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REGULATORY DOCKET FILE COPY

May 15, 1978

Mr. George E. Lear, Chief
Operating Reactors - Branch 3
Division of Operating Reactors
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Unit 3
Feedwater and Control Rod Drive
Nozzle Inspection - Winter 1978
NRC Docket No. 50-254

References (a): M. S. Turbak letter to D. K. Davis dated November 28, 1977

(b): R. Bevan memorandum to G. Lear dated March 24, 1978

(c): M. S. Turbak letter to G. Lear dated March 6, 1978

(d): G. A. Abrell letter to D. L. Ziemann dated October 18, 1976

(e): R. F. Heishman letter to B. Lee, Jr. dated April 18, 1978

(f): M. S. Turbak letter to D. L. Ziemann dated April 25, 1978

Dear Mr. Lear:

A summary of the results of the Dresden Unit 3 Winter 1978 refuel outage Feedwater and Control Rod Drive Nozzle inspections and repairs is enclosed as Attachment 1. These inspections were performed as proposed in Reference (a) with the concurrence of the NRC Staff as contained in Reference (b). This inspection program was justified on the basis of the plant specific operating history for Dresden Unit 3 which was reviewed with the NRC on February 28, 1977 and documented in Reference (c). On the basis of that history, it was concluded that surface examination of the nozzles beyond that specified in Reference (a)

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was not necessary. In addition, Commonwealth Edison committed to implement a long term action plan for Dresden Unit 3 which includes:

(1) The removal of the thermal sleeve in the CRD return nozzle at the next refueling outage currently scheduled for Fall, 1979.

(2) The removal of cladding from the feedwater nozzles and installation of an improved sparger design at one of the two Mark I Containment outages (i.e. Fall, 1979 or Spring, 1981), whichever provides the most economical basis.

This transmittal satisfies the commitment contained in Reference (c) to provide a safety evaluation for the current cycle and the results of testing and analysis conducted to determine the consequence of valving out the CRD return line on Dresden Units 2 & 3 and Quad-Cities Units 1 & 2. The CRD return line information is enclosed as Attachment 2.

One (1) signed original and 39 copies of this letter are provided for your use.

Very truly yours,

M. S. Turbak

M. S. Turbak
Nuclear Licensing Administrator
Boiling Water Reactors

enclosure

Attachment 1

Feedwater and Control Rod Drive Nozzle Inspections Dresden Unit 3 - Winter 1978 Refuel Outage

I. Feedwater Nozzle

The nozzle inspection defined in Reference (a) was performed on March 8, 1978. The feedwater nozzle inner radii inspections were made using Commonwealth Edison Company (CECo.) procedure NDT-C24, Revision 3; the bore inspections were made using NDT-C25, Revision 1. Two recordable indications less than 80% full screen height were detected in the "C" area of nozzles "A" and "D". Both of these indications were observed during the fall outage in 1976 and were reported in Reference (d). It was concluded by the Level III-C examiner that the two small indications were cladding discontinuities. This conclusion was based on the sweep positions and restricted transducer movement over which the indications were observed. These results were reviewed by the NRC Region III inspector, and were documented in his inspection report (Reference (e)).

II. CRD Return Nozzle

The initial nozzle inspection defined in Reference (a) was performed on March 8, 1978. The CRD return nozzle inspection was made using procedure NDT-C26, Revision 0 to examine the nozzle inner radius and the vessel below the nozzle. No recordable indications were observed.

During the subsequent visual examination of the CRD return line thermal sleeve, several crack-like indications were identified at the bottom of the thermal sleeve retaining ring. The licensee decided to remove the thermal sleeve, the retaining ring and PT the nozzle inner radius and the area below the nozzle. Numerous linear indications were identified by PT. The indications were located in an area between 160° to 200° and approximately 12" below the nozzle centerline. The length of the indications varied from 1/8" to 6" and were orientated both radially and circumferentially. All the indications were removed by grinding. Final measurement after grinding indicated that the deepest ground out area was on the reactor vessel wall approximately 5" below the nozzle. The total depth was determined to be 27/32" of which 17/32" was in the base metal.

Using the alternate reinforcement rules of NB-3339 for which the CRD nozzle qualifies, analysis clearly shows that no reinforcement is required in the area in question. It was also shown that excess metal exists both on the nozzle and nozzle wall which can be counted as reinforcement. Finally, the local stresses at the grind out were determined to be below the limits defined by NB-3213.10 and NB-3221.3 of Section III of the ASME Code.

During UT of CRD return line welds, an indication of 100% DAC was found on the pipe side heat-affected zone of the pipe to safe-end weld. The indication was believed to be a crack on the inside surface on the pipe, having a length of approximately 1/2" long located at about 80°. It was decided to replace the portion of the line from the safe-end to pipe weld to the first 90° elbow with a new section of pipe and a 90° elbow. Pieces of the CRD return pipe-to-safe-end weld and adjoining pipe section; as well as, two pieces of the CRD thermal sleeve retainer ring were sent to the Battelle Battelle Columbus labs for analysis. This same action was taken for the Dresden 2 CRD components as was described in Reference (f).

These results were reviewed by the NRC Region III inspector, and were documented in his inspection report (Reference (e)).

III. Exposure Summary

The nozzle program resulted in a total expenditure of 78.5 Man-Rem of exposure for inspection and repair work. A detailed breakdown of this exposure is provided below.

A. Inspection	
1. Feedwater Nozzles	.6 Man-Rem
2. CRD Nozzle	.2 Man-Rem
B. Repair	
1. Feedwater Nozzles	No Repair Required
2. CRD Nozzle	
a. Return Line	11.7 Man-Rem (Contract Labor)
	1.0 Man-Rem (NDE/Misc.)
b. Nozzle	45.0 Man-Rem (Contract Labor)
	11.0 Man-Rem (CECo-Maintenance)
	4.0 Man-Rem (NDE Personnel)
	5.0 Man-Rem (Quality Control Personnel)

The CRD nozzle repair effort required the addition of eleven days to the Dresden 3 Winter 1978 refueling outage.

<u>Attachment 2</u>

The attached test procedures and test results demonstrate the acceptable performance of the CRD system with the CRD return line isolated.

UNIT 3

Test Procedure for Isolated Operation of the Control Rod Drive Hydraulic Return Line to the Reactor Pressure Vessel

DRESDEN STATION

Purpose:

This procedure provides tests instructions to generate data for the acceptance of CRD system performance with the CRD return line isolated. Data accumulated during the execution of this instruction shall be reviewed on an individual plant basis.

B. References:

1) P&IDs of the CRD hydraulic system.

2) Operation and maintenance instructions for the hydraulic control unit.

3) BWR services information letter no. 200 dated 10/29/76

4) Control Rod Drive testing procedure DTS-300-6.

5) Control Rod Drive timing procedure DOS-300-4.

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C. Prerequisites:

1) Have friction testing equipment calibrated and set up.

2) Have the following instruments calibrated if they have not been recently calibrated:

2.a) CRD pump discharge indicator.
2.b) CRD total flow indicators.
2.c) CRD total cooling water flow indicator.
2.d) CRD cooling water pressure indicator.
2.e) CRD charging water pressure indicator.
2.f) CRD total stabilizer flow indicator.
2.g) CRD exhaust water pressure indicator.
2.h) CRD cooling water ΔP indicator.
2.i) CRD drive water ΔP indicator.

3) Reactor is in refuel mode with all control rods fully inserted.

4) CRD system is in normal operation with exhaust water returning to the vessel.

5) Obtain approval from the nuclear engineers for moving the 3 control rods to be withdrawn and inserted during the test. Utilize the attached sequence for control rod movements.

6) Have a complete set of current temperature readings for all CRDs during normal operation.

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7) Need a stop watch for the test.

D. Precautions: When adjusting CRD system flows, check the CRD pump in operation for abnormal bearing temperatures, cavit. etc. which could be the result of pump water starvation

E. Limitations and Actions:

The following requirements should be satisfied by
[illegible]

ormal reactor operation:

1) CRD rod speed shall be 48±10% seconds r full rod travel for rods timed during this test.

2) Recorder traces of monitored units must show ormal wave form traces for notch settle motion as eferenced in the operation and maintenance instruction r the Hydraulic Control Unit.

3) Exhaust water pressure can not exceed PR+30psig.

4) Maximum withdrawal settle time is 7 seconds.

5) Maximum insert settle time is 5.5 seconds.

6) Minimum settle pressure for insert and withdrawal is 30 psid.

7) Charging water maximum pressure is 1510 psig; minimum pressure is 1400 psig.

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= Procedure:

1) Record the following during normal CRD operation:

1.a) CRD pump discharge pressure 1600 psig.

1.b) CRD main system flow 62 gpm.

1.c) Cooling water flow to the drives 51 gpm

1.d) Cooling water ΔP to the drives 18 psid

1.e) Drive water ΔP to the drives 275 psid

1.f) Charging water pressure supplied to the accumulators 152[illegible]

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D.O.S.R.

2) Fully stroke the 8 rods selected for the test. While doing this obtain insert and withdrawal times of the drives. Record the results below. If any CRD time is out of specification retime it using procedure DOS-300-4. Record the as left times.

As Found

CRD	TIMES Insert	TIMES Withdrawal
D-7	47	43.4
G-7	41.6	40.3
G-4	51.7	47.9
E-2	59.7	45
L-2	58.4	41
J-4	52.6	35
M-5	48.9	41.2
M-8	43.4	44.2

As Left

CRD	TIMES Insert	TIMES Withdrawal
D-7	47.0	43.4
G-7	49.0	45.8
G-4	51.7	47.9
E-2	45.4	43.4
L-2	51.0	46.0
J-4	45.8	49.0
M-5	52.7	48.6
M-8	43.2	44.2

3) Record CRD temperatures if the RPV bottom head drain line temperature is greater than 220°.

4) Adjust main system flow until it equals the cooling water flow recorded in F.1.c.

5) Open manual bypass valve (PCV-3-302-11) around the cooling water pressure control valve, MO-3-302-10.

6) Close isolation valves 3-301-74 and 3-301-9

[illegible] MO-3-302-10 to the full open posit[illegible]

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8) Record cooling water pressure. 18 psid

9) If the cooling water pressure does not equal that recorded in F.1.d adjust main system flow to obtain a cooling water ΔP as recorded in F.1.d. Record the as left cooling water pressure.

18 psid

10) Record drive water ΔP. 160 psid

11) If the drive water ΔP does not equal that recorded in F.1.e adjust drive water pressure control valve, MO-3-302-8, to obtain a drive water ΔP as recorded in F.1.e.

Record the as left drive water ΔP 280 psid

12) Record stabilizer flow. —

13) Record charging water pressure 1550 psig

14) Adjust charging water pressure, if necessary, to fall within correct limits.

Record as left charging water pressure

1550 psig

15) Check for rod drifting. If drifting has occured further reduction of main system flow and drive water pressure control adjustments may be necessary.

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16) Record the following data:

16.a) CRD pump discharge pressure 1600 psig.

16.b) CRD main system flow 51 gpm.

16.c) Cooling water flow to the drives 50 gpm.

16.d) Cooling water ΔP to the drives 18 psid.

16.e) Drive water ΔP to the drives 280 psid.

16.f) Charging water pressure 1550 psig.

16.g) Stabilizer flow ~.

17) Full stroke the 8 rods selected for the test. While doing this obtain insert and withdrawal times for the drives. Record the results below. If any CRD time is out of specification retime it using procedure DOS-300-4. Record the as left times.

As Found

CRD	Times Insert	Times Withdrawal
D-7	53.0	45.8
G-7	42.4	40.5
G-4	52.3	49.5
E-2	64.6	44.4
L-2	53.6	48.0
J-4	48.0	49.9
M-5	54.9	49.8
M-8	45.5	45.5

As Left

CRD	Times Insert	Times Withdrawal
SAME AS THE AS FOUND Data		

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18) Take recorder traces of the notch in and notch [out] motion between position 32 and position 30 using [pr]ocedure DTS-300-6 for each of the 8 selected CRDs. ____

19) Increase cooling water pressure to nominal [m]aximum (PR+30 psig). ____

20) Adjust drive water pressure control valve, MO-3-302-8, [to] obtain a drive water ΔP as recorded in F.1.d. ____

21) Record the following data: ____

21.a) CRD pump discharge pressure	1540 psig
21.b) CRD main system flow	70 gpm
21.c) Cooling water flow to the drives	68 gpm
21.d) Cooling water ΔP to the drives	30 psid
21.e) Drive water ΔP to the drives	280 psid
21.f) Charging water pressure	1500 psig
21.g) Stabilizer flow	—

22) Record settle times while notching each CRD selected (8) in and out between position 32 and 30. (Settle time begins at the time that the reactor manual control system circuitry amber settle light comes on and ends when the rod position desired is obtained. Record the times below.

CRD	SETTLE TIMES (SEC)	
	INSERT	WITHDRAWAL
D-7	1.4	3.4

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CRD	SETTLE TIMES	
	INSERT	WITHDRAWAL
G-7	2.2	3.5
G-4	1.5	2.6
E-2	2.6	3.5
L-2	1.4	3.1
J-4	1.5	3.0
M-5	1.4	3.5
M-8	1.6	3.2

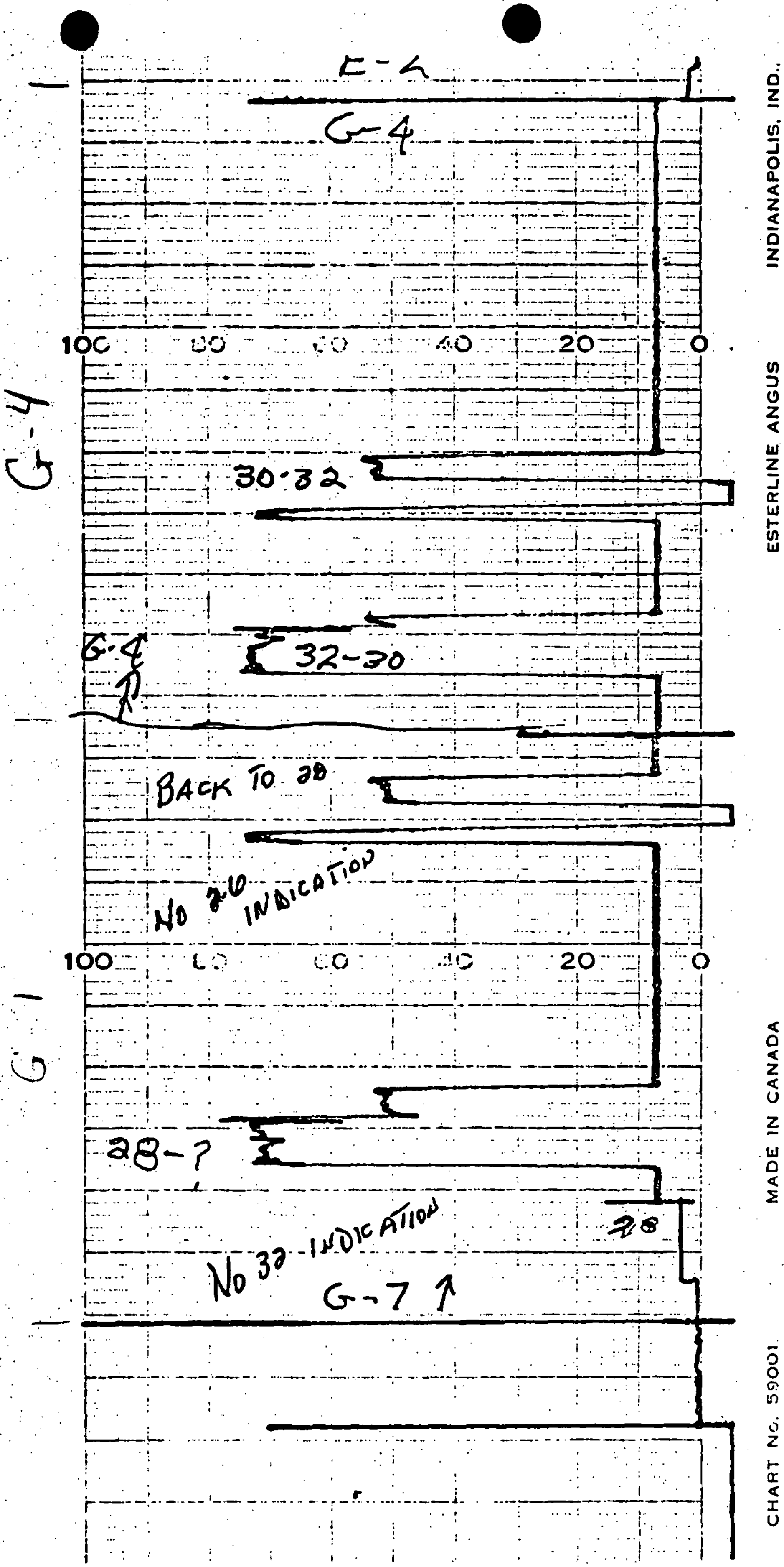
23) If the data meets the requirements established in section "E" and the modified system is to be used, return the system to the parameters as recorded in F.16. (The operating engineer shall determine if the reroute is to be used)

4) If timing had to adjusted for any of the 8 CRDs used in the test re time all the CRDs using procedure DOS-300-4.

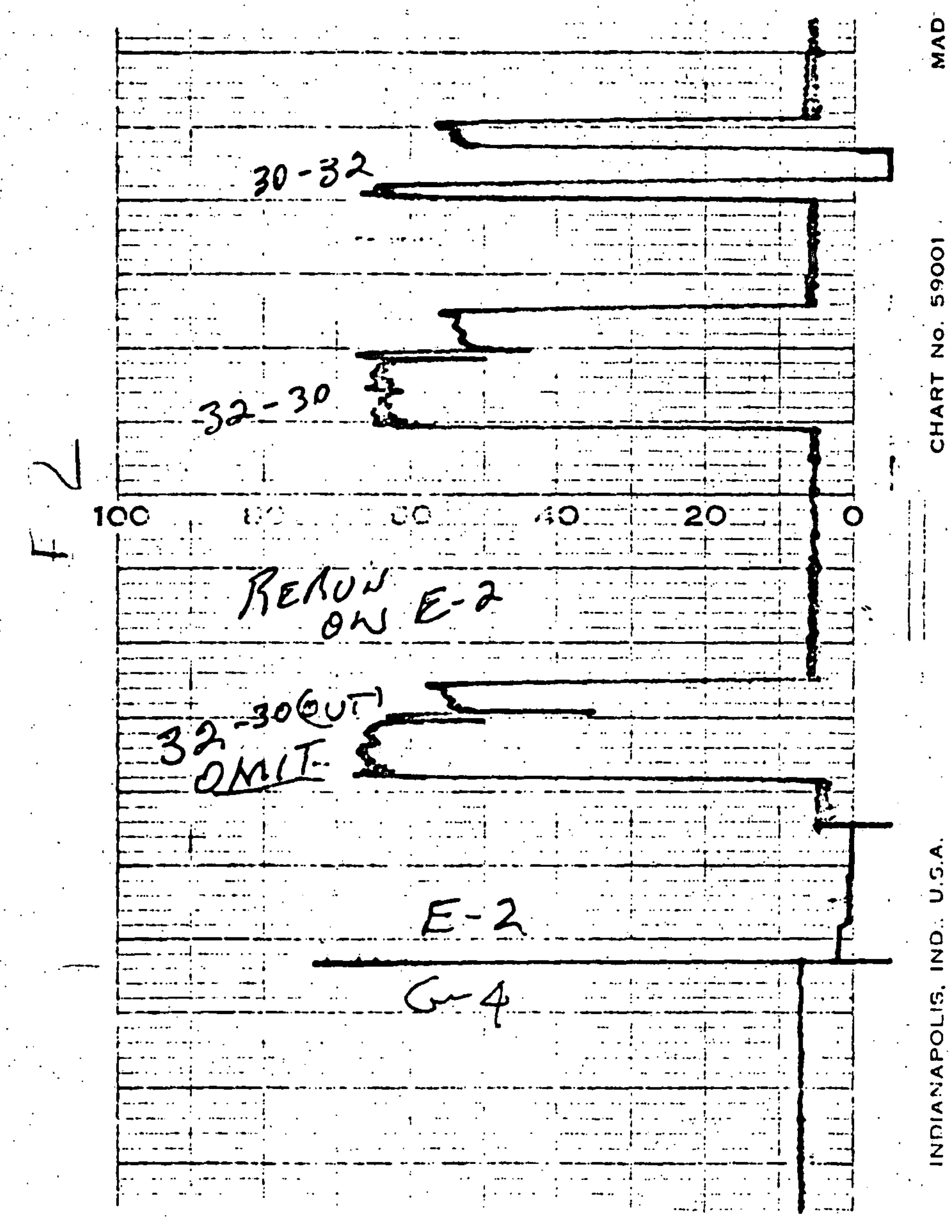
5) If the modified system is not to be used return system to normal operation. (The operating engineer shall determine if the modified system is to be used.)

G. Checklist: Attached.

H. Technical Specification References: None



E-4
G-4
100 80 60 40 20 0
G-4
30-32
G-4
32-30
BACK TO 28
NO 26 INDICATION
100 80 60 40 20 0
G 1
28-7
28
NO 32 INDICATION
G-7
INDIANAPOLIS, IND.
ESTERLINE ANGUS
MADE IN CANADA
CHART No. 59001



MAD
CHART No. 59001
INDIANAPOLIS, IND. U.S.A.
100
40
20
0
30-32
32-30
RERUN ON E-2
32-30 (OUT)
OMIT
E-2
G-4

SPECIAL TEST -
CRD RETURN WATER REROUTE
TO THE COOLING WATER LINE

QUAD CITIES STATION

A. Purpose:

The purpose of this procedure is to observe the effect on the CRD system while rerouting the exhaust water and stabilizing flow to the cooling water flow.

B. References

1. P+ID
   a. M-41, Diagram of Control Rod Drive Hydraulic Piping
2. Equipment Manuals
   a. GEK-9597
   b. GEI-92807A

C. Prerequisites

1. The reactor is in a shutdown condition, meaning reactor water less than 212°F, and in the refuel mode.
2. Radio communications established between the control room and an operator at the 1-301-74 valve.
3. The CRD hydraulic system is in operation with normal flows and differential pressures established.
4. No CRD maintenance is being performed at the time of the test.

D. PRECAUTIONS

1. Closely watch the CRD cooling water differential pressure at the 901-5 panel, making sure the dp does not exceed 80 psid.
2. Close valve 1-301-74 SLOWLY. During closure, monitor all CRD pressures and flows carefully.

E. LIMITATIONS AND ACTIONS

1. If any adverse CRD pressure or flow conditions arise, OPEN 1-301-74 and terminate the test.

F. PROCEDURE

1. Put flow controller, 1-340-1, in manual operation.
2. Slowly decrease the flow through the flow control station by manipulating flow controller, 1-340-1.
3. When flow decreases to 40 gpm, gradually OPEN MO 1-302-10, cooling water pressure control valve, to decrease cooling water pressure.
4. Radio the operator to slowly CLOSE VALVE 1-301-74.
5. As valve 1-301-74 is closing, VERIFY the cooling water flow does not exceed 40 gpm. Adjust MO 1-302-10 accordingly. Adjust MO 1-302-8 to maintain drive water pressure at 260 psid.

6. When valve 1-301-74 is closed, monitor cooling water flow, stabilizing flow, flow through the flow control station, cooling water pressure, return water flow, and drive water pressure. VERIFY CRD pump current is approximately 34 amps. Done GCT

7. After the flows have stabilized, lower the flow through the flow control station by approximately 10-15 gpm.

8. Monitor parameters given in step F.6.

9. Raise the flow through the flow control station to approximately 55 gpm and monitor parameters in step F.6.

10. Return system to flows and pressures as in step F.6. Withdraw and insert a rod and VERIFY satisfactory CRD operation.

11. Return the CRD hydraulic system to normal operation and configuration with normal flows and differential pressures established. OPEN 1-301-74 slowly, CLOSE MO 1-302-10, and increase FC-1-340-1 to 76 gpm.

G. Checklists

1. Test Data Sheet

H. Technical Specification Reference

1. None

...ER G. C. Tut
ENGR. ______

Test 1-26

DATA SheeT

VALVE 1-301-74 OPEN

Flow Thru Flow Cont. Sta.	Stabilizing Flow	Cooling H_2O Flow	Cooling H_2O Pressure	Return H_2O Flow	Drive H_2O Pressure
80 gpm	~~3.3~~	56	23	17	320
70 gpm	~~3.3~~	48	18	14	230
60 gpm	~~3.3~~	41	15	10	150
50 gpm	~~3.3~~	34	11	7	80
40 gpm	~~3.3~~ 3.3	27	8	4	60

Valve 1-301-74 CLOSED

Flow Thru Flow Cont. Sta.	Stabilizing Flow	Cooling H_2O Flow	Cooling H_2O Pressure	Return H_2O Flow	Drive H_2O Pressure
40 gpm	6.4	35	11	0	260
30 gpm	4.4	28	7	0	120
55 gpm	6.2	50	20	0	260 *

CRD Exercise

RoD: 22-03 INSERT OK Ok GCT WITHDRAW OK OK GCT

Before: 00-48 / 48-00 After: 00-48 / 48-00 Gary Spell 4-29-77

Remarks:

Rod insert & withdrew times w/in spec., drive flow ok. for insert

Remarks: (cont.) * When the 74 valve was closed the cooling water pressure would not change when the MO 10 valve was closed and opened.

~~B~~ withdraw ~~#~~ time was 51 seconds with 74 valve closed. Insert time was 49 seconds. ~~B~~ with 74 valve closed. Withdraw ~~[illegible]~~ run flow 3.5 gpm, & insert ~~B~~ run flow was 3.0 gpm.

Drive water pressure was easily manipulated with the MO 302-~~[illegible]~~ valve, without affecting the other parameters.

The CRD pump amps were approximately 30 amps throughout the test (sometimes slightly lower).

The pump discharge pressure was high when the 74 valve was closed (about 1600 psig).

Overall test was quite satisfactory.