REFERENCE

WANL-TME-699

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PRELIMINARY DATA REPORT
LINEAR DISPLACEMENT TRANSDUCERS,
EXPERIMENT NO. 23/W202,
IRRADIATED AT PLUM BROOK REACTOR FACILITY
PBRF CYCLE 6 (PB NO. 3W)

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1.0 INTRODUCTION

This report describes the preliminary results of the irradiation of eight linear displacement transducers which were dynamically tested in the HT-1 facility of the Plum Brook Reactor on October 15-19, 1963. The test was designated Experiment No. 23/W202. The purpose of this experiment was to obtain operational data for NRX-A candidate transducers in a high dose rate radiation environment.

Design and hazards information for the loop is described in WANL-TNR-119¹; and for the experiment, in WANL-TNR-126². Specifications for this test are described in WANL-TME-439³.

2.0 TEST HISTORY

Eight transducers were irradiated and tested in the W-2 facility of the Plum Brook Reactor at a power level of approximately 50 Mw. The transducers were dynamically tested only up to 10 Mw, since the transducer fixture became inoperative when the reactor reached 10 Mw. During this cycle (Cycle 6) the sample fixture containing the LVDT's was exposed to an average water temperature of 130°F and an average pressure of 130 psig. The fixture was irradiated for about 99 hours at an average reactor power of 42.3 Mw, acquiring an exposure of 4192 Mw-hr. It was not possible to remove the experiment at the end of the specified 50-hr irradiation time due to present licensing restrictions which prevent removal of an experiment while the reactor is at power.

-
1. WANL-TNR-119, "Experiment Design Manual and Hazards Analysis, Plum Brook Reactor Facility, Exp. No. 63-05", Radiation Effects Program.
 2. WANL-TNR-126, "Design Manual and Hazards Analysis for Exp. No. 23/W202, Linear Displacement Transducers at Plum Brook Reactor Facility (RFI, 63-05)", Radiation Effects Program, December 18, 1963.
 3. WANL-TME-439, "Test Specification for NRX-A Candidate Linear Motion Displacement Transducers to be Irradiated at the Plum Brook Reactor Facility During August, 1963", July 22, 1963.

Figure 1 is the reactor power profile, obtained from the PBRF water power computer. The test was initiated at 2035 hr on October 15, 1963, and was completed at 2340 hr on October 19, 1963. The reactor was manually scrammed 10.5 hr after the beginning of the run to allow the WANL experiment operators to attempt to resolve operating difficulties with the actuating mechanism (described in Section 3.4). Criticality was achieved 3 hr after this shutdown. Reactor power was subsequently raised to 50 Mw. After 82.9 hr an automatic power reduction from 50 Mw to 25 Mw occurred due to an erroneous W-2 high temperature signal. This actuated the limit switch which initiated the scram. Power recovery to 50 Mw was achieved within a half-hour as shown in Figure 1. Note that the reactor was shut down in steps from 50 to 43 to 28 to 10 Mw. The reactor was scrammed at 10 Mw.

3.0 DESCRIPTION OF TEST

3.1 DESCRIPTION OF TEST SPECIMEN

Table 1 lists the various types of LVDT's tested, and also references the data code letters used on the data tabulations.

Table 1

Types of LVDT's Tested

<u>Reference Designation</u>	<u>Manufacturer</u>	<u>Model No.</u>	<u>Serial No.</u>
A	Physical Science	T1-A-40	214
B	Physical Science	T1-A-20	208
C	IRC	70-3900-5194	4
D	Schaevitz	125XS-1TR-2	028
E	Crescent	250-3K-5/57-9S	3170-1
F	Schaevitz	125YS-1TR-2	021
G	Crescent	250-3K-5/57-9S	3170-3
H	Schaevitz	250XS-1TR-2	040

Figure 1 - Reactor Power Profile for
 Experiment No. 23/W202

3.2 DESCRIPTION OF TEST FIXTURE

A full view of the test fixture is shown in Figure 2. Figure 3 details the arrangement of the LVDT's in the fixture, and the arrangement of dosimeters and thermocouples with respect to them. Four dosimeters and four thermocouples were alternately placed in the fixture adjacent to the eight transducers. A shroud, shown in Figure 4 (Item 48) was used to baffle the primary coolant.

3.3 TEST PROCEDURE

The helium gas actuating system described in WANL-TNR-119, was used to dynamically test the eight linear displacement transducers in this experiment. In the test fixture in which the LVDT's were installed, one disc-shaped cam having a displacement of $\pm .250$ inches from the null point was rotated fifteen degrees each time helium gas pressure was supplied to a bellows in the fixture. One cycle consisted of 24 data positions, and transducer output voltages were measured at each of the 24 positions in a cycle. For each revolution of the cam the insulation resistance and primary and secondary winding resistances for each transducer were measured using a multimeter. One complete revolution was performed at reactor powers of 100 Kw, 1 Mw, and 10 Mw. Figure 5 shows the electrical schematic for the read-out instrumentation. A 5-volt RMS input signal at 3 kilocycles was supplied to the transducer primary winding by an audio-oscillator and power amplifier as shown in the figure. Rotation of the cam caused an axial motion of the transducer push rod which produced a proportional millivolt signal. This signal was measured by a vacuum tube voltmeter during the early part of the test, and later, by an oscilloscope. Also, every hour at full power, test fixture temperature measurements were recorded on the multipoint recorder. Sulfur and bare and cadmium-covered cobalt dosimeters were used to determine neutron fluxes at three energy levels.

3.4 TEST RESULTS

Pre-irradiation LVDT output voltages are given in Table 2. As indicated earlier in Section 2, the reactor was shut down early in the run, because the transducer actuating mechanism could not be operated after initially reaching a reactor power level of 10 Mw. Therefore, transducer output could only be monitored for 19 of the 24 cam positions (as indicated in Table 4, page 14; run time = 4.42 hr). Repeated pressurizations of the bellows produced no measureable change in output signal,

Figure 2 - Test Fixture

Figure 3 - Test Fixture, Detail

Figure 4 - LVDT Fixture, Illustrated

Figure 5 - Electrical System LVDT Radiation Test

which indicated that the actuating mechanism was inoperative. The primary coolant temperature was decreased 10 degrees in an attempt to reduce possible thermal expansion problems. Subsequently, the actuating mechanism operated through one cam revolution (Table 4, page 15, run time 7.42 hr), but failed to operate thereafter. Irradiation of the fixture was continued throughout the reactor power cycle due to the possibility of re-actuating the mechanism. Repeated attempts were made during the remainder of the run to actuate the mechanism, but all attempts failed. Therefore, the data shown in Table 4 after 13.42 hours run time, are recorded for the unknown cam position at which the mechanism failed.

3.5 RAW DATA

Tables 2 through 9, following, present the raw data obtained during this experiment.

LVDT output voltages, before and during irradiation, are shown in Tables 2, 3, and 4.

LVDT insulation resistances, before and during irradiation, are listed in Tables 5 and 6.

LVDT winding resistances, before and during irradiation, are listed in Tables 7 and 8.

"Surface" temperatures measured for four of the LVDT's are listed in Table 9.

In Tables 2 through 8, the letters A, B, C, D, E, F, G, and H, refer to the various LVDT's as described in Table 1.

Each position (referred to in Tables 2 through 5) indicates a 15° revolution; i.e., position 1 indicates a 15-degree revolution; 2, 30-degree; 3, 45-degree, etc.

Transducers E and G were inoperative so that only the insulation resistances could be measured. Transducer G was operative during pre-irradiation testing at Large, but was inoperative after shipment to PBRF.

Table 2 - LVDT Output Voltages, Pre-Irradiation Raw Data (Taken at Large, Penna.)
(Expressed in Millivolts)

Position	Ambient Air Environment								Water Environment							
	A	B	C	D	E	F	G	H	A	B	C	D	E	F	G	H
1	1800	3000	3200	4000	*	4200	5200	4000	1800	3100	3200	3800	*	4000	5400	4100
2	1450	2700	2500	3100		3300	4200	3200	1400	2700	2500	3000		3200	4400	3300
3	1080	2250	1900	2350		2500	3250	2450	1040	2300	1900	2250		2400	3250	2500
4	720	1600	1200	1600		1700	2200	1600	700	1600	1200	1400		1500	2250	1700
5	440	960	680	880		940	1200	920	380	880	640	680		760	1160	920
6	36	42	20	32		74	48	100	27	60	92	180		107	96	60
7	280	680	570	700		660	920	600	380	900	700	1000		960	1100	720
8	600	1500	1250	1500		1500	2000	1420	700	1600	1300	1700		1700	2100	1450
9	920	2050	1750	2200		2200	3000	2150	1080	2300	2000	2500		2500	3200	2300
10	1300	2600	2450	2900		3000	4000	2900	1450	2750	2600	3400		3400	4300	3100
11	1600	2900	3000	3600		3700	5000	3700	1800	3200	3250	4000		4000	5300	3800
12	1800	3100	3500	4200		4400	6000	4400	2000	3400	3600	4600		4600	6200	4600
13	1600	2900	3000	3600		3650	5000	3600	1700	3000	3000	3900		3900	5000	3700
14	1250	2500	2900	2900		2900	4000	2800	1400	2500	2300	2900		2950	3900	2700
15	900	2000	1750	2100		2100	2900	2000	980	2100	1800	2250		2250	2850	2000
16	550	1320	1080	1250		1200	1750	1200	590	1300	1000	1400		1400	1700	1150
17	220	560	480	560		550	750	480	220	530	440	600		560	600	380
18	130	270	160	220		270	370	280	160	380	250	240		340	560	460
19	460	1000	720	960		1000	1300	1000	520	1200	920	1000		1120	1700	1400
20	800	1700	1350	1700		1800	2400	1800	820	1900	1500	1800		1900	2600	2000
21	1200	2300	2000	2500		2600	3400	2500	1300	2600	2250	2600		2800	3800	2800
22	1500	2700	2500	3200		3400	3200	3300	1600	3000	2900	3400		3600	4900	3700
23	1800	3000	3200	3900		4000	5200	4000	2000	3400	3500	4000		4200	6000	4800
24	2100	3200	3800	4700		5000	6400	4700	2200	3800	4000	4800		5000	6800	5200

* Inoperative

Table 3 - LVDT Output Voltages, Pre-Irradiation Raw Data
(Expressed in Millivolts)

	<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Position</u>	<u>Input</u> (Volts)	<u>Output Voltages, Millivolts</u>							
					A	B	C	D	E	F	G	H
II	10/14	*	1	5.0	1500	2800	1040	1260		1300		1300
			2	5.0	1180	2400	820	998		1000		1000
			3	4.0	900	1900	590	710		720		730
			4	5.0	560	1300	380	460		160		190
			5	5.0	120	200	52	81		105		75
			6	5.0	450	960	271	350		380		340
			7	5.0	800	1600	490	610		650		610
			8	5.0	1100	2200	700	890		940		890
			9	5.0	1360	2500	880	1100		1160		1100
			10	5.0	1700	2800	1100	1350		1410		1360
			11	5.0	1700	2800	1140	1410		1450		1400
			12	5.0	-	-	-	-		-		-
	10/15	0630	13	5.0	1300	2400	840	700		1000		400
			14	5.0	2090	1850	670	510		795		340
			15	5.0	6200	5700	430	320		560		290
			16	5.0	300	560	210	200		335		240
			17	5.0	26	54	56	220		80		680
			18	5.0	13	27	43	182		94		685
			19	5.0	300	700	202	435		90		155
			20	5.0	610	1350	410	635		300		128
			21	5.0	900	1580	605	515		580		815
			22	5.0	1200	2400	820	730		690		860
			23	5.0	1500	2650	1000	920		815		900
			24	5.0	6000	6000	1250	1100		955		945
	10/15	0900**	1	5.0	1800	2800	1150	500		400		940
			2	5.0	1500	2600	960	1300		660		200
			3	5.0	1190	1300	770	1180		560		173
			4	5.0	840	1800	560	1050		450		155
			5	5.0	270	660	195	860		292		175
			6	5.0	39	32	735	775		235		210
			7	5.0	345	730	218	700		220		250
			8	5.0	620	1300	380	640		250		290
			9	5.0	950	1850	565	610		310		340

Table 3 - LVDT Output Voltages, Pre-Irradiation Raw Data
(Expressed in Millivolts)

Date (1963)	Time (hr)	Position	Input (Volts)	Output Voltages, Millivolts							
				A	B	C	D	E	F	G	H
10/15		10	5.0	1020	2300	740	590		380		380
		11	5.0	1300	2400	810	580		420		400
		12	5.0	1240	2300	760	580		385		380
10/15	1115***	1	5.0	900	1900	640	760		400		592
		2	5.0	580	1280	442	672		305		635
		3	5.0	280	620	225	600		234		670
		4	5.0	128	280	125	570		195		650
		5	5.0	25	65	55	540		170		740
		6	5.0	150	370	95	510		145		740
		7	5.0	450	1000	280	465		136		790
		8	5.0	600	1300	380	450		150		810
		9	5.0	700	1540	460	435		175		832
		10	5.0	900	1900	580	420		210		860
		11	5.0	1100	2200	730	420		260		900
		12	5.0	1200	2300	790	420		285		920
		13	5.0	1500	2500	970	430		350		960
		14	5.0	1800	2800	1200	450		435		1000
		15	5.0	1800	2800	1200	450		430		1000
		16	5.0	1400	2600	950	435		350		950
		17	5.0	1100	2200	760	420		270		920
		18	5.0	800	1800	550	425		190		860
		19	5.0	550	1300	370	450		145		820
		20	5.0	280	650	560	500		135		740
		21	5.0	40	20	63	550		180		760
		22	5.0	350	700	250	620		250		680
		23	5.0	640	1300	430	690		330		640
		24	5.0	900	1800	620	760		410		600

* Data obtained before shroud was welded on, at 0' 0" elevation, dry.

** Experiment inserted in HT-1. Pressure 145 psig, no flow.

*** Time readings started. HT-1 pressure 135 psig, at 75 gpm flow.

Table 4 - LVDT Output Voltages, Irradiation Raw Data

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run- Time</u> (hr)	<u>Position</u>	<u>Input</u> (volts)	<u>Output Voltages, Millivolts</u>							
					A	B	C	D	E	F	G	H
<u>Reactor Power, 100 Kw</u>												
10/15	2045*	0.16	1	5.0	1500	2600	950	980		670		380
			2	5.0	1200	2350	875	890		590		430
			3	5.0	940	1900	790	790		490		480
			4	5.0	760	1600	750	730		430		520
			5	5.0	300	630	645	585		280		620
			6	5.0	130	230	610	535		220		660
			7	5.0	298	750	550	450		76		760
			8	5.0	440	1000	530	380		34		790
			9	5.0	-	-	-	-		-		-
			10	5.0	900	2000	490	300		130		910
			11	5.0	1200	2400	470	280		230		1000
			12	5.0	1500	2800	470	290		320		1050
			13	5.0	1800	2900	1900	3500		2800		2800
			14	5.0	1500	2700	1500	3000		2300		2500
			15	5.0	900	2000	900	2000		1300		1850
			16	5.0	580	1360	680	1500		840		1500
			17	5.0	270	700	540	1040		350		1200
			18	5.0	60	40	600	600		220		900
			19	5.0	370	700	840	500		650		650
			20	5.0	640	1300	1120	760		1080		500
			21	5.0	920	1900	1500	1200		1560		540
			22	5.0	1200	2300	1800	1700		2100		760
			23	5.0	1500	2600	2150	2100		2500		1000
			2155**			24	5.0	-	-	-	-	
<u>Reactor Power, 1 Mw</u>												
2223*	1.80	1	5.0	1500	2500	2300	2100		2500		1000	
		2	5.0	1700	2500	2100	1900		2200		700	
		3	5.0	1200	2400	2000	1600		2000		700	
		4	5.0	1000	2000	1700	1400		1600		500	
		5	5.0	700	1600	1500	1100		1300		430	
		6	5.0	600	1300	1390	800		1050		410	

Table 4 - LVDT Output Voltages, Irradiation Raw Data

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run- Time</u> (hr)	<u>Position</u>	<u>Input</u> (volts)	<u>Output Voltages, Millivolts</u>							
					A	B	C	D	E	F	G	H
10/15			7	5.0	420	900	1200	600		800		480
			8	5.0	300	630	1180	500		550		500
			9	5.0	17	21	980	520		75		800
			10	5.0	190	420	900	720		250		1000
			11	5.0	300	890	900	980		430		1180
			12	5.0	600	1400	1000	1400		1000		1500
			13	5.0	900	1800	1000	1900		1490		1800
			14	5.0	1200	2300	1100	2400		1950		2800
			15	5.0	1500	2600	1350	2900		2500		2600
			16	5.0	1800	2800	1600	3350		3000		2900
			17	5.0	1800	2800	1600	3300		2900		2900
			18	5.0	1500	2600	1350	2900		2950		3000
			19	5.0	1160	2300	1120	2400		1900		2200
			20	5.0	860	1850	1000	1900		1360		1800
			21	5.0	560	1280	900	1360		840		1440
			22	5.0	260	620	920	900		340		1080
			23	5.0	50	70	1000	500		680		760
			24	5.0	360	707	1200	530		680		480
			2350**									
			<u>Reactor Power 10 Mw</u>									
10/16	0100*	4.42	1	5.0	1000	2000	1900	1600		1800		830
			2	5.0	680	1530	1530	1200		1410		600
			3	5.0	450	1500	1400	730		900		410
			4	5.0	175	530	1200	440		480		550
			5	5.0	120	135	1100	590		38		850
			6	5.0	290	480	980	825		235		1100
			7	5.0	525	910	910	1200		600		1400
			8	5.0	900	1610	890	1800		1200		2000
			9	5.0	1000	2300	1000	2200		1500		2100
			10	5.0	1300	2100	1000	2500		1100		2400
			11	5.0	1500	2300	1000	2600		1100		2700
			12	5.0	1700	2500	1300	3400		2400		3200
			13	5.0	1300	2000	1000	2200		1700		2200
			14	5.0	620	1200	800	1500		800		1500
			15	5.0	400	600	830	1000		360		1000
			16	5.0	78	120	1000	600		100		450

Table 4 - LVDT Output Voltages, Irradiation Raw Data

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run- Time</u> (hr)	<u>Position</u>	<u>Input</u> (volts)	<u>Output Voltages, Millivolts</u>							
					A	B	C	D	E	F	G	H
10/16			17	5.0	150	450	1275	500		1000		500
			18	5.0	300	450	1100	500		500		300
			19***	5.0	150	480	1100	420		410		300
			<u>Reactor Power, 10 Mw</u>									
			0400*	7.42	1	5.0	1800	2700	1500	3500	3000	3400
					2	5.0	1500	1400	1200	3100	2500	2900
					3	5.0	1300	2150	1000	2600	2000	2450
					4	5.0	1000	1700	900	2000	1400	1900
					5	5.0	670	1200	750	1500	850	1400
					6	5.0	400	660	790	1200	860	1100
					7	5.0	96	124	880	580	250	420
					8	5.0	56	200	950	450	480	280
					9	5.0	175	550	1050	440	730	320
					10	5.0	200	570	1050	450	750	320
					11	5.0	420	1020	1250	700	1080	570
					12	5.0	No apparent change. He pressure increased to 225-300 psig to actuate fixture. Primary coolant temperature reduced 10°F. Data taken at reduced temperature.					
					13	5.0						
					14	5.0						
					15	5.0						
					16	5.0						
					17	5.0	150	500	1050	440	750	290
					18	5.0	140	165	870	610	225	480
					19	5.0	400	680	800	1000	330	930
					20	5.0	550	950	760	1225	580	1180
					21	5.0	940	1700	840	2000	1400	1900
					22	5.0	1050	1890	860	2300	1500	2000
					23	5.0						
					24	5.0						
			1000***	13.42	****	5.0	1800	2900	1850	3350	2900	3300
			1025	13.84		5.0	1800	2875	1850	3350	2900	3350
			1030	13.92		5.0	1800	2875	1900	3300	2800	3350
			1105	14.50		5.0	1750	2800	1850	3250	2800	3300
			1110	14.58		5.0	1800	2800	1850	3200	2800	3300

Table 4 - LVDT Output Voltages, Irradiation Raw Data

Date (1963)	Time (hr)	Run- Time (hr)	Position	Input (volts)	Output Voltages, Millivolts							
					A	B	C	D	E	F	G	H
10/16	1135	15.00		5.0	1800	2500	1900	3300		2650		3200
	1230	15.92		5.0	2000	2500	2000	3350		2500		3000
	1330	16.92		5.0	2100	2600	2300	3450		2750		2800
	1430	17.92		5.0	2100	2600	2450	3600		2800		2450
	1530	18.92		5.0	2200	2600	2600	3600		2800		2000
	1630	19.92		5.0	2200	2600	2700	3700		2500		1800
	1730	20.92		5.0	2400	2700	2800	4000		2600		1900
	1830	21.92		5.0	2200	2600	3000	4000		2300		2000
	1900	22.42		5.0	2200	2600	3000	4000		2300		2000
	2000	23.42		5.0	2300	2700	3000	3800		2400		2800
	2100	24.42		5.0	4750	2600	3000	3800		2300		3600
	2200	25.42		5.0	2900	2500	3000	4000		2100		3200
	2300	26.42		5.0	3000	2600	3000	3800		2100		3800
	2400	27.42		5.0	3200	2600	3000	3800		2000		3500
10/17	0100	28.42		5.0	3000	2700	3000	3900		2000		3700
	0200	29.42		5.0	3200	2600	2900	3800		1700		3700
	0300	30.42		5.0	4600	2700	3100	3800		1500		4500
	0400	31.42		5.0	5000	2800	3200	3600		1500		4500
	0500	32.42		5.0	4800	2800	3200	3500		2400		4500
	0600	33.42		5.0	4150	2600	3100	3650		1600		400
	0700	34.42		5.0	5100	2400	2800	3300		1400		3700
	0800	35.42		5.0	5200	2400	2850	3300		1600		3700
	0900	36.42		5.0	5200	2400	2800	3200		1700		3700
	1000	37.42		5.0	5300	2700	3100	3400		2000		4600
	1100	38.42		5.0	5800	2800	3200	3900		2500		4700
	1200	39.42		5.0	5100	2400	2800	3200		2600		3800
	1300	40.42		5.0	5100	2500	2750	3300		2650		3900
	1400	41.42		5.0	5200	2500	2800	3400		2700		3800
	1510	42.58		5.0	5100	2900	2600	3000		3700		4100
	1605	43.50		5.0	5000	2300	2500	3000		3900		4000
	1700	44.42		5.0	5800	2800	3000	3000		4050		4800
	1800	45.42		5.0	5100	2400	2700	2800		3800		4300
	1900	46.42		5.0	5000	2300	2200	2900		4000		4100
	2000	47.42		5.0	5000	2400	2250	2800		3700		4350

Table 4 - LVDT Output Voltages, Irradiation Raw Data

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run- Time</u> (hr)	<u>Position</u>	<u>Input</u> (volts)	<u>Output Voltages, Millivolts</u>							
					A	B	C	D	E	F	G	H
10/17	2100	48.42		5.0	5000	2400	2300	2800		4000		4200
	2200	49.42		5.0	5050	2400	2300	2700		4000		4400
	2300	50.42		5.0	5000	2300	2200	2600		4000		4100
10/18	2400	51.42		5.0	5800	2700	2500	2750		2300		5000
	0100	52.42		5.0	5300	2300	2100	2600		4000		4200
	0205	53.50		5.0	5800	2600	2500	2700		4700		5000
	0300	54.42		5.0	6000	2800	2500	2800		4200		5000
	0400	55.42		5.0	6000	2700	2500	2800		4300		5000
	0519	56.74		5.0	5100	2400	2200	2300		3900		4200
	0605	57.50		5.0	5200	2500	2300	2300		3900		4300
	0702	58.45		5.0	5800	2800	2600	2600		4300		4800
	0755	59.34		5.0	5700	2600	2500	2700		4400		4900
	0900	60.42		5.0	5900	2800	2900	2500		4300		4700
	0956	61.35		5.0	5900	2800	3200	2500		4300		4800
	1110	62.58		5.0	5900	2800	3200	2500		4300		4700
	1300	64.42		5.0	5900	2800	3300	2600		4300		4600
	1400	65.42		5.0	5900	2800	3300	2500		4200		4700
	1500	66.42		5.0	5800	2800	3250	2350		4300		4650
	1600	67.42		5.0	5600	2800	3200	2300		4200		4300
	1700	68.42		5.0	5100	2400	3000	2000		4000		3900
	1800	69.42		5.0	5800	2750	3300	2700		4600		4800
	1900	70.42		5.0	5200	2400	2900	2100		3700		4500
	2000	71.42		5.0	5200	2400	3000	2050		3600		4000
	2102	72.45		5.0	5300	2400	3000	2100		3800		4000
	2200	73.42		5.0	5900	2800	3400	2250		4250		4600
	2300	74.42		5.0	6000	2900	3200	2200		4100		4300
10/19	0001	75.43		5.0	5800	2800	3200	2100		4100		4200
	0100	76.42		5.0	5900	2800	3200	2100		4100		4200
	0210	77.58		5.0	5900	2800	3450	2700		4250		4450
	0307	78.54		5.0	6600	2800	3500	2150		4300		4500
	0400	79.42		5.0	6600	2800	3500	2200		4400		4400
	0500	80.42		5.0	6400	2800	3500	2300		4400		4400
	0600	81.42		5.0	6600	2800	3500	2350		4400		4500
	0700	82.42		5.0	6300	2700	3500	3000		4200		4500
	0800	83.42		5.0	6800	2300	3500	2000		3500		6000

Table 4 - LVDT Output Voltages, Irradiation Raw Data

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run- Time</u> (hr)	<u>Position</u>	<u>Input</u> (volts)	<u>Output Voltages, Millivolts</u>							
					A	B	C	D	E	F	G	H
10/19	0900	84.42		5.0	6700	2400	3500	2100		3500		6500
	1000	85.42		5.0	5100	2300	3150	1900		3200		8100
	1100	86.42		5.0	5100	2350	3100	1800		2800		6800
	1200	87.42		5.0	5000	2300	3100	1900		3350		8600
	1300	88.42		5.0	5100	2400	3100	2200		3350		1550
	1400	89.42		5.0	6850	2700	3500	1900		4000		2000
	1500	90.42		5.0	6800	2700	3600	1900		4700		2100
	1600	91.42		5.0	5300	2400	3600	1800		3750		2600
	1700	92.42		5.0	6700	2800	3600	1850		4150		2850
	1800	93.42		5.0	6700	2800	3600	1850		4200		3500
	1900	94.42		5.0	6700	2750	3500	1850		4200		3700
	2000	95.42		5.0	6800	2700	3500	1800		4250		4000
	2100	96.42		5.0	6800	2400	3500	1700		4100		4000
	2230	97.92		5.0	6700	2300	3600	1900		4200		4000
	2300	98.42		5.0	6800	2300	3100	2000		4150		3700
	2330	98.92		5.0	6700	2700	3700	2330		4100		2750
	2340	99.08		5.0	4800	2500	3100	2100		3400		2400

* Time readings started.

** Finished readings.

*** Fixture became inoperative at this position.

**** Reactor critical at 13.42 hr; Reactor power was 100 Kw during 13.84 and 13.92 hr; 1 Mw during 14.50 and 14.58 hr; 10 Mw during 15.00 hr, and 40 Mw at 15.92 hr. (Refer to Figure 1)

***** Fixture became inoperative at an unknown cam position, and remained inoperative throughout the remainder of the run.

Table 5 - LVDT Insulation Resistances, Pre-Irradiation Raw Data
(Expressed in Kilohms)

<u>Date</u>	<u>Time</u>	<u>Run Time</u> (hr)	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
*			-	-	2600	150	.92	500	100	70,000
*			-	-	550	650	10	1000	350	950
10/15**	1115		-	-	1.5	5	1.8	2	1	.7

*Data taken at Large, Penna.; first row - dry conditions; second row - wet conditions.
 **Data taken at PBRF.

Table 6 - LVDT Insulation Resistance, Irradiation Raw Data
(Expressed in Kilohms)

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run Time</u> (hr)	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
10/15	2045	0.16	-	-	2.0	2.0	1.4	2.2	1.5	2.0
	2223	1.80	-	-	1.0	1.8	1.9	1.8	.7	1.3
10/16	1000	13.4	2.6	2.6	1.1	1.5	1.2	.7	.12	1.3
	1038	14.0	2.6	2.6	1.15	1.6	1.3	1.75	.13	1.35
	1113	14.6	4.0	4.0	1.3	1.2	1.0	2.0	.30	1.4
	1145	15.3	3.4	3.4	1.3	1.5	2.4	1.4	.40	1.0
	1235	16.0	3.0	3.0	1.2	1.3	1.5	1.1	.50	.60
	1335	17.0	3.0	3.0	1.2	1.3	1.4	1.0	1.0	.60
	1430	17.9	3.0	3.0	1.1	1.1	1.4	1.0	1.0	.65
	1530	18.9	3.0	3.0	1.4	1.3	1.1	1.3	1.2	.65
	1630	19.9	3.6	3.0	3.0	3.0	1.5	2.9	1.9	1.1
	1730	20.9	4.0	3.6	3.2	2.8	1.8	2.4	2.0	1.2
	1830	21.9	4.0	4.0	3.5	3.0	1.1	2.5	3.0	1.4
	1900	22.4	4.0	4.0	3.5	3.0	.8	2.5	3.0	1.2
	2000	23.4	2.5	2.3	2.2	2.6	1.1	2.2	1.5	.70
	2100	24.4	3.3	2.8	2.4	2.9	1.2	2.5	1.8	.85
	2200	25.4	2.8	3.3	2.4	2.6	1.4	2.9	2.0	.85
	2300	26.4	2.7	2.8	2.2	2.9	2.4	2.7	2.2	.85
	2400	27.4	2.7	2.7	2.0	3.0	1.6	2.8	2.5	.90
10/17	0100	28.4	2.7	2.7	1.9	3.0	1.6	3.0	2.5	.70
	0200	29.4	2.6	2.7	1.7	2.8	1.7	2.8	2.6	.91
	0300	30.4	2.7	2.7	1.8	2.8	1.7	2.8	2.8	.95
	0400	31.4	2.8	2.8	1.8	2.5	1.7	2.6	2.4	.97
	0500	32.5	2.4	2.4	1.9	2.1	1.5	1.0	2.1	.95
	0600	33.4	2.3	2.3	1.9	2.2	1.8	1.5	2.2	.95
	0700	34.4	2.3	2.3	1.9	2.2	1.8	2.1	2.3	1.3
	0800	35.4	2.3	2.3	1.9	2.2	1.8	1.4	2.2	1.5
	0900	36.4	2.3	2.3	1.9	2.1	1.9	1.4	2.3	1.5
	1000	37.4	2.3	2.3	1.8	2.1	1.8	1.4	2.3	1.5
	1100	38.4	2.3	2.3	1.8	2.2	1.8	1.3	2.3	1.7
	1200	39.4	2.3	2.3	1.8	2.2	1.8	1.4	2.3	1.6
	1300	40.4	2.3	2.3	1.8	2.2	1.8	1.3	2.3	1.5
	1400	41.4	2.3	2.3	1.8	2.2	1.8	1.4	2.3	1.5
	1510	42.6	2.6	2.6	.90	2.1	1.5	2.8	4.0	.85

Table 6 - LVDT Insulation Resistance, Irradiation Raw Data
(Expressed in Kilohms)

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run Time</u> (hr)	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
10/17	1610	43.6	2.9	2.9	.90	2.0	1.4	2.9	3.0	.80
	1700	44.4	2.9	2.9	.90	2.0	1.2	2.9	2.9	.80
	1800	45.4	2.6	2.7	.85	2.2	1.6	3.0	3.5	.75
	1900	46.4	2.8	2.8	.85	2.0	1.4	3.0	3.0	7.0
	2000	47.4	2.7	2.7	.85	2.2	1.8	3.3	3.5	.80
	2100	48.4	2.8	2.8	.75	2.0	1.5	3.0	3.4	.75
	2208	49.5	2.6	2.7	.80	2.2	1.6	3.5	4.0	.80
10/18	0004	51.5	2.6	2.6	.80	2.1	1.7	5.0	4.7	.80
	0100	52.4	2.8	2.8	.80	2.0	1.7	5.0	3.5	.80
	0210	53.6	2.6	2.7	.75	2.1	1.8	6.0	4.5	.90
	0300	54.4	2.8	2.8	.80	2.0	2.0	5.5	4.0	.80
	0400	55.4	2.9	2.9	.70	1.8	1.8	5.0	5.0	1.05
	0510	56.6	2.9	2.9	.70	1.8	1.3	5.0	5.0	.70
	0600	57.4	2.9	2.9	.70	1.8	1.3	5.0	5.0	.70
	0710	58.6	2.9	2.9	.80	1.8	2.0	6.5	3.3	.80
	0800	59.4	2.9	2.9	.80	1.8	1.5	6.5	4.0	.80
	0900	60.4	2.9	2.9	.70	1.8	2.0	6.5	4.0	.70
	1005	61.5	2.7	2.7	1.0	2.0	2.8	10.0	4.5	.95
	1110	62.6	2.7	2.7	.80	2.0	2.8	10.0	4.5	.90
	1200	63.4	2.7	2.8	.75	2.0	2.6	10.0	4.5	.90
	1300	64.4	2.7	2.7	.85	2.0	2.8	10.0	4.5	.90
	1400	65.4	2.4	2.4	.85	2.0	2.8	10.0	4.5	.90
	1509	66.6	2.7	2.7	1.1	1.8	1.8	10.0	5.5	1.0
	1600	67.4	2.7	2.7	1.0	1.5	2.0	10.0	5.5	8.5
	1700	68.4	2.7	2.7	1.0	1.5	1.8	10.0	3.8	8.1
	1800	69.4	2.7	2.7	1.1	1.7	2.0	15.0	5.0	.90
	1900	70.4	2.7	2.7	1.1	1.6	1.9	16.0	6.0	.90
	2000	71.4	2.7	2.7	1.0	1.5	1.9	15.0	5.5	.90
10/19	2104	72.5	2.7	2.7	1.2	1.7	2.2	20.0	5.5	1.0
	2200	73.4	2.7	2.7	1.2	1.7	2.1	20.0	3.5	1.1
	2300	74.4	2.7	2.7	1.2	1.5	2.1	20.0	4.0	.90
	0001	75.4	2.7	2.7	1.3	1.5	2.2	21.0	5.0	.90
	0100	76.4	2.7	2.7	1.2	1.4	2.0	23.0	8.0	.90
	0215	77.7	2.7	2.7	1.2	1.7	2.2	23.0	7.0	1.2
	0311	78.6	2.7	2.7	1.2	1.6	2.2	23.0	7.0	1.0

Table 6 - LVDT Insulation Resistance, Irradiation Raw Data
(Expressed in Kilohms)

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run Time</u> (hr)	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>	<u>E</u>	<u>F</u>	<u>G</u>	<u>H</u>
10/19	0400	79.4	2.7	2.7	1.2	1.7	2.1	23.0	7.0	1.2
	0500	80.4	2.7	2.7	1.2	1.6	2.2	23.0	8.0	1.0
	0600	81.4	2.7	2.7	1.2	1.6	2.0	23.0	8.0	1.3
	0700	82.4	2.7	2.7	1.2	1.6	2.0	23.0	4.0	1.0
	0800	83.4	2.7	2.7	1.1	1.6	2.5	3.0	4.0	.40
	0900	84.4	2.7	2.7	1.2	1.5	2.6	3.0	5.0	.39
	1000	85.4	2.7	2.7	1.2	1.5	2.0	3.0	6.0	.40
	1100	86.4	2.7	2.7	1.2	1.5	2.4	3.0	6.0	.38
	1200	87.4	2.7	2.7	1.2	1.4	2.3	3.0	5.0	.37
	1300	88.4	2.7	2.7	1.2	1.4	2.3	3.5	4.5	.38
	1400	89.4	2.7	2.7	1.1	1.4	2.2	3.5	4.5	.38
	1500	90.4	2.7	2.7	1.2	1.4	2.2	4.0	5.0	.47
	1600	91.4	2.7	2.7	1.2	1.3	2.4	3.5	3.0	.80
	1700	92.4	2.7	2.7	1.1	1.5	2.4	3.5	3.0	.50
	1800	93.4	2.7	2.7	1.1	1.3	2.4	3.5	2.0	.45
	1900	94.4	2.7	2.7	1.1	1.2	2.2	3.0	2.2	.45
	2100	96.4	2.7	2.7	1.2	1.3	2.6	3.0	2.8	.50
	2200	97.4	2.7	2.7	1.2	1.3	2.5	3.1	2.8	.50
	2230	97.9	2.7	2.7	1.35	1.5	2.9	3.5	3.0	.60
	2251	98.3	2.7	2.7	1.6	1.5	3.0	4.0	3.5	.90
	2329	98.9	2.7	2.7	2.3	2.0	4.0	4.5	4.5	1.5
	2345	99.2	2.7	2.7	2.6	2.0	4.5	4.5	4.5	2.0

Table 7 - LVDT Secondary Winding Resistances, Pre-Irradiation Raw Data

<u>Date</u>	<u>Time</u> (hr)	<u>Winding Resistances (Ohms)</u>							
		A	B	C	D	E	F	G	H
*		-	-	46	52	165	60	92	58
*		-	-	46	52	165	60	92	58
10/15 **	1115	-	-	50	58	open	65	open	65

*Data taken at Large, Penna.; first row - dry conditions; second row - wet conditions.
 **Data taken at PBRF.

Table 8 - LVDT Primary (Pr) and Secondary (Sec) Winding Resistances,
Irradiation Raw Data

Date (1963)	Time (hr)	Run Time (hr)	Winding Resistances (Ohms)															
			A		B		C		D		E**		F		G**		H	
			Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec
10/15	2045	0.16	-	*	-	*	-	50	-	57			-	65			-	64
	2223	1.80	-		-		-	50	-	57			-	65			-	62
10/16	0400	7.42	-		-		-	50	-	60			-	70			-	75
	1008	13.6	9.4		9.4		9.4	50	9.4	54			9.4	64			9.4	62
	1045	14.2	8.4		8.4		8.4	44	8.4	49			8.4	57			8.4	55
	1118	14.7	9.5		9.5		9.5	45	9.5	49			9.5	65			9.5	64
	1145	15.3	-		-		-	52	-	58			-	68			-	68
	1235	16.0	-		-		-	55	-	62			-	73			-	80
	1330	16.9	-		-		-	55	-	62			-	72			-	77
	1430	17.9	11		11		11	55	11	65			11	75			11	80
	1540	19.1	11		11		11	55	11	60			11	75			11	75
	1635	20.0	11		11		11	45	11	55			11	63			11	65
	1735	21.0	11		11		11	46	11	53			11	65			11	68
	1835	22.0	11		11		11	55	11	60			11	85			11	90
	1900	22.4	11		11		11	50	11	55			11	65			11	70
	2000	23.4	11		11		11	48	11	55			11	68			11	74
	2100	24.4	11		11		11	50	11	55			11	68			11	75
	2200	25.4	11		11		11	50	11	55			11	65			11	75
	2300	26.4	11		11		11	50	11	60			11	70			11	78
	2400	27.4	11		11		11	50	11	56			11	70			11	70
10/17	0100	28.4	11		11		11	50	11	55			11	70			11	65
	0200	29.4	11		11		11	55	11	63			11	75			11	84
	0300	30.4	11		11		11	55	11	63			11	75			11	84
	0400	31.4	11		11		11	56	11	62			11	75			11	84
	0500	32.4	10		10		10	55	10	60			10	75			10	85
	0600	33.4	10		10		10	55	10	60			10	75			10	85
	0700	34.4	10		10		10	55	10	60			10	75			10	85
	0800	35.4	10		10		10	55	10	63			10	75			10	85
	0900	36.4	10		10		10	56	10	63			10	75			10	85
	1000	37.4	10		10		10	55	10	62			10	75			10	85
	1100	38.4	10		10		10	55	10	65			10	75			10	85

Table 8 - LVDT Primary (Pr) and Secondary (Sec) Winding Resistances,
Irradiation Raw Data

Date (1963)	Time (hr)	Run Time (hr)	Winding Resistances (Ohms)															
			A		B		C		D		E**		F		G**		H	
			Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec
10/17	1200	39.4	10	*	10	*	10	55	10	65			10	75			10	85
	1300	40.4	10		10		10	55	10	63			10	75			10	85
	1400	41.4	10		10		10	55	10	63			10	75			10	85
	1510	42.6	11		11		11	56	11	63			11	76			11	89
	1612	43.6	11		11		11	55	11	63			11	77			11	89
	1700	44.4	11		11		11	55	11	63			11	75			11	89
	1800	45.4	11		11		11	56	11	65			11	79			11	90
	1900	46.4	11		11		11	56	11	65			11	80			11	90
	2000	47.4	11		11		11	57	11	64			11	80			11	92
	2100	48.4	11		11		11	56	11	63			11	77			11	89
	2206	49.5	11		11		11	56	11	64			11	80			11	92
	2300	50.4	11		11		11	54	11	63			11	77			11	79
	0001	51.4	11		11		11	55	11	63			11	79			11	91
	10/18	0100	52.4	11		11		11	54	11	60			11	70			11
0210		53.6	11		11		11	55	11	63			11	80			11	92
0300		54.4	11		11		11	57	11	64			11	75			11	88
0400		55.4	11		11		11	56	11	64			11	75			11	85
0510		56.6	11		11		11	55	11	65			11	80			11	90
0600		57.4	11		11		11	56	11	64			11	80			11	85
0708		58.6	11		11		11	54	11	63			11	75			11	85
0800		59.4	11		11		11	54	11	63			11	75			11	85
0900		60.4	10		10		10	52	10	62			10	75			10	85
1000		61.4	12		12		12	54	12	62			12	76			12	86
1105		62.5	11		11		11	54	11	62			11	75			11	86
1200		63.4	11		11		11	54	11	62			11	75			11	86
1300		64.4	11		11		11	55	11	63			11	75			11	85
1400		65.4	11		11		11	55	11	64			11	75			11	85
1507		66.5	10		10		10	55	10	64			10	76			10	86
1600		67.4	10.5		10.5		10.5	54	10.5	60			10.5	77			10.5	86
1700		68.4	11		11		11	54	11	60			11	77			11	89
1800		69.4	11		11		11	55	11	62			11	79			11	90
1900		70.4	10		10		10	55	10	62			10	79			10	89

Table 8 - LVDT Primary (Pr) and Secondary (Sec) Winding Resistance
Irradiation Raw Data

Date (1963)	Time (hr)	Run Time (hr)	Winding Resistances (Ohms)															
			A		B		C		D		E**		F		G**		H	
			Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec	Pr	Sec
10/18	2000	71.4	10	*	10	*	10	57	10	64			10	80			10	90
	2108	72.6	11		11		11	54	11	59			11	76			11	86
	2200	73.4	11.3		11.3		11.3	54	11.3	60			11.3	70			11.3	86
	2300	74.4	11		11		11	54	11	60			11	76			11	88
10/19	0100	76.4	11		11		11	54	11	60			11	76			11	89
	0220	77.8	10.2		10.2		10.2	54	10.2	60			10.2	76			10.2	86
	0310	78.6	10		10		10	55	10	62			10	76			10	86
	0400	79.4	10		10		10	55	10	62			10	76			10	86
	0500	80.4	10		10		10	54	10	63			10	76			10	85
	0600	81.4	10		10		10	55	10	63			10	76			10	85
	0700	82.4	10		10		10	55	10	63			10	76			10	89
	0800	83.4	10		10		10	55	10	60			10	75			10	81
	0900	84.4	5.5		5.5		5.5	54	5.5	61			5.5	75			5.5	81
	1000	85.4	7		7		7	55	7	61			7	75			7	82
	1100	86.4	5		5		5	55	5	62			5	77			5	85
	1200	87.4	5.1		5.1		5.1	55	5.1	61			5.1	76			5.1	85
	1300	88.4	5		5		5	55	5	61			5	76			5	83
	1400	89.4	5		5		5	55	5	61			5	77			5	85
	1500	90.4	12		12		12	65	12	60			12	76			12	85
	1600	91.4	14		14		14	54	14	60			14	76			14	83
	1700	92.4	14		14		14	57	14	65			14	77			14	90
	1800	93.4	14		14		14	54	14	64			14	76			14	85
	1900	94.4	13		13		13	55	13	65			13	79			13	85
	2100	96.4	12		12		12	55	12	62			12	76			12	85
	2200	97.4	12		12		12	55	12	61			12	78			12	85
	2230	97.9	11.5		11.5		11.5	54	11.5	60			11.5	75			11.5	84
	2252	98.3	11		11		11	53	11	58			11	74			11	79
	2333	99.0	10		10		10	51	10	56			10	68			10	73
	2347	99.2	9.5		9.5		9.5	50	9.5	5			9.5	66			9.5	68

*Secondary resistances for transducers A and B were not requested by the experiment sponsor.
**Transducers E and G were inoperative.

Table 9 - LVDT Surface Temperatures (Raw Data)

<u>Date</u> (1963)	<u>Time</u> (hr)	<u>Run Time</u> (hr)	<u>Temperature Readings, °F</u>			
			<u>Thermocouple 1</u>	<u>Thermocouple 2</u>	<u>Thermocouple 3</u>	<u>Thermocouple 4</u>
10/15	0630	0	122*	122.5*	124*	125*
10/16	0100	4.4	114	123	122	123
10/16	0145	5.2	112	121	123	121
10/16	0330	6.9	107	113	113	112
10/16	0430	7.9	97	114.3	114.3	113
10/16	0530	8.9	116	124	124.5	122
10/16	0630	9.9	117	127	127	124
10/16	0730	10.9	110	116	116	116
10/16	1100	14.4	114	119.3	119.4	119
10/16	1200	15.4	108	114.5	114.5	114.2
10/16	1300	16.4	112	130.5	130.6	128
10/16	1400	17.4	122	130.4	130.4	127.5
10/16	1515	18.7	120	131	132	128
10/16	1700	20.4	120	130	131	128
10/16	1800	21.4	121	131	132	128
10/16	1930	22.9	120	130	131.5	127.5
10/16	2025	23.8	136	139	138	135
10/16	2130	24.9	135	135	136	132
10/16	2230	25.9	125	135	137	131
10/16	2330	26.9	125	136.5	137	132
10/17	0030	27.9	124	135	135	130
10/17	0130	28.9	123	136	136	129
10/17	0230	29.9	123	132	132	129
10/17	0330	30.9	125	133	133.4	129.4
10/17	0430	31.9	122	131.6	132	128
10/17	0530	32.9	124	133.2	134.2	129.8
10/17	0630	33.9	123	131.8	132.2	128.8
10/17	0730	34.9	122	131.8	133	128
10/17	0830	35.9	125	133.7	135.3	131.5
10/17	0930	36.9	124	134.3	133.1	130.6
10/17	1030	37.9	123	130.5	132.5	129.2
10/17	1130	38.9	122	130.4	133	130.3
10/17	1230	39.9	122	132	133.5	129.5

*Pre-irradiation temperatures

Table 9 - LVDT Surface Temperatures (Raw Data)

Date (1963)	Time (hr)	Run Time (hr)	Temperature Readings, °F			
			Thermocouple 1	Thermocouple 2	Thermocouple 3	Thermocouple 4
10/17	1330	40.9	122	132.4	133	130
10/17	1430	41.9	122	133	133.4	130
10/17	1535	43.0	122	134	134	131
10/17	1635	44.0	123	132	132	129
10/17	1735	45.0	124	132	134	128
10/17	1830	45.9	125	135	134	131
10/17	1930	46.9	126	136	138	132
10/17	2030	47.9	123	133	134	130
10/17	2130	48.9	122	133	132	129
10/17	2230	49.9	126	137	138	132.5
10/17	2330	50.9	124	133	136	130
10/18	0003	51.5	126	133	135	130
10/18	0130	52.9	124	132	135	130
10/18	0230	53.9	124	134	135	130
10/18	0330	54.9	124	133	135	130
10/18	0430	55.9	125	134	135	132
10/18	0530	56.9	124	134	135	130
10/18	0630	57.9	122	131	133	120.5
10/18	0730	58.9	124	133	133	130.5
10/18	0830	59.9	126	136	137	132
10/18	0930	60.9	-	-	-	-
10/18	1031	61.9	123	132.6	133.7	129.7
10/18	1130	62.9	123	132	133	130
10/18	1230	63.9	123	132.5	133.4	129.5
10/18	1330	64.9	123	133	132.4	131.1
10/18	1430	65.9	123	131.8	133.5	128.5
10/18	1530	66.9	122.5	131	133	138
10/18	1630	67.9	122	131	133	127
10/18	1730	68.9	123.5	134	134.5	129.5
10/18	1830	69.9	125	133	134	131
10/18	1930	70.9	124	134	135	131
10/18	2030	71.9	124	134	138	132

Table 9 - LVDT Surface Temperature (Raw Data)

Date (1963)	Time (hr)	Run Time (hr)	Temperature Readings, °F			
			Thermocouple 1	Thermocouple 2	Thermocouple 3	Thermocouple 4
10/18	2130	72.9	124	134	135	130
10/18	2230	73.9	121	129.9	132.3	126.9
10/18	2330	74.9	120	130	132	124
10/19	0032	75.9	121	129.7	131.3	126.6
10/19	0130	76.9	120	130	131	129
10/19	0234	78.0	119	129.2	130.4	125.7
10/19	0330	78.9	120	129	130	125.5
10/19	0430	79.9	122	129.1	131.2	126.3
10/19	0530	80.9	119	129	131.3	126.4
10/19	0630	81.9	119	127.1	132	126.2
10/19	0730	82.9	95	124	121.5	122
10/19	0830	83.9	121	130	131	128
10/19	0930	84.9	120	131	132	127
10/19	1030	85.9	122	131	132	128
10/19	1130	86.9	121	132	132	128
10/19	1230	87.9	121	130	132	127
10/19	1330	88.9	122	131	131	127
10/19	1430	89.9	121	130	131	127
10/19	1530	90.9	122	131	131.3	127.5
10/19	1630	91.9	122	130.4	131.6	128
10/19	1730	92.9	124	132	132	128
10/19	1830	93.9	123	132	132	128.3
10/19	2130	96.9	121.6	132	132	128
10/19	2230	97.9	121	131	133	128
10/19	2244	98.1	118	126	125	123
10/19	2258	98.3	113	118	118	116
10/19	2336	99.0	96	104	105	103
10/19	2350	99.2	92	98	99	99

4.0 REFERENCES

1. WANL-TNR-119, "Experiment Design Manual and Hazards Analysis, Plum Brook Reactor Facility, Exp. No. 63-05", Radiation Effects Program.
2. WANL-TNR-126, "Design Manual and Hazards Analysis for Exp. No. 23/W202, Linear Displacement Transducers at Plum Brook Reactor Facility (RFI, 63-05)", Radiation Effects Program, December 18, 1963.
3. WANL-TME-439, "Test Specification for NRX-A Candidate Linear Motion Displacement Transducers to be Irradiation at the Plum Brook Reactor Facility During August, 1963", July 22, 1963.