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**Oak Ridge Research Reactor Quarterly Report
April, May, and June of 1978**

S. S. Hurt, III
E. D. Lance

OAK RIDGE NATIONAL LABORATORY
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OAK RIDGE RESEARCH REACTOR QUARTERLY REPORT
APRIL, MAY, AND JUNE OF 1978

S. S. Hurt, III

E. D. Lance

SPONSOR: J. A. Cox
Director, Operations Division

December 1978

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CONTENTS

	<u>Page</u>
SUMMARY	1
OPERATIONS	1
FUEL USAGE AND INVENTORY	3
SHUTDOWNS AND POWER REDUCTIONS	4
INSTRUMENTATION AND REACTOR CONTROLS	8
PROCESS SYSTEM AND MECHANICAL COMPONENTS	8
EXPERIMENT FACILITIES AND CORE CHANGES	8
DISTRIBUTION	27

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FIGURE LIST

	<u>Page</u>
FIGURE 1. Orr Lattice Configuration - April 1, 1978 through April 7, 1978	16
FIGURE 2. ORR Lattice Configuration - April 14, 1978 through May 11, 1978	17
FIGURE 3. ORR Lattice Configuration - May 11, 1978 through June 28, 1978	18
FIGURE 4. ORR Lattice Configuration - June 28, 1978 through June 30, 1978	19
FIGURE 5. Gamma Flux Measurement Configuration (E-7) - April 7, 1978	20
FIGURE 6. Gamma Flux Measurement Lattice Configuration (E-5) - April 7, 1978	21
FIGURE 7. Gamma Flux Measurement Lattice Configuration (E-3) - April 7, 1978	22
FIGURE 8. Gamma Flux Measurement Lattice Configuration (C-7) - April 7, 1978	23
FIGURE 9. Gamma Flux Measurement Lattice Configuration (E-5) - April 7, 1978	24
FIGURE 10. Gamma Flux Measurement Lattice Configuration (E-7) - April 7, 1978	25

OAK RIDGE RESEARCH REACTOR QUARTERLY REPORT

APRIL, MAY, AND JUNE OF 1978

S. S. Hurt, III and E. D. Lance

SUMMARY

The ORR operated at an average power level of 27.8 MW for 72.6% of the time during April, May, and June of 1978.

The reactor was shut down on fifteen occasions, two of which were unscheduled. Reactor downtime needed for refueling, maintenance and checks was higher than normal due to beam-hole-plug maintenance, with the reactor remaining available for operation 82.4% of the time.

Maintenance activities, both mechanical and instrument, were essentially routine in nature.

Special tests or measurements completed during the quarter included gamma flux (heating) measurements made in core positions E-7, E-5, E-3, and C-7 using lattice configurations as indicated in figure Nos. 5, 6, 7, 8, 9, and 10.

OPERATIONS

The basic operating data presented in Table 1 indicates that the ORR operation for the quarter was normal as compared with recent experience.

Details relative to cycles of operation during the quarter are given in Table 2.

Table 1. ORR Basic Operating Data
Period: April, May, and June of 1978

	This Quarter	Last Quarter	Year To Date	January Thru June, 1977
Total energy, MWd	1,837.77	1,893.63	3,731.40	1,383.41
Average power, MW/operating hr	27.8	28.7	28.3	29.5
Time operating, %	72.6	73.4	73.0	25.9
Availability, %	82.4	88.9	85.7	86.0
Reactor water radio- activity, $\frac{\text{c/min}}{\text{ml}}$ (av)	28,300	24,300	26,300	24,000
Pool water radio- activity, $\frac{\text{c/min}}{\text{ml}}$ (av)	320	460	390	574
Reactor water resis- tivity, ohm-cm (av)	1,613,000	1,931,000	1,772,000	2,322,600
Pool water resistivity, ohm-cm (av)	1,454,000	1,643,000	1,584,500	1,912,400
Fuel elements depleted	47	10	57	15
Average burnup of fuel elements depleted, %	50.1	54.2	50.7	56.1
Shim rods depleted	4	0	4	2
Average burnup of shim rods depleted, %	70.4	-	70.4	72.0
Radioisotope samples	3	0	3	1
Research samples	0	0	0	1

Table 2. Cycles of Operation

Cycle No.	Date Begun	Date Ended	Accumulated Energy (MWd)
143	February 3, 1978	April 7, 1978	192.60 ^a
144	April 14, 1978	May 20, 1978	733.12
145	May 26, 1978	In progress	911.81 ^a

^aMWd this quarter.

FUEL USAGE AND INVENTORY

Forty-seven fuel elements and four shim rods were declared spent during the quarter with an average burnup for the fuel elements of 50.1% and an average burnup for the shim rods of 70.4%. Twenty-three new fuel elements were placed in service. Other details of fuel usage and inventory may be found in Tables 1 and 3.

Table 3. ORR Fuel Status

	This Quarter	Last Quarter	Jan.-June 1978	Jan.-June 1977
Depleted fuel elements transferred for chemical separation	0	18	18	11
Average per cent burnup of fuel elements transferred	-	57.1	57.1	56.5
New fuel elements placed in service	23	8	26	13
New fuel elements available for use	44 ^a	42	-	0
Depleted shim rods transferred for chemical separation	0	2	2	4
Average per cent burnup of shim rods transferred	-	72.1	72.1	65.7
New shim rods placed in service	4	0	4	2
New shim rods available for use	2	2	4	0

^aIncludes four partial fuel elements.

SHUTDOWNS AND POWER REDUCTIONS

Reactor downtime (power level $<N_L$) totaled approximately 599 hours. A summary of the shutdowns is given in Table 4, and details of each are contained in Table 5. Table 6 offers information relative to unscheduled shutdowns, while Table 7 offers information relative to power reductions which did not result in a shutdown.

Table 4. Summary of Shutdowns

Description of Shutdown	Number	Downtime (hr)
Scheduled		
Regular, end of cycle	2	313.884
Regular, refueling, iodine removal, and maintenance	1	29.767
Regular, refueling, and iodine removal	1	5.250
Regular, refueling, iodine removal, and experiment work	1	59.667
Regular, iodine removal (quick change)	5	2.132
Regular, iodine and sample removal	1	0.333
Special, Open House, re-fueled	1	13.433
Special, beam hole maintenance	<u>1</u>	<u>174.450</u>
<u>Subtotal:</u>	13	598.916
Unscheduled		
Human error	<u>2</u>	<u>0.267</u>
<u>Subtotal:</u>	<u>2</u>	<u>0.267</u>
<u>TOTAL:</u>	<u>15</u>	<u>599.132</u>

Table 5. ORR Scheduled Shutdowns, Details

Date	Duration (hr)	End Cycle	Remarks
4-7-78 through 4-14-78	155.501	143	The shutdown marked the end of operating cycle 143. Shutdown activities included: (1) iodine-xenon work, (2) the completion of six runs at N_L with special core loadings to make gamma-flux measurements for future experiment work, (3) the removal of Spire's graphite nose cone in the helium-filled canisters from facilities P-5 and P-6, (4) the installation of water supply and return lines on the beam holes 1 and 2, (5) an audio-inspection of the reactor primary water decay tank, and (6) programmed maintenance.
4-14-78 through 4-21-78	174.450	-	The reactor was shut down for maintenance on the beam hole facilities as follows: (1) temporary repairs were made on No. 2 beam hole plug to eliminate a water leak, (2) the flange on No. 1 beam hole plug was removed for the installation of a new gasket, (3) repairs were made on No. 1 beam hole liner to eliminate a water leak, and (4) the No. 4 beam hole liner-reactor-pool-plug-access-Teflon tape was replaced to eliminate a leak.
4-27-78	29.767	144-A	Shutdown activities included: (1) iodine-xenon work, (2) refueling, and (3) the reinstallation of the plug into HB-2 facility with leak repairs completed.
5-4-78	0.333	-	Shutdown activities included a quick change of the iodine-xenon facility.

Table 5. (Continued)

Date	Duration (hr)	End Cycle	Remarks
5-6-78	13.433	144-B	The reactor was shut down for "Family Day" at ORNL. The reactor was refueled before startup.
5-11-78	0.333	-	Quick change, iodine-xenon work.
5-20-78 through 5-26-78	158.283	144	Shutdown activities included: (1) continued installation of new shielding at beam holes Nos. 1, 2, and 4, (2) iodine-xenon work, (3) replacement of the expansion joint (bellows section) between the south inlet water line and the reactor tank, (4) changing of bypass filter cartridges on the reactor and pool primary flow systems, and (5) programmed maintenance.
6-1-78	0.483	-	Quick change, iodine-xenon work.
6-8-78	0.483	-	Quick change, iodine-xenon work.
6-15-78	5.250	-	Shutdown activities included iodine-xenon work and refueling.
6-22-78	0.500	-	Quick change, iodine-xenon work.
6-28-78 through 6-30-78	59.667	-	Shutdown activities included refueling, iodine-xenon work, and experiment work.

Table 6. ORR Unscheduled Shutdowns, Details

Date	Duration (hr)	End Cycle	Remarks
4-28-78	0.050	-	Inadvertently inserted No. 2 fission chamber and received a five-second-period reverse.
5-5-78	0.217	-	Loss of chamber voltage on Log-N period sigma. The electrician accidentally touched a loosely-connected power supply line on the No. 2 Log-N amplifier.

Table 7. Reductions in ORR Power Not Resulting in Shutdowns

Date	Source of Signal	Type of Signal	Lowest Power (MW)	Comments
4-28-78	Servo demand	Manual Setback	N _L	Lowered the power from 24 MW so a leak on the liner to drain on HB-2 facility could be repaired.
6-12-78	Primary flow ΔP	Automatic Setback	7.0	The primary temperature control was switched from "auto" to "manual" to permit setting of bypass valve in a fixed position. The primary flow decreased, resulting in a momentary decrease of ΔP to the setback point.
6-30-78	Experiment	Setback	25	Intentional setback from OC-2 experiment for the check-out of the alarm and setback after experiment status change was completed.

INSTRUMENTATION AND REACTOR CONTROLS

The performance of the instrumentation for the complex was quite satisfactory and only routine maintenance was required as indicated in Table 8.

PROCESS SYSTEM AND MECHANICAL COMPONENTS

Details of maintenance or changes to the process system are given in Table 9. Table 10 summarizes the results of efficiency tests of the various gaseous waste filters.

EXPERIMENT FACILITIES AND CORE CHANGES

Experiment facility usage is given in Table 11. The core configurations used during the quarter are shown in figure Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10.

Table 8. Maintenance and Changes, Instrumentation and Controls

Date	Component	Trouble	Corrective Action
No. 1 Counting-Rate Channel			
4-28-78	Chamber drive motor	Broken drive shaft	The drive motor was replaced.
5-11-78	Position indicator	False readout	The selsyn indicator was repositioned.
No. 2 Counting-Rate Channel			
4-25-78	Recorder amplifier	Erratic readout	A faulty voltage regulator tube was replaced.
No. 1 Log-N Channel			
5-8-78	Recorder amplifier	Erratic readout	The recorder amplifier was replaced.
South ¹⁶ N Channel			
4-14-78	Recorder amplifier	Erratic readout	The recorder amplifier was replaced.
4-25-78	Recorder	Erratic readout	The picoammeter was replaced.
6-13-78	Recorder	Erratic readout	The picoammeter was replaced.
Process Instrumentation			
5-2-78	Pool water activity recorder	Erratic readout	The amplifier was replaced.
5-16-78	Reactor coolant pH recorder	Erratic readout	The controller was adjusted.

Table 9. Process Systems, Maintenance and Changes

Date	Component	Remarks
Reactor Primary Cooling System		
5-4-78	North reactor demineralizer	Faulty valve N-8 on the anion-resin column was replaced.
5-5-78 through 5-18-78	Degasifier	Modifications were completed to allow the steam condensate from the vacuum jet to be recirculated back into the system rather than being discharged to the hot waste system.
5-22-78 through 5-25-78	South inlet expansion joint	The water level in the reactor pool was lowered 18 in. below the inlet line and the expansion joint was replaced. A vibration test was performed which showed excessive vibration. The exterior convolutions were filled with 1/2 in. of Buna-N, O-ring material. A re-check of the flow at 16,500 GPM showed a normal vibration level.
6-5-78	North reactor demineralizer	Faulty valve N-31 was replaced.
6-9-78	By-pass filter columns	The gasket on valve 116-C was replaced.
6-15-78	Reactor tank access cover	The lifting-ring was straightened.
6-29-78	Reactor tank access cover	The lucite-port-hole covers were replaced.
Reactor Secondary Cooling System		
4-12-78 and 4-13-78	Cooling tower	A routine inspection of the tower was performed. Results were satisfactory. Oil was changed in the fan-gear boxes. Corrosion coupons were changed.
5-1-78	No. 2 secondary cooling pump	A burned-out starter coil was replaced.

Table 9. (Continued)

Date	Component	Remarks
Reactor Secondary Cooling System (Continued)		
6-1-78	Cooling tower, north fan electrical supply lines	One phase on the 440-volt line side at the transfer switch burned out. The trouble was temporarily corrected by removing the wire and wrapping it with tape for safety, switching out the local transformer, and transferring the north and south fans to the 440-volt feed from sub-station 4000.
Pool Primary Cooling System		
5-24-78	Primary water flow pump	The seals were replaced.
Pool Secondary Cooling System		
4-12-78	Cooling tower	A routine inspection was performed. Results were satisfactory. Oil was changed in the fan gear box.
Emergency Cooling System		
4-11-78	Nos. 1, 2, and 3 dc units	Functional tests of equipment and alarms were completed with satisfactory results.
5-3-78	No. 1 dc unit	A temporary "Hi" motor amp meter was replaced with a permanent meter.
5-12-78	No. 3 dc unit	Water was added to the batteries.
5-25-78	Nos. 1, 2, and 3 dc units	Functional tests of equipment and alarms were performed with satisfactory results.
5-25-78	No. 2 dc unit	The monitoring meter "Lo Battery Volts" was replaced to permit clearing of a false alarm.

Table 9. (Continued)

Date	Component	Remarks
Emergency Cooling System (Continued)		
5-26-78	No. 3 dc unit	The pony motor to the primary pump was aligned.
		Diesel
6-19-78	Diesel generator	The faulty oil heater was replaced.
Cell-Ventilation System		
4-13-78	Steam turbine gear box	The oil was replaced.
5-23-78	Filter system	The prefilters were replaced.
Miscellaneous		
4-7-78 through 6-30-78	Experiment facilities (beam holes)	The following work was completed: (1) reinstallation of beam-hole plugs in HB-1, -2, and -4 after cleaning liner-service lines, (2) installation of a nitrogen sweep system on liners to HB-1 through HB-6, and (3) relocated service lines to HB-4 from first level east to beam hole catwalk in east end of basement. Installation of new shields and shielding are in progress at the end of this report period on HB-1, HB-2 and HB-4.
6-28-78	Experiment facility for nose-cone experiments	A new holding facility was fabricated.

Table 10. Status of Filters - Gaseous Waste System

Type Filter	Bank Designation	Date Installed	Date Last Tested	Type Test	Retention Efficiency (%)
Cell-Ventilation System					
CWS	Overall ^a	North, 6-20-73 South, 1-12-75	9-27-78	DOP	99.994
Charcoal	Both banks	North, 9-16-74 South, 12-12-77	7-19-78	Elemental Iodine	99.98
Charcoal	Both banks	North, 9-16-74 South, 12-12-77	1-9-78	Methyl Iodine	98.78
Pressurizable Off-Gas ^b					
CWS	North	5-5-75	9-23-77	DOP	99.780
Charcoal	North	2-26-73	1-28-76	Elemental Iodine	99.940
Charcoal	North	2-26-73	10-7-75	Methyl Iodine	87.970
CWS	South	10-18-67	9-23-77	DOP	99.992
Charcoal	South	8-11-75	8-13-75	Elemental Iodine	99.993
Charcoal	South	8-11-75	10-8-75	Methyl Iodine	97.480

^aThe CWS filters in the cell ventilation system were checked in series.

^bThe POG system is not being used; therefore, all filter tests have been discontinued for the present.

Table 10. (Continued)

Type Filter	Bank Designation	Date Installed	Date Last Tested	Type Test	Retention Efficiency (%)
Basement Hood Exhaust					
CWS	South	10-4-76	9-27-78	DOP	99.998
CWS	North	10-4-76	10-4-76	DOP	99.996
Normal Off-Gas					
CWS	West	6-2-77	9-23-77	DOP	99.98
Charcoal	West	6-2-77	12-8-77	Elemental Iodine	99.90
CWS	East	1-26-77	9-27-78	DOP	99.998
Charcoal	East	1-26-77	11-3-77	Elemental Iodine	99.97
Charcoal	West	6-2-77	7-27-78	Methyl Iodine	1.08 ^c
Charcoal	East	1-26-77	11-10-77	Methyl Iodine	70.57

^cNOG west bank of filters are to be changed.

Table 11. Experiment Facility Usage

Facility	Access Flange	Date Installed	Date Removed	Description of Experiment	Division or Other Sponsor
B-2	None	4-14-78	5-11-78	Antimony sources	Instrumentation and Controls
C-7	None	2-10-78	6-28-78	Austinic alloys	Metals and Ceramics
D-2	None	2-13-78		Radioisotopes (Iodine and Xenon)	Operations
D-8	V-3	3-10-67		Hydraulic tube No. 2 used for isotope production and short-term irradiations	Operations
E-5	V-6	6-28-78		HTGR Creep Irradiation Capsule OC-2	Engineering Technology Division
P-5	None	3-23-78		Flux monitor capsules	Spire Corporation
HB-1 ^a	None			Neutron spectrometer	Solid State Physics
HB-2 ^a	None			Neutron spectrometer	Solid State Physics
HB-3	None	11-1-58		Neutron diffraction experiments	Solid State Physics
HB-4 ^a	None			Neutron spectrometer	Solid State Physics
HB-6	None	4-76		Neutron small angle scattering facility	Solid State Physics
HN-3	None	11-59		Activation analysis	Analytical Chemistry
HN-4	None	12-15-63		"Fly's Eye" two-dimensional neutron detector for neutron diffraction and radiography	Instrumentation and Controls

^aInstallation in progress.

ORR LATTICE LOADING
For Fuel Cycle 143-G

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Be	F	SR	F	SR	Be	Be	Be
C	Be	F	F	F	F	F	Ex	Be	Be
D	Be	^{131}I	F	SR	F	SR	Be	HT	Be
E	Be	F	F	F	F	F	F	F	Be
F	Be	F	F	SR	F	SR	F	Be	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	23
Shim Rod (SR)	6
Beryllium (Be)	31
Experiment (Ex)	1
Iodine Sleeve (^{131}I)	1
Hydraulic Tube (HT)	1

Figure 1. ORR Lattice Configuration - April 1, 1978 through April 7, 1978

ORR LATTICE LOADING
For Fuel Cycles 144-A, 144-B, and 144-C

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Ex	F	SR	F	SR	Be	Be	Be
C	Be	F	F	F	F	F	Ex	Be	Be
D	Be	¹³¹ I	F	SR	F	SR	Be	HT	Be
E	Be	F	F	F	F	F	F	F	Be
F	Be	F	F	SR	F	SR	F	Be	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	23
Shim Rod (SR)	6
Beryllium (Be)	30
Experiment (Ex)	2
Iodine Sleeve (¹³¹ I)	1
Hydraulic Tube (HT)	1

Figure 2. ORR Lattice Configuration - April 14, 1978 through May 11, 1978

ORR LATTICE LOADING
For Fuel Cycles 144-D, 145-A, and 145-B

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Be	F	SR	F	SR	Be	Be	Be
C	Be	F	F	F	F	F	Ex	Be	Be
D	Be	¹³¹ I	F	SR	F	SR	Be	HT	Be
E	Be	F	F	F	F	F	F	F	Be
F	Be	F	F	SR	F	SR	F	Be	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	23
Shim Rod (SR)	6
Beryllium (Be)	31
Experiment (Ex)	1
Iodine Sleeve (¹³¹ I)	1
Hydraulic Tube (HT)	1

Figure 3. ORR Lattice Configuration - May 11, 1978 through June 28, 1978

ORR LATTICE LOADING
For Fuel Cycle 145-C

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Be	F	SR	F	SR	F	Be	Be
C	Be	F	F	F	F	F	F	Be	Be
D	Be	¹³¹ I	F	SR	F	SR	F	HT	Be
E	Be	F	F	F	Ex	F	F	F	Be
F	Be	F	F	SR	F	SR	F	Be	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	25
Shim Rod (SR)	6
Beryllium (Be)	29
Experiment (Ex)	1
Iodine Sleeve (¹³¹ I)	1
Hydraulic Tube (HT)	1

Figure 4. ORR Lattice Configuration - June 28, 1978 through June 30, 1978

ORR LATTICE LOADING
For Fuel Cycle 143-XA

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Be	F	SR	F	SR	F	F	Be
C	Be	F	F	F	F	F	Ex	F	Be
D	Be	^{131}I	F	SR	F	SR	F	HT	Be
E	Be	F	F	F	F	F	HA	F	Be
F	Be	Be	F	SR	F	SR	F	F	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	26
Shim Rod (SR)	6
Beryllium (Be)	27
Experiment (Ex)	1
Iodine Sleeve (^{131}I)	1
Hydraulic Tube (HT)	1
Hollow Aluminum (HA)	1

Figure 5. Gamma Flux Measurement Lattice Configuration (E-7) - April 7, 1978

ORR LATTICE LOADING
For Fuel Cycle 143-XB

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Be	F	SR	F	SR	F	F	Be
C	Be	F	F	F	F	F	Ex	F	Be
D	Be	¹³¹ I	F	SR	F	SR	F	HT	Be
E	Be	F	F	F	HA	F	SA	F	Be
F	Be	Be	F	SR	F	SR	F	F	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	25
Shim Rod (SR)	6
Beryllium (Be)	27
Experiment (Ex)	1
Iodine Sleeve (¹³¹ I)	1
Hydraulic Tube (HT)	1
Hollow Aluminum (HA)	1
Solid Aluminum (SA)	1

Figure 6. Gamma Flux Measurement Lattice Configuration (E-5) - April 7, 1978

ORR LATTICE LOADING
For Fuel Cycle 143-XC

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Be	F	SR	F	SR	F	F	Be
C	Be	F	F	F	F	F	Ex	F	Be
D	Be	F	F	SR	F	SR	F	HT	Be
E	Be	F	HA	F	SA	F	SA	F	Be
F	Be	F	F	SR	F	SR	F	F	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	26
Shim Rod (SR)	6
Beryllium (Be)	26
Experiment (Ex)	1
Hydraulic Tube (HT)	1
Hollow Aluminum (HA)	1
Solid Aluminum (SA)	2

Figure 7. Gamma Flux Measurement Lattice Configuration (E-3) - April 7, 1978

ORR LATTICE LOADING
For Fuel Cycle 143-XD

	1	2	3	4	5	6	7	8	9
A	Be	Be	Be	F	F	F	Be	Be	Be
B	Be	Be	F	SR	F	SR	F	F	Be
C	Be	F	F	F	F	F	HA	F	Be
D	Be	¹³¹ I	F	SR	F	SR	F	HT	Be
E	Be	F	F	F	F	F	F	F	Be
F	Be	Be	F	SR	F	SR	F	Be	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	26
Shim Rod (SR)	6
Beryllium (Be)	28
Iodine Sleeve (¹³¹ I)	1
Hydraulic Tube (HT)	1
Hollow Aluminum (HA)	1

Figure 8. Gamma Flux Measurement Lattice Configuration (C-7) - April 7, 1978

ORR LATTICE LOADING
For Fuel Cycle 143-XE

	1	2	3	4	5	6	7	8	9
A	Be	Be	F	F	F	F	Be	Be	Be
B	Be	F	F	SR	F	SR	F	Be	Be
C	Be	F	SA	F	F	F	F	F	Be
D	Be	F	F	SR	F	SR	F	HT	Be
E	Be	F	SA	F	HA	F	SA	F	Be
F	Be	F	F	SR	F	SR	F	Be	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

<u>LATTICE COMPONENT</u>	<u>NUMBER</u>
Fuel (F)	26
Shim Rod (SR)	6
Beryllium (Be)	26
Hydraulic Tube (HT)	1
Solid Aluminum (SA)	3
Hollow Aluminum (HA)	1

Figure 9. Gamma Flux Measurement Lattice Configuration (E-5) - April 7, 1978

ORR LATTICE LOADING
For Fuel Cycle 143-XF

	1	2	3	4	5	6	7	8	9
A	Be	Be	F	F	F	F	Be	Be	Be
B	Be	F	F	SR	F	SR	F	Be	Be
C	Be	F	SA	F	F	F	F	F	Be
D	Be	F	F	SR	F	SR	F	HT	Be
E	Be	F	SA	F	SA	F	HA	F	Be
F	Be	F	F	SR	F	SR	F	Be	Be
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

LATTICE COMPONENTNUMBER

Fuel (F)	26
Shim Rod (SR)	6
Beryllium (Be)	26
Hydraulic Tube (HT)	1
Solid Aluminum (SA)	3
Hollow Aluminum (HA)	1

Figure 10. Gamma Flux Measurement Lattice Configuration (E-7) - April 7, 1978

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