MASTER

DUQUESNE LIGHT COMPANY

SHIPPINGPORT ATOMIC POWER STATION

TEST RESULTS

DLCS 1580302
T-550010

CONTROL ROD DRIVE MECHANISMS
PRECRITICAL AND INITIAL CRITICAL TESTS

CORE I, SEED 2

Section 3 of 3 Sections

First Issue, August 25, 1960

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DISCLAIMER

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CONTROL ROD DRIVE MECHANISMS
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CORE I, SEED 2

Purpose

To assure proper operation of control rod mechanisms under normal conditions.

Conclusions

The results obtained during this test indicate satisfactory performance of the control rod mechanisms under normal operating conditions.

Description of Test Equipment and Test Procedure

The latch current for each rod was determined by slowly increasing the stator current until the rod was observed to be rising as indicated by a voltage increase on the voltmeter attached to the rod bottom position indicator coil. The peak current recorded when the rod started rising was considered to be the latch current.

After each rod was latched it was withdrawn to four inches and held in this position. The stator current was then reduced until the rod scrammed. The peak current recorded when the rod scrammed was considered to be the stationary scram current.

To save time two control rods were raised simultaneously, on separate spare buses, to 69 inches and then by opening the appropriate circuit breakers separate scram times were obtained for each rod. Scram times were indicated on traces of the Offner recorder.

When raising two rods at one time, each on a separate spare bus and with a current of 8.5 amps on each spare bus, the rod test supply circuit breaker tripped causing the rods to drop. This current was reduced to 7.5 amps and the rods were successfully raised. It was later discovered that a 10 amp breaker had been installed instead of the 35 amp breaker specified. A breaker of the correct capacity was installed after the test.

Test Results

DLCS 1580302 was performed on April 29, 1960. An inverse count rate was plotted for the first pair of control rods (13 and 82) that were pulled to a height of 69 inches. This check showed that the reactor did not approach criticality.

Latch currents and stationary scram currents were determined without incident. The control rod scram times from 69 inches ranged from 0.95 to 1.10 seconds with the average scram time being 1.02 seconds. No rollout scrams occurred during this section of the test.

The control rod scram times, latching currents, and stationary scram currents are tabulated in Table I along with their respective reactor coolant pressures, temperatures, and flow rates. A representative Offner chart, which shows the method used in determining the scram time, is shown in Figure I.

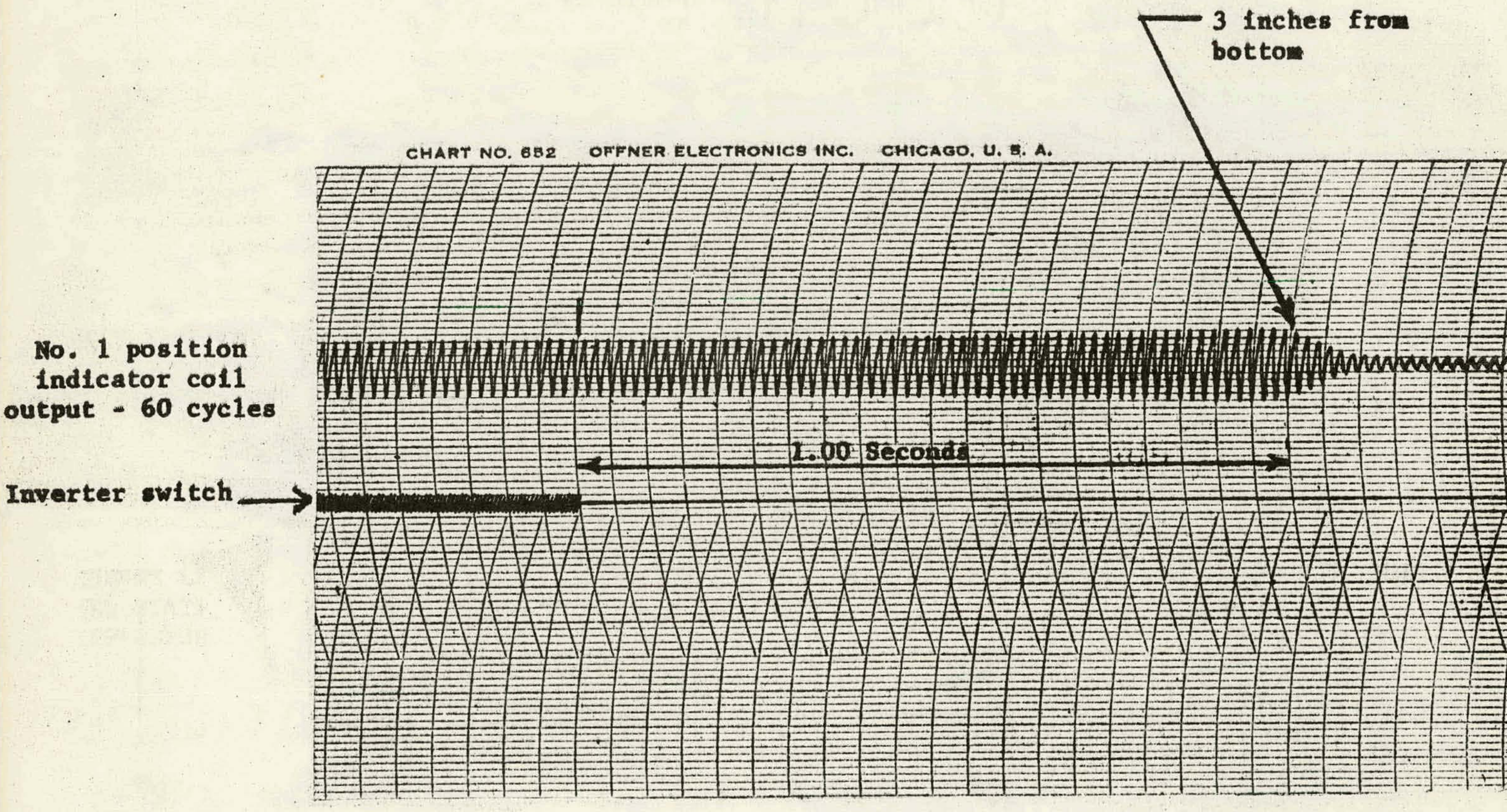
For three of the control rods (82, 62, 34) the latching currents were above the normal latching current of 7.0 amperes. However, these readings are questionable due to the fluctuation at the ammeters at the time of reading.

All the rod bottom lights, dial type position indicators and "candlestick" indicators functioned properly.

For the majority of the control rods tested the reactor coolant temperature was approximately 515 F instead of 500 F as outlined in the test procedure. This was necessitated by the concurrent performance of DLCS 24301.

FIGURE 1

OFFNER RECORDING FOR DETERMINING SCRAM TIME



Rod 31 scram from 69 inches
Offner speed 100 mm/sec

TABLE I

Rod Number	Coolant Pressure (psig)	Reactor Coolant Temperature (Tc)	(Th)	Reactor Coolant Flow lb/hr	Latching Current (amps)	Stationary Scram Current (amps)	Scram* Time (sec)
13	1760	499.3	499.0	7.8 x 10^6	6.0	1.5	1.10
82	1760	499.3	499.0	7.8 x 10^6	7.1	2.2	1.10
71	1760	499.3	498.7	7.8 x 10^6	6.0	1.9	1.07
23	1770	499.3	498.7	7.8 x 10^6	6.1	1.9	1.05
61	1760	500.0	498.8	7.8 x 10^6	6.0	1.9	1.00
33	1760	500.0	498.8	7.8 x 10^6	5.0	1.9	1.00
51	1775	514.0	513.0	7.75 x 10^6	7.0	2.0	1.05
43	1790	514.0	513.0	7.75 x 10^6	5.2	1.9	.98
41	1700	514.4	513.8	7.75 x 10^6	5.5	1.9	1.00
53	1785	514.4	513.8	7.75 x 10^6	6.0	1.5	1.00
31	1785	515.0	514.3	7.75 x 10^6	6.2	1.9	1.00
63	1785	515.0	514.3	7.75 x 10^6	6.2	1.8	1.03
21	1785	515.5	515.0	7.75 x 10^6	6.9	2.0	1.00
73	1800	515.5	515.0	7.72 x 10^6	6.3	1.9	1.00
84	1800	515.4	514.5	7.72 x 10^6	6.8	2.0	1.03
11	1800	515.4	514.5	7.75 x 10^6	7.0	1.8	1.05
14	1785	515.3	514.3	7.75 x 10^6	6.6	1.5	1.03
83	1785	515.3	514.3	7.73 x 10^6	6.5	1.7	1.03
72	1785	515.0	514.3	7.75 x 10^6	5.9	1.6	1.00
24	1785	515.0	514.3	7.75 x 10^6	6.3	1.9	1.05
62	1800	515.0	514.5	7.75 x 10^6	7.5	1.9	1.03
34	1800	515.0	514.5	7.75 x 10^6	7.2	1.9	1.00
52	1800	515.0	514.4	7.75 x 10^6	6.5	1.8	1.00
44	1800	515.0	514.4	7.75 x 10^6	6.5	1.8	.98
42	1800	515.0	514.5	7.75 x 10^6	6.2	1.9	1.09
54	1800	515.0	514.5	7.75 x 10^6	5.9	1.6	1.00
32	1800	515.0	514.5	7.73 x 10^6	6.8	2.0	1.03
64	1800	515.0	514.5	7.75 x 10^6	6.5	1.5	1.05
22	1790	515.2	515.3	7.75 x 10^6	5.9	1.8	0.98
74	1790	515.2	515.3	7.72 x 10^6	6.5	2.0	.95
12	1790	519.1	519.0	7.72 x 10^6	6.4	1.9	1.05
81	1790	519.1	519.0	7.70 x 10^6	6.2	1.5	1.03

* As indicated on the sample tape the scram time is taken as the time from the point of unlatching to a point 3 inches from the bottom of the core. This "bottom" point is an easily identified point for future comparison and is essentially bottom. It is believed that the gradual drop in position indicator coil output voltage during the last three inches of rod travel is due to deceleration of the rod and electrical "decay" of the transformer voltage.

Results Prepared By Jay F. Nunamaker per RJL

Results Reviewed By Roger J. Lawrence

Approved (Duquesne Light Company) P.A. Jones Date 8-25-60

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