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SUBJECT: OBSERVED NET HEAT LOSS FROM THE HRT
HIGH-PRESSURE SYSTEM

TO: S. E. Beall

FROM: R. Van Winkle and R. R. Wiethaup

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OBSERVED NET HEAT LOSS FROM THE HRT HIGH-PRESSURE SYSTEM

HRT TEST 1 B 7

An estimate has been obtained of the heat that would need to be generated in the HRT core in order to hold the system at operating temperature under no-load conditions. This estimate has been made by measuring the feed-water rate to the package boiler during an oxygenated water run.

To do this, the surge tank (Item 64) was filled with water and all streams into the tank were diverted. Thus, the change in water level in the tank was equal to the feed to the package boiler and to the steam condensed in the main heat exchangers. The change in level in the surge tank was observed over an 8-hr period during which the fuel and blanket circulating systems were held at normal operating temperature, and feed, letdown, and purge streams were maintained in the normal manner.

The results are summarized in the attached table. The original data are on page 184 of the HRT Data Log. For these conditions, 257 kw of heat would have to be generated in the reactor to maintain the operating temperature at about 280°C.

R. Van Winkle

RRW-RVW:be

Attachment - 1 Table, Net Heat Loss.

NET HEAT LOSS

Date of Test	January 17, 1957
Duration of Test	8 hours
Reactor Conditions:	
Temperature	277°C
Pressure	1500 psig
Fluid	Oxygenated Water
Shield Tank Pressure	1 Atmosphere
Shield Tank Temperature (Space Coolers on)	~ 45°C
Steam Pressure	920 psig
Saturation Temperature	536°F
Steam Rate to Both Heat Exchangers	1329 lb/hr
Heat Supplied to System by Steam	878,000 Btu/hr*
	14,600 Btu/min
	257 kw

*Of this total, about 110,000 Btu/hr was lost to the cooling water of the letdown heat exchangers. During this test, the following average conditions were maintained by the letdown system:

	Flow Rate gpm	Temperature Entering High-Pressure System °C	Estimated Heat Loss Btu/hr
<u>Feed Stream</u>			
Fuel Side	0.322	228	15,600
Blanket Side	1.05	219	61,400
<u>Pressurizer Purge</u>			
Fuel Side	0.145	246	4,500
Blanket Side	0.148	243	5,000

	<u>Flow Rate</u> <u>gpm</u>	<u>Temperature</u> <u>Entering</u> <u>High-Pressure</u> <u>System</u> <u>°C</u>	<u>Estimated</u> <u>Heat Loss</u> <u>Btu/hr</u>
<u>Circulating Pump Purge</u>			
Fuel Side	.057	60*	11,700
Blanket Side	.056	60*	11,500
Total			109,700

The letdown stream, both sides, was at 277°C.

*Estimated temperature.