no visual evidence of pitting or corrosion inside the ends of the 1-B heat exchanger, as seen through the handholes.

A radio-chemical analysis of a smear sample taken from the inside of number one handhole showed the presence of the following isotopes: Fe⁵⁹, Co⁵⁸, Co⁶⁰, Mn⁵⁴, Cr⁵¹, Hf¹⁸¹, and Zr⁹⁵. A radiation survey performed in four handholes indicated a maximum level of 1 R/hr (Number one handhole, inlet).

Description of Test Equipment and Test Procedure

After four handhole covers were removed from the 1-B heat exchanger (See Figure 1) a radiation survey was performed inside the handholes. A gamma spectrometer and radio chemical analysis was performed on a smear sample obtained from the number one handhole (inlet). The exchanger ends, as seen through the handholes, were visually inspected for pitting and corrosion.

Results

DLCS 1550105 was performed on October 20 and 21, 1959. The handhole covers of the 1-B heat exchanger had been removed so that a probolog could be performed on the heat exchanger tubes. The reactor had been sub-critical since October 7. The heat exchanger had been in service 5369 EFPH or 11,804 hours at a normal operating temperature of approximately 523 F at the inlet.

A smear sample was taken from the inside of the number one handhole. (See Figure 1). The crud contained in this sample consisted of finely divided magnetic particles of uniform texture. A radiochemical analysis of the crud showed that the following isotopes were present: Fe⁵⁹, Co⁵⁸, Co⁶⁰, Mn⁵⁴, Cr⁵¹, Hf¹⁸¹, and Zr⁹⁵ and account for major portion of the activity present. As expected Co⁶⁰ showed the highest specific activity - 4.6×10^6 dpm/mg. The radio chemical analysis results are contained in Table I. The results from the gamma spectrometer analysis are plotted in Figure 2. In Figure 2 the peaks correspond to the activities of the various isotopes reported. By a few calculations, and with the knowledge of the isotopes actually present from the radiochemical analysis, it is possible to determine several of the isotope or isotopes associated with the peaks. This was done and the results are as shown on the curves.

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A radiation survey was also performed in the handholes after their covers were removed. The results of this survey are contained in Table II. Figure 1 shows the positions of the survey meter probe in the handholes. The highest reading was measured in the number one handhole (inlet), ~1R/hr. Readings in general were highest in the inlet handholes. This was due to the fact that the crud in the primary coolant water, as it entered the heat exchanger tubes from the 18" piping, was suddenly exposed to a much greater surface area to which it could adhere.

There was no observed evidence of any pitting or corrosion inside the ends of the heat exchanger.

Calibration data for the Jordan probe used in the survey are contained in Table III.

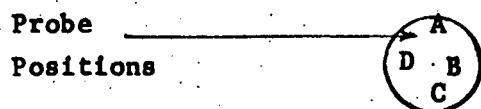
Additional radiation data obtained at the time this test was performed can be found in DLCS 1840403.

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EXAMINATION OF COMPONENT
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FIGURE 1

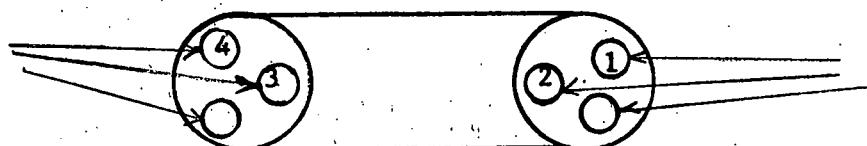
Handhole



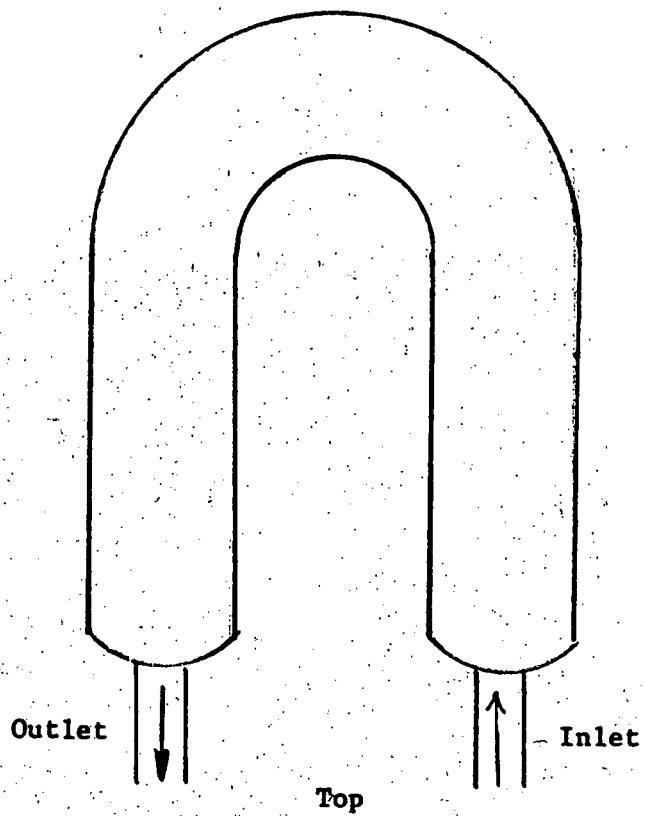
1-B Heat Exchanger

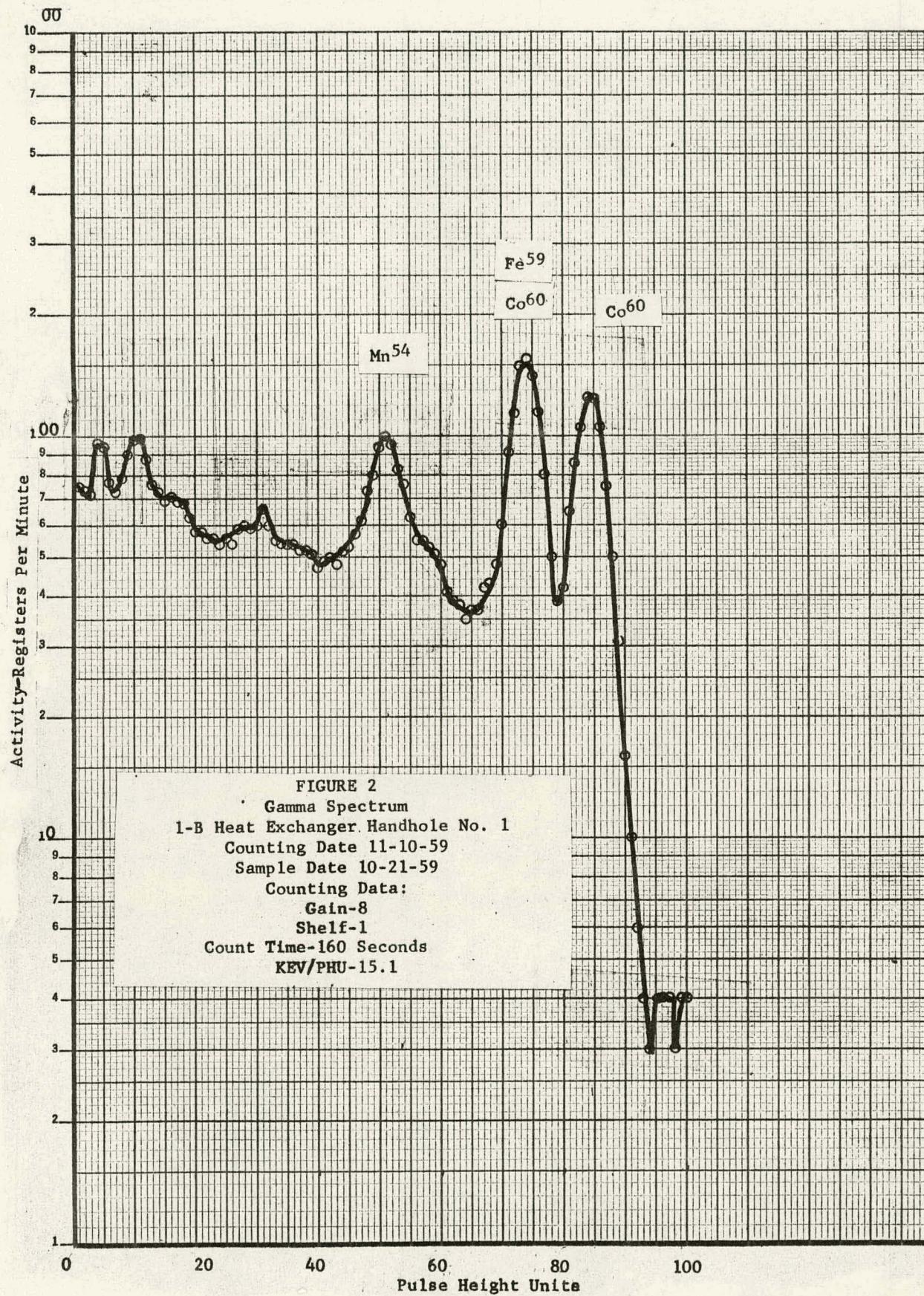
Handholes

Handholes



Front





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TABLE I

Radiochemical Analysis of Crud from the No. 1 Handhole
of the 1B Heat Exchanger

Nuclide	Sp. Act. corrected to 10-21-59	% Total Act. on 11/10/59
Fe ⁵⁹	3.7×10^5 dpm/mg	2.3
Co ⁵⁸	5.5×10^5 dpm/mg	4.0
Co ⁶⁰	4.6×10^6 dpm/mg	58.3
Mn ⁵⁴	4.3×10^5 dpm/mg	4.0
Cr ⁵¹	3.1×10^6 dpm/mg	1.5
Hf ¹⁸¹	2.5×10^5 dpm/mg	6.4
Zr ⁹⁵	1.2×10^5 dpm/mg	6.4
		76.5%

Sample Date: October 21, 1959

TABLE II

Outlet Side 1-B Heat Exchanger

Time	Date	Position	Radiation Level, mr/hr	
			Three (3) inches inside handhole	Entrance to handhole
1450	10-21-59	3A	350	65
1450	10-21-59	3B	340	72
1450	10-21-59	3C	340	90
1450	10-21-59	3D	340	80
1100	10-21-59	4A	300	75
1100	10-21-59	4B	325	75
1100	10-21-59	4C	325	100
1100	10-21-59	4D	325	75

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TABLE II (cont'd)

Inlet Side, 1-B Heat Exchanger

Time	Date	Position	Radiation Level mr/hr	Entrance to handhole
			Three (3) inches inside handhole	
1046	10-21-59	1A	1000	150
1046	10-21-59	1B	1000	175
1046	10-21-59	1C	800	400
1046	10-21-59	1D	700	300
1842	10-20-59	2A	750	90
1842	10-20-59	2B	750	110
1842	10-20-59	2C	800	93
1842	10-20-59	2D	950	80

TABLE III

Calibration Data

Jordan 728 (Calibrated 10-16-59) MR/HR						
Calculated Measured	10 8	100 100	250 250	500 500	1000 1000	1500 1500

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Results Prepared By Warren Duff

Results Reviewed By John Shambler Jr.

Approved (Duquesne Light Company) D. Jones

Date

10-16-60