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DUQUESNE LIGHT COMPANY

SHIPPINGPORT ATOMIC POWER STATION

TEST RESULTS

DLCS 2430105

T-641303B

PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS

CORE I SEED 2

Section 1 of 1 Section

First Issue, January 31, 1961

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TEST RESULTS

DLCS 2430105

T-641303B

PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS

CORE I SEED 2

Purpose

To determine the direction and magnitude of any short or long term drift in the following temperature sensing elements; core thermocouples, primary loop and pressurizer resistance thermometers, and the resistance thermometers in the secondary side of the boilers.

Conclusion

Due to the lack of comparative data, determination of temperature sensing element and instrumentation drifts could not be made.

Due to station conditions only Reactor Coolant Loops A and C were in service during the entire test and consequently, calibration of the temperature sensing instruments on the B and D loops was impossible.

The calibrating Tc's were used as standards for temperature intercalibrations. Analysis of the data taken on A and C loops showed the following:

1. The Norwood Th and Tc resistance thermometers were reading within ± 0.4 per cent of the calibrating Tc's.
2. The Bristol Recorder was reading within ± 0.9 per cent of the calibrating Tc's.
3. Data obtained for Tb resistance thermometers showed appreciable variation from calibrating Tc temperatures. This variation indicates the need for calibration of the Tb "Bristol" receiving recorder.
4. A total of 87 of the 98 core thermocouples were reading within ± 7 F of the calibrating Tc's. The thermocouples which were not within this limit were shorted, and were reading the ambient temperature of the junction box.
5. The temperature sensing elements of the Mueller Tc Recorders were calibrated over the range 100 F to 500 F. The Mueller Tc Resistance Bridges should be calibrated over the maximum station temperature range encountered during operation (100 F - 535 F), since they are used as the standard for calibrating all the station recorders. Safety restrictions on present oil bath temperature calibrating equipment (flash point of oil approximately 530 F) limits the maximum temperature, to which the temperature sensing element can be calibrated, to 510 F.

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Due to the lack of calibration data above 500 F for the Mueller Tc's, the standard during the test, all calibrations above 500 F are questionable and should not be used.

Description of Test Equipment and Test Procedure

Periodic Intercalibration of Temperature Sensing Elements, DLCS 2430105 (T-641303) was performed in accordance with the approved test procedure, third issue, dated April 28, 1960.

The Th and Tc Norwood Control Indicator inputs were disconnected from their receivers and the resistance necessary to drive the Norwood Th and Tc Indicators to 450, 460, 480, 500, 520, 540 and 550 F was determined. The input circuits were then reconnected to the Norwood Receivers.

With the Reactor Coolant Temperature at $500 \pm 1/2$ F for 2 hours, as determined by the Mueller Bridges, the Norwood Th and Tc Indicators were adjusted to read in agreement with the calibrating Tc's.

The Reactor Coolant Temperature was lowered to $485 \pm 1/2$ F, as determined by the Mueller Bridges; the data as outlined in the procedure was taken. Subsequently, this procedure was repeated at temperatures of 500 F, 515 F and 530 F.

At the termination of the temperature runs, the Norwood Th and Tc resistance thermometer inputs were again disconnected from the receiver units and resistances necessary to drive the indicator to the above mentioned points were determined.

Results

DLCS 2430105 was performed from April 29 to April 30, 1960. The data taken during the test is tabulated in the Appendix as Tables I-VI.

The Mueller Bridge Tc's were used as standards of comparison for the instruments recording reactor coolant temperature. Calibration curves were plotted for the 1A and 1C coolant loop Norwood Indicators. The calibration curves are shown on Figures 1-4.

At the start of the test, with the plant at 500 F, the Norwood Th's and Tc's were adjusted to read in agreement with the Calibrating Tc's. Table XI-A contains corrections applied to the Mueller Tc Resistance Bridges and lists the adjustments made to the Norwood Indicators. The 1A Norwood Coolant Tc could not be adjusted to read any higher than shown in the table. Resistance necessary to drive the Norwood Indicators to various temperatures were determined before and after the adjustments at 500 F, and this data is shown in Table XI.

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T-641303B

PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS, CORE I SEED 2

The corrections for all core thermocouples is given in Tables VIII through X. Table VII gives a comparison of the correction factors for core thermocouples as obtained by Westinghouse from DLCS 2430104 and those determined from this performance, DLCS 2430105. The 36 seed exit water and inlet water thermocouples were reading within ± 5 F of the calibrating Tc's. This was considered to be a reasonable error and the recorder was not adjusted. Auxiliary Seed Exit I-12 was not recording at the time of the test. Blanket exit and inlet temperatures indicated that 28 of the 38 thermocouples were reading within ± 6 F of the calibrating Tc's. Those reading in excess of ± 20 F were considered defective. No temperature emf relation was established on newly installed seed thermocouples for comparison with results of this test. Standard conversion tables are not truly representative of normal deviations of newly installed operating thermocouples.

The Swartwout recorders were inadvertently not adjusted at 500 F.

An intercalibration of the pressurizer resistance thermometers was impossible since no valid data was obtained for either of the two pressurizer calibrating thermometers. The pressurizer water calibrating thermometer was broken and the pressurizer steam calibrating thermometer was read with an improper type resistance bridge during the test.

All calibration data for the Seed Exit and Inlet, Blanket Exit and Inlet, Seed Fuel Element Temperature, Mueller Bridges and the ΔT Recorders are given in Tables XII through XV. Figures 5-13 give the calibration curves for the above recorders.

Correction factors could not be determined for the ΔT Recorder and the CIP Jackboard due to the inconsistent data obtained.

FIGURE 2
1C-Th Norwood Correction
4/30/60

Correction F

1.5

1.0

0.5

0

0.5

1.0

470

480

490

500

510

520

530

540

Temperature F

689
90

5

FIGURE 7

ΔT - Range 1 Recorder
Calibration
Recorder 57-N1-9R
5/1/60

FIGURE 8

ΔT - Range II Recorder
Calibration
Recorder 57-N1-9R
5/1/60

FIGURE 13

Seed Fuel Element
Temperature Recorder
Calibration
Recorder 57-N1-4R
4/28/60

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE I

Date	4/30/60				
Time	1045	1105	1125	1145	
Run Temp. (Nominal)	485 F				Avg.
1A Coolant Loop Th (Norwood)	483.3	483.3	483.3	483.3	483.3
1B Coolant Loop Th (Norwood)		B Loop isolated			
1C Coolant Loop Th (Norwood)	484.8	485.0	485.0	485.0	485.0
1D Coolant Loop Th (Norwood)		D Loop isolated			
1A Coolant Loop Tc (Norwood)	484.8	484.6	484.7	484.7	484.7
1B Coolant Loop Tc (Norwood)		B Loop isolated			
1C Coolant Loop Tc (Norwood)	484.5	484.3	484.3	484.2	484.3
1D Coolant Loop Tc (Norwood)		D Loop isolated			
1A Coolant Loop Th (Swartout)	450.0	450.0	450.0	450.0	450.0
1B Coolant Loop Th (Swartout)		B Loop isolated			
1C Coolant Loop Th (Swartout)	465.0	465.0	465.0	465.0	465.0
1D Coolant Loop Th (Swartout)		D Loop isolated			
1A Coolant Loop Tc (Swartout)	450.0	450.0	450.0	450.0	450.0
1B Coolant Loop Tc (Swartout)		B Loop isolated			
1C Coolant Loop Tc (Swartout)	480.0	480.0	480.0	480.0	480.0
1D Coolant Loop Tc (Swartout)		D Loop isolated			
1A Coolant Loop Tc (Mueller)	484.7	484.7	484.8	484.8	484.7
1B Coolant Loop Tc (Mueller)		B Loop isolated			
1C Coolant Loop Tc (Mueller)	484.6	484.8	484.9	484.9	484.8
1D Coolant Loop Tc (Mueller)		D Loop isolated			
1A Boiler Tb Bristol	476.0	476.0	476.0	476.0	476.0
1B Boiler Tb Bristol	00S	00S	00S	00S	00S
1C Boiler Tb Bristol	487.0	487.0	488.0	488.0	487.5
1D Boiler Tb Bristol	00S	00S	00S	00S	00S
1A Reactor Outlet (Bristol)	486.0	486.0	486.0	486.0	486.0
1B Reactor Outlet (Bristol)	00S	00S	00S	00S	00S
1C Reactor Outlet (Bristol)	489.0	489.0	489.0	489.0	489.0
1D Reactor Outlet (Bristol)	00S	00S	00S	00S	00S
Avg. Coolant Temperature		Not Read			
Pressurizer Temperature (MCC-RS)	619.9	619.7	620.1	620.3	620.0
Press. Steam Temp. (T/C) - MV	17.32	17.26	17.28	17.31	17.29
Press. Steam Temp. (T/C) - F	604.3	602.5	603.0	604.0	603.3
Press. Water Temp. (Bristol)	632.0	632.0	633.0	636.0	633.4
Press. Steam Temp. (Thermo-AIP) - n	58.038	58.075	58.145	58.149	58.102
Press. Steam Temp. (Thermo-AIP) - F	661.5	662.3	663.6	663.7	662.7

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE I (cont'd)

Date	4/29/60							
Time	0415	0440	0455	0515	0545	0635	0700	
Run Temp. (Nominal)	500 F							Avg.
1A Cool. Loop Th (Norwood)	498.5	498.5	498.5	498.5	498.5	498.5	498.5	498.5
1B Cool. Loop Th (Norwood)	B Loop out of service							
1C Cool. Loop Th (Norwood)	499.8	499.8	499.5	499.5	499.5	499.5	499.5	499.6
1D Cool. Loop Th (Norwood)	499.8	499.8	499.5	499.5	499.5	499.5	499.5	499.6
1A Cool. Loop Tc (Norwood)	499.8	499.5	499.8	499.5	499.5	499.5	499.5	499.6
1B Cool. Loop Tc (Norwood)	B Loop out of service							
1C Cool. Loop Tc (Norwood)	499.5	499.0	499.2	499.2	499.2	499.2	499.2	499.2
1D Cool. Loop Tc (Norwood)	499.5	499.5	499.8	499.8	499.8	499.8	499.8	499.7
1A Cool. Loop Th(Swartwout)	out of service							
1B Cool. Loop Th(Swartwout)	out of service							
1C Cool. Loop Th(Swartwout)	465.0	465.0	465.0	465.0	465.0	465.0	465.0	465.0
1D Cool. Loop Th(Swartwout)	495.0	495.0	495.0	495.0	495.0	495.0	495.0	495.0
1A Cool. Loop Tc(Swartwout)	out of service							
1B Cool. Loop Tc(Swartwout)	out of service							
1C Cool. Loop Tc(Swartwout)	495.0	495.0	495.0	495.0	495.0	495.0	495.0	495.0
1D Cool. Loop Tc(Swartwout)	496.0	496.0	496.0	496.0	496.0	496.0	496.0	496.0
1A Cool. Loop Tc (Mueller)	499.5	499.5	499.5	499.4	499.3	499.3	499.4	499.4
1B Cool. Loop Tc (Mueller)	B Loop isolated							
1C Cool. Loop Tc (Mueller)	499.6	499.6	499.6	499.5	499.5	499.6	499.5	499.6
1D Cool. Loop Tc (Mueller)	499.6	499.6	499.6	499.6	499.6	499.6	499.6	499.6
1A Boiler Tb Bristol	500.0	500.0	500.0	500.0	500.0	500.0	500.0	500.0
1B Boiler Tb Bristol	out of service							
1C Boiler Tb Bristol	501.0	501.0	501.0	501.0	501.0	501.0	501.0	501.0
1D Boiler Tb Bristol	502.0	502.0	502.0	502.0	502.0	502.0	502.0	502.0
1A React. Outlet (Bristol)	Not Read							
1B React. Outlet (Bristol)	Not Read							
1C React. Outlet (Bristol)	Not Read							
1D React. Outlet (Bristol)	Not Read							
Avg. Cool. Temp.	499.0	499.2	499.5	499.5	499.5	499.5	499.5	499.4
Press. Temp. (MCC-RS)	578.0	579.0	577.0	575.0	575.0	575.0	575.0	576.0
Press. Stm. Temp. (T/C)-MV	16.31	16.12	16.25	16.17	16.22	16.23	16.10	16.20
Press. Stm. Temp. (T/C)-F	571.3	565.3	569.6	567.0	568.6	569.0	564.5	565.1
Press. Wtr. Temp. (Bristol)	580.0	575.0	575.0	572.0	570.0	570.0	570.0	573.0
Press. Stm. Temp. (Thermo-AIP)-R	55.915	55.935	55.865	55.885	55.93	55.94	55.89	55.916
Press. Stm. Temp. (Thermo-AIP)-F	618.8	619.2	617.8	618.2	619.1	619.3	618.3	618.8

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE I (cont'd)

Date	4/29/60				
Time	2015	2035	2055	2115	
Run Temp. (Nominal)	515 F				Avg.
1A Coolant Loop Th (Norwood)	513.8	513.8	513.8	513.7	513.8
1B Coolant Loop Th (Norwood)		B Loop out of service			
1C Coolant Loop Th (Norwood)	515.2	515.1	515.2	515.2	515.2
1D Coolant Loop Th (Norwood)		D Loop out of service			
1A Coolant Loop Tc (Norwood)	515.0	515.0	515.0	515.0	515.0
1B Coolant Loop Tc (Norwood)		B Loop out of service			
1C Coolant Loop Tc (Norwood)	515.0	515.0	515.0	515.0	515.0
1D Coolant Loop Tc (Norwood)		D Loop out of service			
1A Coolant Loop Th (Swartout)		out of service			
1B Coolant Loop Th (Swartout)		out of service			
1C Coolant Loop Th (Swartout)		out of service			
1D Coolant Loop Th (Swartout)		out of service			
1A Coolant Loop Tc (Swartout)		out of service			
1B Coolant Loop Tc (Swartout)		out of service			
1C Coolant Loop Tc (Swartout)	512.0	512.0	512.0	512.0	512.0
1D Coolant Loop Tc (Swartout)		D Loop out of service			
1A Coolant Loop Tc (Mueller)	514.9	514.9	514.9	515.0	514.9
1B Coolant Loop Tc (Mueller)		B Loop out of service			
1C Coolant Loop Tc (Mueller)	515.0	515.0	515.1	515.2	515.1
1D Coolant Loop Tc (Mueller)		D Loop out of service			
1A Boiler Tb	516.0	516.0	516.0	516.0	516.0
1B Boiler Tb	115.0	115.0	115.0	115.0	115.0
1C Boiler Tb	518.0	518.0	518.0	518.0	518.0
1D Boiler Tb	195.0	195.0	195.0	195.0	195.0
1A Reactor Outlet (Bristol)	518.0	517.0	517.0	517.0	517.2
1B Reactor Outlet (Bristol)	210.0	210.0	210.0	210.0	210.0
1C Reactor Outlet (Bristol)	518.0	518.0	518.0	519.0	518.2
1D Reactor Outlet (Bristol)	236.0	235.0	234.0	233	234.5
Avg. Coolant Temperature		Not Read			
Press. Temp. (MCC-RS)	622.7	622.7	623.6	624.0	623.2
Press. Stm. Temp. (T/C) - MV		Not Read			
Press. Stm. Temp. (T/C) - F		Not Read			
Press. Wtr. Temp. (Bristol)	620.0	620.0	621.0	620.9	620.5
Press. Stm. Temp. (Thermo-AIP)-A	58.51	58.514	58.559	58.579	58.54
Press. Stm. Temp. (Thermo-AIP)-F	671.6	671.7	672.6	673.1	672.2

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE I (cont'd)

Date	4/29/60				
Time	0145	0205	0225	0245	
Run Temp. (Nominal)	530 F				Avg.
1A Coolant Loop Th (Norwood)	527.5	528.0	527.5	528.0	527.8
1B Coolant Loop Th (Norwood)		out of service			
1C Coolant Loop Th (Norwood)	529.5	530.0	530.0	530.0	529.9
1D Coolant Loop Th (Norwood)		out of service			
1A Coolant Loop Tc (Norwood)	529.0	529.0	529.0	529.0	529.0
1B Coolant Loop Tc (Norwood)		out of service			
1C Coolant Loop Tc (Norwood)	529.5	529.5	529.5	529.5	529.5
1D Coolant Loop Tc (Norwood)		out of service			
1A Coolant Loop Th (Swartwout)		out of service			
1B Coolant Loop Th (Swartwout)		out of service			
1C Coolant Loop Th (Swartwout)		out of service			
1D Coolant Loop Th (Swartwout)		out of service			
1A Coolant Loop Tc (Swartwout)		out of service			
1B Coolant Loop Tc (Swartwout)		out of service			
1C Coolant Loop Tc (Swartwout)		out of service			
1D Coolant Loop Tc (Swartwout)		out of service			
1A Coolant Loop Tc (Mueller)	529.3	529.2	529.2	529.2	529.2
1B Coolant Loop Tc (Mueller)		B Loop isolated			
1C Coolant Loop Tc (Mueller)	529.6	529.4	529.4	529.4	529.4
1D Coolant Loop Tc (Mueller)		D Loop isolated			
1A Boiler Tb	535.0	520.0	517.0	517.0	522.0
1B Boiler Tb		out of service			
1C Boiler Tb	533.0	533.0	533.0	533.0	533.0
1D Boiler Tb	00S	00S	00S	00S	00S
1A Reactor Outlet (Bristol)	530.0	530.0	531.0	531.0	530.5
1B Reactor Outlet (Bristol)	00S	00S	00S	00S	00S
1C Reactor Outlet (Bristol)	532.0	532.0	532.0	533.0	532.2
1D Reactor Outlet (Bristol)	00S	00S	00S	00S	00S
Avg. Coolant Temperature		Not Read			
Press. Temp. (MCC-RS)	622.0	622.0	622.0	622.0	622.0
Press. Stm. Temp. (T/C) - MV	17.67	17.65	17.65	17.67	17.66
Press. Stm. Temp. (T/C) - F	616.0	615.0	615.0	616.0	615.5
Press. Wtr. Temp. (Bristol)	620.0	620.0	620.0	620.0	620.0
Press. Stm. Temp. (Thermo-AIP)-A	58.58	58.46	58.46	58.48	58.495
Press. Stm. Temp. (Thermo-AIP)-F	672.4	669.9	669.9	670.3	670.6

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE II

BLANKET EXIT AND BLANKET INLET, AUXILIARY SEED EXIT AND SEED INLET TEMPERATURES

Date Time Recorder Point	Location	1045	1107	1125	4/30/60 1145 485 F	1205	1225	1245	Avg.
1	BXJ13	486.5	486.5	486.5	487.5	487.0	487.0	487.0	486.9
2	BXM10	489.5	489.5	489.5	489.5	490.0	489.5	490.0	489.6
3	TBJ2	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
4	BXJ3	476.0	477.0	476.5	476.0	476.0	476.0	476.0	476.2
5	BXK3	480.5	481.0	481.0	481.0	481.0	481.0	481.0	481.1
6	BXJ2	483.0	483.5	483.0	483.5	483.0	483.5	483.0	483.2
7	BXI7	473.0	473.0	475.5	474.5	473.5	475.5	476.0	474.4
8	BXH7	480.0	480.0	480.0	480.0	480.5	480.0	480.5	480.1
9	BXI6	477.0	478.0	478.0	478.5	478.5	478.5	479.0	478.2
10	BXI5	481.5	482.0	482.0	482.5	483.0	482.5	483.0	482.4
11	ASXJ12-1	488.0	488.0	488.0	488.0	488.0	488.0	488.0	488.0
12	ASXJ12-2	488.0	488.0	488.0	488.0	488.0	488.0	488.0	488.0
13	BX611	488.5	488.5	488.5	488.5	488.5	488.5	488.5	488.5
14	BXH9	488.5	488.5	488.5	488.5	488.5	488.5	488.5	488.5
15	BXH11	488.0	488.0	488.0	488.0	487.5	488.0	488.0	487.9
16	BXH10	488.0	488.0	488.0	488.0	488.0	488.0	488.0	488.0
17	BXH8	487.5	488.0	488.0	488.0	488.0	488.0	488.0	487.9
18	BXH5	482.5	483.5	484.0	485.0	483.0	486.0	486.0	484.3
19	ASXL10-1	488.0	488.5	488.0	488.0	488.0	488.0	488.0	488.1
20	BXC10	474.0	474.5	474.5	474.5	474.5	475.0	475.5	474.6
21	TBH7	400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
22	BXM6	475.5	475.5	475.5	476.0	476.0	476.0	476.0	475.8
23	ASXL10-2	488.0	488.0	488.5	488.5	488.0	488.0	488.0	488.1
24		400.0	400.0	400.0	400.0	400.0	400.0	400.0	400.0
25		-----	-----	-----	-----	-----	-----	-----	-----
26		-----	-----	-----	-----	-----	-----	-----	-----
27	BXE13	478.5	479.0	479.0	479.0	479.0	479.0	479.0	479.0
28	BIC6	471.0	471.0	471.5	471.0	470.5	471.5	471.3	471.1
29	BIH8	477.0	477.5	477.5	477.5	477.5	478.0	478.0	477.6
30	BIK6	475.0	474.0	474.5	472.0	472.0	472.0	474.0	473.3
31	BIM10	479.0	478.0	477.0	476.5	476.0	476.0	476.5	477.5
32	BIE10	466.6	465.5	465.0	465.5	466.0	466.0	466.0	465.7
33	SID8	400.0	400.0	400.0	400.0	489.0	489.0	489.0	489.0
34	SIE11	400.0	400.0	400.0	400.0	489.5	489.5	489.5	489.5
35	SIJ12	400.0	400.0	400.0	400.0	488.5	488.5	488.5	488.5
36	SIL8	400.0	400.0	400.0	400.0	489.5	489.0	489.0	489.7
37	SIK5	400.0	400.0	400.0	400.0	489.5	489.0	489.5	489.2
38	SIF4	400.0	400.0	400.0	400.0	489.5	489.0	489.5	489.2

Recorder points 3, 21, 24, 25 and 26 shorted. 33, 34, 35, 36, 37 and 38 shorted temporarily - corrected.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE II (cont'd)

BLANKET EXIT AND BLANKET INLET, AUXILIARY SEED EXIT AND SEED INLET TEMPERATURES

Date Time Recorder Point	Location	0415	0440	0500	4/29/60 0515 500 F	0545	0635	0700	Avg.
1	BXJ13	502.0	502.0	502.0	502.0	502.0	502.0	502.5	502.1
2	BXM10	503.0	503.5	503.5	503.5	504.0	503.5	504.0	503.6
3	TBJ2	-----	-----	-----	-----	-----	-----	-----	-----
4	BXJ3	493.5	493.5	492.5	492.0	492.0	492.0	492.0	492.5
5	BXK3	496.0	496.0	496.0	496.0	492.0	492.0	496.5	496.0
6	BXJ2	499.0	499.0	499.0	498.5	499.0	499.0	499.0	499.0
7	BXI7	493.5	493.5	493.5	493.5	493.5	494.5	494.0	493.7
8	BXH7	496.5	496.5	496.0	496.0	496.5	496.5	496.5	496.5
9	BXI6	494.5	494.5	494.0	494.0	494.5	494.5	494.5	494.3
10	BXI5	500.0	499.5	498.5	499.0	498.5	498.0	497.5	498.5
11	ASXJ12-1	503.0	503.0	503.0	503.0	503.0	503.0	503.0	503.0
12	ASXJ12-2	503.0	503.0	503.0	503.0	503.0	503.0	503.0	503.0
13	BX611	503.5	503.5	503.5	503.5	503.5	504.0	504.0	503.6
14	BXH9	503.5	503.5	503.5	503.5	503.5	504.0	504.0	503.6
15	BXH11	503.0	503.0	503.0	503.0	503.0	503.5	503.5	503.1
16	BXH10	503.0	503.0	503.0	503.0	503.0	503.0	503.0	503.0
17	BXH8	502.5	503.0	503.0	502.5	403.0	503.0	503.0	503.0
18	BXH5	504.0	504.0	503.0	504.0	503.5	504.5	503.5	503.5
19	ASXL10-1	503.5	503.5	503.5	503.0	503.5	404.0	503.5	503.5
20	BXC10	492.5	492.5	493.0	493.0	493.5	493.5	493.5	493.1
21	TBH7	-----	-----	-----	-----	-----	-----	-----	-----
22	BXM6	494.0	494.0	494.0	493.5	494.0	493.5	493.5	493.8
23	ASXL10-2	503.5	503.5	503.5	503.5	503.5	503.5	503.5	503.5
24		-----	-----	-----	-----	-----	-----	-----	-----
25		-----	-----	-----	-----	-----	-----	-----	-----
26		-----	-----	-----	-----	-----	-----	-----	-----
27	BXE13	494.5	494.5	494.5	494.0	494.0	494.0	494.0	484.2
28	BIC6	491.5	491.5	491.5	491.5	491.5	491.5	491.5	491.5
29	BIH8	493.5	494.0	494.0	493.5	493.5	494.0	494.0	493.7
30	BIK6	494.0	494.0	493.5	494.0	494.0	493.5	493.5	493.7
31	BIM10	491.5	492.5	493.0	493.0	493.5	493.0	493.0	492.8
32	BIE10	482.5	481.0	482.0	481.0	480.0	481.0	480.0	481.0
33	SID8	504.5	504.0	504.0	503.5	504.0	504.0	504.5	504.0
34	SIJ11	504.5	504.5	504.5	504.5	504.5	504.5	504.5	504.5
35	SIJ12	503.5	503.5	503.5	503.5	503.5	504.0	504.0	503.6
36	SIL8	504.0	504.0	504.0	504.0	504.5	504.5	504.5	504.2
37	SIK5	504.0	504.5	504.0	504.0	504.0	504.5	504.5	504.2
38	SIF4	504.0	504.0	504.0	504.0	504.5	504.5	504.5	504.2

Recorder points 3, 21, 24, 25 and 26 shorted.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303-B)

TABLE II (cont'd)

BLANKET EXIT AND BLANKET INLET, AUXILIARY SEED EXIT AND SEED INLET TEMPERATURES

Date Time Recorder Point	Location	2015	4/29/60 515 F				Avg.	0145	4/29/60 530 F				Avg.
			2035	2055	2115				0205	0225	0245		
1	BXJ13	517.5	517.5	517.5	517.5	517.5	531.5	531.5	531.5	531.5	531.5	531.5	531.5
2	BXM10	519.5	519.5	520.0	520.0	519.7	533.5	533.5	533.5	533.5	533.5	533.5	533.5
3	TBJ2	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
4	BXJ3	507.5	508.0	508.0	508.0	507.7	520.5	520.5	520.5	520.5	520.5	520.5	520.5
5	BXK3	510.5	511.0	511.0	511.2	510.7	425.0	525.0	525.0	525.0	525.0	525.0	525.0
6	BXJ2	511.5	512.0	512.5	512.5	512.0	526.5	626.5	627.0	526.5	526.5	526.5	526.6
7	BXI7	504.0	504.0	504.0	504.0	504.0	515.0	514.5	515.0	514.0	514.0	514.6	514.6
8	BXH7	510.0	510.5	510.5	510.5	510.5	524.5	525.0	524.5	524.5	524.5	524.8	524.8
9	BXI6	508.0	508.0	508.0	508.0	508.0	519.5	519.5	519.5	519.5	519.5	519.5	519.5
10	BXI5	510.0	510.0	510.0	510.0	510.0	524.5	524.5	524.5	524.5	524.5	524.5	524.5
11	ASXJ12-1	517.5	518.0	518.0	518.0	518.0	532.5	532.5	532.5	532.5	532.5	532.5	532.5
12	ASXJ12-2	517.5	518.0	518.0	518.0	518.0	532.0	532.0	532.0	532.0	532.0	532.0	532.0
13	BX611	519.0	518.6	519.0	519.0	518.7	533.0	533.0	533.0	533.0	533.0	533.0	533.0
14	BXH9	519.0	518.5	519.0	519.0	518.7	533.0	533.0	533.0	533.0	533.0	533.0	533.0
15	BXH11	518.5	518.5	518.5	518.5	518.5	532.5	532.5	532.5	532.5	532.5	532.5	532.5
16	BXH10	518.5	518.5	518.5	518.5	518.5	532.5	532.5	532.5	532.5	532.5	532.5	532.5
17	BXH8	518.5	518.5	518.5	518.5	518.5	532.0	532.0	532.0	532.0	532.0	532.0	532.0
18	BXH5	516.0	516.0	516.0	516.5	516.0	532.0	532.0	532.0	532.0	532.0	532.0	532.0
19	ASXL10-1	519.5	518.5	518.5	519.0	518.7	532.0	532.0	532.0	532.0	532.0	532.0	532.0
20	BXC10	505.0	504.0	504.5	505.0	504.5	517.5	517.5	517.5	516.5	517.2	517.2	517.2
21	TBH7	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
22	BXM6	505.0	505.0	504.5	505.5	505.0	517.5	517.0	517.0	517.0	517.0	517.0	517.0
23	ASXL10-2	518.5	519.0	518.5	519.0	518.7	533.0	533.0	533.0	533.0	533.0	533.0	533.0
24		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
25		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
26		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
27	BXE13	508.5	508.5	508.5	508.5	508.5	521.5	521.5	521.5	521.5	521.5	521.5	521.5
28	BIC6	504.5	504.5	505.0	505	504.7	517.5	517.5	517.5	517.5	517.5	517.5	517.5
29	BIH8	506.5	506.5	507.5	507.5	507.0	520.0	520.0	520.0	520.0	520.0	520.0	520.0
30	BIK6	500.0	500.0	502.0	501.5	500.9	510.5	510.5	512.0	512.5	511.4	511.4	511.4
31	BIM10	503.5	503.5	505.0	503.0	503.7	510.0	512.0	513.0	513.5	512.1	512.1	512.1
32	BIE10	488.5	488.5	489.0	489.0	489.7	498.5	499.0	498.0	500.0	498.8	498.8	498.8
33	SID8	519.5	519.5	520.0	520.0	519.7	533.5	533.5	533.5	533.5	533.5	533.5	533.5
34	SIE11	519.5	519.5	520.0	520.0	519.7	534.0	534.0	534.0	534.0	534.0	534.0	534.0
35	SIJ12	518.5	519.0	519.5	519.5	518.7	533.5	533.5	533.5	533.5	533.5	533.5	533.5
36	SIL8	519.5	519.5	520.0	520.0	519.7	534.0	534.0	534.5	534.0	534.0	534.0	534.0
37	SIK5	519.5	519.5	520.5	520.5	520.0	533.5	534.0	534.0	534.0	534.0	533.9	533.9
38	SIF4	519.5	519.5	520.5	520.0	519.7	533.5	534.0	534.0	534.0	534.0	533.9	533.9

Recorder points 3, 21, 24, 25, 26 and 27 shorted.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS
DLCS 2430105
T-641303B

TABLE III
BLANKET AND SEED FLOW

Time Date		1415 4/30/60	1200 4/29/60	1326 4/29/60	2127 4/29/60	2147 4/29/60	0315 4/29/60	Time Date		1415 4/30/60	1200 4/29/60	1330 4/29/50	2127 4/29/60	2147 4/29/60	0315 4/29/60
Blanket Location		485 F	500 F	500 F	515 F	515 F	530 F	Seed Location		485 F	500 F	500 F	515 F	515 F	530 F
Point		(Nominal Temperatures)						Point		(Nominal Temperatures)					
1	H6	57.0	57.4	57.9	57.5	57.5	56.8	1	D6	69.0	68.3	68.3	67.8	67.4	67.4
2	H7	-----	-----	-----	-----	-----	-----	2	D8	-----	-----	-----	-----	-----	-----
3	H8	53.0	53.0	52.9	52.5	52.5	52.0	3	D10	71.4	71.0	71.0	69.8	70.0	69.6
4	H9	-----	-----	-----	-----	-----	-----	4	E11	54.8	54.9	54.2	54.2	54.2	54.0
5	H10	50.0	50.7	50.4	49.8	49.8	49.1	5	F12	69.6	68.8	69.5	68.75	68.7	68.6
6	H5	54.0	54.3	54.3	53.5	53.5	52.5	6	H12	73.7	73.2	73.2	72.3	72.2	72.2
7	I5	56.0	55.4	55.4	54.0	54.0	53.1	7	J12	51.6	42.2	52.0	50.8	51.0	50.05
8	H11	60.0	59.4	60.0	58.5	58.5	58.4	8	K11	-----	-----	-----	-----	-----	-----
9	G11	57.0	56.5	56.5	56.0	56.0	55.0	9	L10	56.3	56.3	56.0	55.5	55.5	55.4
10	C9	54.0	53.3	53.3	52.5	52.5	52.0	10	L8	52.7	52.5	52.5	51.8	51.8	51.7
11	C10	61.0	61.0	61.0	60.0	60.0	59.6	11	L6	-----	-----	-----	-----	-----	-----
12	G13	59.0	58.7	58.7	58.2	58.0	57.1	12	K5	70.4	69.3	69.0	68.5	68.6	68.2
13	J13	57.0	57.0	57.0	56.0	56.5	54.8	13	J4	76.0	75.7	75.0	74.6	74.5	74.5
14	M5	51.0	50.0	50.0	49.5	50.0	48.4	14	H4	67.9	67.5	67.3	66.5	66.6	66.4
15	M6	55.0	55.0	55.2	54.5	54.5	53.0	15	E5	-----	-----	-----	-----	-----	-----
16	M7	59.0	58.4	58.5	58.0	57.5	57.2	16	F4	53.6	53.0	53.3	52.4	52.7	53.0
17	I3	60.0	59.8	59.5	58.5	59.0	57.9	17		-----	-----	-----	-----	-----	-----
18	F3	65.5	65.7	65.9	64.5	65.0	64.0	18		-----	-----	-----	-----	-----	-----
19	F14	49.0	48.5	48.7	47.5	48.0	47.0	19		-----	-----	-----	-----	-----	-----
20	J2	56.5	56.5	56.4	55.5	55.5	54.9	20		-----	-----	-----	-----	-----	-----
21		-----	-----	-----	-----	-----	-----	21		-----	-----	-----	-----	-----	-----
22		-----	-----	-----	-----	-----	-----	22		-----	-----	-----	-----	-----	-----
23		-----	-----	-----	-----	-----	-----	23		-----	-----	-----	-----	-----	-----
24		-----	-----	-----	-----	-----	-----	24		-----	-----	-----	-----	-----	-----

Reading in terms of per cent of maximum 3 loop flow.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE IV
SEED EXIT TEMPERATURES (F)

Date		4/30/60				4/29/60							
Time		1205	1225	1245		0415	0440	0445	0515	0545	0635	0700	
Recorder Location		485 F				500 F							
Point		Avg.				Avg.							
		(Nominal Temp.)											
1	SXJ4	488.5	488.5	488.5	488.5	503.5	503.5	502.5	502.5	503.0	503.0	503.0	503.0
2	SXH4	487.5	487.5	487.5	487.5	503.0	503.0	502.0	501.5	502.5	502.5	502.5	502.5
3	SXD8	487.5	487.5	487.5	487.5	503.0	503.0	502.0	502.0	502.5	502.5	503.0	502.4
4	SXD10	488.0	488.0	488.5	488.2	503.0	503.5	502.5	502.0	503.0	503.0	503.0	502.9
5	SXE11	487.5	487.5	487.5	487.5	503.0	503.0	502.0	502.0	502.5	502.5	503.0	502.5
6	SXF12	488.0	488.0	488.0	488.0	502.5	503.0	502.0	501.5	502.5	502.5	503.0	502.4
7	SXH12	489.0	489.0	489.0	489.0	503.5	503.5	502.5	502.5	503.5	503.5	503.5	503.2
8	SXJ12	489.0	489.0	489.0	489.0	503.5	503.5	502.5	502.5	503.5	503.5	503.5	503.2
9	SXK11	488.5	488.5	488.5	488.5	503.0	503.0	502.0	502.0	503.0	503.0	503.0	502.7
10	SXL10	489.0	489.0	489.0	489.0	504.0	504.0	503.0	503.0	503.5	504.0	503.5	503.6
11	SXL8	488.0	488.0	488.0	488.0	503.0	503.0	502.0	502.5	503.0	503.0	502.5	502.7
12	SXF4	487.5	487.5	487.5	487.5	503.5	503.0	502.5	502.5	503.0	503.0	503.0	502.9
13	SXF5	488.0	488.0	488.0	488.0	503.0	503.0	502.0	502.5	503.0	502.5	503.0	502.7
14	SXD6	487.0	487.0	487.0	487.0	502.0	502.0	501.0	501.5	502.0	502.0	502.0	501.8
15	SXL6	488.0	488.0	488.0	488.0	503.0	503.0	502.0	503.0	503.0	503.0	503.0	502.9
16	SXK5	488.5	488.5	488.5	488.5	503.5	503.5	502.5	503.0	503.0	503.0	503.0	503.0
17	SXD8	487.5	487.5	487.5	487.5	502.5	502.5	502.0	502.0	502.5	502.5	502.0	502.3
18	SXD10	488.0	488.0	488.0	488.0	502.5	503.0	502.5	502.5	502.5	503.0	502.5	502.6
19	SXE11	487.5	487.0	487.5	487.2	503.0	503.0	502.0	502.5	503.0	502.5	502.5	502.6
20	SXF12	487.0	487.0	487.0	487.0	501.5	502.0	501.0	500.5	501.0	501.0	501.0	501.0
21	SXH12	488.5	488.5	488.5	488.5	503.0	503.0	502.5	503.0	503.0	503.0	503.0	502.9
22	ASXI12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
23	SXJ12	488.0	487.5	487.5	487.7	502.5	502.5	501.0	502.0	502.5	502.5	502.5	502.3
24	ASXK12	488.0	488.0	488.0	488.0	502.5	503.0	502.0	502.5	502.5	502.5	502.5	502.5
25	SXK11	488.0	488.0	488.0	488.0	503.0	503.0	502.0	502.5	502.5	503.0	503.0	502.7
26	ASXL11	489.5	489.5	489.5	489.5	504.0	503.5	502.5	503.5	503.5	504.0	504.0	503.6
27	SXL10	488.5	488.5	488.5	488.5	503.0	503.0	502.0	502.5	503.0	503.0	503.0	502.8
28	ASXL9	488.5	488.5	488.5	488.5	502.5	502.5	501.5	502.0	502.5	502.5	502.5	502.3
29	SXL8	488.0	488.0	488.0	488.0	503.0	503.0	502.0	502.5	503.0	503.0	503.0	502.8
30	SXL6	488.5	488.5	488.0	488.3	503.0	503.0	502.0	502.5	502.5	503.0	503.0	502.7
31	SXK5	488.5	488.5	488.5	488.5	503.5	503.5	502.5	503.0	503.0	503.0	503.5	503.1
32	SXJ4	488.5	488.5	488.5	488.5	503.0	503.5	502.5	502.5	503.0	503.0	503.5	503.0
33	SXH4	487.5	487.5	487.5	487.5	502.5	502.5	502.0	502.0	502.5	502.5	503.0	502.4
34	SXF4	488.5	488.0	488.0	488.2	503.0	503.5	503.0	502.5	503.0	503.0	503.5	503.1
35	SXE5	488.0	488.0	488.0	488.0	503.0	503.0	502.5	502.5	503.0	503.0	503.0	502.9
36	SXD6	487.5	487.5	487.5	487.5	502.0	502.0	501.5	501.5	502.0	502.0	502.0	501.9

Recorder point 22 - shorted

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE IV (cont'd)

SEED EXIT TEMPERATURES (F)

Date		4/29/60						4/29/60				
Time		2015	2035	2055	2115		0145	0205	0225	0245		
Recorder Location		515 F						530 F				
Point		(Nominal Temp.)					Avg.					Avg.
1	SXJ4	518.4	518.4	518.4	518.4	518.4	532.5	532.5	532.5	532.5	532.5	532.5
2	SXH4	517.9	517.5	517.9	518.0	517.8	532.0	532.0	532.0	532.0	532.0	532.0
3	SXD8	517.5	517.5	517.5	517.8	518.3	532.5	532.5	532.5	532.5	532.5	532.5
4	SXD10	518.2	518.2	518.3	518.5	518.5	532.5	532.5	532.5	532.5	532.5	532.5
5	SXE11	517.6	517.5	517.5	517.7	517.4	532.0	532.0	532.0	532.0	532.0	532.0
6	SXF12	517.6	517.5	517.6	517.6	517.6	532.0	532.0	532.0	532.0	532.0	532.0
7	SXH12	518.4	518.3	518.5	518.5	518.4	532.5	532.5	532.5	532.5	532.5	532.5
8	SXJ12	518.7	518.7	518.8	519.0	518.8	533.0	533.0	533.0	533.0	533.0	533.0
9	SXK11	517.8	517.8	517.8	518.0	517.8	532.0	532.0	532.0	532.0	532.0	532.0
10	SXL10	518.8	518.8	519.0	519.0	518.9	533.0	533.5	533.5	533.5	533.5	533.4
11	SXL8	517.8	517.8	518.0	518.0	517.9	532.0	532.0	532.0	532.0	532.0	532.0
12	SXF4	517.5	517.6	517.8	518.0	517.7	532.0	532.0	532.0	532.0	532.0	532.0
13	SXF5	517.5	517.5	517.5	517.8	517.6	531.5	531.5	531.5	531.5	531.5	531.5
14	SXD6	516.8	516.9	517.0	517.2	517.0	531.0	531.0	531.0	531.0	531.0	531.0
15	SXL6	517.8	517.8	518.0	518.2	518.0	532.5	532.5	532.0	532.0	532.0	532.2
16	SXK5	518.0	518.0	518.2	518.3	518.1	532.5	532.5	532.5	532.5	532.5	532.5
17	SXD8	517.2	517.2	517.4	517.5	517.3	532.0	532.0	532.0	532.0	532.0	532.0
18	SXD10	517.5	517.4	517.6	517.8	517.6	532.0	532.0	532.0	532.0	532.0	532.0
19	SXE11	517.3	517.3	517.4	517.4	517.6	517.4	532.0	532.0	532.0	532.0	532.0
20	SXF12	516.4	516.5	516.7	516.8	516.6	531.0	531.0	531.0	531.0	531.0	531.0
21	SXH12	517.8	518.0	518.2	518.2	518.1	532.5	532.5	532.5	532.5	532.5	532.5
22	ASXI12	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
23	SXJ12	517.4	517.4	517.4	517.6	517.4	532.0	532.0	532.0	532.0	532.0	532.0
24	ASXK12	517.4	517.2	517.4	517.6	517.4	532.0	532.0	532.0	532.0	532.0	532.0
25	SXK11	517.4	517.4	517.5	517.7	517.5	532.0	532.0	532.0	532.0	532.0	532.0
26	ASXL11	518.5	518.5	518.6	518.8	518.6	533.0	533.0	533.0	533.0	533.0	533.0
27	SXL10	518.0	518.0	518.0	518.2	518.0	533.0	533.0	533.0	533.0	533.0	533.0
28	ASXL9	517.0	517.2	517.4	517.4	517.3	532.0	532.0	532.0	531.5	532.0	532.0
29	SXL8	517.8	517.8	518.0	518.1	517.9	532.0	532.0	532.0	532.0	532.0	532.0
30	SXL6	518.0	518.0	518.0	518.2	518.0	532.5	532.5	532.5	532.5	532.5	532.5
31	SXK5	518.3	518.3	518.5	518.5	518.4	533.0	533.0	533.0	532.5	532.9	532.9
32	SXJ4	518.3	518.4	518.5	518.5	518.4	533.0	533.0	533.0	533.0	533.0	533.0
33	SXH4	517.5	517.5	517.5	517.6	517.6	532.0	532.0	532.0	532.0	532.0	532.0
34	SXF4	518.0	518.0	518.2	518.2	518.1	533.0	532.5	532.5	532.5	532.5	532.6
35	SXE5	517.2	517.4	517.4	517.6	517.6	532.0	532.0	532.0	532.0	532.0	532.0
36	SXD6	517.0	517.0	517.0	517.2	517.0	532.0	531.5	532.0	531.5	531.7	531.7

Recorder point 22 - shorted

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
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TABLE V
SEED METAL TEMPERATURES

Date				4/30/60					
Time									
Recorder	Location	1045	1105	1125	1145	1205	1225	Avg.	
Point				485 F					
1	SMD8-D	489.0	491.0	490.0	493.0	491.0	491.0	490.0	490.7
2	SMD8-C	489.0	491.0	490.0	493.0	491.0	491.0	490.0	490.7
3	SMD8-E	489.0	491.0	490.0	493.0	491.0	491.0	490.0	490.7
4	SMD8-B	489.0	491.0	490.0	493.0	491.0	491.0	490.0	490.7
5	SMJ12-D	490.0	493.0	491.0	493.0	491.0	492.0	491.0	490.6
6	SMJ12-C	490.0	493.0	491.0	493.0	491.0	492.0	491.0	490.6
7	SMJ12-E	490.0	490.0	491.0	493.0	491.0	492.0	491.0	491.1
8	SMJ12-B	490.0	490.0	491.0	493.0	491.0	492.0	491.0	491.1
9	SME11-D	490.0	490.0	491.0	493.0	491.0	492.0	491.0	491.1
10	SME11-C	490.0	490.0	491.0	493.0	491.0	491.0	491.0	491.0
11	SME11-E	490.0	490.0	491.0	493.0	490.0	491.0	490.0	490.7
12	SME11-B	490.0	490.0	491.0	493.0	490.0	491.0	490.0	490.7
13	SML8-D	490.0	490.0	491.0	492.0	490.0	491.0	490.0	490.5
14	SML8-C	490.0	490.0	491.0	492.0	491.0	491.0	491.0	490.7
15	SML8-E	490.0	490.0	491.0	492.0	491.0	490.0	490.0	490.5
16	SML8-B	489.0	490.0	490.0	492.0	490.0	490.0	489.0	490.0
17	SMF4-D	489.0	491.0	490.0	492.0	490.0	490.0	489.0	490.1
18	SMF4-C	489.0	491.0	489.0	492.0	490.0	490.0	489.0	490.0
19	SMF4-E	489.0	491.0	489.0	492.0	490.0	490.0	489.0	490.0
20	SMF4-B	489.0	491.0	489.0	492.0	490.0	490.0	489.0	490.0
21	SMK5-D	489.0	491.0	489.0	492.0	490.0	490.0	489.0	490.0
22	SMK5-C	489.0	491.0	490.0	492.0	490.0	490.0	489.0	490.1
23	SMK5-E	489.0	491.0	490.0	492.0	490.0	490.0	490.0	490.1
24	SMK5-B	489.0	491.0	490.0	492.0	490.0	490.0	490.0	490.1

DUQUESNE LIGHT COMPANY
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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
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TABLE V (cont'd)
SEED METAL TEMPERATURES

Date Time	Recorder Location	2015	4/30/60		2115	Avg.	0145	4/30/60		0245	Avg.
Point			2035	2055				0205	0225		
			515 F					530 F			
1	SMD8-D	520.0	520.0	519.0	519.0	519.5	530.0	530.0	530.0	530.0	530.0
2	SMD8-C	520.0	520.0	519.0	518.0	519.2	530.0	530.0	530.0	530.0	530.0
3	SMD8-E	520.0	520.0	519.0	518.0	519.2	530.0	530.0	530.0	530.0	530.0
4	SMD8-E	520.0	519.0	519.0	518.0	519.0	530.0	530.0	530.0	530.0	530.0
5	SMJ12-D	520.0	520.0	520.0	518.0	519.5	530.0	530.0	530.0	530.0	530.0
6	SMJ12-C	520.0	521.0	520.0	520.0	520.0	530.0	530.0	530.0	530.0	530.0
7	SMJ12-E	520.0	521.0	520.0	520.0	520.2	530.0	530.0	530.0	530.0	530.0
8	SMJ12-B	520.0	520.0	520.0	520.0	520.0	530.0	530.0	530.0	530.0	530.0
9	SME11-D	520.0	520.0	520.0	520.0	520.0	530.0	530.0	530.0	530.0	530.0
10	SME11-C	520.0	520.0	520.0	520.0	520.0	530.0	530.0	530.0	530.0	530.0
11	SME11-E	520.0	520.0	518.0	520.0	519.5	530.0	530.0	530.0	530.0	530.0
12	SMF11-R	520.0	520.0	518.0	520.0	519.5	530.0	530.0	530.0	530.0	530.0
13	SML8-D	520.0	520.0	518.0	519.0	519.2	530.0	530.0	530.0	530.0	530.0
14	SML8-C	520.0	519.0	518.0	518.0	518.0	530.0	530.0	530.0	530.0	530.0
15	SML8-E	520.0	519.0	518.0	518.0	518.8	530.0	530.0	530.0	530.0	530.0
16	SML8-B	520.0	519.0	518.0	518.0	518.8	530.0	530.0	530.0	530.0	530.0
17	SMF4-D	520.0	520.0	518.0	518.0	519.0	530.0	530.0	530.0	530.0	530.0
18	SMF4-C	520.0	519.0	518.0	518.0	518.8	530.0	530.0	530.0	530.0	530.0
19	SMF4-E	520.0	518.0	518.0	518.0	518.5	530.0	530.0	530.0	530.0	530.0
20	SMF4-B	520.0	518.0	518.0	518.0	518.5	530.0	530.0	530.0	530.0	530.0
21	SMK5-D	520.0	519.0	518.0	518.0	518.8	530.0	530.0	530.0	530.0	530.0
22	SMK5-C	520.0	520.0	518.0	518.0	518.5	530.0	530.0	530.0	530.0	530.0
23	SMK5-E	520.0	520.0	519.0	518.0	519.2	530.0	530.0	530.0	530.0	530.0
24	SMK5-B	520.0	520.0	519.0	518.0	519.2	530.0	530.0	530.0	530.0	530.0

DUQUESNE LIGHT COMPANY
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SENSING ELEMENTS
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TABLE V (cont'd)
SEED METAL TEMPERATURES

Date Time	Recorder Location	0415	0440	4/30/60 0455 500 F	0515	0545	0635	0700	Avg.
1	SMD8-D	504.0	504.0	504.0	504.0	503.0	503.0	503.0	503.5
2	SMD8-C	504.0	504.0	504.0	504.0	503.0	503.0	503.0	503.6
3	SMD8-E	504.0	504.0	504.0	504.0	503.0	503.0	503.0	503.6
4	SMD8-B	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
5	SMJ12-D	504.0	504.0	504.0	504.0	503.0	503.0	503.0	503.6
6	SMJ12-C	504.0	504.0	504.0	504.0	503.0	503.0	503.0	503.6
7	SMJ12-E	504.0	503.0	504.0	504.0	503.0	503.0	503.0	503.3
8	SMJ12-B	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
9	SME11-D	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
10	SME11-C	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
11	SME11-E	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
12	SME11-B	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
13	SML8-D	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
14	SML8-C	503.0	503.0	503.0	504.0	503.0	503.0	503.0	503.1
15	SML8-E	503.0	503.0	503.0	503.0	503.0	503.0	503.0	503.0
16	SML8-B	503.0	503.0	503.0	503.0	503.0	503.0	503.0	503.0
17	SMF4-D	503.0	503.0	503.0	503.0	503.0	503.0	504.0	503.1
18	SMF4-C	503.0	503.0	503.0	503.0	503.0	503.0	504.0	503.1
19	SMF4-E	503.0	503.0	503.0	503.0	503.0	503.0	504.0	503.1
20	SMF4-B	503.0	503.0	503.0	503.0	503.0	503.0	504.0	503.1
21	SMK5-D	503.0	503.0	503.0	503.0	503.0	503.0	504.0	503.1
22	SMK5-C	503.0	503.0	503.0	503.0	503.0	503.0	503.0	503.0
23	SMK5-E	568.0	568.0	503.0	503.0	503.0	503.0	503.0	503.0
24	SMJ5-B	504.0	504.0	503.0	503.0	503.0	503.0	503.0	503.1

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE VI

MISCELLANEOUS DATA

Date		4/30/60	4/29/60	4/29/60	4/29/60
Run		485 F	500 F	515 F	530 F
Time		0245	0520	1155	1330
Pressurizer Pressure (WR) psig		1750	1200	1750	1725
Pressurizer Pressure (NR) psig		1777	1200	1788	1770
Thermocouples in Reactor Chamber Temp. Indicator Points					
Reactor Chamber Ambient Temp.	12 F	88.0	78.0	89.5	92.0
Reactor Chamber Ambient Temp.	13 F	118.0	109.0	112.5	116.0
Supply and exhaust fans	F				
1A Supply Fan Temperature	F	86	57	78	81
1B Supply Fan Temperature	F	96	75	89	92
1A Exhaust Temperature	F	106	100	91	102
1B Exhaust Temperature	F	107	100	91	102
1A Main Coolant Loop Flow	lbs/hr x 10 ⁶	OOS	OOS	OOS	OOS
1B Main Coolant Loop Flow	lbs/hr x 10 ⁶	OOS	OOS	OOS	OOS
1C Main Coolant Loop Flow	lbs/hr x 10 ⁶	7.86	7.70	7.80	7.75
1D Main Coolant Loop Flow	lbs/hr x 10 ⁶	OOS	OOS	OOS	OOS
Reactor Pressure	psig	1750	1780	1780	1790

LEGEND: OOS - out of service.

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE VII

THERMOCOUPLE CORRECTION FACTORS

Blanket Exit and Inlet Auxiliary Seed Exit and Inlet				Seed Exit			
		Westinghouse	DLC			Westinghouse	DLC
Point	Location	Corr'n Factor	Corr'n Factor	Point	Location	Corr'n Factor	Corr'n Factor
1	BxJ13	- 2.3	- 2.4	1	SXJ4	- 3.3	- 3.5
2	BxM10	- 4.4	- 4.5	2	SXH4	- 2.8	- 2.8
3	TBJ2	-----	-----	3	SXD8	- 2.6	- 2.7
4	BXJ3	+ 8.0	+ 7.9	4	SXD10	- 3.3	- 3.4
5	BXK3	+ 4.0	+ 3.9	5	SXE11	- 2.6	- 2.8
6	BXJ2	+ 2.7	+ 1.9	6	SXF12	- 2.6	- 2.9
7	BXI7	+ 12.0	+ 10.4	7	SXH12	- 3.3	- 3.6
8	BXH7	+ 4.5	+ 4.2	8	SXJ12	- 3.8	- 3.9
9	BXI6	+ 8.0	+ 7.1	9	SXK11	- 2.8	- 3.1
10	BXI5	+ 5.0	+ 3.3	10	SXL10	- 4.0	- 4.1
11	AsJ12-1	- 3.2	- 3.2	11	SXL8	- 2.8	- 3.0
12	AsJ12-12	- 3.0	- 3.1	12	SXF4	- 2.8	- 2.9
13	BXG11	- 4.0	- 3.8	13	SXE5	- 2.5	- 2.8
14	BXH9	- 4.0	- 3.8	14	SXD6	- 2.0	- 2.1
15	BXH11	- 3.5	- 3.4	15	SXL6	- 2.9	- 3.1
16	BXH10	- 3.5	- 3.4	16	SXK5	- 3.1	- 3.4
17	BXH8	- 3.0	- 3.2	17	SXD8	- 2.6	- 2.6
18	BXH5	- 2.0	- 1.8	18	SXD10	- 3.3	- 2.9
19	AsXL10	- 3.5	- 3.4	19	SXE11	- 2.6	- 2.7
20	BXC10	+ 11.0	+ 9.8	20	SXF12	- 3.3	- 1.8
21	TBH7	-----	-----	21	SXH12	- 3.8	- 3.4
22	BXM-6	+ 11.0	+ 9.2	22	AsxI12	Out	Out
23	AsXL10-2	- 3.8	- 3.8	23	SxJ12	- 3.8	- 2.7
24	BXG-13	-----	-----	24	AsxK12	- 2.7	- 2.8
25	-----	-----	-----	25	SXK11	- 2.8	- 2.9
26	-----	-----	-----	26	AsxL11	- 3.6	- 4.0
27	BXE13	+ 7.0	+ 6.3	27	SXL10	- 4.0	- 3.4
28	BIC6	+ 11.0	+ 10.9	28	AsxL9	- 2.4	- 2.6
29	BIH8	+ 8.0	+ 7.6	29	SXL8	- 2.8	- 3.0
30	BIK6	+ 15.0	+ 12.3	30	SXL6	- 2.9	- 3.2
31	BIM10	+ 13.0	+ 10.6	31	SXK5	- 3.1	- 3.6
32	BIE10	+ 27.0	+ 23.4	32	SXJ4	- 3.3	- 3.6
33	SID8	- 4.4	- 4.4	33	SXH4	- 2.8	- 2.7
34	SIE11	- 4.7	- 4.8	34	SXF4	- 2.8	- 3.4
35	SIJ12	- 4.5	- 3.9	35	SXE5	- 2.5	- 2.9
36	SIL8	- 4.7	- 4.8	36	SXD6	- 2.0	- 2.4
37	SIK5	- 4.8	- 4.7				
38	SIF4	- 4.8	- 4.6				

NOTE: Duquesne Light Company Correction Factors are the average of the values indicated in Table VIII and Table IX.

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TABLE VIII

BLANKET EXIT AND INLET, AUXILIARY SEED EXIT AND INLET CORRECTIONS

Point	Location	485 F	500 F	515 F	530 F
1	BXJ13	- 2.15	- 2.6	- 2.5	- 2.2
2	BXM10	- 4.85	- 4.1	- 4.7	- 4.2
3	TBJ2	-----	-----	-----	-----
4	BXJ3	+ 8.55	+ 7.0	+ 7.3	+ 8.8
5	BXK3	+ 3.65	+ 3.5	+ 4.3	+ 4.3
6	BXJ2	+ 1.55	+ 0.5	+ 3.0	+ 2.7
7	BXI7	+ 10.35	+ 5.8	+ 11.0	+ 14.7
8	BXH7	+ 4.65	+ 3.0	+ 4.5	+ 4.5
9	BXI6	+ 6.55	+ 5.2	+ 7.0	+ 9.8
10	BX15	+ 2.35	+ 1.0	+ 5.0	+ 4.8
11	ASJ12-1	- 3.25	- 3.5	- 3.0	- 3.2
12	ASJ12-12	- 3.25	- 3.5	- 3.0	- 2.7
13	BX6.11	- 3.75	- 4.1	- 3.7	- 3.7
14	BXH9	- 3.75	- 4.1	- 3.7	- 3.7
15	BXH11	- 3.15	- 3.6	- 3.5	- 3.2
16	BXH10	- 3.25	- 3.5	- 3.5	- 3.2
17	BXH8	- 3.15	- 3.5	- 3.5	- 2.7
18	BXH5	+ 0.43	- 4.0	- 1.0	- 2.7
19	ASXL10-1	- 3.33	- 4.0	- 3.7	- 2.7
20	BXC10	+ 10.15	+ 6.4	+ 10.5	+ 12.1
21	TBH7	-----	-----	-----	-----
22	BXM6	+ 8.95	+ 5.7	+ 10.0	+ 12.3
23	ASXL10-2	- 3.35	- 4.0	- 3.7	- 3.7
24	BXG-13	-----	-----	-----	-----
25	-----	-----	-----	-----	-----
26	-----	-----	-----	-----	-----
27	BXE13	+ 5.75	+ 5.3	+ 6.5	+ 7.8
28	BIC6	+ 13.65	+ 8.0	+ 10.3	+ 11.8
29	BIH8	+ 7.15	+ 5.8	+ 8.0	+ 9.3
30	BIK6	+ 11.45	+ 5.8	+ 14.1	+ 17.9
31	BIM10	+ 7.25	+ 6.7	+ 11.3	+ 17.2
32	BIE10	+ 19.05	+ 18.5	+ 25.3	+ 30.5
33	SID8	- 4.25	- 4.5	- 4.7	- 4.2
34	SIE11	- 4.75	- 5.0	- 4.7	- 4.7
35	SIJ12	- 3.75	- 4.1	- 3.7	- 4.2
36	SIL8	- 4.95	- 4.7	- 4.7	- 4.7
37	SIK5	- 4.45	- 4.7	- 5.0	- 4.6
38	SIF4	- 4.45	- 4.7	- 4.7	- 4.6

NOTE: Indicated corrections are the differences between the average recorder point indications and the average of the corrected Mueller Tc recorder indications.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE IX

SEED EXIT AND INLET CORRECTION F

Point	Location	485 F	500 F	515 F	530 F
1	SXJ4	3.75	3.5	3.4	3.2
2	SXH4	2.75	3.0	2.8	2.7
3	SXD8	2.75	2.9	2.6	2.7
4	SXD10	3.45	3.4	3.4	3.2
5	SXE11	2.75	3.1	2.6	2.7
6	SXF12	3.25	2.9	2.6	2.7
7	SXH12	4.25	3.7	3.4	3.2
8	SXJ12	4.25	3.7	3.8	3.7
9	SXK1	3.75	3.2	2.8	2.7
10	SXL10	4.25	4.1	3.9	4.1
11	SXL8	3.25	3.2	2.9	2.7
12	SXF4	2.75	3.4	2.7	2.7
13	SXE5	3.25	3.2	2.6	2.2
14	SXD6	2.25	2.3	2.0	1.7
15	SXL6	3.25	3.4	3.0	2.9
16	SXK5	3.75	3.5	3.1	3.2
17	SXD8	2.75	2.8	2.3	2.7
18	SXD10	3.25	3.1	2.6	2.7
19	SXE11	2.45	3.1	2.4	2.7
20	SXF12	2.25	1.5	1.6	1.7
21	SXH12	3.75	3.4	3.1	3.2
22	AsxI12	----	----	----	----
23	SXJ12	2.95	2.8	2.4	2.7
24	AsxK12	3.25	3.0	2.4	2.7
25	SXK11	3.25	3.2	2.5	2.7
26	AsxL11	4.75	4.1	3.6	3.7
27	SXL10	3.75	3.3	3.0	3.7
28	AsxL9	3.75	2.8	2.3	2.7
29	SXL8	3.25	3.3	2.9	2.7
30	SXL6	3.55	3.2	3.0	3.2
31	SXK5	3.75	3.6	3.4	3.6
32	SXJ4	3.75	3.5	3.4	3.7
33	SXH4	2.75	2.9	2.5	2.7
34	SXF4	3.45	3.6	3.1	3.3
35	SXE5	3.25	3.4	2.4	2.7
36	SXD6	2.75	2.4	2.0	2.4

All corrections are negative.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE X

SEED METAL CORRECTION F

Point	Location	485 F	500 F	515 F	530 F
1	SMD8-D	5.9	4.1	4.5	0.7
2	SMD8-C	5.9	4.1	4.2	0.7
3	SMD8-E	5.9	4.1	4.2	0.7
4	SMD8-B	5.9	3.6	4.0	0.7
5	SMJ12-D	5.8	4.1	4.5	0.7
6	SMJ12-C	5.8	4.1	5.2	0.7
7	SMJ12-E	6.3	3.9	5.2	0.7
8	SMJ12-B	6.3	3.6	5.2	0.7
9	SME11-D	6.3	3.6	5.2	0.7
10	SME11-C	6.2	3.6	5.2	0.7
11	SME11-E	5.9	3.6	4.5	0.7
12	SME11-B	5.9	3.6	4.5	0.7
13	SML8-D	5.7	3.6	4.2	0.7
14	SML8-C	5.9	3.6	3.8	0.7
15	SML8-E	5.7	3.5	3.8	0.7
16	SML8-B	5.2	3.5	3.8	0.7
17	SMF4-D	5.3	3.6	4.0	0.7
18	SMF4-C	5.25	3.6	3.8	0.7
19	SMF4-E	5.25	3.6	3.5	0.7
20	SMF4-B	5.25	3.6	3.5	0.7
21	SMK5-D	5.25	3.6	3.8	0.7
22	SMK5-C	5.35	3.5	3.5	0.7
23	SMK5-E	5.35	3.5	4.2	0.7
24	SMK5-B	5.35	3.6	4.2	0.7

All corrections are negative.

NOTE: Indicated corrections are the differences between the average recorder point indications and the average of the corrected Mueller Tc recorder indications.

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TALBE XI-A

MUELLER BRIDGE TEMP.

Run	1A	F	1C	F	1D	F	Avg. Tc F
1	49.897	499.74	49.905	499.9	49.815	498.2	
Cor'n Fact.		- 0.5		- 0.5		+ 1.0	
Cor. Tc		499.24		499.4		499.2	499.28
2	49.90	499.8	49.905	499.9	49.81	498.1	
Cor'n Fact.		- 0.5		- 0.5		+ 1.0	
Cor. Tc		499.3		499.4		499.1	499.27

ZERO ADJUSTMENT OF NORWOOD TEMP. IND.

Temp. Indicator	As Found	As Left
Norwood 1A Coolant Th	450 F	499.25 F
Norwood 1A Coolant Tc	505 F	498.5 F
Norwood 1C Coolant Th	502 F	499.25 F
Norwood 1C Coolant Tc	498.6 F	499.25 F
Norwood 1D Coolant Th	499 F	499.25 F
Norwood 1D Coolant Tc	499 F	499.25 F
Avg. Coolant Temp.	500 F	499.25 F

NOTE: 1B Loop was out of service.

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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE XI

"AS FOUND" DRIFT CHECK OF NORWOOD TEMPERATURE INDICATORS
Instrument Signal

Indicated Temp. °F	Th ohms				Tc ohms			
	1A	1B	1C	1D	1A	1B	1C	1D
450	32.24	32.20	32.20	32.18	32.18	32.17	32.20	32.16
460	32.58	32.53	32.48	32.51	32.45	32.48	32.45	32.48
480	33.18	33.19	33.15	33.19	33.11	33.14	33.11	33.14
500	33.91	33.85	33.81	33.83	33.75	33.81	33.78	33.81
520	34.56	34.49	34.47	34.50	34.41	34.43	34.44	34.47
540	35.23	35.16	35.12	35.15	35.08	35.12	35.09	35.12
550	35.56	35.52	35.46	35.49	35.40	35.46	35.42	35.46

"AS LEFT" DRIFT CHECK OF NORWOOD TEMPERATURE INDICATORS
Instrument Signal

Indicated Temp. °F	Th ohms				Tc ohms			
	1A	1B	1C	1D	1A	1B	1C	1D
450	32.16	32.20	32.20	32.18	32.18	32.17	32.20	32.16
460	32.50	32.53	32.53	32.51	32.52	32.51	32.54	32.50
480	33.16	33.19	33.20	33.19	33.18	33.17	33.20	33.16
500	33.83	33.85	33.85	33.83	33.84	33.83	33.86	33.84
520	34.50	34.51	34.51	34.50	34.51	34.49	34.51	34.51
540	35.16	35.18	35.16	35.15	35.17	35.15	35.17	35.18
550	35.50	35.52	35.50	35.49	35.51	35.50	35.50	35.52

DUQUESNE LIGHT COMPANY
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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE XII

CALIBRATION SHEET

Date: May 1, 1960

Recorder: 57N13R

Recording: Seed Exit and Auxiliary Seed Exit Temperature

		<u>Indicated Recorder Temperature °F</u>			
Applied DC Signal Voltage	F	As Found		As Left	
		Up	Down	Up	Down
8.31	400	400.0	400.0	400.0	400.0
8.87	425	425.2	425.5	425.2	425.5
9.43	450	450.2	450.5	450.2	450.5
10.00	475	476.0	476.0	476.0	476.0
10.57	500	501.0	501.0	501.0	501.0
11.13	525	525.5	525.2	525.5	525.2
11.71	550	551.0	550.5	551.0	550.5
12.28	575	576.0	575.5	576.0	575.5
12.86	600	601.0	600.5	601.0	600.5
13.44	625	626.0	625.5	626.0	625.5
14.02	650	651.0	651.0	651.0	651.0
14.60	675	* 674.5	-----	-----	-----

* Pegged mechanism stopped recording arm.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE XIII

CALIBRATION SHEET

Date: May 1, 1960

Recorder: 57N15R

Recording: Blanket Exit and Inlet Auxiliary Seed Exit and Inlet Temperature

Applied DC Signal Voltage F		Indicated Recorder Temperature °F			
		As Found		As Left	
		Up	Down	Up	Down
8.31	400	402.5	403.0	400.0	400.5
8.87	425	427.5	428.0	425.0	425.5
9.43	450	452.5	453.0	450.0	450.2
10.00	475	478.0	478.5	475.5	475.5
10.57	500	503.0	503.0	500.1	500.5
11.13	525	527.5	528.0	525.0	525.3
11.71	550	553.0	553.5	550.5	550.5
12.28	575	578.0	578.0	575.2	575.2
12.86	600	603.0	603.0	600.5	600.5
13.44	625	628.0	628.0	625.0	625.2
14.02	650	653.0	653.5	650.5	650.5
14.48	675	* 670.0	-----	670.0	-----

* Pegs at 670.0 F with 14.48 applied. Adjustments made to recorder prior to "As Left" readings.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE XIV

CALIBRATION SHEET

Date: May 1, 1960
Recorder: 57-NI-9R
Recording: ΔT Recorder Seed

Applied DC Signal			Recorder Indication			
Range I		F	As Found		As Left	
Millivolt			Up	Down	Up	Down
0	0	0	0	0	0	0.25
0.45	20	18.5	19.5	19.5	20.25	20.25
0.91	40	39.0	39.75	39.9	40.75	40.75
1.37	60	59.25	59.75	60.0	60.75	60.75
1.82	80	78.0	79.5	79.5	80.2	80.2
2.28	100	98.0	-----	100.0	-----	-----
Range II						
Millivolt						
- 0.69	- 30	- 29.5	- 28.75	- 29.5	- 28.75	- 28.75
- 0.23	- 10	- 8.5	- 8.25	- 8.5	- 8.25	- 8.25
+ 0.23	10	9.75	10.50	9.75	10.50	10.50
0.69	30	30.0	30.75	30.0	30.75	30.75
1.13	50	48.75	49.75	48.75	49.75	49.75
1.59	70	68.5	69.25	68.5	69.25	69.25

NOTE: Range I pegs at 99 F on chart. Adjustment made to recorder prior to "As Left" readings. Hysteresis present in recorder.

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE XV

CALIBRATION SHEET

Applied Resistance		As Found		Recorder	Deviation
Temperature	Input	Up	Down	Temperature	
1A Mueller Tc Recorder					
100.1	28.76	28.762	28.762	100.14	.04
150.4	31.50	31.502	31.502	150.44	.04
200.3	34.18	34.185	34.185	200.4	.10
250.7	36.90	36.904	36.904	250.78	.08
300.4	39.54	39.549	39.549	300.58	.18
350.6	42.18	42.189	42.189	350.78	.18
400.8	44.80	44.809	44.809	400.94	.14
450.3	47.36	47.369	47.369	450.48	.18
500.6	49.54	49.95	49.95	500.8	.20

1B Mueller Tc Recorder					
100.1	28.76	28.761	28.761	100.12	.02
150.4	31.50	31.50	31.502	150.44	.04
200.3	34.18	34.18	34.185	200.4	.10
250.7	36.90	36.90	36.905	250.80	.10
300.4	39.54	39.548	39.548	304.56	.16
350.6	42.18	42.18	42.188	350.76	.16
400.8	44.80	44.808	44.808	400.92	.12
450.3	43.36	47.369	47.369	450.48	.18
500.6	49.94	49.95	49.95	500.8	.20

DUQUESNE LIGHT COMPANY
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PERIODIC INTERCALIBRATION OF TEMPERATURE
SENSING ELEMENTS
DLCS 2430105 (T-641303B)

TABLE XV (cont'd)

CALIBRATION SHEET

Applied Resistance Temperature	Input	As Found UpDown		Recorder Temperature	Deviation
1C Mueller Tc Recorder					
100.1	28.76	28.771	28.771	100.32	.22
150.4	31.50	31.515	31.515	150.63	.23
200.3	34.18	34.185	34.185	200.40	.10
250.7	36.90	36.919	36.919	250.9	.20
300.4	39.54	39.560	39.560	300.8	.40
350.6	42.18	42.199	42.199	350.98	.38
400.8	44.80	44.821	44.821	401.1	.3
350.3	42.36	47.38	47.38	450.7	.40
500.6	49.94	49.969	49.969	501.2	.6

1D Mueller Tc Recorder					
100.1	28.76	28.76	28.758	100.08	.02
150.4	31.50	31.498	31.498	150.38	.02
200.3	34.18	34.179	34.18	200.29	.01
250.7	36.90	36.899	36.898	250.67	.03
300.4	39.54	39.541	39.541	300.42	.02
350.6	42.18	42.181	42.181	350.62	.02
400.8	44.80	44.80	44.801	400.81	.01
450.3	47.36	47.361	47.361	450.32	.02
500.6	49.94	49.942	49.943	500.66	.06

DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
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PERIODIC CALIBRATION OF TEMPERATURE SENSING ELEMENTS
CORE 1 SEED 2
DLCS 2430105 (T-641303B)

TABLE XVI

THERMOCOUPLE - ΔT RECORDER COMPARISON DATA

Date 4/30/60

ΔT Recorder Scale Setting Range 2

Compiled By Test Crew

Average Coolant Temperature 485 F

Reference Temperature 82.9°F (Const.)

Inlet
Thermocouple

Exit
Thermocouple

Recorder Point Number	ΔT Before	Core Location	Exit Thermocouple Jack Board Number	EMF (mv)	Temp. (F)	Core Location	Jack Board Number	EMF (mv)	Temp. (F)	Temperature Difference (Exit-Inlet)	ΔT After
1	- 2.4	D-8	B-1	10.129	480.95	D-8	E-9	10.128	480.90	+ 0.05	- 2.0
2	- 2.4	D-10	B-2	10.088	478.90	E-11	E-10	10.100	479.50	- 0.60	- 2.0
3	- 2.4	E-11	B-3	10.082	478.70	E-11	E-10	10.082	478.70	0	- 2.0
4	- 2.4	F-12	B-4	10.062	478.06	E-11	E-10	10.079	478.66	- 0.6	- 2.0
5	- 0.5	H-12	B-5	10.079	473.86	J-12	E-11	10.051	477.55	+ 1.11	- 0.3
6		I-12	B-6	OOS		J-12	E-11	OOS			
7	- 2.0	J-12	B-7	10.072	478.40	J-12	E-11	10.048	477.40	+ 1.0	- 1.8
8	- 0.8	K-12	B-8	10.056	477.75	J-12	E-11	10.041	477.05	+ 0.70	- 1.1
9	- 0.8	K-11	B-9	10.054	477.70	J-12	E-11	10.031	476.55	+ 1.15	- 1.1
10	0	L-11	B-10	10.068	478.22	J-12	E-11	10.038	476.90	+ 1.32	0
11	0	L-10	B-11	10.041	477.05	J-12	E-11	10.040	477.00	+ 0.05	0
12	0	L-9	B-12	10.040	477.00	J-12	E-11	10.040	477.00	0	0
13	0	L-8	E-1	10.065	478.16	L-8	E-12	10.062	478.76	- 0.10	0
14	- 0.8	L-6	E-2	10.062	478.06	K-5	H-1	10.083	478.76	- 0.70	0
15	- 0.8	K-5	E-3	10.091	479.03	K-5	H-1	10.090	479.00	+ 0.03	0
16	+ 0.1	J-4	E-4	10.091	479.03	K-5	H-1	10.091	479.03	0	0
17	- 0.1	H-4	E-5	10.058	477.90	F-4	H-2	10.091	479.03	- 1.13	- 0.1
18	- 0.8	F-4	E-6	10.080	478.67	F-4	H-2	10.097	479.35	- 0.68	- 0.4
19	- 0.8	E-5	E-7	10.073	478.41	F-4	H-2	10.083	478.76	- 0.35	- 0.5
20	- 2.4	D-6	E-8	10.046	477.20	F-4	H-2	10.081	478.70	- 1.50	- 0.8

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DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS
DLCS 2430105
(T-641303B)

TABLE XVII (cont'd)

THERMOCOUPLE - ΔT RECORDER COMPARISON DATA

Date 4/29/60

ΔT Recorder Scale Setting Range - 2

Compiled By Test Crew

Average Coolant Temperature 500 F

Ref. Temp.	Recorder Point Number	ΔT Before	Core Location	Exit Thermocouple Jack Board Number	EMF (mv)	Temp. (F)	Core Location	Inlet Thermocouple Jack Board Number	EMF (mv)	Temp. (F)	Temperature Difference (Exit-Inlet)	ΔT After	Ref. Temp.
82.0	1	- 1.8	D-8	B-1	10.51	497.50	D-8	E-9	10.36	491.0	+ 6.50	- 2.0	81.8
82.0	2	- 1.8	D-10	B-2	10.47	496.00	E-11	E-10	10.37	491.50	+ 4.50	- 2.0	81.8
82.0	3	- 1.8	E-11	B-3	10.466	495.80	E-11	E-10	10.37	491.50	+ 4.30	- 2.0	81.8
82.0	4	- 1.8	F-12	B-4	10.44	494.50	E-11	E-10	10.37	491.50	+ 3.00	- 2.0	81.8
81.9	5	- 0.2	H-12	B-5	10.48	496.33	J-12	E-11	10.36	491.00	+ 5.33	- 0.5	81.8
81.8	6	0	I-12	B-6	OOS		J-12	E-11	OOS			0	81.8
81.8	7	- 2.0	J-12	B-7	10.42	493.66	J-12	E-11	10.36	491.00	+ 2.66	- 2.0	81.8
81.8	8	- 1.4	K-12	B-8	10.41	493.33	J-12	E-11	10.36	491.00	+ 2.33	- 1.4	81.8
81.8	9	- 1.2	K-11	B-9	10.41	493.33	J-12	E-11	10.36	491.00	+ 2.33	- 1.4	81.8
81.8	10	0	L-11	B-10	10.41	493.33	J-12	E-11	10.36	491.00	+ 2.33	0	81.8
81.8	11	0	L-10	B-11	10.395	492.75	J-12	E-11	10.36	491.00	+ 1.75	0	81.8
81.8	12	0	L-9	B-12	10.36	491.00	J-12	E-11	10.36	491.00	0	0	81.8
81.8	13	0	L-8	E-1	10.40	493.00	L-8	E-12	10.36	491.00	+ 2.00	0	81.8
81.8	14	0	L-6	E-2	10.39	492.50	K-5	H-1	10.40	493.00	- 0.50	0	81.9
81.8	15	0	K-5	E-3	10.40	493.00	K-5	H-1	10.40	493.00	0	0	81.9
81.8	16	0	J-4	E-4	10.39	492.50	K-5	H-1	10.40	493.00	- 0.50	0	81.9
81.9	17	0	H-4	E-5	10.38	492.00	F-4	H-2	10.40	493.00	- 1.00	- 0.4	81.9
81.9	18	- 0.2	F-4	E-6	10.37	491.50	F-4	H-2	10.40	493.00	- 1.50	- 0.5	81.9
81.8	19	- 0.4	E-5	E-7	10.36	491.00	F-4	H-2	10.40	493.00	- 2.00	- 0.5	81.9
81.9	20	- 1.6	D-6	E-8	10.38	492.00	F-4	H-2	10.40	493.00	- 1.00	- 1.4	81.9

Tc at end - 499.6 F.

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DUQUESNE LIGHT COMPANY
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PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS
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(T-641303B)

TABLE XVII

THERMOCOUPLE - ΔT RECORDER COMPARISON DATA

Date 4/29/60

ΔT Recorder Scale Setting Range - 2

Compiled By Test Crew

Ave age Coolant Temperature 500 F

Ref. Temp.	Recorder Point Number	ΔT Before	Core Location	Exit Thermocouple			Core Location	Inlet Thermocouple			Temperature Difference (Exit-Inlet)	ΔT After	Ref. Temp.
				Jack Board Number	EMF (mv)	Temp. (F)		Jack Board Number	EMF (mv)	Temp. (F)			
81.8	1	- 2.0	D-8	B-1	10.51	497.50	D-8	E-9	10.49	496.66	+ 0.84	- 2.0	81.8
81.8	2	- 2.0	D-10	B-2	10.43	494.00	E-11	E-10	10.45	495.00	- 1.00	- 0.1	81.8
81.8	3	- 2.0	E-11	B-3	10.43	494.00	E-11	E-10	10.45	495.00	- 1.00	- 0.6	81.8
81.9	4	- 2.0	F-12	B-4	10.39	492.50	E-11	E-10	10.41	493.33	- 0.83	- 1.0	81.9
81.9	5	- 0.5	H-12	B-5	10.43	494.00	J-12	E-11	10.37	491.50	+ 2.50	- 0.2	81.9
82.0	6	- 2.0	I-12	B-6	OOS		J-12	E-11	OOS				81.9
81.9	7	- 1.3	J-12	B-7	10.40	493.0	J-12	E-11	10.36	491.00	+ 2.00	- 2.0	81.9
82.0	8	- 1.2	K-12	B-8	10.375	491.75	J-12	E-11	10.36	491.00	+ 0.75	- 1.5	82.0
82.0	9	0	K-11	B-9	10.375	491.75	J-12	E-11	10.35	490.50	+ 1.25	- 1.1	82.0
82.0	10	0	L-11	B-10	10.39	492.50	J-12	E-11	10.35	490.50	+ 2.00	0	82.0
82.0	11	0	L-10	B-11	10.36	491.00	J-12	E-11	10.35	490.50	+ 0.50	0	82.0
82.0	12	0	L-9	B-12	10.35	490.50	J-12	E-11	10.34	490.00	+ 0.50	0	82.0
82.0	13	0	L-8	E-1	10.37	491.50	L-8	E-12	10.35	490.50	+ 1.00	0	82.0
82.0	14	0	L-6	E-2	10.37	491.50	K-5	H-1	10.37	491.50	0	0	82.0
82.0	15	0	K-5	E-3	10.40	493.0	K-5	H-1	10.40	493.0	0	0	82.0
82.0	16	0	J-4	E-4	10.41	493.33	K-5	H-1	10.40	493.0	+ 0.33	0	82.0
82.0	17	0	H-4	E-5	10.39	492.50	F-4	H-2	10.40	493.0	- 0.50	0	82.0
82.0	18	- 1.12	F-4	E-6	10.38	492.00	F-4	H-2	10.39	492.50	- 0.50	- 0.2	82.0
82.0	19	- 1.3	E-5	E-7	10.37	491.50	F-4	H-2	10.40	493.0	- 1.50	- 0.4	82.0
82.0	20	- 1.8	D-6	E-8	10.34	490.00	F-4	H-2	10.40	493.0	- 3.00	- 1.7	82.0

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TABLE XVIII

THERMOCOUPLE - ΔT RECORDER COMPARISON DATA

Date 4/29/60

ΔT Recorder Scale Setting Range - 2

Compiled By Test Crew

Average Coolant Temperature 515 F

Reference Temperature 83 F (Const.)

Recorder Point Number	ΔT Before	Core Location	Exit Thermocouple			Core Location	Inlet Thermocouple			Temperature Difference (Exit-Inlet)	ΔT After
			Jack Board Number	EMF (mv)	Temp. (F)		Jack Board Number	EMF (mv)	Temp. (F)		
1	- 1.7	D-8	B-1	10.875	513.75	D-8	E-9	10.84	512.00	+ 1.75	- 1.7
2	- 1.7	D-10	B-2	10.802	510.40	E-11	E-10	10.801	510.36	+ 0.04	- 1.7
3	- 1.7	E-11	B-3	10.783	509.65	E-11	E-10	10.801	510.36	- 0.71	- 1.7
4	- 1.7	F-12	B-4	10.760	508.50	E-11	E-10	10.795	510.16	+ 1.66	- 1.7
5	- 1.4	H-12	B-5	10.795	510.16	J-12	E-11	10.774	509.20	+ 1.14	- 0.4
6		I-12	B-6	OOS		J-12	E-11	OOS			
7	- 1.4	J-12	B-7	10.794	509.20	J-12	E-11	10.763	508.65	+ 0.55	- 1.4
8	- 1.4	K-12	B-8	10.767	508.85	J-12	E-11	10.750	508.00	+ 0.85	- 1.4
9	- 1.3	K-11	B-9	10.767	508.85	J-12	E-11	10.754	508.20	+ 0.65	- 1.3
10	- 0.3	L-11	B-10	10.783	509.65	J-12	E-11	10.751	508.05	+ 1.60	- 0.1
11	- 0.3	L-10	B-11	10.765	508.75	J-12	E-11	10.742	507.73	+ 0.98	- 0.1
12	- 0.3	L-9	B-12	10.736	507.53	J-12	E-11	10.743	507.76	- 0.23	- 0.1
13	+ 0.2	L-8	E-1	10.770	509.00	L-8	E-12	10.769	508.95	+ 0.05	- 0.1
14	+ 0.2	L-6	E-2	10.769	508.95	K-5	H-1	10.793	510.13	+ 1.08	- 0.1
15	+ 0.2	K-5	E-3	10.795	510.16	K-5	H-1	10.786	509.80	+ 0.36	0
16	+ 0.2	J-4	E-4	10.792	510.10	K-5	H-1	10.792	510.10	0	+ 0.1
17	+ 0.1	H-4	E-5	10.770	509.0	F-4	H-2	10.784	509.70	- 0.70	- 0.5
18	0	F-4	E-6	10.775	509.25	F-4	H-2	10.780	509.50	- 0.25	- 0.5
19	0	E-5	E-7	10.768	508.90	F-4	H-2	10.788	509.90	- 1.00	- 0.5
20	- 1.6	D-6	E-8	10.745	507.83	F-4	H-2	10.774	509.20	- 1.37	- 1.2

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DUQUESNE LIGHT COMPANY
POWER STATIONS DEPARTMENT
SHIPPINGPORT ATOMIC POWER STATION

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TABLE XIX

THERMOCOUPLE - ΔT RECORDER COMPARISON DATA

Date 4/30/60

ΔT Recorder Scale Setting Range - 2

Compiled By Test Crew

Average Coolant Temperature 530

Reference Temperature 83 F (Const.)

Recorder Point Number	ΔT Before	Core Location	Exit Thermocouple			Core Location	Inlet Thermocouple			Temperature Difference (Exit-Inlet)	ΔT After
			Jack Board Number	EMF (mv)	Temp. (F)		Jack Board Number	EMF (mv)	Temp. (F)		
1	- 1.5	D-8	B-1	11.12	524.5	D-8	E-9	11.16	526.0	- 1.5	- 2.0
2	- 1.6	D-10	B-2	11.10	523.5	E-11	E-10	11.10	523.5	0	- 2.0
3	- 1.6	E-11	B-3	11.10	523.5	E-11	E-10	11.10	523.5	0	- 2.0
4	- 1.5	F-12	B-4	11.06	521.66	E-11	E-10	11.10	523.5	- 1.84	- 2.0
5	- 0.2	H-12	B-5	11.08	522.5	J-12	E-11	11.04	521.0	+ 1.5	- 0.4
6	0	I-12	B-6	OOS		J-12	E-11	OOS			
7	- 1.5	J-12	B-7	11.08	522.5	J-12	E-11	11.04	521.0	+ 1.5	- 1.4
8	- 1.25	K-12	B-8	11.07	522.0	J-12	E-11	11.06	521.66	+ 0.34	- 1.2
9	- 1.2	K-11	B-9	11.07	522.0	J-12	E-11	11.06	521.66	+ 0.34	- 1.2
10	- 0.2	L-11	B-10	11.09	523.0	J-12	E-11	11.16	526.0	- 3.0	- 0.4
11	- 0.1	L-10	B-11	11.18	527.0	J-12	E-11	11.14	525.3	+ 1.7	- 0.3
12	- 0.1	L-9	B-12	11.16	526.0	J-12	E-11	11.16	526.0	0	- 0.3
13	- 0.1	L-8	E-1	11.20	528.0	L-8	E-12	11.16	526.0	+ 2.0	- 0.3
14	- 0.1	L-6	E-2	11.24	529.5	K-5	H-1	11.22	528.6	+ 0.9	- 0.3
15	+ 0.3	K-5	E-3	11.17	526.5	K-5	H-1	11.17	526.5	0	- 0.3
16	+ 0.3	J-4	E-4	11.10	523.5	K-5	H-1	11.12	524.5	- 1.0	- 1.4
17	+ 0.5	H-4	E-5	11.09	523.0	F-4	H-2	11.19	527.5	- 4.5	- 1.2
18	+ 0.5	F-4	E-6	11.13	525.0	F-4	H-2	11.16	526.0	- 1.0	- 1.3
19	+ 0.3	E-5	E-7	11.11	524.0	F-4	H-2	11.13	525.0	- 1.0	- 1.2
20	- 0.9	D-6	E-8	11.09	523.0	F-4	H-2	11.18	527.0	- 4.0	- 1.9
14	0	L-6	E-2	11.23	529.0	K-5	H-1	11.21	528.3	+ 0.7	- 0.2
15	+ 0.3	K-5	E-3	11.23	529.0	K-5	H-1	11.17	526.5	+ 2.5	+ 0.4
16	+ 0.3	J-4	E-4	11.20	528.0	K-5	H-1	11.19	527.5	+ 0.5	+ 0.4
17	+ 0.4	H-4	E-5	11.16	526.0	F-4	H-2	11.18	527.0	- 1.0	+ 0.4
18	+ 0.4	F-4	E-6	11.16	526.0	F-4	H-2	11.17	526.5	- 0.5	+ 0.3
19	+ 0.3	E-5	E-7	11.13	525.0	F-4	H-2	11.16	526.0	- 1.0	+ 0.2
20	- 0.9	D-6	E-8	11.12	524.5	F-4	H-2	11.17	526.5	- 2.0	- 1.1

DUQUESNE LIGHT COMPANY
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PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS
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TABLE XX

THERMOCOUPLE - ΔT RECORDER COMPARISON DATA

Date 4/30/60

ΔT Recorder Scale Setting Range - 2

Compiled By Test Crew

Average Coolant Temperature 485 F

Recorder Point Number	Core Location	Exit Thermocouple Jack Board Number	EMF (mv)	Temp. (F)	Core Location	Inlet Thermocouple Jack Board Number	EMF (mv)	Temp. (F)	Temperature Difference (Exit-Inlet)
1	D-8	B-1	10.185	483.25	D-8	E-9	10.174	482.70	+ 0.55
4	F-12	B-4	10.187	483.35	E-11	E-10	10.158	481.93	+ 1.42
7	J-12	B-7	10.159	481.95	J-12	E-11	10.180	483.0	- 1.05
10	L-11	B-10	10.150	481.66	J-12	E-11	10.181	483.05	- 1.39
13	L-8	E-1	10.171	482.55	L-8	E-12	10.171	482.55	0
16	J-4	E-4	10.198	483.90	K-5	H-1	10.191	483.55	+ 0.35
19	E-5	E-7	10.204	484.20	F-4	H-2	10.175	482.57	+ 1.63

NOTE: Data for Addendum 1, using copper leads.

TEST RESULTS DLCS 2430105
T-641303B

PERIODIC INTERCALIBRATION OF TEMPERATURE SENSING ELEMENTS, CORE I SEED 2

Results Prepared By

J. F. Spieck per Edw

Results Reviewed By

Edward Jones

Approved (Duquesne Light Company)

George Santel

Date

1-31-61