Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

August 17, 1977



Mr. Edson G. Case, Deputy Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Unit 3
Quad-Cities Station Unit 2
Proposed Amendment to Facility
Operating License Nos. DPR-25
and DPR-30 to Permit Power
Coastdown to 40% Power
NRC Docket Nos. 50-249 and 50-265



Reference (a): R. L. Bolger letter to E. G. Case,
dated June 6, 1977.

Dear Mr. Case:

Pursuant to 10 CFR 50.59, Commonwealth Edison proposes to amend Section 3.E of Facility Operating License No. DPR-25 and Section 3.C of Facility Operating License No. DPR-30. The proposed amendments (Attachments 1 and 2) would eliminate the restriction which prohibits operation beyond the end of full power capability.

The amendments are needed to permit continued operation of the units from full power down to 40% power and is supported by the enclosed General Electric Company analyses (Attachments 3 and 4). These analyses show that coastdown operation following the all-rods-out condition results in increased margin to the operating limits. Specifically, the pressure and MCPR margins as calculated from the turbine trip without bypass transient were shown to increase as the power was reduced during coastdown. Attachment 3 was previously transmitted as part of Reference (a). It is included in this submittal to make a complete package for your review. Attachment 4 is a letter stating that the Dresden 2 end of cycle coastdown analysis (Attachment 3) is applicable to Dresden 3 Cycle 5 and Quad-Cities 2 Cycle 3.

The proposed operating plan for Dresden 3 and Quad-Cities 2 is conservative when compared to the current operating limit requirements. No unreviewed safety hazards are introduced and no Technical Specification changes are required.

These amendments have received on-site and off-site review and approval.

Three (3) signed originals and 57 copies of this letter are provided for your use.

Very truly yours,

R. L. Bolger
Assistant Vice President

Attachments

SUBSCRIBED and SWORN to
before me this 18th day
of August, 1977.

NOTARY PUBLIC

**Attachment 1**

**Dresden Station Unit 3**

**DPR-25**

Part 20, Section 30.34 of 10 CFR Part 30, Section 40.41 of 10 CFR Part 40, Sections 50.54 and 50.59 of 10 CFR Part 50, and Section 70.32 of 10 CFR Part 70; and is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified below:

A. Maximum Power Level

Commonwealth Edison is authorized to operate the facility at steady state power levels not in excess of 2527 megawatts (thermal), except that Commonwealth Edison shall not operate the facility at power levels in excess of five (5) megawatts (thermal) until satisfactory completion of modifications and final testing of the station output transformer, the auto-depressurization interlock, and the feedwater system, as described in Commonwealth Edison's telegrams dated February 26, 1971, have been verified in writing by the Commission.

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 28, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

C. Reports

Commonwealth Edison shall make certain reports in accordance with the requirements of the Technical Specifications.

D. Records

Commonwealth Edison shall keep facility operating records in accordance with the requirements of the Technical Specifications.

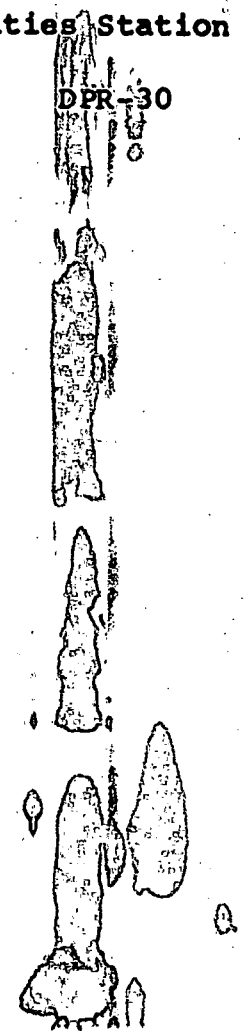
E. Restrictions

Reactor power level shall be limited to maintain pressure margin to the safety valve set points during the worst case pressurization transient. The magnitude of the power limitation, if any, and the point in the cycle at which it shall be applied is specified in the Reload No. 4 licensing submittal for Dresden Unit No. 3 (NEDO-21338). Plant operation shall be limited to the operating plant described therein until the end of full power reactivity has been reached. Subsequent operation in the coastdown mode is permitted based on the Dresden 2 Cycle 5 Extended Operation analysis described in the June 6, 1977 letter from R. L. Bolger to E. G. Case.

Attachment 2

Quad-Cities Station Unit 2

DPR-30



3. This license shall be deemed to contain and is subject to the conditions specified in the following Commission regulations in 10 CFR Chapter I: Part 20, Section 30.34 of Part 30, Section 40.41 of Part 40, Sections 50.54 and 50.59 of Part 50, and Section 70.32 of Part 70; is subject to all applicable provisions of the Act and to the rules, regulations and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

A. Maximum Power Level

Commonwealth Edison is authorized to operate Quad-Cities Unit No. 2 at power levels not in excess of 2511 megawatts (thermal).

B. Technical Specifications

The Technical Specifications contained in Appendices A and B, as revised through Amendment No. 38, are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications.

3.C Restrictions

Reactor power level shall be limited to maintain pressure margin to the safety valve set points during the worst case pressurization transient. The magnitude of the power limitation, if any, and the point in the cycle at which it shall be applied is specified in the Reload No. 2 licensing submittal for Quad-Cities Unit 2 (NEDO-21313). Plant operation shall be limited to the operating plant described therein **until the end of full power reactivity has been reached. Subsequent operation in the coastdown mode is permitted based on the Dresden 2 Cycle 5 Extended Operation analysis described in the June 6, 1977 letter from R. L. Bolger to E. G. Case.**

D. Equalizer Valve Restriction

The valves in the equalizer piping between the recirculation loops shall be closed at all times during reactor operation.

E. Recirculation Loop Inoperable

The reactor shall not be operated with one recirculation loop out of service.

4. This license is effective as of the date of issuance, and shall expire at midnight, February 15, 2007.

Enclosures: Appendices A and B--
Technical Specifications

FOR THE ATOMIC ENERGY COMMISSION

A. Giambusso, Deputy Director
for Reactor Projects
Directorate of Licensing

Date of Issuance: December 14, 1972

**Attachment 3**

DRESDEN 2 CYCLE 5

EXTENDED CYCLE OPERATION

## I. INTRODUCTION

Analyses have been completed in support of Dresden 2, Cycle 5, extended cycle operation. The operating plan is shown in Figure 1. The analyses have verified that application of previous operating limits to operation of the plant as shown in Figure 1 is conservative. The analyses consist of the Turbine Trip Without Bypass, trip scram, for the all rods out condition at 90%, 70%, 55%, and 40% of rated power.

## II. DISCUSSION

The Turbine Trip Without Bypass transient has been analyzed for four specific cases. These four cases cover the reduced power operation as shown in Figure 1. Each analysis was done at a specific power and exposure point. The three points are as follows: 1) 90% power at 4803 MWd/t, 2) 70% power at 5776 MWd/t, 3) 55% power at 6624 MWd/t, and 4) 40% power at 7481 MWd/t. The exposure values are cycle increment values. The analysis covering the 100% power operation and the first coastdown have previously been submitted and are not changed.

The primary cycle-dependent input parameters for the transient analyses are given in the attached figures and tables. Figure 2 shows the scram reactivity curves, Table 1 gives the dynamic void coefficient of reactivity, and Table 2 gives the Doppler coefficient.

The transient analysis results are given in Table 3 and Figures 3, 4, 5, and 6. The pressure margin results given in Table 3 compare to the previous EOC margin of 39 psi. The required margin is 25 psi. Thus, the pressure margin is larger for the four cases than the required margin resulting in a conservative operating basis. The previously calculated, current value, MCPR's for the fuel are 1.29/1.35 (7x7/8x8). Since these are minimum allowable operating values, any values calculated to be lower would be conservative. The MCPR values for the four cases have been evaluated and found to be less than or equal to the current operating values. Thus, operation with the current values for the new plan is conservative. The system transient responses for the three cases are shown in Figures 3, 4, 5 and 6.

## III. CONCLUSION

The planned operation is to operate the plant at 100% power out to the "B" curve at an approximate cycle exposure of 3750 MWd/t; locking the control rods in position at this exposure and coasting down in power to a power level of 90% of rated; then pulling control rods to maintain 90% power until the all rods out condition is achieved at a calculated cycle exposure of 4803 MWd/t, and finally, a coastdown with all rods out to 40% power at a calculated cycle exposure of 7481 MWd/t. All coastdowns are to be done at 100% of rated core flow.

TABLE 1

VOID COEFFICIENT

| POWER LEVEL, % | CYCLE INCREMENTAL EXPOSURE, MWD/T | VOID COEFFICIENT CALCULATED, c/% | VOID COEFFICIENT USED IN TRANSIENT ANALYSIS, c/% |
|---|---|---|---|
| 90 | 4803 | -5.938 | -7.422 |
| 70 | 5776 | -4.195 | -5.243 |
| 55 | 6624 | -3.060 | -4.502 |
| 40 | 7481 | -2.076 | -3.491 |

TABLE 2

DOPPLER COEFFICIENT

| POWER LEVEL, % | CYCLE INCREMENTAL EXPOSURE, MWD/T | AVERAGE FUEL TEMPERATURE, °F | DOPPLER COEFFICIENT CALCULATED, c/°F | DOPPLER COEFFICIENT USED IN TRANS. ANALYSIS, c/°F |
|---|---|---|---|---|
| 90 | 4803 | 1053 | -0.217 | -0.206 |
| 70 | 5776 | 925 | -0.261 | -0.248 |
| 55 | 6624 | 836 | -0.266 | -0.253 |
| 40 | 7481 | 751 | -0.271 | -0.256 |

TABLE 3

TRANSIENT ANALYSIS RESULTS

| POWER LEVEL, % | NEUTRON FLUX % OF INITIAL | HEAT FLUX, % OF INITIAL | LINE PRESSURE, PSIG | MARGIN TO SV, PSI |
|---|---|---|---|---|
| 90 | 261.8 | 104.1 | 1204 | 36 |
| 70 | 153.9 | 77.1 | 1161 | 79 |
| 55 | 115.6 | 61.0 | 1141 | 99 |
| 40 | 62.3 | 42.0 | 1097 | 143 |

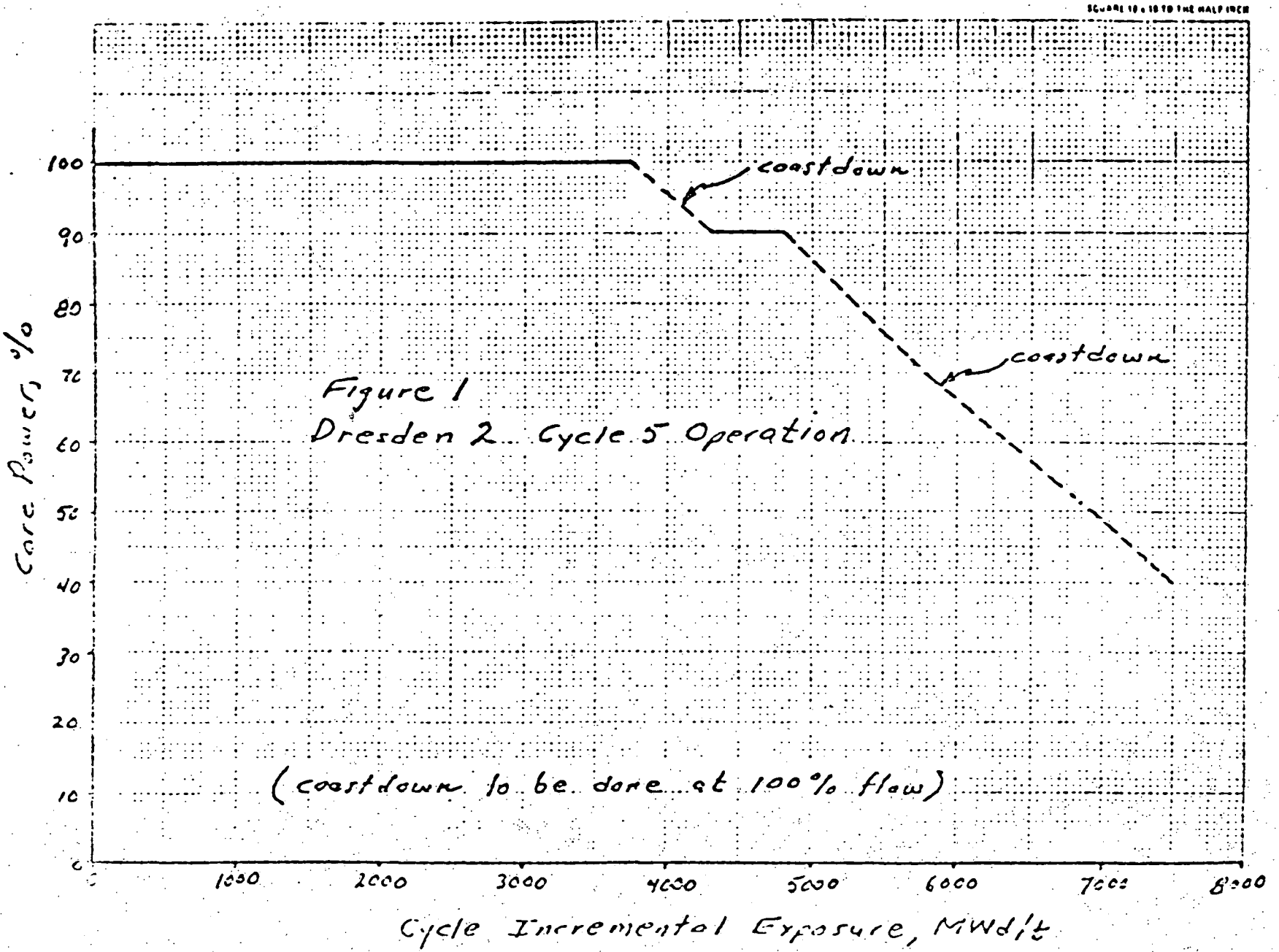



Figure 1
Dresden 2 Cycle 5 Operation

(coastdown to be done at 100% flow)

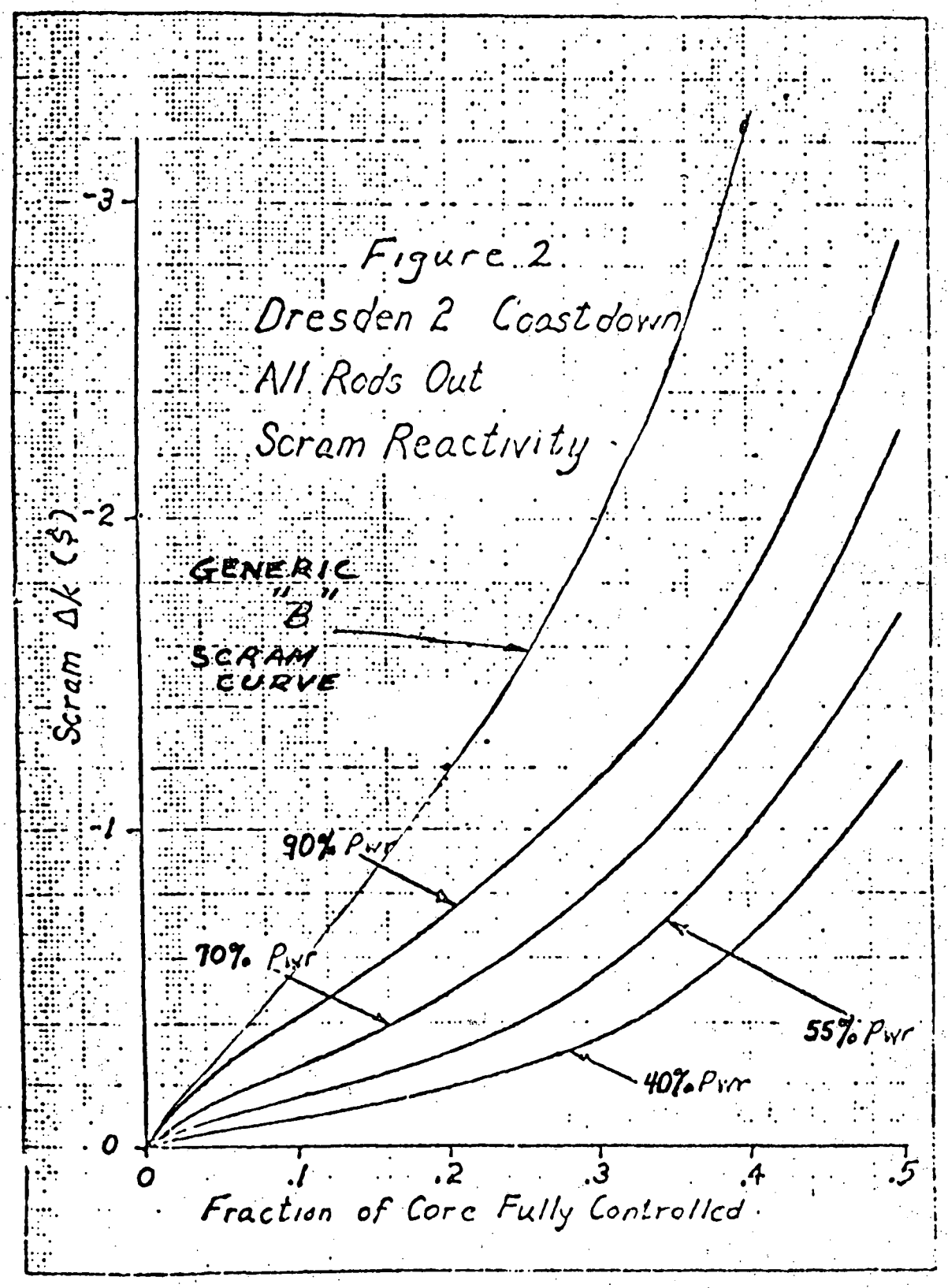
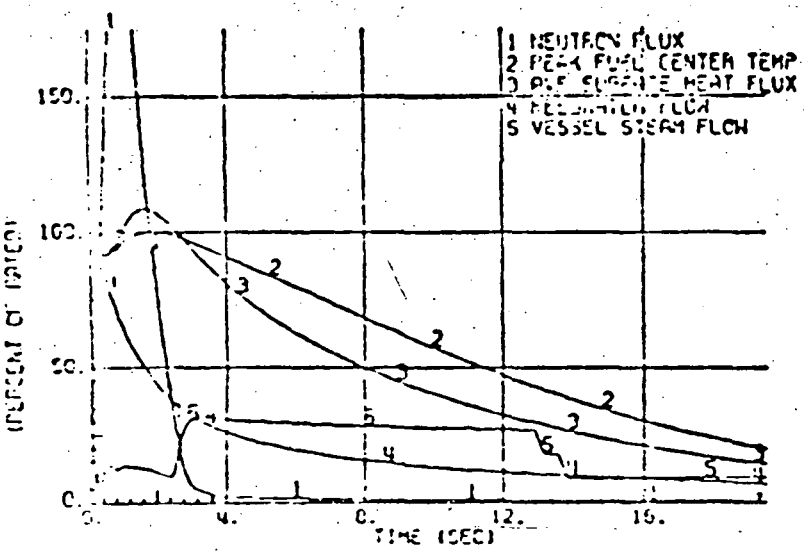
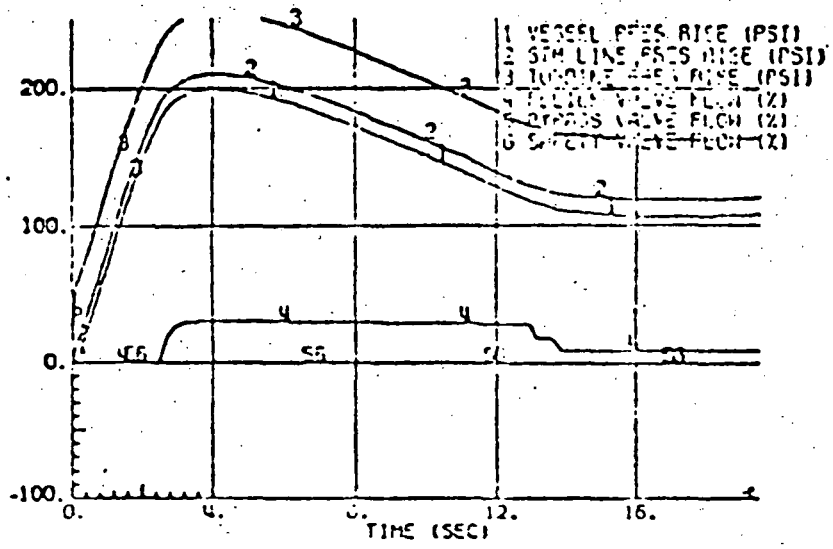
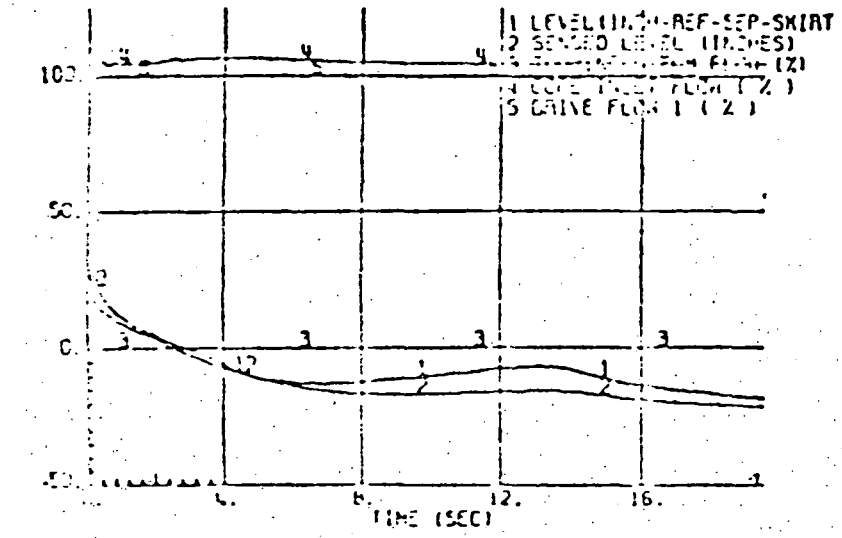


Figure 2
Dresden 2 Coastdown
All Rods Out
Scram Reactivity
GENERIC
"B"
SCRAM
CURVE
90% Pwr
70% Pwr
55% Pwr
40% Pwr
Scram Δk (¢)
-3
-2
-1
0
0
.1
.2
.3
.4
.5
Fraction of Core Fully Controlled


1 NEUTRON FLUX
2 PEAK FUEL CENTER TEMP
3 PEAK SURFACE HEAT FLUX
4 RECIRCULATION FLOW
5 VESSEL STEAM FLOW
150.
100.
50.
0.
TIME (SEC)


1 VESSEL PRESS RISE (PSI)
2 STM LINE PRESS RISE (PSI)
3 TURBINE PRESS RISE (PSI)
4 FEEDW VALVE FLOW (%)
5 BYPASS VALVE FLOW (%)
6 SAFETY VALVE FLOW (%)
200.
100.
0.
-100.
TIME (SEC)


1 LEVEL (INCH-REF-SEP-SKIRT
2 SENSED LEVEL (INCHES)
3 RECIRC FLOW (%)
4 CORE INLET FLOW (%)
5 DRIVE FLOW (%)
100.
50.
0.
-50.
TIME (SEC)

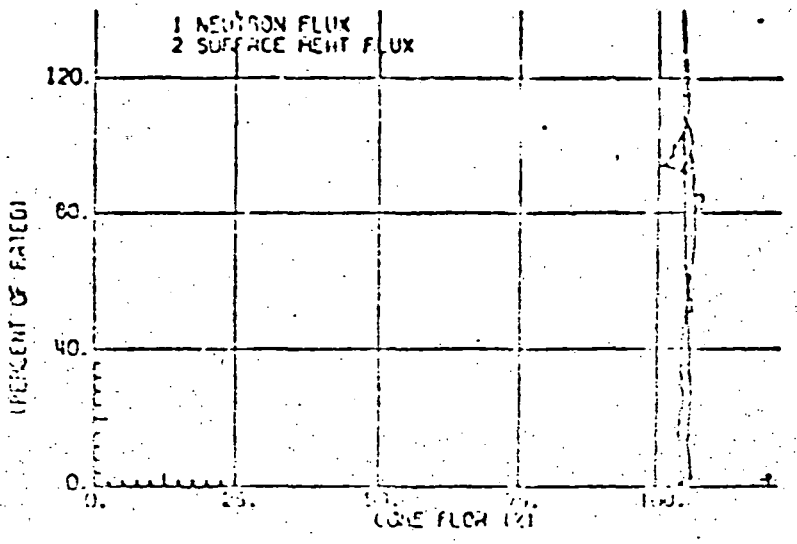
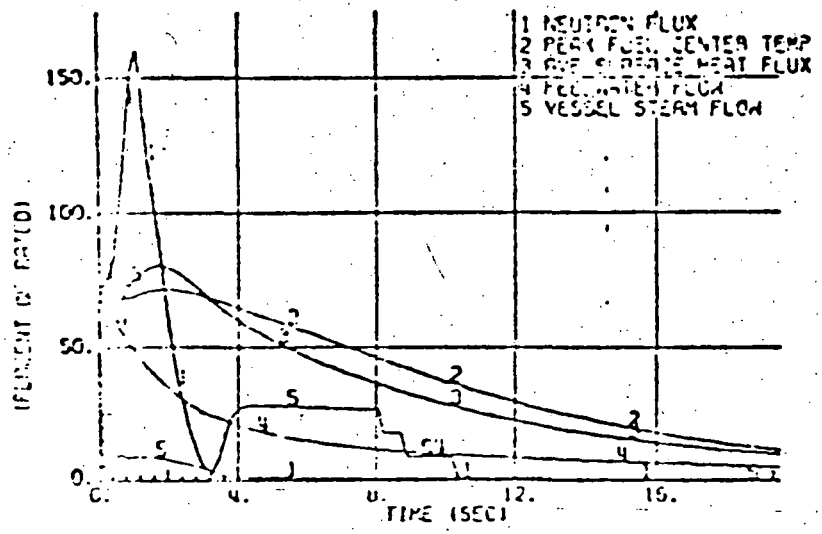
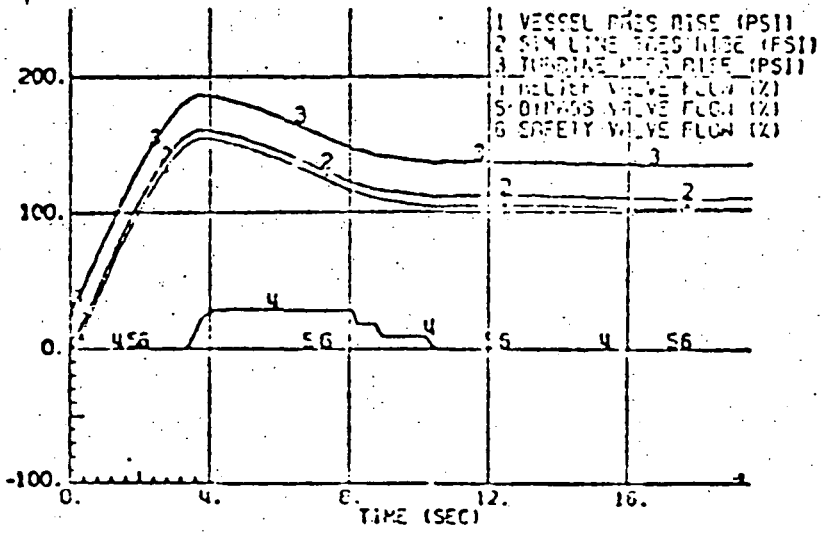
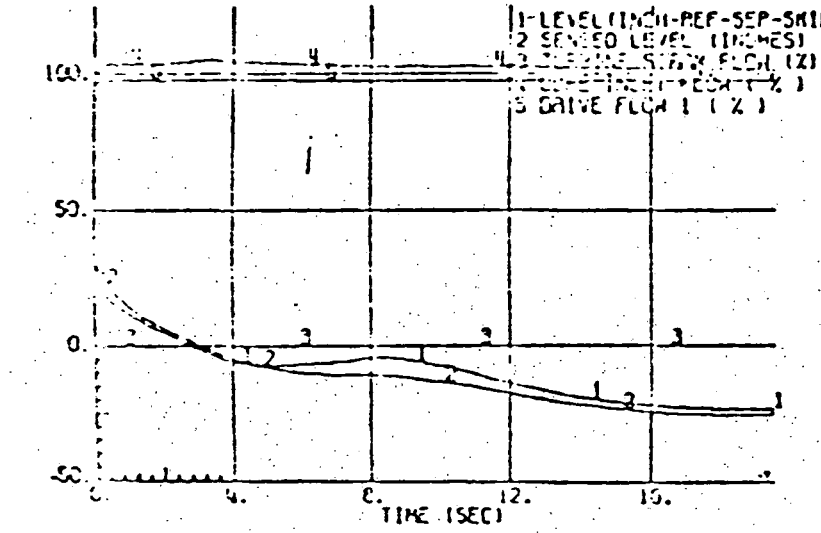

1 NEUTRON FLUX
2 SURFACE HEAT FLUX
120.
80.
40.
0.
CORE FLOW (%)

Figure 3


1 NEUTRON FLUX
2 PEAK FUEL CENTER TEMP
3 CORE AVERAGE HEAT FLUX
4 FEEDWATER FLOW
5 VESSEL STEAM FLOW
150.
100.
50.
0.
0.
4.
8.
12.
16.
TIME (SEC)


1 VESSEL PRES RISE (PSI)
2 SIM LINE PRES RISE (PSI)
3 TURBINE PRES RISE (PSI)
4 RELIEF VALVE FLOW (%)
5 BYPASS VALVE FLOW (%)
6 SAFETY VALVES FLOW (%)
200.
100.
0.
-100.
0.
4.
8.
12.
16.
TIME (SEC)


1-LEVEL (INCH-REF-SEP-SKIRT
2 SENSED LEVEL (INCHES)
3 TURBINE STEAM FLOW (%)
4 CORE INLET FLOW (%)
5 DRIVE FLOW ( % )
100.
50.
0.
-50.
0.
4.
8.
12.
16.
TIME (SEC)

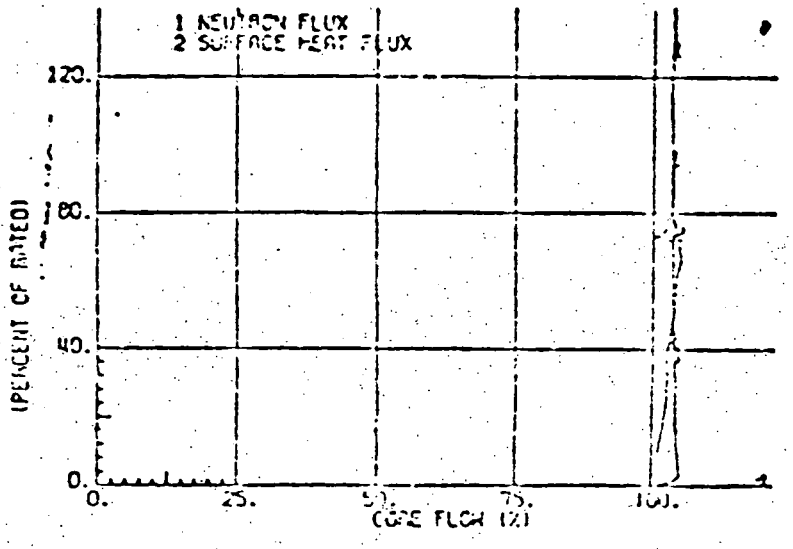
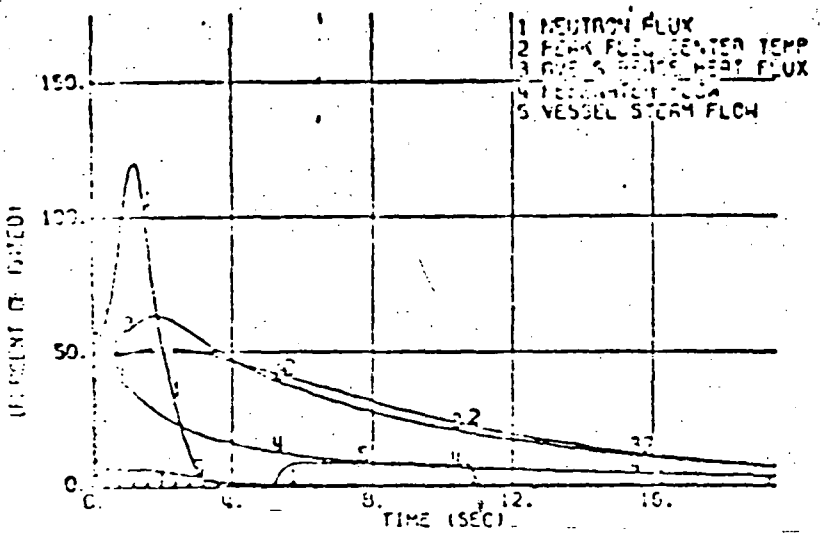
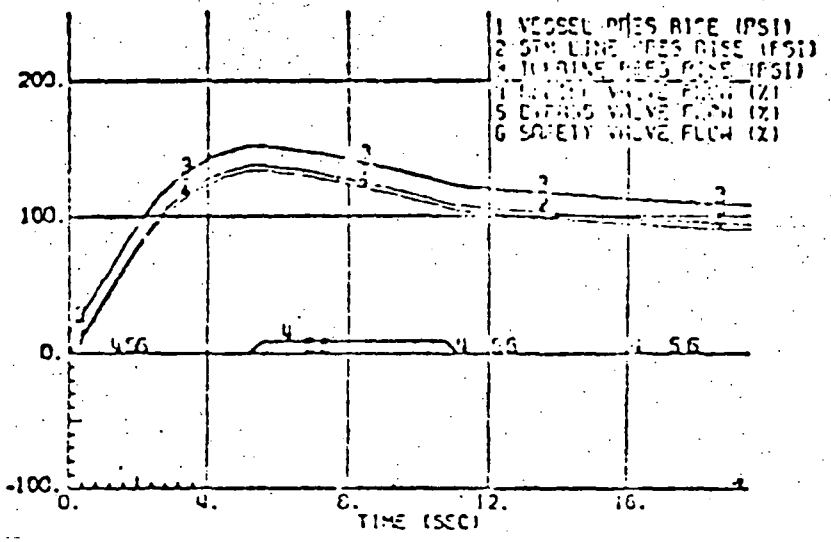
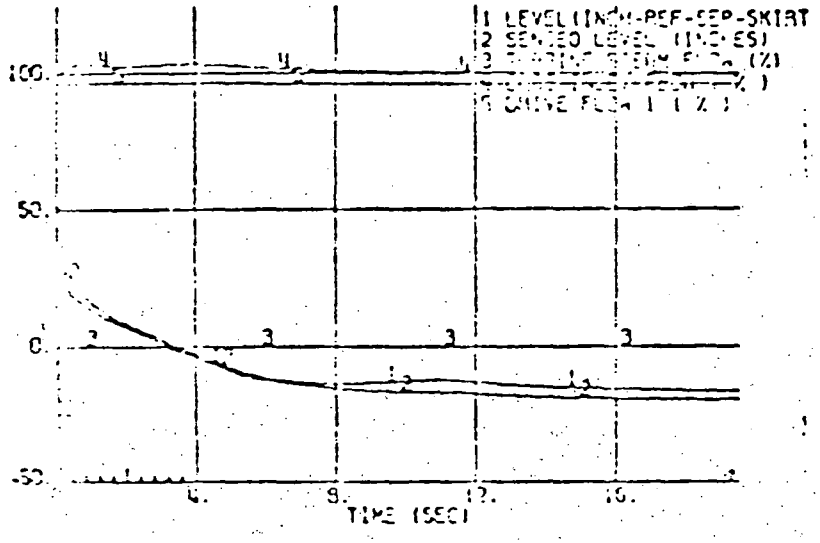

1 NEUTRON FLUX
2 SURFACE HEAT FLUX
(PERCENT OF RATED)
120.
80.
40.
0.
0.
25.
50.
75.
100.
CORE FLOW (%)

Figure 4


1 NEUTRON FLUX
5 VESSEL STEAM FLOW
150.
100.
50.
0.
0.
4.
8.
12.
16.
TIME (SEC)


200.
100.
0.
-100.
0.
4.
8.
12.
16.
TIME (SEC)


100.
50.
0.
-50.
4.
8.
12.
16.
TIME (SEC)

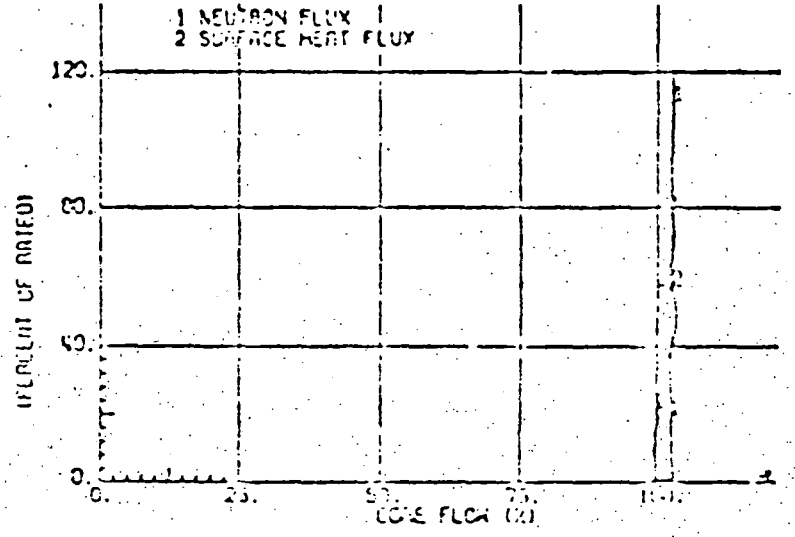

1 NEUTRON FLUX
2 SURFACE HEAT FLUX
120.
80.
40.
0.
0.
25.
50.
75.
100.
CORE FLOW (%)

Figure 5

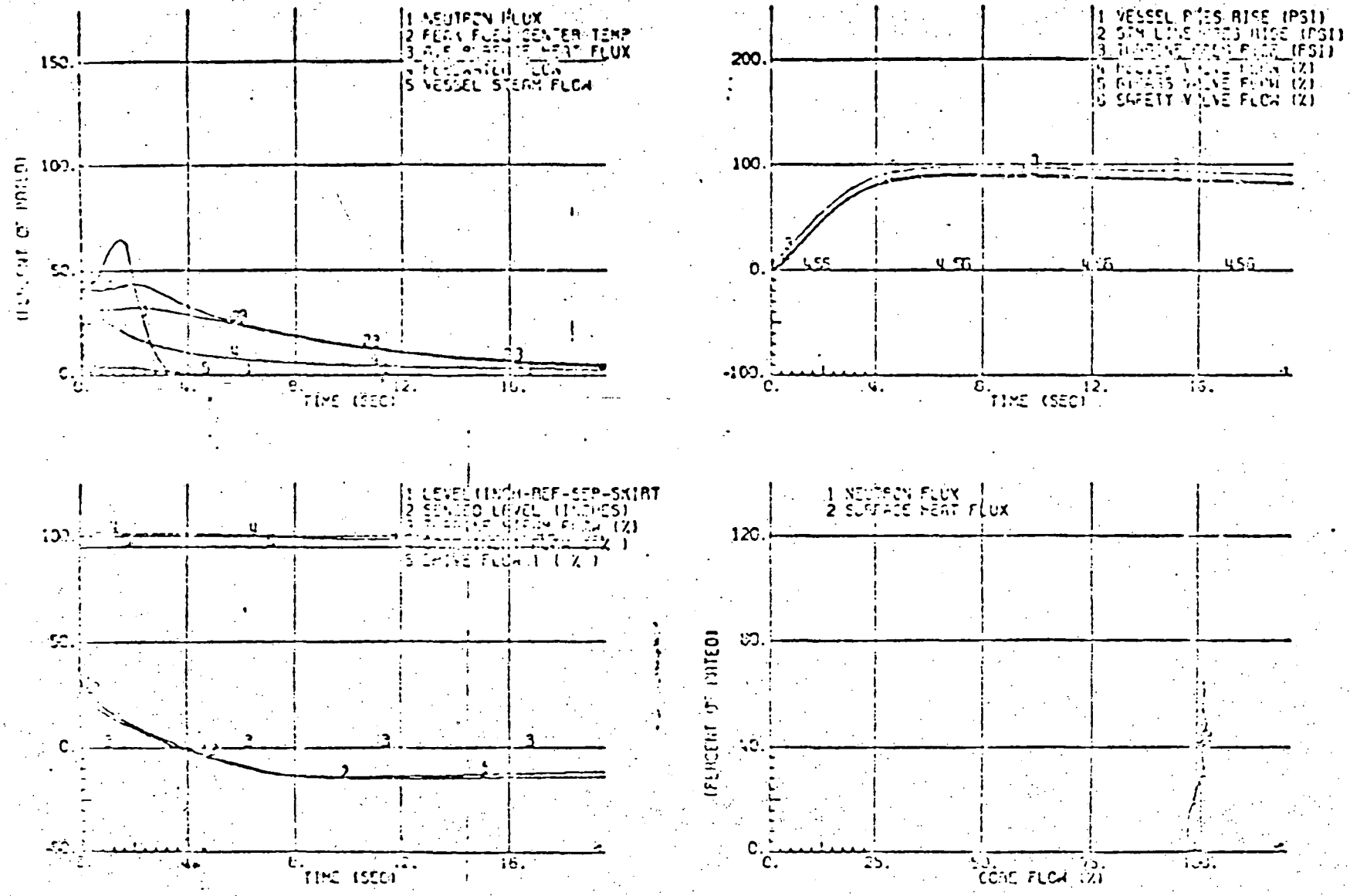

1 NEUTRON FLUX
5 VESSEL STEAM FLOW
150.
100.
50.
0.
0.
4.
8.
12.
16.
TIME (SEC)
1 VESSEL P-ES RISE (PSI)
200.
100.
0.
-100.
TIME (SEC)
TIME (SEC)
1 NEUTRON FLUX
2 SURFACE HEAT FLUX
120.
60.
0.
0.
25.
CORE FLOW (%)

Figure 6

Attachment 4

GENERAL ELECTRIC

INSTALLATION AND SERVICE ENGINEERING DIVISION

GENERAL ELECTRIC COMPANY, 2015 SPRING ROAD, OAK BROOK, ILL. 60521
Phone (312) 986-3000

WRITER'S DIRECT DIAL NUMBER
(312) 986-3199

DRESDEN 3 - CYCLE 5 AND QUAD CITIES 2 - CYCLE 3
END OF CYCLE COASTDOWNS

June 1, 1977

Mr. R.J. Martin
Asst. Fuel Agent
Commonwealth Edison Company
One First National Plaza
Post Office Box 767
Chicago, IL 60690

Dear Mr. Martin:

The proposed operating plans outlined in your letter of March 18, 1977, specified EOC all rods out coastdowns from 98% power to 55% power for Dresden 3 and to 60% power for Quad Cities 2. Previous analyses have consistently shown that the end of cycle operating limits as determined by the turbine trip without bypass transient are not exceeded during the EOC all rods out coastdown at 100% flow. These analyses have shown that the reduction in power during the coastdown more than compensates for the degradation in scram reactivity insertion in determining the pressure and MCPR limits of the transient. The pressure margin and the MCPR are greater than or equal to the values determined at the nominal EOC conditions. The Dresden 2 EOC 5 coastdown analysis verifies these results for coastdown to 40% power.

Based on the above discussion, the Dresden 2 EOC 5 coastdown analysis is applicable to Dresden 3 Cycle 5 and Quad Cities 2 Cycle 3 in that it supports operation at reduced power to the all rods condition and subsequent coastdown to the 40% power level, at all rods out and 100% flow, by verifying that the pressure and MCPR limits for the turbine trip without bypass transient are less than or equal to the limits normally calculated for the EOC condition.

Therefore, operation of Dresden 3 Cycle 5 (or Quad Cities 2 Cycle 3) at 100% power out to the scram derate point, coastdown to reduced power point (98%) and operation at this reduced power level to rods all out, followed by a rods all out coastdown to 55% (or 60%) power will not exceed the pressure and MCPR limits normally calculated for the EOC conditions. No new analyses are needed to support the proposed operation for these plants.

Should you or members of your staff have any questions regarding this information, we will be pleased to discuss them with you.

Very truly yours,

H.A. Zimmerman-PROJECT APPLICATION ENGINEER
HAZ/rj MECHANICAL & NUCLEAR SERVICE