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REACTOR DEACTIVATION INTERIM REPORT -
EXPERIMENTAL DATA

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PRODUCTION TEST-080 - PHYSICS TESTS AT D REACTOR DEACTIVATION
INTERIM REPORT - EXPERIMENTAL DATA

G. F. Bailey

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Physics Subsection
Research and Engineering Section

By Authority of CG-NMP-1
RM Oten, 8-16-94.
By Jerri Maley, 9-29-94.
Verified By J.E. Sawley 10-4-94

September 22, 1967

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PRODUCTION TEST-080 - PHYSICS TESTS AT D REACTOR DEACTIVATION
INTERIM REPORT - EXPERIMENTAL DATA

INTRODUCTION

Production Test-080¹ authorized the conduct of certain physics tests during the deactivation of D Reactor. The primary objective of the tests was to measure certain physics parameters which could be used to check current computational models. In this report are presented a brief chronology of the tests and a tabulation of the experimental data. In general, data processing has not progressed beyond simple reduction of the raw experimental data to a form more easily used in future analytical comparisons and evaluations.

SUMMARY

The first two tests, Tests A and B, were really not experiments but preparatory work required for the succeeding tests. In Test C the excess reactivity of the reactor was determined by calibrating a control rod in a relatively constant flux distribution. The rather close agreement between the actual calibration and that inferred from the flux distribution substantiates current flux-squared weighting techniques used in developing rod calibration curves for the operating reactors and in evaluating reactivity effects caused by certain reactor loadings.

Test D was designed to evaluate an experimental technique for measuring the effect of the safety systems (particularly the vertical safety rod system). The test was not a complete success, largely because the available reactivity was sufficient for the insertion of only six rods. The concept shows great promise, however, and further analysis may yet provide valuable information. Because this method can save a substantial amount of outage time, further testing to prove the accuracy of the method is probably warranted.

Test E was conducted to obtain data on space-dependent reactor transients. The immediate use for the data obtained is to check computer program CLUMSY. The data obtained appear to be very good and should provide valuable comparisons with analytical computations.

Test F was designed to measure coupling coefficients. Because of instrumentation problems, the test was generally not successful.

A fair amount of information has been obtained in addition to that specifically desired. For example, the flux traverses cover not only the reactor core, but also the shield protection loadings and the reflector. This can provide additional verification of the current treatment of these loadings in reactivity evaluations through determination of the effective reactor size. Also, a "rod-drop" experiment

(1) DUN-2584, "Production Test-080, Physics Testing at D Reactor Deactivation," G. F. Bailey, June 15, 1967. (Secret)

involving only the vertical safety rods was performed. This provides a fairly definitive measure of the flux decay subsequent to a scram. It is possible that a measurement of the VSR system worth can be effected in this manner, although such measurements are notoriously inaccurate. Finally, data relative to the reactivity effect of splines, nitrogen, and replacing enrichment with solid aluminum were obtained.

Although certain aspects of the test program were not as valuable as expected, the overall program was productive and has provided a substantial amount of valuable information.

CHRONOLOGY

On June 26 at 1402 hours, D Reactor was shut down. During the evening of the next day the two chambers for the subcritical monitors were placed in VSR holes 22 and 26. Sometime later (possibly an hour) during instrument checkout, it was noted that an apparent short existed in both systems. Investigation showed that the environment in the vicinity of the top shield had been hot enough to damage the instrument cables. The instruments were withdrawn and salvaged. The locations for the subcritical monitors were changed from VSR channels 22 and 26 to process channels 0969 and 0978. However, on June 28 it was determined that an extra row of fuel had been discharged from the bottom of the reactor. Consequently, the SCM locations were again revised to process channels 1069 and 1078.

On June 29 the instrumentation was removed from "B" test hole and two flux monitor chambers installed and connected to the Beckman system. That night startup was attempted. The approach to critical was uneventful. After all rods and splines were removed, the reactor was still an estimated 20 mk subcritical. This estimate was based on anticipated rod strengths and inverse count rate data obtained during the startup attempt. This is shown in Figure 1.

Later that morning (June 30) a second attempt was made. The reactor atmosphere (primarily air, at that time) was purged with CO₂. The second approach to critical is shown in Figure 2. At 11:30 a.m. all rods were out, and the count rate was still increasing as the CO₂ replaced the N₂ atmosphere. At this point it was decided to charge 14 columns of enriched fuel in channels containing solid aluminum charges. The second channel of subcritical monitoring instrumentation was placed in service, the traverse channel was readied, and the reactor started. This time the startup attempt was successful.

The two flux monitor channels in the A test hole were calibrated, and the trips set. During this procedure the galvanometer calibration was misinterpreted, and the power level was permitted to increase above anticipated levels. However, the maximum power attained was 1.6 MW, below the 2.0 MW limit imposed for the tests. Once the necessary instrument adjustments had been completed and all ATPs conducted and approved, the actual test program began.

The first test conducted was Test C, which involved primarily calibration of #5 HCR. This was done to determine the excess reactivity of the reactor. To prevent flux shifts during the calibration process, splines were inserted into areas from which the rod had been withdrawn. During Test D a flux traverse was made. By taking

FIGURE 1
FIRST APPROACH TO CRITICAL

FIGURE 2
SECOND APPROACH TO CRITICAL

Normalized Inverse Count Rate

Reactivity Inserted, mk

Estimated 16.5 mk Subcritical at
This Point

FIGURE 3
FINAL APPROACH TO CRITICAL

the data from the flux traverse and applying flux-squared weighting, a second calibration curve was obtained normalized to the first at a rod position of 110 inches out. The remarkable agreement between these two methods, shown in Figure 4, indicates the invariance of the flux during the calibration process. The strength of 5-rod at full insertion was ~ 5.25 mk. The excess reactivity of the reactor was ~ 3.3 mk.

Knowing the rod worth, it is possible to estimate again the subcriticality of the reactor during the initial startup attempts. This is shown in Figure 5. The decay of xenon and purging of the reactor atmosphere with CO_2 increased reactivity by nearly 3 mk. Further purging and charging enrichment increased it about 11.5 mk more.

After calibrating 5-rod, Test D was begun. This consisted of first taking a flux traverse, then inserting as many VSRs as possible without driving the reactor subcritical, and then taking another flux traverse. Figure 6 shows the two traverses and the position of the various rods. With 5-rod withdrawn, the reactor was critical with seven VSRs inserted. However, during the traverse, the reactivity effect of the traverse chamber in the vicinity of the flux peak was enough to drive the reactor subcritical, so the traverse was made with only six VSRs inserted.

Test E (the "poison flush" test) was then conducted. This consisted of rapidly removing (flushing) poison from the critical reactor and observing the resultant flux transient at several locations in the reactor. The flux distortion to the far side caused the worth of the poison to be less than the desired value. To partially correct for this, splines were inserted on the far side in an attempt to balance the flux. Having accomplished this, the test continued with poison flushes of 13, 21, and 42 pieces of poison. The subcritical monitor locations were interchanged and the test repeated.

Then starting on graveyard shift July 3, Test F was begun. This test was intended to serve as an experimental use of a novel technique to measure "coupling coefficients" between zones of a large reactor. During the test one of the channels of instrumentation became faulty. In rearranging the chambers to permit use of the traverse chamber as the fourth channel, it was noted that the chambers were improperly identified - that is, the actual chamber locations did not agree with the labels in the control room. The chambers were then properly identified, and the 42-piece poison flush (Test E) was rerun. Chamber identification at various times during the test is shown in Figure 7.

During the period between 8 a.m. and 12 noon on July 3, one column of enrichment was displaced with solid aluminum to determine its reactivity worth, and the effect of nitrogen in the reactor atmosphere was measured over a rather narrow interval. At high noon the reactor was shut down by inserting VSRs, thereby terminating the deactivation tests.

EXPERIMENTAL DATA

The data reduction and analysis was accomplished by using program EDRAP, a computer code especially written for this purpose. The output from this program comprises the remainder of this report.

GFB:mmm

G. F. Bailey
for G. F. Bailey
Physics Subsection

FIGURE 6
FLUX TRAVERSES TEST D

FIGURE 7

CHAMBER IDENTIFY CHART

* Indicates reading on subcritical monitor 1 (B).

** Indicates reading on subcritical monitor 2 (A).

APPENDIX ADETERMINATION OF DEAD TIME CORRECTION

Because most neutron counting systems which employ pulse counting techniques are inoperative for a short while after receiving a pulse, a correction must be made to account for this "dead time". This correction generally takes the form

$$C_A = \frac{C_M}{1 - \pi C_M}$$

where C_A = actual count rate
 C_M = measured count rate
 π = dead time

This can be rewritten

$$\frac{C_A}{C_M} = 1 + \pi C_A$$

In the present case, the actual count rate, C_A , is unknown. However, it can be assumed that it is proportional to the measured count rate from another system - a system operating in such a fashion that the dead time correction is negligible. Then, if

$$C_A = QC_M^1$$

$$\frac{C_A}{C_M} = \frac{QC_M^1}{C_M} = 1 + \pi QC_M^1 = 1 + \pi C_A$$

$$\text{or } \frac{C_M^1}{C_M} = \frac{1}{Q} + \pi C_M^1$$

We note that this is a linear function of C_M^1 with π as a coefficient. This can be determined by least squares techniques.

During Test C-5 the following data were obtained:

C_M	C_M^1	C_M^1/C_M
560.8	31,979.5	0.01753
699.3	39,015.1	0.01792
834.5	46,608.9	0.01790
1026.1	55,132.0	0.01861
1247.4	64,925.2	0.01921
1485.0	75,802.8	0.01959
1731.1	87,524.2	0.01977
2132.9	100,066.4	0.02131
2528.4	111,641.2	0.02264
3024.4	121,539.3	0.02488
3600.1	128,415.0	0.02803
4327.8	131,524.5	0.03290
5155.5	131,489.6	0.03920

This data has been plotted in Figure A-1. It is noted that when C_M is greater than about 110,000 the correction becomes nonlinear. The data below $C_M = 120,000$ has been fitted by least squares techniques. The resulting curve is also shown in the figure. The fitted value for π , the dead time, is 2.4973 μ sec. It was assumed that this value applied to all systems in the test. All data points with count rates above 110,000 were discarded.

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APPENDIX BANALYTICAL METHODSFLUX TRAVERSES

Generally for each point of a flux traverse, three channels of power level information were available in addition to the traverse chamber data. These three channels of power level data were used to normalize the traverse data. First, the statistical error for each channel was determined from

$$\sigma_j^2 = \Sigma N_{j,i} / (\Delta T)^2$$

where σ_j^2 is the square of the standard deviation for the j^{th} channel.

$N_{j,i}$ is the number of counts in the i^{th} interval from the j^{th} channel.

ΔT is the total counting time.

Then the ratio of the power at this traverse point to that at a base point was determined for each channel, and the error in that quantity determined from

$$\sigma_R^2 = R_j^2 (\sigma_j^2 / r^2 + \sigma^* / r^{*2})$$

where σ_R^2 is error on ratio

R_j is the ratio

σ_j^2 is error on count rate

r is the count rate

$*$ refers to the base point

The average change in power was then computed by taking the weighted average power ratio:

$$\bar{R} = \frac{1}{3} \Sigma W_j R_j$$

The error in the average will be minimized if the weight factors are chosen according to the formula

$$W_j = \frac{1/\sigma_j^2}{\sum (1/\sigma_k^2)}$$

Finally, the flux was determined as the measured count rate from the traverse channel, divided by the computed average power ratio. By definition this ratio was 1.0 for the first point.

The traverse data was then fitted with a Fourier series. The inferred buckling values are computed from

$$B^2(x) = B_g^2 \frac{\sum A_n n^2 \sin \frac{n\pi x}{L}}{\sum A_n \sin \frac{n\pi y}{L}}$$

where $\phi(x) = \sum A_n \sin \frac{n\pi x}{L}$

$$B_g^2 = \text{geometric buckling} = (\pi/L)^2$$

HCR CALIBRATIONS

The HCR calibration data was reduced by first calculating the period observed on each channel of information. This was done by using least squares techniques to determine the coefficients to the equation

$$\ln(\pi_j) = K + \frac{1}{\pi} t_j$$

where π_j is the count rate at time t_j

π is the reactor period

K is a coefficient of no use in this analysis, but it is equal to the logarithm of the initial count rate.

The reactivity worth of the period was determined from

$$\rho = \frac{1}{\pi} + \sum \frac{\beta_i \lambda_i}{1 + \pi \lambda_i}$$

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where ρ = reactivity

π = period

l = prompt lifetime

β_i = yield on neutrons in the i^{th} delay group

λ_i = decay constant for the precursor to the i^{th} delay group.

The average period is the average of the measured periods, and the average reactivity is the average of the reactivities. Thus, the average period and average reactivity may not exactly correspond.

SUPPLEMENTARY INFORMATION FOR REACTOR LOADING DURING DEACTIVATION TESTS

COLUMN 5	6	7	8	9
NUMBER 123456789012345678901234567890123456				
ROW 37 TWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW				ROW 37
ROW 36 TWW W W W W W W W W W W W W W W W W W				WWT ROW 36
ROW 35 TWW W W S SW W W W W W W W W W W W				WWT ROW 35
ROW 34 TEE E E E B S E E E E E E E E E E E				EET ROW 34
ROW 33 TEE E E X X G E E E E E E E E E E E				EET ROW 33
ROW 32 TEE E E B E E E E E E E E E E E E E				EET ROW 32
ROW 31 TEE EE A A A A E E E E E E E E E E E				EET ROW 31
ROW 30 TEE EEE E E E E E E E E E E E E E E E				EET ROW 30
ROW 29 TEE EE E E X E E E E E E E E E E E E				EET ROW 29
ROW 28 TEE EE A A A A E E E E E E E E E E E				EET ROW 28
ROW 27 TEE E A A A A E E E E E E E E E E E				EET ROW 27
ROW 26 TEE E X A A A A E E E E E E E E E E E				EET ROW 26
ROW 25 TEE E E A A A A E E E E E E E E E E E				EET ROW 25
ROW 24 TEE E E EX E E X E E E E E E E E E E E				EET ROW 24
ROW 23 TEE E P BXB E E E E G E E E E E E E E				EET ROW 23
ROW 22 TEE E E E E E E E E E E E E E E E E				EET ROW 22
ROW 21 TEE E A A X E E E E E E E E E E E E				EET ROW 21
ROW 20 TEE E E A A A A E E E E E E E E E E E				EET ROW 20
ROW 19 TEE EE E E E E E E E E E E E E E E E E				EET ROW 19
ROW 18 TEE EE E E E E E E E E E E E E E E E E				EET ROW 18
ROW 17 TEE EEE E E E EX E E E X E E E E E E E				EET ROW 17
ROW 16 TEE EE A A G E E E X X E E E E E E E				EET ROW 16
ROW 15 TEE E X E E E E E E E E E E E E E E E				EET ROW 15
ROW 14 TEE E E E E E E E E E E E E E E E E E				EET ROW 14
ROW 13 TEE E E E E E E E E E E E E E E E E E				EET ROW 13
ROW 12 TWW W S W S W S W S W S W S W S W S W				WWT ROW 12
ROW 11 TWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW				WWT ROW 11
COLUMN 5 6 7 8 9				
NUMBER 123456789012345678901234567890123456				

S - SOLID ALUMINUM X - BLANK (AIR CHANNEL)
 G - GRAPHITE W - WATER
 E - ENRICHMENT - NATURAL URANIUM
 T - THORIA P - POISON (PCCF, OR BALL VALVE)
 A - SOLID ALUMINUM, LATER CHARGED WITH ENRICHMENT
 B - BISMUTH, LATER CHARGED WITH SOLID ALUMINUM

HCR-LATTICE UNIT RELATIONSHIP

POSITION 1, .0 INCHES OUT CORRESPONDS TO MIDPOINT OF LATTICE UNIT 89.
 POSITION 2, 320.0 INCHES OUT CORRESPONDS TO MIDPOINT OF LATTICE UNIT 51.

DERIVED EQUATION IS
 LATTICE UNIT = 89.00 PLUS HCR POSITION MULTIPLIED BY -.1187

TRAVERSE DISTANCE-LATTICE UNIT RELATIONSHIP

TRIMBLE LENGTH TO UNIT SKIN	31.50 INCHES
BIOLOGICAL SHIELD THICKNESS	56.00 INCHES
THERMAL SHIELD THICKNESS	14.25 INCHES
REFLECTOR THICKNESS	23.03 INCHES

DERIVED EQUATION IS
 LATTICE UNIT = 111.40 PLUS DISTANCE MULTIPLIED BY -.1194

REACTOR FRONT FACE DATA

CORE EXTENDS FROM COLUMN 51 ON THE NEAR SIDE TO COLUMN 96 ON THE FAR SIDE,
 WITH AUGMENTATION DISTANCES OF 63.0 CM NEAR AND 63.0 CM FAR.
 HORIZONTAL GEOMETRIC BUCKLING IS 8.1 MICROBUCKS
 POSITION (CM) = -1011.3 PLUS COLUMN NUMBER TIMES 21.2725

CORE EXTENDS FROM ROW 12 ON THE BOTTOM TO ROW 36 ON THE TOP,
 WITH AUGMENTATION DISTANCES OF 34.5 CM BOTTOM AND 34.5 CM TOP.
 VERTICAL GEOMETRIC BUCKLING IS 27.3 MICROBUCKS
 POSITION (CM) = -210.1 PLUS ROW NUMBER TIMES 21.2725

SUPPLEMENTARY INFORMATION FOR

MATERIAL SPECIFICATION FOR DELAYED NEUTRON DATA

THE INTERPRETATION OF THE MATERIAL TYPES LISTED IN THE
FOLLOWING PAGES IN THE DETERMINATION OF DELAYED NEUTRON
PARAMETERS IS AS FOLLOWS.....

TYPE	MATERIAL	EXPOSURE	TUBES	FACTOR
21	61 4 INCH SMOOTH NATURAL URANIUM	744	19	.763
22	31 8 INCH SMOOTH NATURAL + MIXER	816	163	.753
24	32 8 INCH BUMPERED NATURAL URANIUM	629	20	1.155
26	31 8 INCH BUMPERED NATURAL + MIXER	641	15	1.120
27	31 SMOOTH AND BUMP. NATURAL + MIXER	1028	1181	1.071
51	43 6 INCH ENRICHED URANIUM (.00946)	942	224	.635
56	33 6 INCH ENRICHED + MIXER	843	212	1.174
56	33 6 INCH ENRICHED + MIXER	0	14	1.174

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DELAYED NEUTRON DATA FROM ANL-5800, 2ND EDITION, TABLES 1-13 AND 1-14.
 EXTRACTED FROM G.R. KEEPIN, ET AL., DELAY. NEUTRONS FROM FISSIONABLE
 ISOTOPES OF URANIUM, PLUTONIUM, AND THORIUM, PHYS. REV., 107, NO. 4, 1044
 (1957)

U235 THERMAL 11 BETA= .00650 NU= 2.4300 PERFIS= .0158

GROUP	HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
11 1	55.720	.0124	.0330	.052
11 2	22.720	.0305	.2190	.346
11 3	6.220	.1110	.1960	.310
11 4	2.500	.3010	.3950	.624
11 5	.610	1.1300	.1150	.182
11 6	.230	3.0000	.0420	.066

U235 FAST 12 BETA= .00650 NU= 2.5400 PERFIS= .0165

GROUP	HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
12 1	54.510	.0127	.0380	.063
12 2	21.840	.0317	.2130	.351
12 3	6.000	.1150	.1880	.310
12 4	2.230	.3110	.4070	.672
12 5	.496	1.4000	.1280	.211
12 6	.179	3.8700	.0260	.043

U235 D20 13 BETA= .15966 NU= .0158 PERFIS= .0025

GROUP	HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
13 1	1105200.000	.0000	.0258	.006
13 2	190800.000	.0000	.0647	.016
13 3	15240.000	.0000	.2044	.051
13 4	5940.000	.0001	1.4683	.370
13 5	1520.000	.0004	1.3016	.328
13 6	462.000	.0015	2.1190	.534
13 7	144.000	.0048	4.4048	1.110
13 8	41.000	.0169	12.8571	3.240
13 9	2.500	.2773	40.9127	10.310

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U238 FAST 22 BETA= .01570 NU= 2.6200 PERFIS= .0412

GROUP		HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
22	1	52.380	.0132	.0130	.054
22	2	21.580	.0321	.1370	.564
22	3	5.000	.1390	.1620	.667
22	4	1.930	.3580	.3880	1.599
22	5	.490	1.4100	.2250	.927
22	6	.172	4.0200	.0750	.309

PU239 THERML 31 BETA= .00210 NU= 2.9000 PERFIS= .0061

GROUP		HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
31	1	54.280	.0128	.0350	.021
31	2	23.040	.0301	.2980	.182
31	3	5.600	.1240	.2110	.129
31	4	2.130	.3250	.3260	.199
31	5	.618	1.1200	.0860	.052
31	6	.257	2.6900	.0440	.027

PU239 FAST 32 BETA= .00210 NU= 3.0000 PERFIS= .0063

GROUP		HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
32	1	53.750	.0129	.0380	.024
32	2	22.290	.0311	.2800	.176
32	3	5.190	.1340	.2160	.136
32	4	2.090	.3310	.3280	.207
32	5	.549	1.2600	.1030	.065
32	6	.216	3.2100	.0350	.022

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PJ240 FAST 42 BETA= .00260 NU= 3.3800 PERFIS= .0088

GROUP	HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
42 1	53.560	.0129	.0230	.022
42 2	22.140	.0313	.2730	.238
42 3	5.140	.1350	.1920	.162
42 4	2.080	.3330	.3500	.315
42 5	.511	1.3600	.1280	.119
42 6	.172	4.0400	.0290	.024

U233 THERML 51 BETA= .00264 NU= 2.5000 PERFIS= .0066

GROUP	HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
51 1	55.000	.0126	.0860	.057
51 2	20.570	.0337	.2990	.197
51 3	5.000	.1390	.2520	.166
51 4	2.130	.3250	.2780	.184
51 5	.615	1.1300	.0510	.034
51 6	.277	2.5000	.0340	.022

U233 FAST 52 BETA= .00270 NU= 2.5900 PERFIS= .0070

GROUP	HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
52 1	55.110	.0126	.0860	.060
52 2	20.740	.0334	.2740	.192
52 3	5.300	.1310	.2270	.159
52 4	2.290	.3020	.3170	.222
52 5	.546	1.2700	.0730	.051
52 6	.221	3.1300	.0230	.016

TH232 FAST 62 BETA= .02200 NU= 2.2600 PERFIS= .0496

GROUP	HALF LIFE	DECAY CONSTANT	RELATIVE ABUNDANCE	ABSOLUTE YIELD
62 1	56.030	.0124	.0340	.169
62 2	20.750	.0334	.1500	.744
62 3	5.740	.1210	.1550	.769
62 4	2.160	.3210	.4460	2.212
62 5	.571	1.2100	.1720	.853
62 6	.211	3.2900	.0430	.213

END OF DELAYED NEUTRON DATA

APRIL 1, 1966

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M A T E R I A L S P E C I F I C A T I O N S . B Y R E G I O N

R E G I O N 1 - T Y P E 2 2 W E I G H T . 0 3 3 8

U235 THERML FISSIONS	WEIGHT IN REGION	.80790
U235 FAST FISSIONS	WEIGHT IN REGION	.00099
U238 FAST FISSIONS	WEIGHT IN REGION	.04759
PU239 THERML FISSIONS	WEIGHT IN REGION	.14336
PU239 FAST FISSIONS	WEIGHT IN REGION	.00016
PU240 FAST FISSIONS	WEIGHT IN REGION	.00001

R E G I O N 2 - T Y P E 2 4 W E I G H T . 0 1 5 5

U235 THERML FISSIONS	WEIGHT IN REGION	.83371
U235 FAST FISSIONS	WEIGHT IN REGION	.00105
U238 FAST FISSIONS	WEIGHT IN REGION	.04911
PU239 THERML FISSIONS	WEIGHT IN REGION	.11600
PU239 FAST FISSIONS	WEIGHT IN REGION	.00013
PU240 FAST FISSIONS	WEIGHT IN REGION	.00001

R E G I O N 3 - T Y P E 2 6 W E I G H T . 0 1 0 0

U235 THERML FISSIONS	WEIGHT IN REGION	.83229
U235 FAST FISSIONS	WEIGHT IN REGION	.00105
U238 FAST FISSIONS	WEIGHT IN REGION	.04902
PU239 THERML FISSIONS	WEIGHT IN REGION	.11750
PU239 FAST FISSIONS	WEIGHT IN REGION	.00013
PU240 FAST FISSIONS	WEIGHT IN REGION	.00001

R E G I O N 4 - T Y P E 2 7 W E I G H T . 7 7 8 9

U235 THERML FISSIONS	WEIGHT IN REGION	.78184
U235 FAST FISSIONS	WEIGHT IN REGION	.00092
U238 FAST FISSIONS	WEIGHT IN REGION	.04605
PU239 THERML FISSIONS	WEIGHT IN REGION	.17099
PU239 FAST FISSIONS	WEIGHT IN REGION	.00018
PU240 FAST FISSIONS	WEIGHT IN REGION	.00001

R E G I O N 5 - T Y P E 5 1 W E I G H T . 0 5 0 1

U235 THERML FISSIONS	WEIGHT IN REGION	.83958
U235 FAST FISSIONS	WEIGHT IN REGION	.00136
U238 FAST FISSIONS	WEIGHT IN REGION	.04819
PU239 THERML FISSIONS	WEIGHT IN REGION	.11071
PU239 FAST FISSIONS	WEIGHT IN REGION	.00015
PU240 FAST FISSIONS	WEIGHT IN REGION	.00001

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MATERIAL SPECIFICATIONS BY REGION

REGION 6 -	TYPE56	WEIGHT	.0948
U235	THERML FISSIONS	WEIGHT IN REGION	.83923
U235	FAST FISSIONS	WEIGHT IN REGION	.00136
U233	FAST FISSIONS	WEIGHT IN REGION	.04817
PU239	THERML FISSIONS	WEIGHT IN REGION	.11108
PU239	FAST FISSIONS	WEIGHT IN REGION	.00016
PU240	FAST FISSIONS	WEIGHT IN REGION	.00001

REGION 7 -	TYPE56	WEIGHT	.0168
U235	THERML FISSIONS	WEIGHT IN REGION	.94409
U235	FAST FISSIONS	WEIGHT IN REGION	.00172
U233	FAST FISSIONS	WEIGHT IN REGION	.05419

* * * REDUCED FCW-GROUP EQUIVALENT DELAYED NEUTRON PARAMETERS * * *

SIX-GROUP PARAMETERS				T H R E E G R O U P P A R A M E T E R S			
GRP		BETA	LAMBDA	ISOLATE SLOW GROUP		ISOLATE FAST GROUP	
				GRP	BETA	GRP	LAMBDA
1	.000188	.01247		1	.000188	1	.001662
2	.001315	.03059		2	.002093	2	.004206
3	.001187	.11422		3	.003872	3	.000283
4	.002398	.30827					3.14016
5	.000781	1.18147					
6	.000283	3.14016					

FOUR-GROUP PARAMETERS				TWO-GROUP PARAMETERS				ONE-GROUP PARAMETERS			
GRP		BETA	LAMBDA	GRP		BETA	LAMBDA	GRP		BETA	LAMBDA
1	.000188	.01247		1	.001800	.02572		1	.006152	.07992	
2	.001929	.03579		2	.004352	.62231					
3	.003751	.47451									
4	.000283	3.14016									

MILLI-K PER DOLLAR 6.152

CENTS PER MILLI-K 16.25

CENTI-MK PER IN HOUR 2.132

INHOURS PER MILLI-K 46.89

AVERAGE LIFETIME - INFINITE PERIOD .0775 SEC

20-SECOND PERIOD .0340 SEC

THE FOLLOWING DATA WERE USED FOR 36 GROUPS AND PROMPT LIFETIME OF .5400 MSEC

GRP		BETA	LAMBDA	GRP		BETA	LAMBDA	GRP		BETA	LAMBDA
1	1.6453-04	.01240		13	1.0019-05	.01320		25	1.6330-08	.01290	
2	1.6948-03	.03050		14	1.0465-04	.03210		26	1.1975-07	.03110	
3	9.6086-04	.11100		15	1.2376-04	.13900		27	9.2534-08	.13400	
4	1.9744-03	.30100		16	2.9668-04	.35800		28	1.4084-07	.33100	
5	5.7586-04	1.13000		17	1.7200-04	1.41000		29	4.4226-08	1.26000	
6	2.0683-04	3.00000		18	5.7333-05	4.02000		30	1.4969-08	3.21000	
7	2.5212-07	.01270		19	1.3128-05	.01280		31	9.8105-10	.01290	
8	1.4047-06	.03170		20	1.1377-04	.03010		32	1.0613-08	.03130	
9	1.2406-06	.11500		21	8.0641-05	.12400		33	7.2241-09	.13500	
10	2.6893-06	.31100		22	1.2440-04	.32500		34	1.4047-08	.33300	
11	8.4440-07	1.40000		23	3.2506-05	1.12000		35	5.3066-09	1.36000	
12	1.7203-07	3.87000		24	1.6878-05	2.69000		36	1.0702-09	4.04000	

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

PERIOD	* 0	* 1	* 2	* 3	* 4	* 5	* 6	* 7	* 8	* 9
SECS										
10.000	2.44	2.33	2.24	2.15	2.08	2.01	1.94	1.88	1.83	1.77
20.000	1.72	1.68	1.64	1.60	1.56	1.52	1.49	1.46	1.42	1.39
30.000	1.37	1.34	1.31	1.29	1.27	1.24	1.22	1.20	1.18	1.16
40.000	1.14	1.12	1.11	1.09	1.07	1.06	1.04	1.03	1.01	1.00
50.000	.98	.97	.96	.95	.93	.92	.91	.90	.89	.88
60.000	.87	.86	.85	.84	.83	.82	.81	.80	.79	.78
70.000	.78	.77	.76	.75	.74	.74	.73	.72	.72	.71
80.000	.70	.70	.69	.68	.68	.67	.66	.66	.65	.65
90.000	.64	.64	.63	.63	.62	.62	.61	.61	.60	.60
100.000	.59	.59	.58	.58	.57	.57	.56	.56	.55	.55
110.000	.55	.54	.54	.54	.53	.53	.53	.52	.52	.51
120.000	.51	.51	.50	.50	.50	.49	.49	.49	.49	.48
130.000	.48	.48	.47	.47	.47	.46	.46	.46	.46	.45
140.000	.45	.45	.45	.44	.44	.44	.44	.43	.43	.43
150.000	.43	.42	.42	.42	.42	.41	.41	.41	.41	.41
160.000	.40	.40	.40	.40	.39	.39	.39	.39	.39	.38
170.000	.38	.38	.38	.38	.38	.37	.37	.37	.37	.37
180.000	.36	.36	.36	.36	.36	.36	.35	.35	.35	.35
190.000	.35	.35	.34	.34	.34	.34	.34	.34	.34	.33
200.000	.33	.33	.33	.33	.33	.33	.32	.32	.32	.32
210.000	.32	.32	.32	.32	.31	.31	.31	.31	.31	.31
220.000	.31	.31	.30	.30	.30	.30	.30	.30	.30	.30
230.000	.29	.29	.29	.29	.29	.29	.29	.29	.29	.28
240.000	.28	.28	.28	.28	.28	.28	.28	.28	.28	.27
250.000	.27	.27	.27	.27	.27	.27	.27	.27	.27	.27

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SUPPLEMENTARY INFORMATION FOR FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

TEST C STARTED ON GRAVEYARD SHIFT, JULY 1, 1967

OBSERVED CRITICAL WITH NO. 5 HCR AT 64-64 INCHES OUT

RUN C-10	HCR AT 150 INCHES, 2 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-10	7
RUN C-15	HCR AT 200 INCHES, 4 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-15	9
RUN C-23	HCR AT 270 INCHES, 7 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-23	6
RUN C-26	HCR AT 320 INCHES, 8 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-26	11
RUN C-29	HCR AT 260 INCHES, 8 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-29	11
RUN C-31	HCR AT 230 INCHES, 7 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-31	10
RUN C-33	HCR AT 200 INCHES, 6 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-33	10
RUN C-35	HCR AT 180 INCHES, 5 SPLINES		
CHANNEL 2 COUNTS TOO HIGH, DATA IS FROM CHANNEL 1		C-35	11
RUN C-40	HCR AT 120 INCHES, 2 SPLINES		
CHANNEL 1 NOT OPERATING, DATA IS FIRST 10 POINTS FROM CHANNEL 2		C-40	11
RUN C-41	HCR AT 120 INCHES, 1 SPLINES		
CHANNEL 1 NOT OPERATING, DATA IS FROM CHANNEL 3		C-41	7

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

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OBSERVED PERIODS				INDICATED REACTIVITIES				AVG.	AVG.		
COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	PERIOD	REACT		
1099	1069	1058	1078	1099	1069	1058	1078				
85.04	HCR NO. 5 AT 90.0 INCHES OUT, LATTICE UNIT	88.76	91.01	94.65	78.3	.670	.649	.636	.617	89.87	.64
54.57	HCR NO. 5 AT 100.0 INCHES OUT, LATTICE UNIT	52.39	59.50	59.53	77.1	.926	.953	.872	.871	56.50	.91
38.58	HCR NO. 5 AT 110.0 INCHES OUT, LATTICE UNIT	37.66	39.52	38.85	75.9	1.168	1.186	1.150	1.163	38.65	1.17
33.69	HCR NO. 5 AT 115.0 INCHES OUT, LATTICE UNIT	32.92	34.51	33.73	75.3	1.273	1.291	1.254	1.272	33.71	1.27
71.49	HCR NO. 5 AT 115.0 INCHES OUT, LATTICE UNIT	76.72	83.08	83.11	75.3	.763	.724	.682	.682	78.60	.71
	SPLINE INSERTED IN 2575										
	SPLINE WORTH .56 MILLI-K										
44.35	HCR NO. 5 AT 130.0 INCHES OUT, LATTICE UNIT	43.78	47.22	44.21	73.6	1.067	1.076	1.023	1.069	44.89	1.06
77.17	HCR NO. 5 AT 130.0 INCHES OUT, LATTICE UNIT	93.14	97.34	96.20	73.6	.605	.625	.604	.609	95.96	.61
	SPLINE INSERTED IN 2571										
	SPLINE WORTH .45 MILLI-K										
46.20	HCR NO. 5 AT 150.0 INCHES OUT, LATTICE UNIT	46.20	48.21	46.55	71.2	1.038	1.038	1.009	1.033	46.79	1.03
72.87	HCR NO. 5 AT 150.0 INCHES OUT, LATTICE UNIT	74.63	79.77	75.68	71.2	.753	.739	.704	.732	75.74	.73
	SPLINE INSERTED IN 2568										
	SPLINE WORTH .30 MILLI-K										
40.54	HCR NO. 5 AT 170.0 INCHES OUT, LATTICE UNIT	44.73	45.51	45.41	68.8	1.132	1.061	1.049	1.050	44.05	1.07

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

OBSERVED PERIODS				INDICATED REACTIVITIES				AVG.	AVG.
COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	PERIOD	REACT
1099	1069	1058	1078	1099	1069	1058	1078		
HCR NO. 5 AT 170.0 INCHES OUT, LATTICE UNIT 68.8									
SPLINE INSERTED IN 2172									
74.10	76.82	87.02	82.50	.743	.724	.659	.686	80.11	.70
SPLINE WORTH .37 MILLI-K									
HCR NO. 5 AT 190.0 INCHES OUT, LATTICE UNIT 66.4									
51.93	50.10	52.30	52.53	.959	.983	.954	.951	51.71	.96
HCR NO. 5 AT 200.0 INCHES OUT, LATTICE UNIT 65.3									
40.39	40.39	44.43	44.06	1.134	1.134	1.065	1.071	42.32	1.10
HCR NO. 5 AT 200.0 INCHES OUT, LATTICE UNIT 65.3									
SPLINE INSERTED IN 2564									
61.95	58.84	60.90	60.33	.847	.879	.857	.863	60.50	.86
SPLINE WORTH .24 MILLI-K									
HCR NO. 5 AT 220.0 INCHES OUT, LATTICE UNIT 62.9									
46.09	47.17	47.17	46.36	1.040	1.024	1.024	1.036	46.69	1.03
HCR NO. 5 AT 220.0 INCHES OUT, LATTICE UNIT 62.9									
SPLINE INSERTED IN 2162									
56.84	55.34	60.40	57.00	.900	.917	.863	.899	57.40	.89
SPLINE WORTH .14 MILLI-K									
HCR NO. 5 AT 245.0 INCHES OUT, LATTICE UNIT 59.9									
44.13	43.98	45.42	43.98	1.070	1.073	1.050	1.073	44.38	1.07
HCR NO. 5 AT 245.0 INCHES OUT, LATTICE UNIT 59.9									
SPLINE INSERTED IN 2460									
54.45	52.57	55.33	54.57	.928	.951	.918	.926	54.23	.93
SPLINE WORTH .14 MILLI-K									
HCR NO. 5 AT 270.0 INCHES OUT, LATTICE UNIT 56.9									
44.89	44.89	46.69	45.15	1.058	1.058	1.031	1.054	45.40	1.05

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

OBSERVED		PERIODS		INDICATED REACTIVITIES				AVG.	AVG.
COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	PERIOD	REACT
1099	1069	1058	1078	1099	1069	1058	1078		
HCR NO. 5 AT 270.0 INCHES OUT, LATTICE UNIT 56.9									
SPLINE INSERTED IN 2257									
48.32	48.75	51.49	50.06	1.000	1.001	.964	.983	49.78	.99
SPLINE WORTH .06 MILLI-K									
HCR NO. 5 AT 320.0 INCHES OUT, LATTICE UNIT 51.0									
42.05	42.05	45.26	45.33	1.105	1.105	1.052	1.051	43.67	1.08
HCR NO. 5 AT 320.0 INCHES OUT, LATTICE UNIT 51.0									
SPLINE INSERTED IN 2557									
54.16	53.09	55.49	54.53	.931	.944	.916	.927	54.32	.93
SPLINE WORTH .15 MILLI-K									
HCR NO. 5 AT 320.0 INCHES OUT, LATTICE UNIT 51.0									
SPLINE WITHDRAWN FROM 2557									
44.33	43.78	45.69	44.54	1.059	1.076	1.043	1.064	44.76	1.06
SPLINE WORTH .13 MILLI-K									
HCR NO. 5 AT 260.0 INCHES OUT, LATTICE UNIT 58.1									
53.79	53.79	57.94	57.43	.936	.936	.888	.894	55.74	.91
HCR NO. 5 AT 260.0 INCHES OUT, LATTICE UNIT 58.1									
SPLINE WITHDRAWN FROM 2257									
46.46	45.29	47.91	46.85	1.034	1.052	1.013	1.028	46.63	1.03
SPLINE WORTH .12 MILLI-K									
HCR NO. 5 AT 230.0 INCHES OUT, LATTICE UNIT 61.7									
60.57	60.57	67.03	66.61	.861	.861	.800	.804	63.70	.83
HCR NO. 5 AT 230.0 INCHES OUT, LATTICE UNIT 61.7									
SPLINE WITHDRAWN FROM 2460									
49.16	48.29	50.47	50.28	.995	1.007	.978	.980	49.55	.99
SPLINE WORTH .16 MILLI-K									
HCR NO. 5 AT 200.0 INCHES OUT, LATTICE UNIT 65.3									
75.93	75.94	85.78	85.32	.730	.730	.666	.669	80.74	.70

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

OBSERVED PERIODS			INDICATED REACTIVITIES				AVG.	AVG.	
COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	PERIOD	REACT
1099	1069	1058	1078	1099	1069	1058	1078		
HCR NO. 5 AT 200.0 INCHES OUT, LATTICE UNIT 65.3									
SPLINE WITHDRAWN FROM 2162									
58.58	57.08	59.84	58.83	.881	.898	.868	.879	58.58	.88
SPLINE WORTH .18 MILLI-K									
HCR NO. 5 AT 180.0 INCHES OUT, LATTICE UNIT 67.6									
100.62	100.62	102.94	102.04	.588	.588	.578	.582	101.56	.58
HCR NO. 5 AT 180.0 INCHES OUT, LATTICE UNIT 67.6									
SPLINE WITHDRAWN FROM 2564									
61.33	59.55	61.47	61.62	.853	.871	.852	.850	60.99	.86
SPLINE WORTH .27 MILLI-K									
HCR NO. 5 AT 150.0 INCHES OUT, LATTICE UNIT 71.2									
219.80	212.42	228.36	227.49	.307	.316	.297	.298	222.02	.30
HCR NO. 5 AT 150.0 INCHES OUT, LATTICE UNIT 71.2									
SPLINE WITHDRAWN FROM 2172									
76.57	71.36	76.13	73.05	.725	.764	.729	.751	74.28	.74
SPLINE WORTH .44 MILLI-K									
HCR NO. 5 AT 130.0 INCHES OUT, LATTICE UNIT 73.6									
200.26	194.68	211.22	204.60	.333	.341	.318	.326	202.69	.33
HCR NO. 5 AT 120.0 INCHES OUT, LATTICE UNIT 74.8									
204.10	323.03	474.35	319.08	.327	.217	.152	.220	330.14	.23
HCR NO. 5 AT 120.0 INCHES OUT, LATTICE UNIT 74.8									
SPLINE WITHDRAWN FROM 2568									
94.64	131.16	132.74	128.52	.617	.476	.471	.484	121.76	.51
SPLINE WORTH .28 MILLI-K									
HCR NO. 5 AT 120.0 INCHES OUT, LATTICE UNIT 74.8									
SPLINE WITHDRAWN FROM 2571									
61.71	60.68	63.54	61.71	.849	.860	.832	.849	61.91	.85
SPLINE WORTH .34 MILLI-K									

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

OBSERVED		PERIODS		INDICATED REACTIVITIES				AVG.	AVG.
COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	PERIOD	PEACT
1099	1069	1058	1078	1099	1069	1058	1078		
HCR NO. 5 AT 110.0 INCHES OUT, LATTICE UNIT 75.9									
84.90	80.40	79.49	84.75	.671	.699	.705	.672	82.38	.69
HCR NO. 5 AT 110.0 INCHES OUT, LATTICE UNIT 75.9									
SPLINE WITHDRAWN FROM 2575									
37.73	38.26	39.80	39.17	1.185	1.175	1.145	1.157	38.74	1.17
SPLINE WORTH .48 MILLI-K									

DECLASSIFIED

FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

ROD POSITION DIFFERENTIAL WORTH
INCHES MILLI-K/INCH

95.0	.026252
105.0	.026145
112.5	.021063
122.5	.023036
140.0	.020930
160.0	.017040
180.0	.012940
195.0	.013966
210.0	.008451
232.5	.006865
257.5	.004788
295.0	.001823
290.0	.002450
245.0	.006680
215.0	.009719
190.0	.014869
165.0	.018414
140.0	.020653
125.0	.010017
115.0	.016059

DECLASSIFIED

FIRST ROD CALIBRATION TESTS C-1 THRU C-43

TEST C

ROD POSITION INCHES	ROD POSITION LATTICE UNIT	ACCUMULATED WORTH MILLI-K
90.0	78.3	.643
100.0	77.1	.906
110.0	75.9	1.167
115.0	75.3	1.272
130.0	73.6	1.618
150.0	71.2	2.037
170.0	68.8	2.377
190.0	66.4	2.636
200.0	65.3	2.776
220.0	62.9	2.945
245.0	59.9	3.116
270.0	56.9	3.236
320.0	51.0	3.327
260.0	58.1	3.180
230.0	61.7	2.980
200.0	65.3	2.688
180.0	67.6	2.391
150.0	71.2	1.839
130.0	73.6	1.426
120.0	74.8	1.325
110.0	75.9	1.165

DECLASSIFIED

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR FLUX TRAVERSE FOR TEST D-1 NO VSRS INSERTED

TEST D-1

TEST D STARTED AT 0855 ON JULY 1

TEST D-1 COMPLETED AT 0956

**FOURIER FIT DID NOT PASS ERROR CRITERION OF 4.253-03 IN 15 TRIES.

MINIMUM RMS ERROR OCCURS FOR ORDER 3 FIT.

RMS ERROR FOR 16 POINTS IS 5.912-02. INDIVIDUAL ERRORS ARE:

-0.000	-1.095-01	-6.330-02	-1.953-02	1.314-02	2.043-02	1.585-02	-1.522-02	-6.143-02	-6.732-02
-6.158-02	-6.420-02	7.873-02	-3.469-02	-4.463-02	-5.066-02	-5.722-02	-0.000		

FLUX TRAVERSE FOR TEST D-1 NO VSRS INSERTED

TEST D-1

REACTOR CONDITIONS

HCR NO. 5 AT 80.0 INCHES OUT

SPLINES IN TUBES 0

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DECLASSIFIED

DDN-3145

D. REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

FLUX TRAVERSE FOR TEST D-1 NO VSRS INSERTED

TEST D-1

POINT	TRAVERSE INCHES	CHAMBER LATTICE UNIT	LOCATION CM FROM NEAR SIDE	ADJUSTED COUNTRATE COUNTS/SEC	RANDOM ERROR PERCENT	FITTED COUNTRATE COUNTS/SEC	FITTING ERROR PERCENT
1	.0	.0	.00	.0	.00	.0	.00
2	441.0	58.7	238.34	31258.2	.16	34681.0	10.95
3	423.0	60.9	284.06	37026.0	.15	39369.7	6.33
4	405.0	63.0	329.78	42835.7	.15	43672.2	1.95
5	387.0	65.2	375.50	48491.5	.15	47854.3	-1.31
6	369.0	67.3	421.22	53260.7	.15	52172.8	-2.04
7	351.0	69.5	466.94	57728.2	.14	56813.0	-1.59
8	333.0	71.6	512.66	60905.4	.14	61832.2	1.52
9	315.0	73.8	558.38	63235.3	.14	67120.0	6.14
10	297.0	75.9	604.10	67818.0	.14	72383.5	6.73
11	279.0	78.1	649.82	72684.6	.14	77180.7	6.16
12	261.0	80.2	695.54	75983.7	.14	80862.1	6.42
13	243.0	82.4	741.26	89915.7	.13	82837.0	-7.87
14	225.0	84.5	786.98	79691.4	.14	82455.8	3.47
15	207.0	86.7	832.70	75813.2	.14	79196.8	4.46
16	189.0	88.8	878.42	69220.6	.14	72727.0	5.07
17	171.0	91.0	924.14	59555.2	.14	62963.1	5.72
18	.0	.0	1104.53	.0	.00	.0	.00
19	153.0	93.1	969.86	45866.0	.14	.0	.00
20	135.0	95.3	1015.58	27889.5	.16	.0	.00
21	117.0	97.4	1061.30	15295.3	.18	.0	.00
22	99.0	99.6	1107.02	4377.5	.27	.0	.00
23	81.0	101.7	1152.74	33.8	2.70	.0	.00
24	63.0	103.9	1198.46	6.4	6.18	.0	.00

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DECLASSIFIED

DOW-3145

INFERRED FLUX DISTRIBUTION FLUX TRAVERSE FOR TEST D-1 NO VSRS INSERTED

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT.SQD	INFERRED BUCKLING
51	.2244	.005	.0440	.001	18.21
52	.2860	.011	.0715	.003	17.46
53	.3454	.019	.1042	.005	16.53
54	.4022	.027	.1413	.008	15.44
55	.4562	.037	.1818	.012	14.18
56	.5073	.048	.2248	.017	12.79
57	.5554	.060	.2695	.023	11.27
58	.6003	.073	.3153	.029	9.66
59	.6435	.087	.3618	.037	7.98
60	.6839	.102	.4086	.046	6.27
61	.7223	.118	.4559	.056	4.56
62	.7593	.134	.5037	.067	2.92
63	.7953	.152	.5526	.079	1.37
64	.8303	.170	.6030	.092	-.02
65	.8663	.189	.6556	.106	-1.22
66	.9022	.208	.7112	.122	-2.19
67	.9391	.229	.7705	.139	-2.88
68	.9771	.250	.8342	.157	-3.28
69	1.0166	.272	.9030	.176	-3.38
70	1.0577	.295	.9774	.198	-3.17
71	1.1002	.319	1.0576	.221	-2.66
72	1.1441	.344	1.1436	.245	-1.89
73	1.1889	.370	1.2349	.272	-.87
74	1.2342	.396	1.3308	.301	.34
75	1.2792	.424	1.4298	.332	1.73
76	1.3233	.453	1.5300	.366	3.24
77	1.3654	.483	1.6289	.401	4.84
78	1.4045	.513	1.7236	.438	6.49
79	1.4395	.545	1.8105	.478	8.17
80	1.4692	.577	1.8859	.519	9.84
81	1.4923	.609	1.9457	.561	11.47
82	1.5077	.642	1.9860	.604	13.06
83	1.5141	.675	2.0031	.648	14.59
84	1.5106	.707	1.9938	.691	16.05
85	1.4961	.740	1.9557	.734	17.42

DECLASSIFIED

INFERRED FLUX DISTRIBUTION FLUX TRAVERSE FOR TEST D-1 NO VSRS INSERTED

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT.SQD	INFERRED BUCKLING
85	1.4699	.772	1.6877	.775	18.70
87	1.4312	.803	1.7697	.814	19.89
88	1.3797	.833	1.6631	.850	20.99
89	1.3151	.862	1.5110	.883	21.99
90	1.2374	.889	1.3377	.912	22.89
91	1.1469	.914	1.1492	.937	23.70
92	1.0441	.936	.9525	.957	24.42
93	.9298	.956	.7554	.974	25.04
94	.8050	.974	.5662	.986	25.57
95	.6709	.989	.3933	.995	26.01
96	.5290	1.000	.2445	1.000	26.36

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DEPENDENT VARIABLES: 0-FLUX FACTOR H-

HORIZONTAL 1.0+01

DUN-3149

DECLASSIFIED

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR FLUX TRAVERSE - TEST D-2 VSRS 10,15,21,28,29,34 INSERTED TEST D-2

VSR INSERTION DATA

VSR S INSERTED

NO. 5 ROD

PERIOD

AT FIRST

INDICATION

21

93

48

21, 34, 10

140

78

21, 34, 10, 28, 15

159

74

21, 34, 10, 28, 15, 29, 16

320

148

21, 34, 10, 28, 15, 29, 16, 35, 23

320

SUBCRIT.

WITHDREW VSRS 35 AND 23 TO RUN TRAVERSE. DURING THE TRAVERSE,
THE REACTIVITY EFFECT OF THE TRAVERSE CHAMBER AT THE FLUX
PEAK WAS SUFFICIENT TO DRIVE THE REACTOR SUBCRITICAL.
THEREFORE VSR 16 WAS ALSO WITHDRAWN AND THE TRAVERSE RERUN.

**FOURIER FIT DID NOT PASS ERROR CRITERION OF 5.836-03 IN 15 TRIES.

MINIMUM RMS ERROR OCCURS FOR ORDER 3 FIT.

RMS ERROR FOR 16 POINTS IS 6.198-02. INDIVIDUAL ERRORS ARE:

-0.000 -2.935-01 -2.772-01 -1.803-01 -7.403-02 -5.071-03 2.383-02 3.070-02 1.488-02 2.212-02
-1.118-02 -6.190-02 1.767-02 -8.023-02 -8.511-02 -6.124-02 -4.154-02 -0.000

FLUX TRAVERSE - TEST D-2

VSRS 10,15,21,28,29,34 INSERTED

TEST D-2

REACTOR CONDITIONS

HCR NO. 5 AT 180.0 INCHES OUT

SPLINES IN TUBES 0

DECLASSIFIED

DDM-3145

POINT	TRAVERSE CHAMBER LOCATION			ADJUSTED		RANDOM		FITTED		FITTING	
	INCHES	LATTICE UNIT	CM FROM NEAR SIDE	COUNTS/SEC	COUNTS/SEC	PERCENT ERROR	PERCENT ERROR	COUNTS/SEC	COUNTS/SEC	PERCENT ERROR	PERCENT ERROR
1	.0	.0	.00	.0	.0	.00	.00	.0	.0	.00	.00
2	441.0	58.7	238.34	5464.9	7060.8	.27	.27	7060.8	7060.8	29.35	29.35
3	423.0	60.9	284.06	9110.1	11635.0	.24	.24	11635.0	11635.0	27.72	27.72
4	405.0	63.0	329.78	14716.1	17371.5	.22	.22	17371.5	17371.5	18.03	18.03
5	337.0	65.2	375.50	22448.1	24110.0	.20	.20	24110.0	24110.0	7.40	7.40
6	369.0	67.3	421.22	31417.9	31577.2	.19	.19	31577.2	31577.2	.51	.51
7	351.0	69.5	466.94	40373.5	39411.5	.18	.18	39411.5	39411.5	-2.38	-2.38
8	333.0	71.6	512.66	48679.9	47165.4	.18	.18	47165.4	47165.4	-3.07	-3.07
9	315.0	73.8	558.38	55256.1	54433.8	.18	.18	54433.8	54433.8	-1.49	-1.49
10	297.0	75.9	604.10	62057.6	60684.8	.18	.18	60684.8	60684.8	-2.21	-2.21
11	279.0	78.1	649.82	64766.8	65491.0	.18	.18	65491.0	65491.0	1.12	1.12
12	261.0	80.2	695.54	64469.8	68460.2	.18	.18	68460.2	68460.2	6.19	6.19
13	243.0	82.4	741.26	70528.0	69281.9	.18	.18	69281.9	69281.9	-1.77	-1.77
14	225.0	84.5	786.98	62717.9	67749.8	.18	.18	67749.8	67749.8	8.02	8.02
15	207.0	86.7	832.70	58774.4	63776.6	.18	.18	63776.6	63776.6	8.51	8.51
16	189.0	88.8	878.42	54090.0	57402.5	.18	.18	57402.5	57402.5	6.12	6.12
17	171.0	91.0	924.14	46849.2	48795.2	.18	.18	48795.2	48795.2	4.15	4.15
18	.0	.0	1104.53	.0	.0	.00	.00	.0	.0	.00	.00
19	153.0	93.1	969.86	35849.0	.0	.18	.18	.0	.0	.00	.00
20	135.0	95.3	1015.58	22496.8	.0	.20	.20	.0	.0	.00	.00
21	117.0	97.4	1061.30	12270.6	.0	.23	.23	.0	.0	.00	.00
22	99.0	99.6	1107.02	3179.4	.0	.35	.35	.0	.0	.00	.00
23	81.0	101.7	1152.74	27.6	.0	3.33	3.33	.0	.0	.00	.00
24	63.0	103.9	1193.46	4.1	.0	8.22	8.22	.0	.0	.00	.00

DECLASSIFIED

TEST D-2

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT. SQD	INFERRED BUCKLING
51	.0016	.000	.0000	.000	-4664.90
52	.0076	.000	.0000	.000	-1193.78
53	.0176	.001	.0002	.000	-605.73
54	.0329	.001	.0003	.000	-373.24
55	.0535	.002	.0020	.000	-252.71
56	.0802	.004	.0046	.000	-180.81
57	.1134	.007	.0091	.000	-133.99
58	.1535	.010	.0167	.001	-101.61
59	.2007	.014	.0285	.001	-73.20
60	.2549	.020	.0460	.002	-60.68
61	.3162	.027	.0708	.004	-47.21
62	.3841	.035	.1046	.006	-36.62
63	.4585	.045	.1489	.009	-28.15
64	.5380	.057	.2056	.014	-21.26
65	.6240	.070	.2759	.020	-15.58
66	.7137	.086	.3609	.028	-10.84
67	.8069	.103	.4613	.038	-6.85
68	.9026	.123	.5773	.050	-3.47
69	.9993	.145	.7082	.066	-.57
70	1.0971	.169	.8528	.084	1.92
71	1.1935	.195	1.0093	.106	4.09
72	1.2878	.223	1.1750	.132	5.97
73	1.3785	.253	1.3463	.161	7.63
74	1.4644	.284	1.5195	.194	9.08
75	1.5444	.318	1.6900	.231	10.36
76	1.6171	.353	1.8529	.271	11.49
77	1.6814	.390	2.0032	.315	12.50
78	1.7362	.427	2.1359	.361	13.40
79	1.7805	.466	2.2463	.410	14.20
80	1.8134	.506	2.3299	.460	14.91
81	1.8340	.545	2.3833	.512	15.55
82	1.8416	.585	2.4035	.565	16.12
83	1.8361	.625	2.3887	.616	16.63
84	1.8160	.665	2.3382	.667	17.09
85	1.7831	.704	2.2528	.716	17.50

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INFERRED FLUX DISTRIBUTION FLUX TRAVERSE - TEST D-2 VSRS 10,15,21,28,29,34 INSERTED

TEST D-2

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT.SQD	INFERRED BUCKLING
86	1.7355	.741	2.1340	.763	17.86
87	1.6739	.778	1.9852	.806	18.19
88	1.5985	.812	1.8103	.845	18.43
89	1.5097	.845	1.6149	.880	18.74
90	1.4082	.876	1.4049	.911	18.96
91	1.2945	.904	1.1874	.937	19.16
92	1.1697	.929	.9694	.958	19.33
93	1.0347	.952	.7585	.974	19.48
94	.8905	.971	.5619	.986	19.60
95	.7385	.987	.3864	.995	19.70
96	.5796	1.000	.2382	1.000	19.78

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INDEPENDENT VARIABLE: LATTICE UNIT
DEPENDENT VARIABLES: 0-FLUX FACTOR

*-1,579

615.1 -*

*- 1.053

06L • -*

527. *

792° -*

2007-01-01

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DUN-3145

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR

TEST E-2

13 PIECE POISON FLUSH, NO SPLINES

TEST E-2

TEST E STARTED AT 1415 ON JULY 1

FIRST TEST WAS FLUSH OF 6 PIECES OF POISON. NO NOTICEABLE EFFECT WAS OBSERVED. THEN THIS RUN, WITH 13 PIECES OF POISON WAS RUN.

TEST E-2

13 PIECE POISON FLUSH, NO SPLINES

TEST E-2

REACTOR CONDITIONS

HCR NO. 5 AT -.0 INCHES OUT

SPLINES IN TUBES 0

TEST E-2

13 PIECE POISON FLUSH, NO SPLINES

TEST E-2

	COUNTER 1 1099	COUNTER 2 1069	COUNTER 3 -0	COUNTER 4 -0
APPARENT TIME ZERO FOR STEP	25.41	28.71	.00	.00
ASYMPTOTIC PERIOD. (SECONDS)	1023.02	875.49	.00	.00
MEASURED REACTIVITY (MILLI-K)	.073	.085	.000	.000
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.06589	.04199	.00000	.00000
BETA OVER L (INVERSE SECONDS)	11.39	11.39	.00	.00
REACTIVITY (DOLLARS)	.015	.026	.000	.000
INFERRED BETA	.00501	.00322	.00000	.00000
INFERRED LIFE (SECONDS)	.00044	.00028	.00000	.00000

DNM-3145

DECLASSIFIED

TEST E-2

13 PIECE POISON FLUSH, NO SPLINES

TIME SECONDS	R E L A T I V E F L U X T R A N S I E N T			
	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
	1099	1069	-0	-0
1.00	.9798	1.0054	1.0000	1.0000
11.00	.9871	.9816	1.0000	1.0000
21.00	.9908	.9915	1.0000	1.0000
31.00	1.0551	1.0253	1.0000	1.0000
41.00	.9871	.9962	1.0000	1.0000
51.00	1.0818	1.0643	1.0000	1.0000
61.00	.9859	1.1325	1.0000	1.0000
71.00	1.1636	1.1014	1.0000	1.0000
81.00	1.1134	1.1490	1.0000	1.0000
91.00	1.1036	1.2027	1.0000	1.0000
101.00	1.0964	1.1927	1.0000	1.0000
111.00	1.1365	1.2066	1.0000	1.0000
121.00	1.2142	1.2066	1.0000	1.0000
131.00	1.1934	1.2404	1.0000	1.0000
141.00	1.2737	1.2894	1.0000	1.0000
151.00	1.2956	1.3007	1.0000	1.0000
211.00	1.2871	1.4802	1.0000	1.0000
271.00	1.4366	1.5492	1.0000	1.0000
331.00	1.5835	1.6978	1.0000	1.0000
391.00	1.6627	1.7455	1.0000	1.0000
451.00	1.6955	1.8345	1.0000	1.0000
511.00	1.7283	1.9354	1.0000	1.0000

DECLASSIFIED

TEST E-2

13 PIECE POISON FLOSH, NO SPLINES

TE

INDEPENDENT VARIABLE: TIME, SECONDS

DEPENDENT VARIABLES: 0-CHANNEL 1

II-CHANNEL 2

Δ-CHANNEL 3

*-CHANNEL 4

+ -

1.935-*

II*- 1.935

1.799-*

II*- 1.799

1.662-*

II*- 1.662

1.526-*

II*- 1.526

1.389-*

II*- 1.389

1.253-*

II*- 1.253

1.116-*

II*- 1.116

.980-*

II*- .980

.010

.520

1.030

1.540

2.050

2.560

3.070

3.580

4.090

4.600

5.110

SCALE FACTORS - VERTICAL

1.0+00

HORIZONTAL

1.0+02

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SUPPLEMENTARY INFORMATION FOR

TEST E-3

SHORT TRAVERSE, 5 SPLINES

TEST E-3

AT THIS TIME, THE FLUX TRAVERSES HAD BEEN PLOTTED AND IT WAS REALIZED THAT A SUBSTANTIAL FLUX DISTORTION TO THE FAR SIDE WAS EFFECTIVELY REDUCING THE WORTH OF THE POISON CHARGES. TO ALLEVIATE THIS PROBLEM, SPLINES WERE PLACED ON THE FAR SIDE TO PARTIALLY BALANCE THE FLUX DISTRIBUTION. THIS TRAVERSE WAS RUN TO OBSERVE THE PROGRESS MADE SO FAR BY THIS TECHNIQUE.

**FOURIER FIT DID NOT PASS ERROR CRITERION OF 5.999×10^{-3} IN 3 TRIES.

MINIMUM RMS ERROR OCCURS FOR ORDER 2 FIT.

RMS ERROR FOR 4 POINTS IS 8.649×10^{-2} . INDIVIDUAL ERRORS ARE:

-0.000 1.483-01 -1.545-02 -8.367-02 7.509-02 -6.623-07

TEST E-3

SHORT TRAVERSE, 5 SPLINES

TEST E-3

REACTOR CONDITIONS

HCR NO. 5 AT 160.0 INCHES OUT

SPLINES IN TUBES 2685

2284

2580

2176

2770

TEST E-3

SHORT TRAVERSE, 5 SPLINES

TEST E-3

TRAVERSE CHAMBER LOCATION
LATTICE CM FROM

ADJUSTED
COUNTRATE

RANDOM
ERROR

FITTED
COUNTRATE

FITTING
ERROR

POINT

INCHES

UNIT

NEAR SIDE

COUNTS/SEC

PERCENT

COUNTS/SEC

PERCENT

1	.0	.0	.00	.0	.00	.0	.00
2	441.0	58.7	238.34	18310.6	.21	12667.9	-30.82
3	359.0	67.3	421.22	34735.6	.20	29020.1	-16.57
4	279.0	78.1	649.82	42768.3	.20	46187.0	7.94
5	243.0	82.4	741.26	42569.6	.19	46656.4	9.60
6	159.0	92.4	954.62	24212.0	.20	.0	.00

DECLASSIFIED

INFERRED FLOX DISTRIBUTION

TEST E-3

SHORT TRAVERSE, 5 SPLINES

TEST E-3

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT.SQD	INFERRED BUCKLING
51	.1076	.002	.0093	.000	-33.93
52	.1416	.005	.0161	.001	-32.28
53	.1776	.009	.0254	.001	-30.35
54	.2160	.014	.0375	.002	-28.18
55	.2572	.020	.0532	.003	-25.85
56	.3014	.026	.0731	.005	-23.42
57	.3488	.034	.0978	.007	-20.95
58	.3994	.042	.1283	.010	-18.47
59	.4534	.052	.1654	.013	-16.02
60	.5107	.063	.2098	.018	-13.64
61	.5711	.076	.2624	.023	-11.35
62	.6345	.090	.3238	.030	-9.15
63	.7005	.105	.3947	.039	-7.07
64	.7687	.121	.4753	.049	-5.11
65	.8387	.140	.5658	.062	-3.27
66	.9099	.160	.6659	.076	-1.54
67	.9817	.181	.7753	.093	.07
68	1.0535	.204	.8928	.112	1.57
69	1.1248	.228	1.0173	.135	2.97
70	1.1941	.254	1.1470	.159	4.26
71	1.2614	.282	1.2799	.187	5.46
72	1.3255	.310	1.4133	.218	6.58
73	1.3857	.341	1.5445	.252	7.60
74	1.4411	.372	1.6705	.288	8.56
75	1.4909	.404	1.7880	.327	9.44
76	1.5344	.438	1.8938	.368	10.25
77	1.5707	.472	1.9846	.411	11.00
78	1.5993	.507	2.0574	.456	11.69
79	1.6194	.542	2.1094	.502	12.33
80	1.6304	.577	2.1383	.548	12.92
81	1.6320	.613	2.1423	.595	13.46
82	1.6236	.648	2.1203	.641	13.96
83	1.6049	.683	2.0719	.686	14.41
84	1.5758	.717	1.9975	.729	14.83
85	1.5362	.750	1.8982	.771	15.21

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DECLASSIFIED

DUN-3145

INFERRED FLUX DISTRIBUTION TEST E-3 SHORT TRAVERSE, 5 SPLINES

TEST E-3

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT. SQD	INFERRED BUCKLING
86	1.4859	.783	1.7760	.809	15.56
87	1.4252	.814	1.6339	.845	15.88
88	1.3543	.843	1.4754	.877	16.16
89	1.2735	.871	1.3046	.905	16.42
90	1.1832	.897	1.1262	.930	16.65
91	1.0841	.920	.9453	.950	16.85
92	.9766	.941	.7672	.967	17.03
93	.8617	.960	.5973	.980	17.18
94	.7400	.976	.4405	.989	17.31
95	.6126	.990	.3019	.996	17.42
96	.4804	1.000	.1856	1.000	17.51

DECLASSIFIED

DECLASSIFIED

DTM-3145

-53-

-- 1.632

-- 1.414

-- 1.196

-- .979

-- .761

-- .543

-- .325

-- .108

1E

SHORT TRAVERSE, 5 SPLINES

TEST E-3

INDEPENDENT VARIABLE: LATTICE UNIT
DEPENDENT VARIABLES: 0-FLUX FACTOR

1.632--*

1.414--*

1.196--*

.979--*

.761--*

.543--*

.325--*

.108--*

5.100 5.550 6.000 6.450 6.900 7.350 7.800 8.250 8.700 9.150 9.600
SCALE FACTORS - VERTICAL 1.0+00 HORIZONTAL 1.0+01

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR

TEST E-4

13 PIECES OF POISON - 9 SPLINES

TEST E-4

THIS WAS A RERUN OF THE 13 PIECE FLUSH CONDUCTED AS TEST E-2.

TEST E-4

13 PIECES OF POISON - 9 SPLINES

TEST E-4

REACTOR CONDITIONS

HCR NO. 5 AT 235.0 INCHES OUT

SPLINES IN TUBES

2685

2284

2580

2176

2770

1581

1973

3174

3180

TEST E-4

13 PIECES OF POISON - 9 SPLINES

TEST E-4

	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
	1099	1069	1078	1088
APPARENT TIME ZERO FOR STEP	56.50	37.78	53.56	6.38
ASYMPTOTIC PERIOD (SECONDS)	294.02	282.04	256.54	270.45
MEASURED REACTIVITY (MILLI-K)	.237	.246	.267	.255
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.06682	.06361	.05628	.06679
BETA OVER L (INVERSE SECONDS)	11.39	11.39	11.39	11.39
REACTIVITY (DOLLARS)	.048	.053	.065	.052
INFERRED BETA	.00489	.00465	.00413	.00486
INFERRED LIFE (SECONDS)	.00043	.00041	.00036	.00043

DECLASSIFIED

DN 3145

TEST E-4

13 PIECES OF POISON - 9 SPLINES

TIME SECONDS	RELATIVE FLUX TRANSIENT			
	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
1.00	1099	1069	1073	1088
11.00	.9764	1.0114	.9642	1.1072
21.00	.9939	.9769	1.0814	.9107
31.00	1.0316	1.0016	1.0554	.9643
41.00	.9621	.9967	.8990	1.0357
51.00	.9795	1.0133	.8990	.9821
61.00	1.0316	1.0770	1.2769	1.1786
71.00	1.0842	1.1577	.8360	1.3750
81.00	1.0933	1.2432	1.2373	1.4286
91.00	1.1447	1.2730	1.1466	1.4465
101.00	1.1978	1.3237	1.3812	1.3572
111.00	1.2672	1.3867	1.4203	1.6608
121.00	1.3420	1.4881	1.5245	1.7858
131.00	1.3796	1.5057	1.3290	1.8394
141.00	1.4553	1.5612	1.5636	1.6429
151.00	1.5253	1.6068	1.3030	1.7144
161.00	1.5430	1.7252	1.6288	1.6930
171.00	1.6215	1.8095	1.5375	2.1073
181.00	1.6937	1.8212	1.5375	1.9108
191.00	1.8606	2.0326	1.8764	1.9466
201.00	2.0846	2.2729	2.1240	2.6739
211.00	2.2942	2.5049	2.4369	2.9290
221.00	2.5285	2.8565	2.5933	2.6611
231.00	2.7673	3.1102	3.0104	3.2327
241.00	3.1106	3.4424	3.2451	4.3047

DECLASSIFIED

TEST E-4 13 PIECES OF POISON - 9 SPLINES

TE

INDEPENDENT VARIABLE: TIME, SECONDS
DEPENDENT VARIABLES: 0-CHANNEL 1
2-CHANNEL 2
3-CHANNEL 3
4-CHANNEL 4

***- 4.305

3.816-*

3.328-*

2.640-*

2.351-*

1.663-*

1.374-*

.686-*

SCALE FACTORS - VERTICAL 1.0+00 HORIZONTAL 1.0+02

DECLASSIFIED

DWM-3345

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR

TEST E-6

21 PIECE POISON FLUSH

TEST E-6

FIRST ATTEMPT AT FLUSHING 21 PIECES FAILED, AS THE DUMMIES
FLUSHED, BUT THE POISON DID NOT. THIS IS A RERUN OF THAT TEST.

TEST E-6

21 PIECE POISON FLUSH

TEST E-6

REACTOR CONDITIONS

HCR NO. 5 AT 266.0 INCHES OUT

SPLINES IN TUBES 2685

2284

2580

2176

2770

1581

1973

3174

3180

TEST E-6

21 PIECE POISON FLUSH

TEST E-6

	COUNTER 1 1099	COUNTER 2 1069	COUNTER 3 1078	COUNTER 4 1088
APPARENT TIME ZERO FOR STEP	22.05	19.98	16.42	22.64
ASYMPTOTIC PERIOD (SECONDS)	113.73	120.58	124.46	125.19
MEASURED REACTIVITY (MILLY-K)	.534	.509	.496	.494
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.05836	.05080	.06039	.05623
BETA OVER L (INVERSE SECONDS)	11.39	11.39	11.39	11.39
REACTIVITY (DOLLARS)	.131	.140	.117	.124
INFERRED BETA	.00408	.00363	.00423	.00397
INFERRED LIFE (SECONDS)	.00036	.00032	.00037	.00035

DECLASSIFIED

TEST E-6

21 PIECE POISON FLUSH

TIME SECONDS	RELATIVE FLUX TRANSIENT			
	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
1.00	1099	1069	1078	1088
7.00	.9764	1.0031	.9261	.9335
13.00	.9840	1.0028	1.0504	.9949
19.00	.9737	1.0098	.9918	1.0033
25.00	.9921	.9982	1.0082	.9921
31.00	.9791	.9860	.9261	.9977
37.00	1.0947	1.2266	1.0974	1.0785
43.00	1.2032	1.3871	1.2217	1.1929
49.00	1.4622	1.5550	1.5832	1.4662
55.00	1.5846	1.6900	1.5362	1.4578
61.00	1.6966	1.8532	1.6184	1.6392
67.00	1.8223	2.0343	1.9002	1.7312
73.00	1.9574	2.2110	1.8697	1.9015
79.00	2.2235	2.4047	2.1468	2.1387
85.00	2.3916	2.5966	2.4288	2.2922
91.00	2.5486	2.8180	2.5862	2.3620
97.00	2.7270	3.0407	2.6568	2.6301
103.00	3.0577	3.3290	2.9836	2.8256
109.00	3.2802	3.5934	3.2023	3.0212
115.00	4.1367	4.5634	3.9177	3.8960
121.00	5.4476	5.8694	4.9918	5.1243
127.00	6.8865	7.3325	6.6435	6.0598
133.00	9.0262	9.2432	8.1019	7.5097
139.00	11.5344	11.1488	9.8426	9.4591

DECLASSIFIED

TEST E-6

21 PIECE POISON FLUSH

TE

INDEPENDENT VARIABLE: TIME, SECONDS

DEPENDENT VARIABLES: 0-CHANNEL 1 □-CHANNEL 2 Δ-CHANNEL 3 *-CHANNEL 4 +-CHANNEL 5

1.153-*

0*- 1.153

1.002-*

Δ*- 1.002

.850-*

*- .850

.699-*

*- .699

.547-*

*- .547

.396-*

*- .396

.244-*

*- .244

.093-*

*- .093

.010

.262

.514

.766

1.018

1.270

1.522

1.774

2.026

2.278

2.530

SCALE FACTORS - VERTICAL

1.0+01

HORIZONTAL

1.0+02

DECLASSIFIED

C REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR FLUX TRAVERSE WITH 42 PIECES OF POISON IN 2360 AND 8 SPLINES

TRAVERSE OBTAINED ON GRAVEYARD SHIFT, JULY 3, FOLLOWING TEST
E-10 AND PRECEDING TEST E-11.

**FOURIER FIT DID NOT PASS ERROR CRITERION OF 8.931×10^{-3} IN 15 TRIES. .

MINIMUM RMS ERROR OCCURS FOR ORDER 2 FIT.

RMS ERROR FOR 16 POINTS IS 6.304×10^{-2} . INDIVIDUAL ERRORS ARE:

-0.000	-9.567-02	-1.203-01	-4.566-02	5.535-03	1.812-02	3.071-02	4.407-03	-4.897-02	-8.377-02
-8.010-02	-8.481-02	-3.769-03	-1.013-01	-6.018-02	1.615-02	8.415-02	-0.000		

FLUX TRAVERSE WITH 42 PIECES OF POISON IN 2360 AND 8 SPLINES

REACTOR CONDITIONS

HCR NO. 5 AT 225.0 INCHES OUT

SPLINES IN TUBES

1581

1973

2176

2284

2580

2685

3174

3180

-60-

DECLASSIFIED

DUM-3145

FLUX TRAVERSE WITH 42 PIECES OF POISON IN 2360 AND 8 SPLINES

POINT	TRAVERSE CHAMBER LOCATION			ADJUSTED		RANDOM		FITTED		FITTING	
	LATTICE	UNIT	NEAR SIDE	COUNTS/SEC	ERROR	PERCENT	PERCENT	COUNTS/SEC	ERROR	PERCENT	PERCENT
1	INCHES	.0	.00	.0	.00	.00	.00	.0	.00	.00	.00
2	441.0	58.7	238.34	11763.8	.31	.31	.31	12889.2	9.57	9.57	9.57
3	423.0	60.9	284.06	13348.7	.32	.32	.32	14954.5	12.03	12.03	12.03
4	405.0	63.0	329.78	16072.5	.32	.32	.32	16806.3	4.57	4.57	4.57
5	387.0	65.2	375.50	18514.1	.32	.32	.32	18411.6	-5.55	-5.55	-5.55
6	369.0	67.3	421.22	20103.0	.32	.32	.32	19738.9	-1.81	-1.81	-1.81
7	351.0	69.5	466.94	21417.0	.31	.31	.31	20759.3	-3.07	-3.07	-3.07
8	333.0	71.6	512.66	21542.3	.31	.31	.31	21447.4	-4.44	-4.44	-4.44
9	315.0	73.8	558.38	20765.1	.29	.29	.29	21762.0	4.90	4.90	4.90
10	297.0	75.9	604.10	20066.5	.27	.27	.27	21747.4	8.38	8.38	8.38
11	279.0	78.1	649.82	19752.2	.27	.27	.27	21334.3	8.01	8.01	8.01
12	261.0	80.2	695.54	18934.4	.28	.28	.28	20540.3	8.48	8.48	8.48
13	243.0	82.4	741.26	19298.4	.28	.28	.28	19371.1	.38	.38	.38
14	225.0	84.5	786.98	16199.2	.29	.29	.29	17840.5	10.13	10.13	10.13
15	207.0	86.7	832.70	15064.1	.29	.29	.29	15970.6	6.02	6.02	6.02
16	189.0	88.8	878.42	14018.4	.29	.29	.29	13792.1	-1.61	-1.61	-1.61
17	171.0	91.0	924.14	12385.4	.28	.28	.28	11343.2	-8.41	-8.41	-8.41
18	.0	.0	1104.53	.0	.00	.00	.00	.0	.00	.00	.00
19	153.0	93.1	969.86	9580.1	.29	.29	.29	.0	.00	.00	.00
20	135.0	95.3	1015.53	6082.0	.30	.30	.30	.0	.00	.00	.00
21	117.0	97.4	1061.30	3453.7	.35	.35	.35	.0	.00	.00	.00
22	99.0	99.6	1107.02	984.0	.54	.54	.54	.0	.00	.00	.00

DECLASSIFIED

INFERRED FLUX DISTRIBUTION FLUX TRAVERSE WITH 42 PIECES OF POISON IN 2360 AND 8 SPLINES

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT.SQD	INFERRED BUCKLING
51	.2735	.006	.0664	.001	6.27
52	.3512	.014	.1094	.004	6.30
53	.4279	.023	.1624	.007	6.34
54	.5034	.034	.2248	.012	6.38
55	.5774	.046	.2957	.019	6.43
56	.6497	.061	.3745	.027	6.48
57	.7202	.076	.4601	.037	6.54
58	.7884	.093	.5515	.049	6.61
59	.8544	.112	.6476	.063	6.68
60	.9177	.132	.7472	.079	6.76
61	.9783	.153	.8490	.098	6.84
62	1.0355	.176	.9518	.118	6.93
63	1.0901	.199	1.0541	.141	7.02
64	1.1409	.224	1.1547	.166	7.11
65	1.1886	.250	1.2520	.194	7.21
66	1.2313	.277	1.3449	.223	7.31
67	1.2704	.304	1.4318	.254	7.41
68	1.3054	.333	1.5117	.287	7.51
69	1.3359	.362	1.5831	.321	7.62
70	1.3618	.391	1.6451	.357	7.72
71	1.3829	.421	1.6965	.394	7.83
72	1.3991	.452	1.7366	.432	7.93
73	1.4103	.482	1.7646	.470	8.04
74	1.4164	.513	1.7798	.509	8.14
75	1.4173	.544	1.7820	.547	8.25
76	1.4129	.575	1.7709	.586	8.35
77	1.4031	.605	1.7466	.624	8.45
78	1.3880	.635	1.7091	.661	8.55
79	1.3675	.665	1.6591	.697	8.64
80	1.3417	.694	1.5970	.732	8.73
81	1.3106	.723	1.5238	.765	8.82
82	1.2742	.751	1.4404	.796	8.91
83	1.2327	.777	1.3481	.825	8.99
84	1.1862	.803	1.2483	.853	9.07
85	1.1349	.828	1.1425	.877	9.15

DECLASSIFIED

INFERRED FLUX DISTRIBUTION FLUX TRAVERSE WITH 42 PIECES OF POISON IN 2360 AND 8 SPLINES

LATTICE UNIT	FLUX FACTOR	SUM OF FACTORS	FACTORS SQUARED	SUM OF FACT.SQD	INFERRED BUCKLING
85	1.0789	.851	1.0324	.900	9.22
87	1.0182	.873	.9197	.920	9.29
88	.9534	.894	.8063	.937	9.35
89	.8845	.913	.6940	.953	9.41
90	.8118	.931	.5847	.965	9.46
91	.7357	.947	.4802	.976	9.51
92	.6564	.961	.3823	.984	9.55
93	.5743	.974	.2926	.990	9.59
94	.4897	.984	.2127	.995	9.62
95	.4030	.993	.1441	.998	9.65
96	.3145	1.000	.0677	1.000	9.67

DECLASSIFIED

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR TEST E-8 42 PIECE POISON FLUSH TEST E-8

REMOVED SPLINE IN 2770 TO GO CRITICAL
OBSERVED THAT FLUSH IS COMPLETED IN LESS THAN ONE SECOND.

TEST E-8 42 PIECE POISON FLUSH TEST E-8

REACTOR CONDITIONS
HCR NO. 5 AT 225.0 INCHES OUT
SPLINES IN TUBES 1581

1973
2176
2284
2580
2685
3174
3180

TEST E-8	42 PIECE POISON FLUSH	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
APPARENT TIME ZERO FOR STEP	17.41	25.21	.00	.00	.00
ASYMPTOTIC PERIOD (SECONDS)	74.53	74.59	.00	.00	.00
MEASURED REACTIVITY (MILLI-K)	.740	.740	.000	.000	.000
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.09073	.08575	.00000	.00000	.00000
BETA OVER L (INVERSE SECONDS)	11.39	11.39	.00	.00	.00
REACTIVITY (DOLLARS)	.129	.135	.000	.000	.000
INFERRED BETA	.00575	.00547	.00000	.00000	.00000
INFERRED LIFE (SECONDS)	.00050	.00048	.00000	.00000	.00000

DUN-3145

DECLASSIFIED

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D REACTOR DEACTIVATION TESTS - PT -080 JUNE 26 TO JULY 2, 1967

TEST E-8

42 PIECE POISON FLUSH

TEST E-8

TIME SECONDS	RELATIVE FLUX TRANSIENT			
	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
	1078	1088	-0	-0
1.00	1.0138	1.0135	1.0000	1.0000
7.00	1.0244	.9531	1.0000	1.0000
13.00	.9708	.9344	1.0000	1.0000
19.00	.9450	.9656	1.0000	1.0000
25.00	1.0410	.9948	1.0000	1.0000
31.00	1.1796	1.1385	1.0000	1.0000
37.00	1.3995	1.2843	1.0000	1.0000
43.00	1.5104	1.3739	1.0000	1.0000
49.00	1.6675	1.5490	1.0000	1.0000
55.00	1.8006	1.6990	1.0000	1.0000
61.00	1.8450	1.7970	1.0000	1.0000
67.00	2.2705	2.0785	1.0000	1.0000
73.00	2.3779	2.0681	1.0000	1.0000
79.00	2.5352	2.3246	1.0000	1.0000
85.00	2.7685	2.5729	1.0000	1.0000
91.00	2.9519	2.6084	1.0000	1.0000
97.00	3.1650	2.9946	1.0000	1.0000
103.00	3.4819	3.0343	1.0000	1.0000
109.00	3.6841	3.5920	1.0000	1.0000
115.00	4.1126	3.8763	1.0000	1.0000
145.00	6.3451	5.5485	1.0000	1.0000
175.00	9.0617	8.3319	1.0000	1.0000
205.00	13.6542	12.2389	1.0000	1.0000
235.00	20.2354	18.8292	1.0000	1.0000
265.00	30.4831	27.9855	1.0000	1.0000
295.00	45.5897	42.3734	1.0000	1.0000
325.00	68.3451	63.0996	1.0000	1.0000

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DECLASSIFIED

DUM-3145

DECLASSIFIED

TEST E-8 42 PIECE POISON FLUSH

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INDEPENDENT VARIABLE: TIME, SECONDS

DEPENDENT VARIABLES: 0-CHANNEL 1 H-CHANNEL 2 A-CHANNEL 3 *-CHANNEL 4 +-

6.835-*

0*- 6.835

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0.093-***.010 .334 .658 .982 1.306 1.630 1.954 2.278 2.602 2.926 3.250

DUN-3145

SCALE FACTORS - VERTICAL 1.0+01 HORIZONTAL 1.0+02

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D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR TEST E-9 13 PIECE FLUSH, SECOND CHAMBER POSITION TEST E-9

CHAMBERS INTERCHANGED BETWEEN 2200 AND 2230 ON JULY 2.
INSERTED SPLINE IN 2770.

TEST E-9 13 PIECE FLUSH, SECOND CHAMBER POSITION TEST E-9

REACTOR CONDITIONS

HCR NO. 5 AT 233.0 INCHES OUT

SPLINES IN TUBES
2685
2284
2580
2176
2770
1581
1973
3174
3180

TEST E-9 13 PIECE FLUSH, SECOND CHAMBER POSITION TEST E-9

	COUNTER 1 1078	COUNTER 2 1069	COUNTER 3 1058	COUNTER 4 1088
APPARENT TIME ZERO FOR STEP	14.43	12.77	15.31	.23
ASYMPTOTIC PERIOD (SECONDS)	170.76	176.09	183.89	190.96
MEASURED REACTIVITY (MILLI-K)	.381	.372	.358	.347
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.07370	.07327	.05604	.07280
BETA OVER L (INVERSE SECONDS)	11.39	11.39	11.39	11.39
REACTIVITY (DOLLARS)	.074	.072	.088	.067
INFERRED BETA	.00518	.00517	.00405	.00516
INFERRED LIFE (SECONDS)	.00045	.00045	.00036	.00045

DUN-3145

DECLASSIFIED

D REACTOR DEACTIVATION TESTS - PTA-90 JUNE 26 TO JULY 2, 1967

TEST E-9

13 PIECE FLUSH, SECOND CHAMBER POSITION

TEST E-9

TIME SECONDS	R E L A T I V E F L U X T R A N S I E N T			
	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
1.00	1078	1069	1058	1088
7.00	.9735	1.0004	.9670	1.0155
13.00	.9859	.9950	1.0506	1.0259
19.00	.9797	1.0039	.9120	.9119
25.00	.9685	1.0006	1.0704	1.0466
31.00	1.0723	1.1355	1.1254	1.2954
37.00	1.1197	1.1977	1.2727	1.1814
43.00	1.2632	1.2507	1.2529	1.3265
49.00	1.3150	1.2941	1.3607	1.4509
55.00	1.3580	1.3543	1.4312	1.1917
61.00	1.3840	1.4050	1.5060	1.6582
67.00	1.4275	1.4590	1.5544	1.6374
73.00	1.4799	1.4980	1.6028	1.6063
79.00	1.5253	1.5504	1.4730	1.5545
85.00	1.5554	1.5922	1.5808	1.6862
91.00	1.6051	1.6747	1.6050	1.9173
97.00	1.6813	1.7337	1.7723	1.7411
103.00	1.7050	1.7740	1.7921	1.9277
109.00	1.7420	1.8596	1.7569	1.8862
115.00	1.9278	1.9043	1.8603	2.3424
121.00	2.0012	1.9813	1.8758	2.2076
127.00	2.0565	2.0474	2.1951	2.0003
133.00	2.0897	2.1176	2.1026	2.3528
139.00	2.1638	2.1897	2.2788	2.4668
145.00	2.2302	2.2767	2.3625	2.5394
151.00	2.2969	2.3490	2.3801	2.5912
157.00	2.3484	2.4372	2.3030	2.5186
163.00	2.6619	2.8745	2.8649	2.8401
211.00	3.4302	3.4161	3.4669	3.2134
241.00	4.1032	4.0704	3.6089	4.0431
271.00	4.8523	4.7933	4.4404	4.9664
301.00	5.7765	5.6924	5.5345	6.0559

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DECLASSIFIED

DUN-3145

DECLASSIFIED

DUN-3116

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TEST E-9 13 PIECE FLUSH, SECOND CHAMBER POSITION 1E

INDEPENDENT VARIABLE: TIME, SECONDS
DEPENDENT VARIABLES: O-CHANNEL 1
H-CHANNEL 2
A-CHANNEL 3
*-CHANNEL 4

**-- 6.056

**-- 5.321

**-- 4.586

**-- 3.851

**-- 3.116

**-- 2.382

**-- 1.647

**-- .912

6.056--

5.321--

4.586--

3.851--

3.116--

2.382--

1.647--

.912--

SCALE FACTORS - VERTICAL

1.0+00

HORIZONTAL

1.0+02

.010

.310

.610

.910

1.210

1.510

1.810

2.110

2.410

2.710

3.010

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

TEST E-10

21 PIECE PLUSH, SECOND CHAMBER POSITION

TEST E10

REACTOR CONDITIONS

HCR NO. 5 AT 254.0 INCHES OUT

SPLINES IN TUBES 2685

2284

2580

2176

2770

1581

1973

3174

3180

TEST E-10

21 PIECE PLUSH, SECOND CHAMBER POSITION

TEST E10

	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
	1078	1069	1058	1088
APPARENT TIME ZERO FOR STEP	15.59	17.25	23.52	2.11
ASYMPTOTIC PERIOD (SECONDS)	85.90	107.72	91.45	96.08
MEASURED REACTIVITY (MILLI-K)	.665	.558	.634	.610
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.08921	.06613	.08642	.07849
BETA OVER L (INVERSE SECONDS)	11.39	11.39	11.39	11.39
REACTIVITY (DOLLARS)	.115	.123	.112	.117
INFERRED BETA	.00576	.00453	.00564	.00521
INFERRED LIFE (SECONDS)	.00051	.00040	.00050	.00046

DECLASSIFIED

DDM-3145

D REACTOR DEACTIVATION TESTS - P-1-080 JUNE 26 TO JULY 2, 1967

TEST E-10

21 PIECE PLUSH, SECOND CHAMBER POSITION

TEST E10

TIME SECONDS	RELATIVE FLUX TRANSIENT			
	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
	1078	1069	1058	1088
1.00	.9907	.9915	.9850	1.0659
7.00	.9929	.9928	.9909	.9593
13.00	.9954	.9877	.9477	.9496
19.00	.9963	.9858	1.0146	.9787
25.00	1.0246	1.0422	1.0618	1.0465
31.00	1.2762	1.2492	1.1720	1.2985
37.00	1.3690	1.3798	1.2291	1.7250
43.00	1.4683	1.5013	1.3747	1.8607
49.00	1.5767	1.6340	1.3531	1.9092
55.00	1.6725	1.7569	1.5696	1.9382
61.00	1.9044	1.8999	1.6977	2.0740
67.00	2.0178	2.0187	1.8887	2.0449
73.00	2.1243	2.1624	2.0148	2.2097
79.00	2.2498	2.3335	2.1015	2.4036
85.00	2.3950	2.4765	2.1252	2.4133
91.00	2.6737	2.6726	2.3400	2.9175
97.00	2.8225	2.8681	2.5391	3.0629
103.00	2.9560	3.0710	2.7068	3.3054
109.00	3.2793	3.2851	2.8586	3.4896
115.00	3.4767	3.5085	3.0994	3.9164
121.00	3.6732	3.7505	3.3658	3.6448
127.00	4.0304	3.9921	3.4724	4.1783
133.00	4.2304	4.2642	3.7943	3.9261
139.00	4.4894	4.5386	3.9820	4.7118
145.00	5.1874	5.1180	4.4109	5.1678
151.00	5.9557	5.7712	5.0538	6.2159
157.00	7.0328	6.4156	6.0280	6.5362
163.00	7.9941	7.0735	6.8112	7.5653
169.00	9.1357	7.6454	7.7223	8.8374
211.00	10.5895	8.1234	8.8415	10.2267

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DECLASSIFIED

DUN-3145

TEST E-10 21 PIECE PUSHER, SECOND CHAMBER POSITION TE

INDEPENDENT VARIABLE: TIME, SECONDS

DEPENDENT VARIABLES: 0-CHANNEL 1 H-CHANNEL 2 A-CHANNEL 3 *-CHANNEL 4 +-
1.059--

0*- 1.059

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DECLASSIFIED

2.110

1.900

1.690

1.480

1.270

1.060

.850

.640

.430

.220

.010

HORIZONTAL

1.0+01

SCALE FACTORS - VERTICAL

1.0+02

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR TEST E - 42 PIECE PCCF FLUSH, 8 SPLINES INSERTED, RUN E-11

REMOVED SPLINE FROM 2770.

TEST E - 42 PIECE PCCF FLUSH, 8 SPLINES INSERTED, RUN E-11

REACTOR CONDITIONS

HCR NO. 5 AT 223.0 INCHES OUT

SPLINES IN TUBES

2685

2284

2580

2176

1581

1973

3174

3180

TEST E - 42 PIECE PCCF FLUSH, 8 SPLINES INSERTED, RUN E-11

	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
	1099	1069	1078	1088
APPARENT TIME ZERO FOR STEP	51.01	49.81	50.35	35.53
ASYMPTOTIC PERIOD (SECONDS)	68.67	79.26	72.84	75.22
MEASURED REACTIVITY (MILLI-K)	.786	.707	.753	.735
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.09368	.07263	.08686	.11399
BETA OVER L (INVERSE SECONDS)	11.39	11.39	11.39	11.39
REACTIVITY (DOLLARS)	.135	.148	.136	.104
INFERRED BETA	.00584	.00478	.00552	.00704
INFERRED LIFE (SECONDS)	.00051	.00042	.00048	.00062

DECLASSIFIED

DUN-3145

TEST E - 42 PIECE PCCF FLUSH, 8 SPLINES INSERTED, RUN E-11

TIME SECONDS	RELATIVE FLUX TRANSIENT			
	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
1.00	1.0003	1.0054	1.0829	1.1318
7.00	.9774	.9939	.9799	.9742
13.00	1.0017	1.0037	.9362	1.0458
19.00	.9795	.9907	.9336	.9169
25.00	.9929	.9991	1.0468	.9312
31.00	.9948	.9923	1.0854	.8309
37.00	.9831	1.0120	.9542	1.2035
43.00	.9909	1.0081	1.0262	1.1461
49.00	.9914	.9825	.9902	1.1605
55.00	.9920	1.0122	.9645	1.1891
61.00	1.0960	1.2308	1.2347	1.3324
67.00	1.2178	1.4188	1.3634	1.9199
73.00	1.5039	1.5979	1.5462	1.8196
79.00	1.6226	1.7626	1.6415	2.0059
85.00	1.7436	1.9476	1.7548	1.9916
91.00	1.8795	2.1145	2.0485	2.2925
97.00	2.0246	2.3193	2.1335	2.6795
103.00	2.3162	2.5459	2.2160	2.3515
109.00	2.4967	2.7930	2.5433	3.4965
115.00	2.6637	3.0049	2.7469	3.4679
121.00	2.8585	3.2961	2.9558	3.7546
127.00	3.2261	3.5566	3.0796	4.1560
133.00	3.5027	3.8920	3.5207	4.1273
139.00	3.8824	4.1978	3.6575	5.1453
145.00	4.1799	4.5730	3.9673	5.1740
151.00	4.4665	4.9897	4.3081	5.6042
157.00	4.9594	5.3815	4.8816	5.3604
163.00	5.3135	5.8627	5.3288	6.2496
169.00	5.8670	6.3521	5.7891	7.5836
175.00	6.5007	6.8569	5.6745	7.9853
181.00	7.0022	7.3524	6.7493	8.2867
187.00	7.6676	7.9477	7.3865	8.7889
193.00	8.4271	8.4184	7.8271	9.3342
199.00	9.2756	8.9914	8.7271	11.0423
205.00	9.9173	9.4930	8.8958	11.4730

DECLASSIFIED

TEST E - 42 PIECE PCCF FLUSH, 8 SPLINES INSERTED, RUN E-11

INDEPENDENT VARIABLE: TIME, SECONDS

DEPENDENT VARIABLES: 0-CHANNEL 1 □-CHANNEL 2 Δ-CHANNEL 3 *-CHANNEL 4 +-

SCALE FACTORS - VERTICAL

1.0+01

HORIZONTAL

1.0+02

DECLASSIFIED

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR TEST E-12 42 PIECE POISON FLUSH - THIRD TIME TEST E12

THIS TEST CONDUCTED ON GRAVEYARD SHIFT, JULY 3, AFTER FINDING
THAT THE INSTRUMENT CHAMBERS HAD BEEN MISIDENTIFIED.

TEST E-12 42 PIECE POISON FLUSH - THIRD TIME TEST E12

REACTOR CONDITIONS

HCR NO. 5 AT 226.0 INCHES OUT

SPLINES IN TUBES 1531
1973
2176
2284
2580
2685
3174
3180

TEST E-12 42 PIECE POISON FLUSH - THIRD TIME TEST E12

	COUNTER 1 1078	COUNTER 2 1069	COUNTER 3 1058	COUNTER 4 1088
APPARENT TIME ZERO FOR STEP	28.59	27.41	21.25	28.20
ASYMPTOTIC PERIOD (SECONDS)	64.83	71.36	70.96	69.79
MEASURED REACTIVITY (MILLI-K)	.820	.764	.768	.777
EFFECTIVE DELAY CONSTANT (INV. SEC.)	.08435	.07545	.07619	.08735
BETA OVER L (INVERSE SECONDS)	11.39	11.39	11.39	11.39
REACTIVITY (DOLLARS)	.155	.157	.156	.141
INFERRED BETA	.00530	.00488	.00492	.00551
INFERRED LIFE (SECONDS)	.00047	.00043	.00043	.00048

DECLASSIFIED
JUN-31-15

D REACTOR DEACTIVATION TESTS - 2TA-080 JUNE 26 TO JULY 2, 1967

TEST E-12

42 PIECE POISON FLUSH - THIRD TIME

TEST E12

TIME SECONDS	RELATIVE FLUX TRANSIENT			
	COUNTER 1 1078	COUNTER 2 1069	COUNTER 3 1058	COUNTER 4 1088
1.00	.9132	.9596	.9142	.9639
7.00	1.0197	.9677	1.1815	.9541
13.00	1.0118	1.0032	.9359	.8819
19.00	1.0454	1.0728	.9815	1.0066
25.00	.9605	.9790	.9294	.9836
31.00	1.0493	1.0178	1.0576	1.0787
37.00	1.2270	1.2943	1.4380	1.1312
43.00	1.3771	1.3963	1.4793	1.2034
49.00	1.5351	1.5484	1.6424	1.4757
55.00	1.7366	1.8042	2.0535	1.6824
61.00	1.9757	1.9839	2.2624	1.7448
67.00	2.1437	2.2966	2.3974	1.8327
73.00	2.3197	2.3841	2.6651	2.0796
79.00	2.6658	2.7521	2.9853	2.4507
85.00	3.1012	3.0084	3.2577	2.4638
91.00	3.2616	3.3882	3.3122	2.8646
103.00	3.7766	3.9388	4.1866	3.4330
115.00	4.3852	4.6820	4.8130	4.0248
127.00	5.2325	5.6721	5.8727	4.9032
139.00	6.3513	6.3636	6.7785	5.5582
151.00	7.2527	7.5005	8.0250	6.6585
163.00	8.6699	8.9329	9.6558	7.8984
175.00	10.2698	10.7946	11.3471	9.5624
187.00	12.2722	12.6374	13.4836	11.1196
199.00	14.8235	14.9164	16.2105	13.8256
211.00	20.8376	17.6815	18.6335	15.8367
241.00	30.7600	27.1938	28.7019	24.4572
271.00	48.8014	41.8663	44.3640	37.4992

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DECLASSIFIED

DUN-3145

DECLASSIFIED

TEST E-12 42 PIECE POISON FLUSH - THIRD TIME

1E

INDEPENDENT VARIABLE: TIME, SECONDS

DEPENDENT VARIABLES: 0-CHANNEL 1 H-CHANNEL 2 A-CHANNEL 3 *-CHANNEL 4

0*-4.880

4.196

3.511

2.826

2.142

1.457

.773

.088

DUM-314

SCALE FACTORS - VERTICAL 1.0+01 HORIZONTAL 1.0+02

.010

.280

.550

.820

1.090

1.360

1.630

1.900

2.170

2.440

2.710

SUPPLEMENTARY INFORMATION FOR TEST F, CONDUCTED ON GRAVEYARD, JULY 3

ALL DATA IS NORMALIZED SO THAT ZONE 4 (1088) IS CONSTANT AT 1000.

DURING THE FIRST PART OF THE TEST, THE INSTRUMENTATION IN ZONE 3 (CHANNEL 1078) WAS FAULTY, SO NO INFORMATION IS RECORDED FOR THAT ZONE DURING THAT PART OF THE TEST.

5	SPLINE	ZONE 1	ZONE 2	ZONE 3	ZONE 4
ROD#	LOCATION	1058	1069	1078	1088
175	NONE	1617	2112		1000
180	2857	1662	2097		1000
183	2257, 2857	1716	2229		1000
185	2257, 2857	1505	2002		1000
183	2857	1609	2103		1000
178	NONE	1614	2079		1000
187	2777	1747	2581	1747	1000
205	2578, 2777	1990	2287	1767	1000
211	2378, 2777	1948	2357	2197	1000
194	2777	1736	2181	2184	1000
180	NONE	1627	1866	2154	1000

* 5 ROD ALWAYS ACTS IN ZONE 2. THE ZONE BOUNDARY (ON THE LEFT, OR NEAR, SIDE) IS AT ABOUT 220 INCHES)

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SUPPLEMENTARY INFORMATION FOR RECALIBRATE 5 ROD TEST G

RECALIBRATED NO. 5 HCR IN PREPARATION FOR DISCHARGING ONE COLUMN OF ENRICHED METAL.

CRITICAL WAS AT 43 INCHES BEFORE DISCHARGE
CRITICAL WAS AT 92 INCHES AFTER THE DISCHARGE

NITROGEN TEST DATA

TIME	PERCENT CO2	INFERRED PERCENT N2	5 ROD
1045	90	8	92
1130	83.5	13	105
1142	82	14.1	107
1147	80.8	15	110
1152	80	15.7	111

DISCHARGED ENRICHED URANIUM (95 METAL) FROM 2776.
CHARGED SOLID ALUMINUM IN ITS PLACE. THE 95 METAL
WAS GREEN AND HAD BEEN CHARGED DURING THE TEST.

REFERENCES TO SPLINE 2776 IN REMAINDER OF TEST G
REALLY MEAN THE 95 METAL TO SOLID ALUMINUM CHANGE
ACCOMPLISHED AT THIS POINT.

DECLASSIFIED

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

RECALIBRATE 5 ROD TEST 6

TEST 6

OBSERVED PERIODS				INDICATED REACTIVITIES				AVG.	AVG.
COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4	PERIOD	REACT
1078	1069	1058	1088	1078	1069	1058	1088		
HCR NO. 5 AT 90.0 INCHES OUT, LATTICE UNIT 78.3									
72.89	78.40	83.14	77.55	.753	.713	.682	.719	78.00	.72
HCR NO. 5 AT 100.0 INCHES OUT, LATTICE UNIT 77.1									
53.73	51.20	71.50	53.60	.936	.968	.763	.938	57.51	.90
HCR NO. 5 AT 120.0 INCHES OUT, LATTICE UNIT 74.8									
43.58	43.73	44.45	43.19	1.079	1.077	1.065	1.086	43.74	1.08
HCR NO. 5 AT 120.0 INCHES OUT, LATTICE UNIT 74.9									
65.94	65.60	71.14	69.66	.810	.813	.766	.778	68.09	.79
SPLINE INSERTED IN 2776									
SPLINE WORTH .28 MILLI-K									
HCR NO. 5 AT 160.0 INCHES OUT, LATTICE UNIT 70.0									
22.36	23.46	25.19	23.01	1.622	1.578	1.515	1.596	23.50	1.58

DECLASSIFIED

TEST 6

RECALIBRATE 5 ROD TEST 6

ROD POSITION DIFFERENTIAL WORTH

INCHES MILLI-K/INCH

95.0 .018499
110.0 .003760
140.0 .019651

ROD POSITION ROD POSITION ACCUMULATED WORTH

INCHES LATTICE UNIT MILLI-K

90.0 78.3 .716
100.0 77.1 .901
120.0 74.9 1.077
160.0 70.0 1.863

DECLASSIFIED

D REACTOR DEACTIVATION TESTS - PTA-080 JUNE 26 TO JULY 2, 1967

SUPPLEMENTARY INFORMATION FOR ROD DROP - FALLING PERIOD - FULL VSR SYSTEM DROP TEST H

THIS TEST COMPLETED THE D DEACTIVATION TESTS.

H 3

FINAL SHUTDOWN (WHICH INITIATED THIS TEST) OCCURRED AT HIGH NOON ON JULY 3, 1967.

ROD DROP - FALLING PERIOD - FULL VSR SYSTEM DROP TEST H

REACTOR CONDITIONS

HCR NO. 5 AT 160.0 INCHES OUT
SPLINES IN TUBES 0

ROD DROP - FALLING PERIOD - FULL VSR SYSTEM DROP TEST H

	COUNTER 1 1078	COUNTER 2 1069	COUNTER 3 1058	COUNTER 4 1088
APPARENT TIME ZERO FOR STEP	46.00	46.00	46.00	46.00
ASYMPTOTIC PERIOD (SECONDS)	-62.28	-59.69	-70.89	-58.97
MEASURED REACTIVITY (MILLI-K)	.000	.000	.000	.000
EFFECTIVE DELAY CONSTANT (INV. SEC.)	-.00000	-.00000	-.00000	-.00000
BETA OVER L (INVERSE SECONDS)	11.39	11.39	11.39	11.39
REACTIVITY (DOLLARS)	-.000	-.000	-.000	-.000
INFERRED BETA	.00000	.00000	.00000	.00000
INFERRED LIFE (SECONDS)	.00000	.00000	.00000	.00000

DOM-3145

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TEST H

ROD DROP - FALLING PERIOD - FULL VSR SYSTEM DROP

RELATIVE FLUX TRANSLIENT

TIME SECONDS	COUNTER 1	COUNTER 2	COUNTER 3	COUNTER 4
1.00	1078	1069	1058	1068
7.00	.9965	.9977	.9890	1.0055
13.00	1.0026	.9968	.9949	1.0050
19.00	.9979	1.0082	1.0074	1.0085
25.00	1.0030	.9973	1.0087	.9810
31.00	.9949	.9995	1.0027	.9865
37.00	1.0022	1.0004	1.0070	1.0032
43.00	.1572	.1966	.2371	.2049
49.00	.0357	.0406	.0618	.0542
55.00	.0219	.0278	.0436	.0383
61.00	.0169	.0198	.0327	.0271
67.00	.0140	.0167	.0274	.0211
73.00	.0121	.0155	.0210	.0182
79.00	.0098	.0121	.0177	.0147
85.00	.0077	.0091	.0153	.0128
91.00	.0072	.0086	.0124	.0091
97.00	.0055	.0073	.0107	.0101
103.00	.0056	.0060	.0098	.0071
109.00	.0042	.0054	.0068	.0062
115.00	.0038	.0050	.0060	.0055
121.00	.0030	.0035	.0059	.0049
127.00	.0028	.0036	.0058	.0053
133.00	.0021	.0023	.0038	.0030
139.00	.0010	.0015	.0020	.0023
145.00	.0007	.0013	.0017	.0019
151.00	.0005	.0009	.0013	.0010
157.00	.0005	.0005	.0007	.0007
163.00	.0004	.0005	.0009	.0006
169.00	.0004	.0003	.0005	.0004
175.00	.0002	.0002	.0003	.0003
181.00	.0002	.0002	.0006	.0002
187.00	.0001	.0001	.0003	.0002
193.00	.0001	.0002	.0002	.0001
199.00	.0001	.0001	.0002	.0002
205.00	.0001	.0001	.0002	.0001
211.00	.0001	.0001	.0002	.0001
217.00	.0001	.0001	.0001	.0000
223.00	.0001	.0001	.0001	.0000
229.00	.0000	.0000	.0002	.0001
235.00	.0000	.0000	.0002	.0001
241.00	.0000	.0000	.0002	.0001
247.00	.0000	.0000	.0002	.0001
253.00	.0000	.0000	.0002	.0001
259.00	.0000	.0000	.0002	.0001
265.00	.0000	.0000	.0002	.0001
271.00	.0000	.0000	.0002	.0001
277.00	.0000	.0000	.0002	.0001
283.00	.0000	.0000	.0002	.0001
289.00	.0000	.0000	.0002	.0001
295.00	.0000	.0000	.0002	.0001
301.00	.0000	.0000	.0002	.0001
307.00	.0000	.0000	.0002	.0001
313.00	.0000	.0000	.0002	.0001
319.00	.0000	.0000	.0002	.0001
325.00	.0000	.0000	.0002	.0001
331.00	.0000	.0000	.0002	.0001
337.00	.0000	.0000	.0002	.0001
343.00	.0000	.0000	.0002	.0001
349.00	.0000	.0000	.0002	.0001
355.00	.0000	.0000	.0002	.0001
361.00	.0000	.0000	.0002	.0001
367.00	.0000	.0000	.0002	.0001
373.00	.0000	.0000	.0002	.0001

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ROD DROP - FALLING PERIOD - FULL VSR SYSTEM DROP

TE

INDEPENDENT VARIABLE: TIME, SECONDS

DEPENDENT VARIABLES: 0-CHANNEL 1 □-CHANNEL 2 Δ-CHANNEL 3 *-CHANNEL 4 +-

1.009-*** ** ΔΔ *

*- 1.009

*Δ **

.865-*

*- .865

.721-*

*- .721

.576-*

*- .576

.432-*

*- .432

.288-*

*- .288

.144-*

*- .144

.000-*

*- .000

.010

.383

.756

1.129

1.502

1.875

2.248

2.621

2.994

3.367

3.740

SCALE FACTORS - VERTICAL

1.0+00

HORIZONTAL

1.0+02

DECLASSIFIED