30
1/21/82
25 cup

(2)
I-922

ornl

MASTER

ORNL/TM-8029

OAK
RIDGE
NATIONAL
LABORATORY

**Bulk Shielding Facility
Quarterly Report
April, May, and June 1981**

S. S. Hurt, III
E. D. Lance
J. R. Thomas

ORNL/TM--8029

DE82 007133

OPERATED BY
UNION CARBIDE CORPORATION
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

Printed in the United States of America. Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road, Springfield, Virginia 22161
NTIS price codes—Printed Copy: A03; Microfiche A01

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Contract No. W-7405-eng-26

OPERATIONS DIVISION

BULK SHIELDING FACILITY QUARTERLY REPORT
APRIL, MAY, AND JUNE 1981

S. S. Hurt, III
E. D. Lance
J. R. Thomas

SPONSOR: J. H. Swanks
Director, Operations Division

DISCLAIMER

This book was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

Date Published - January 1982

OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37830
operated by
UNION CARBIDE CORPORATION
for the
DEPARTMENT OF ENERGY

THIS PAGE
WAS INTENTIONALLY
LEFT BLANK

CONTENTS

SUMMARY	1
BULK SHIELDING FACILITY	1
Operations	1
Shutdowns	6
Maintenance and Changes	6
Fuel	7
Experiment Facilities Assignment	11
Demineralizer Performance	12
Special Tests	14
Efficiency Tests	14
Operational Activities	15
Building Evacuation Drill	15
Summary of Surveillance Tests at the BSR	16
POOL CRITICAL ASSEMBLY	17
Operations	17
Summary of Surveillance Tests at the PCA	21
DISTRIBUTION	23

FIGURE LIST

Figure

1	Core Loading 87 BSR	4
2	Core Loading 88 BSR	5
3	Core Loading 89 BSR	6

TABLE LIST

Table

1	Basic Operating Data	2
2	Analysis of Shutdowns	6
3	Maintenance and Changes, Instrumentation and Controls . .	7
4	Maintenance and Changes, Mechanical System	9
5	Maintenance and Changes, Process System	10
6	Fuel and Shim Rod Status	11
7	Facilities Assignment	12
8	Demineralizer Performance Data	13
9	Efficiency Tests Results, Filters	14
10	Operational Activities	15
11	Summary of Surveillance Tests at the BSR	16
12	Usage of Pool Critical Facility	18
13	PCA Maintenance	20
14	Summary of Surveillance Tests at the PCA	21

BULK SHIELDING FACILITY QUARTERLY REPORT
APRIL, MAY, AND JUNE 1981

S. S. Hurt, III, E. D. Lance, J. R. Thomas

SUMMARY

The BSR operated at an average power level of 1825 kW for 76.75% of the time during April, May, and June. Water-quality control in both the reactor primary and secondary cooling systems was satisfactory.

The BSR was operated at low and variable power during this quarter for 45 hours as part of the training programs for nuclear engineering students from Mississippi State University and the University of Tennessee.

The PCA was also used in the above mentioned training programs and was operated on five occasions when nuclear engineering students from Mississippi State University and the University of Kentucky actively participated in training laboratories. The PCA was also operated on eighteen occasions for the Reactivity Measurements experiment and the Reduced Enrichment in Research and Test Reactors experiment (RERTR).

BULK SHIELDING FACILITY

Operations

During this quarter, the reactor operated primarily for the irradiation of research experiments. It was operated at low and variable power (2.70% of the operating time) to enable nuclear engineering students from Mississippi State University and the University of Tennessee to perform training labs described elsewhere in this report. Basic operating data for this period are given in Table 1.

Table 1. Basic Operating Data
April, May, and June 1981

	This Quarter	Last Quarter	Year To Date
Total energy, kWd	127,400	104,684	232,084
Average operating power, kW	1,825	1,954	1,890
Time operating, %	76.75	59.53	68.14
Reactor availability, %	88.33	69.26	78.80
Reactor water radioactivity, counts $\cdot$ min ⁻¹ ml ⁻¹ (av)	1,552	1,458	1,505
Reactor water resistivity, ohm-cm (av)	1,159,000	1,397,000	1,278,000
Research samples	26	13	39

Core loading 87 (Fig. 1) was temporarily converted to core loading 88 (Fig. 2) on April 28, 1981 for Low Temperature Irradiation Facility (LTIF) experiment irradiations. Core loading 88 was accomplished by replacing the 194 g U-235 fuel element in CP-55 with an aluminum core piece. Core loading 88 had an initial operating mass of 4807 g which, when against the LTIF experiment complex, provided an excess reactivity of 5.05% $\Delta k/k$ (2.50% $\Delta k/k$ excess reactivity above xenon equilibrium). Core loading 87 was reestablished on May 15, 1981 after completion of the LTIF run. Core loading 88 was also used for LTIF irradiations from May 25-29, 1981.

Core loading 87 was converted to core loading 89 (Fig. 3) on June 19, 1981 to provide excess reactivity for versatile operation. The initial operating mass (5001 g U-235) of core loading 87 had been reduced to 4859 g due to burnup, thereby reducing the excess reactivity from 5.60% $\Delta k/k$ to 3.37% $\Delta k/k$ (0.82% $\Delta k/k$ excess reactivity above xenon equilibrium).

BSR CORE

81	82	83	84	FC 85	A1 CAN 86	A1 CAN 87	A1 CAN 88	M-57-H 191 89
71	72	73	74	A1 CAN 75	A1 CAN 76	A1 CAN 77	BSF A-7 194 78	M-58-H 189 79
61	EAST D ₂ O TANK 62	63	64	M-50-H 179 65	BSF-S-15 66 66	BSF A-5 168 67	BSF-S-16 66 68	M-51-H 179 69
51	52	53	54	M-52-H 194 55	YZP 0042 149 56	M-18-H 141 57	YZP 0046 153 58	YZP 0047 138 59
41	42	43	44	BSF T-1 216 45	BSF-S-T 110 46	BSF A-6 170 47	BSF-S-T3 110 48	BSF A-8 200 49
31	32	33	34	BSF A-2 164 35	YZP 0040 142 36	YZP 0048 134 37	YZP 0041 144 38	BSF A-3 169 39
21	22	23	24	YZP 0043 187 25	BSF-S-17 79 26	M-S-H 130 27	BSF-S-18 79 28	BSF A-1 174 29
11	12	13	14	A1 PLUG 15	BSF A-9 205 16	BSF A-4 182 17	BSF A-10 218 18	YZP 0045 181 19

LOADING NO.

87

DATE

March 19, 1981

EXCESS REACTIVITY

5.60% $\Delta k/k$

OPERATING MASS

~5001 g

ROD POSITIONS AT CRITICAL
(With Operating Mass)

ROD NO.	IN. WITHDRAWN	
1	9.20	11.05
2	9.20	11.05
3	9.20	11.05
4	9.20	11.05
5	23.00	11.05
6	23.00	11.05

REMARKS:

Fig. 1 Core Loading 87 BSR

BSR CORE

				FC	A1 CAN	A1 CAN	A1 CAN	M-57-H 191
81	82	83	84	85	86	87	88	89
				A1 CAN	A1 CAN	A1 CAN	BSF A-7 194	M-58-H 189
71	72	73	74	75	76	77	78	79
				M-50-H 179	BSF-S-15 66	BSF A-5 168	BSF-S-16 66	M-51-H 179
61	62 EAST	63	64	65	66	67	68	69
	D ₂ O TANK			A1 CAN	YZP 0042 149	M-18-H 141	YZP 0046 153	YZP 0047 138
51	52	53	54	55	56	57	58	59
				BSF T-1 216	BSF-S-T1 110	BSF A-6 170	BSF-S-T3 110	BSF A-8 200
41	42	43	44	45	46	47	48	49
				BSF A-2 164	YZP 0040 142	YZP 0048 134	YZP 0041 144	BSF A-3 169
31	32	33	34	35	36	37	38	39
				YZP 0043 187	BSF-S-17 79	M-5-H 130	BSF-S-18 79	BSF A-3 174
21	22	23	24	25	26	27	28	29
				A1 PLUG	BSF A-9 205	BSF A-4 182	BSF A-10 218	YZP 0045 181
11	12	13	14	15	16	17	18	19

LOADING NO.

88

DATE

April 28, 1981

EXCESS REACTIVITY

5.05% $\Delta k/k$

OPERATING MASS

4807 g

ROD POSITIONS AT CRITICAL
(With Operating Mass)

ROD NO.	IN. WITHDRAWN
1	10.00
2	10.00
3	10.00
4	10.00
5	23.00
6	23.00

REMARKS:

Core 88 used for LTIF Experiment

Fig. 2 Core Loading 88 BSR

BSR CORE

LOADING NO.	
89	
DATE	
June 19, 1981	
EXCESS REACTIVITY	
4.95% $\Delta k/k$	
OPERATING MASS	
~4953 g	
ROD POSITIONS AT CRITICAL (With Operating Mass)	
ROD NO.	IN. WITHDRAWN
1	10.16
2	10.16
3	10.16
4	10.16
5	23.00
6	23.00
REMARKS:	

81	82	83	84	FC	A1 CAN	A1 CAN	A1 CAN	M-57-H 188
71	72	73	74	A1 CAN	A1 CAN	A1 CAN	BSF A-7 189	M-58-H 185
61	62 EAST	63	64	M-50-H 175	BSF-S-15 64	BSF A-5 163	BSF-S-16 64	M-51-H 175
51	D ₂ O TANK	53	54	M-52-H 189	YZP 0042 144	M-18-H 136	YZP 0046 148	BSF A-8 194
41	42	43	44	BSF T-1 209	BSF-S-T 106	BSF A-6 162	BSF-S-T3 106	BSF T-2 220
31	32	33	34	BSF A-2 159	YZP 0040 137	YZP 0048 129	YZP 0041 138	BSF A-3 165
21	22	23	24	YZP 0043 182	BSF-S-17 76	YZP 0045 177	BSF-S-18 77	BSF A-1 170
11	12	13	14	A1 PLUG 15	BSF A-9 201	BSF A-4 178	BSF A-10 213	YZP 0047 134

Fig. 3 Core Loading 89 BSR

Core loading 89 was accomplished by replacing one depleted 126 g fuel element with one new 220 g fuel element. Core loading 89 had an initial operating mass of 4953 g which provided an excess reactivity of 4.95% $\Delta k/k$ (2.40% $\Delta k/k$ excess reactivity above xenon equilibrium).

Shutdowns

There were four unscheduled shutdowns during the quarter. There were two caused by electrical equipment and one each caused by shim-rod drop and instrumentation. Table 2 gives an analysis of both scheduled and unscheduled shutdowns.

Table 2. Analysis of Shutdowns

Description of Shutdown	Number	Downtime (h)
<u>Scheduled</u>		
Experimenters:		
No request to operate	6	252.717
Experiment insertion, removal or data taking	5	6.100
Repositioning of the reactor	10	11.650
Reactor Operations:		
University personnel training	5	2.934
Refueling critical runs	6	6.150
BSR quarterly shutdown and maintenance	2	223.850
Subtotal:	34	503.401
<u>Unscheduled</u>		
Instrumentation	1	1.150
Rod drops	1	0.533
Electrical equipment	2	2.433
Subtotal:	4	4.116
TOTAL:	38	507.517

Maintenance and Changes

Maintenance or changes to the instrumentation and mechanical components in the complex are listed in Tables 3, 4, and 5.

Table 3. Maintenance and Changes, Instrumentation and Controls

Date	Component	Trouble or Change	Reason or Maintenance
4-2-81	Facility radiation and contamination monitoring system	Routine	Bimonthly check
4-7-81	Secondary pH control system	The pH controller was adjusted.	Setpoint for pH control between 7.0 and 7.5
4-28-81	Counting-rate channel	Would not calibrate.	The count-rate meter was replaced.
5-4-81	Portable pH meter	Inoperative	The pH probes were replaced.
5-18-81	Continuous air monitor SW	Inoperative alarms	The instrument was retubed.
5-19-81	Servo system	Erratic operation	The servo amplifier was replaced.
5-11-81 and 5-14-81	Counting-rate channel	Period readout unsteady.	The log count meter was replaced twice.
6-1-81	Magnet control bin No. 3	Troubleshooting	Magnet switches Nos. 5 and 6 were swapped.
6-2-81	Counting-rate channel	Spiking	The count-rate meter was replaced.
6-2-81	Log-N channel	False fast period scram	Corrected a poor connection on the sigma buss cable.
6-15-81 through 6-21-81	Instrumentation	Routine	Quarterly checks

Table 3. Maintenance and Changes (Cont'd)

Date	Component	Trouble or Change	Reason or Maintenance
6-19-81	Log-N channel	Erratic readout	The Log-N amplifier was replaced.
6-19-81	Nos. 1 and 3 sigma amplifiers	Did not meet specifications.	The sigma amplifier preamps were retubed.
6-19-81	Local-Remote switch	Inoperative	A faulty relay was replaced.
6-22-81	Instrumentation	Routine	Quarterly checks
6-23-81	Servo channel	Insensitive	The servo amplifier was replaced.
6-29-81	Counting-rate channel	Spiking	The count-rate meter was replaced.

Table 4. Maintenance and Changes, Mechanical System

Date	Component	Trouble or Change	Reason or Maintenance
6-2-81 and 6-3-81	South tower fan	Excessive vibration	A new Dodge Flexidyne coupling was installed.
6-5-81	North tower fan	Noisy	New shaft bearings were installed.
6-15-81	Shim-rod assemblies Nos. 1, 3, and 6	Routine	The magnet faces and clutch switch push rods were cleaned, brushed and flushed the armatures. Replaced No. 1 clutch switch (had leakage to ground), and replaced a rusty spring on No. 3 clutch switch.

Table 5. Maintenance and Changes, Process System

Date	Component	Trouble or Change	Reason or Maintenance
4-1-81	Primary cooling pump	Failure of pump from overload trip on phase B.	The overload relay on the pump was checked and reset okay. No abnormal condition was found so the pump was placed back in service.
4-6-81	Primary cooling pump	Previous overload trip on phase B thermal overload relay.	A new electrical box containing 8C amp fuses and switches was installed on phases A, B, and C so the faulty phase B could be bypassed until a replacement relay is obtained.
6-26-81	Demineralizer	Valve D-15 would not close.	The faulty gate valve was replaced with a new globe valve.
6-26-81	Demineralizer	Routine treatment	The anion column was treated with 378 ml of microbiotreat 321.
6-29-81	Demineralizer	Routine regeneration	The cation and anion columns were regenerated and the unit returned to service.

Fuel

Changes in the fuel inventory are reflected in Table 6.

Table 6. Fuel and Shim Rod Status

	This Quarter	Last Quarter	Year To Date
Fuel elements depleted	0	2	2
Control-rod fuel elements depleted	0	2	2
New fuel elements placed in service	1	2	3
New control-rod fuel elements placed in service	0	2	2
New fuel elements available for use	15	16	15
New control-rod fuel elements available for use	4	4	4
Partially depleted fuel elements available for use (included core)	30	29	30
New shim rods placed in service	0	0	0
Boron stainless steel shim rods in service	6	6	6
Boron stainless steel shim rods available for use	1	1	1

Experiment Facilities Assignment

Facility assignments are listed in Table 7. The tubes of the east D₂O tank are not permanently assigned; they are used by various laboratory personnel for short-term sample irradiations.

Table 7. Facilities Assignment

Facility	Location	Division or Sponsor
Liquid helium cryostat	Southwest corner of pool	Solid State
Heavy Section Steel experiment	North and west face of core	Metals and Ceramics
Fast-neutron tube	Core position 15	Solid State
Water-cooled tube	Core position 15	Solid State
Dry thermal-neutron tubes ^a (D-3-1 and -2)	East D ₂ O tank	Operations
Wet thermal-neutron tubes ^a (D-4-1 and -2, D-6-1, -2, -3, -4, and -5)	East D ₂ O tank	Operations

^aThese facility tubes are for sample irradiations and are used by personnel of several divisions, primarily Analytical Chemistry and Solid State Divisions.

Demineralizer Performance

Table 8 gives detailed information on the condition of the primary water system for the preceding year and pertinent data on the performance of the bypass demineralizer.

Table 8. Demineralizer Performance Data

Run No.	Initiation Date	Termination Date	Throughput (gallons)	Gross Gamma (Counts min ⁻¹ ml ⁻¹)		pH		Specific Resistance (ohm-cm)	
				In	Out	In	Out	In	Out
42 ^a	12-17-74	4-15-75	3,850,000	2,116	119	5.8	6.0	1,018,000	1,611,000
43	4-16-75	7-7-75	2,550,000	2,712	174	5.7	5.8	937,000	1,823,000
44	7-10-75	11-5-75	2,750,000	2,528	144	5.7	5.9	968,000	1,428,000
45	11-5-75	4-29-76	2,325,000	2,146	154	5.3	5.5	902,000	1,593,000
46	4-30-76	9-2-76	2,800,000	1,430	124	5.4	5.6	1,085,000	1,808,000
47	9-2-76	1-27-77	3,450,000	1,700	126	5.4	5.6	975,000	1,548,000
48	2-1-77	4-22-77	2,000,000	2,026	146	5.6	5.7	1,052,000	1,971,000
49	4-25-77	9-21-77	2,700,000	2,005	140	5.6	5.8	1,054,000	1,815,000
50	9-22-77	3-6-78	2,950,000	1,585	134	5.5	5.7	1,191,000	1,953,000
51	3-8-78	8-2-78	2,350,000	2,112	122	5.6	5.8	1,030,000	1,634,000
52 ^a	8-15-78	9-18-78	950,000	2,077	157	5.7	5.9	1,363,000	2,209,000
53	9-19-78	12-19-78	2,580,000	2,194	163	5.6	5.8	1,194,000	3,207,000
54	12-19-78	4-10-79	3,040,000	1,964	134	5.6	5.9	1,183,000	1,910,000
55	4-11-79	7-24-79	2,750,000	2,188	164	5.5	5.7	1,006,000	1,675,000
56	7-27-79	11-19-79	2,800,000	1,801	138	5.3	5.5	971,000	1,743,000
57	11-20-79	4-8-80	2,750,000	1,866	134	5.3	5.5	1,084,000	2,038,000
58	4-9-80	5-29-80	1,000,000	1,979	123	5.3	5.5	808,000	1,832,000
59	5-30-80	6-2-80	5,000	1,950	125	5.3	5.6	774,000	1,538,000
60 ^a	6-3-80	8-4-80	1,750,000	1,929	106	5.4	5.6	1,278,000	3,466,000
61	8-5-80	10-30-80	1,850,000	1,824	118	5.4	5.6	1,148,000	2,600,000
62	11-4-80	2-26-81	2,600,000	1,587	110	5.4	5.6	1,368,000	4,319,000
63	3-2-81	6-20-81	2,200,000	1,271	151	5.5	5.7	1,233,000	3,960,000
64	6-29-81	In Service	50,000	2,570	178	5.3	5.6	1,000,000	2,000,000

^aNew resin in the demineralizer columns.

Special Tests

Efficiency Tests

Tests were performed by Quality Assurance and Inspection Department personnel on the cell ventilation filters. Details are given in Table 9.

Table 9. Efficiency Tests Results, Filters

Date	Unit	Type Test	Efficiency (%)
5-19-81	North bank	Elemental Iodine	99.96
5-19-81	South bank	Elemental Iodine	99.98
6-9-81	North bank	DOP	99.988
6-9-81	Center bank	DOP	99.996
6-9-81	South bank	DOP	99.995
6-11-81	Center bank	Elemental Iodine	99.99
6-23-81	North bank	Methyl Iodide	92.34
6-23-81	Center bank	Methyl Iodide	79.37
6-23-81	South bank	Methyl Iodide	14.88

Operational Activities

The operational activities for the quarter are reflected in Table 10.

Table 10. Operational Activities

Date	Remarks
5-19-81	The skimmer filters were changed.
6-15-81	The emergency electrical power quarterly test was completed with satisfactory results.
6-17-81	The containment system quarterly functional checks were performed with satisfactory results.

Building Evacuation Drill

An unannounced building evacuation drill of the BSF simulating a condition of an impending radiation problem from an experiment, to test the response of the personnel in the building and action of the local emergency squad, was successfully completed on May 4, 1981.

Summary of Surveillance Tests at the BSR

Table 11 is a tabulation of the completion dates of the surveillance tests required by the Technical Specifications. This table contains all the surveillance tests scheduled for frequencies of one test per month or longer. Other surveillance requirements which will not be reported are satisfied by routine completion of daily and weekly check sheets, start-up check lists, hourly data sheets, the operating log book, and miscellaneous quality assurance tests.

Table 11. Summary of Surveillance Tests at the BSR

Test	Most Recent Test	Previous Test
<u>Biennial Tests</u>		
Inspection of the shim-safety rods	9-12-80	5-3-79
<u>Annual Tests</u>		
Calibration of shim-safety rods	3-19-81	9-16-80
Core ΔT channel calibration	6-19-81	9-15-80
Primary coolant flow channel calibration	6-19-81	9-10-80
Pool water level channel calibration	6-19-81	12-4-80
Maximum rate of reactivity addition by the shim-safety rods	6-18-81	3-13-81
Reactivity assigned to the servo-control system	3-11-81	3-5-80
Subcriticality with each shim-safety rod at its upper limit while all other shim-safety rods are fully inserted	6-18-81	3-13-81
<u>Semiannual</u>		
Cell ventilation filter efficiency		
A. Methyl Iodide	6-23-81	12-11-80
B. Elemental Iodine	6-11-81	11-21-80
C. Dioctyl Phthalate	6-9-81	12-5-80

Table 11. Summary of Surveillance Tests (Cont'd)

Test	Most Recent Test	Previous Test
<u>Semiannual (Cont'd)</u>		
Radiation monitoring equipment calibration	6-4-81	4-2-81
Stack radiation monitor calibration	6-16-81	3-17-81
<u>Quarterly</u>		
Safety channel No. 1 calibration	6-16-81	3-12-81
Safety channel No. 2 calibration	6-16-81	3-12-81
Safety channel No. 3 calibration	6-16-81	3-12-81
Log-N channel calibration	6-16-81	3-10-81
Fission chamber channel calibration	6-16-81	3-10-81
Flapper valve position channel functional test	6-19-81	3-13-81
Measurement of release time and time of flight for the shim-safety rods	6-18-81	3-13-81
Containment closure system functional test	6-17-81	3-12-81
In-leakage during containment mode	6-17-81	3-12-81

POOL CRITICAL ASSEMBLY

Operations

The Pool Critical Assembly (PCA) was used 49.7 hours as an experiment facility for the benefit of nuclear engineering students from Mississippi State University and the University of Kentucky. The PCA was used 122.9 hours for the Reactivity Measurement experiment and the Reduced Enrichment in Research and Test Reactors experiment (RERTR). Operational activities in preparing the facility for use included a check-out of the reactor control instrumentation and preparation of the required loadings. The operational activities are listed in Table 12 (Usage of Pool Critical Facility). The PCA maintenance is listed in Table 13.

Table 12. Usage of Pool Critical Facility

Date	Operational Activity	Purpose	Hours Used
4-6-81 and 4-7-81	Established core Nos. 289 and 299 to obtain a critical mass following the standard approach-to-critical procedure.	Training lab for the Mississippi State University Nuclear Engineering students.	21.7
4-8-81 and 4-9-81	Established core No. 77 to permit calibration of the regulating rod and performance of the Importance Function experiment.	Training lab for the Mississippi State University Nuclear Engineering students.	15.2
4-13-81	Established core No. 300 to obtain a critical mass following the standard approach-to-critical procedure, and core No. 77 to permit calibration of the regulating rod.	Training lab for the University of Kentucky Nuclear Engineering students.	12.8
5-20-81 and 5-21-81	Established core 286 for the Reactivity Measurement experiment.	Experiment data	16.6
6-2-81	Used core No. 286 for the Reactivity Measurement experiment.	Experiment data	4.3
6-10-81 through 6-12-81	Used core No. 287 for the Reduced Enrichment in Research and Test Reactors experiment (RERTR).	Experiment data	23.9

Table 12. Usage of Pool Critical Facility (Cont'd)

Date	Operational Activity	Purpose	Hours Used
6-15-81 through 6-19-81	Used core No. 287 and established cores 301 through 311 for the Reduced Enrichment in Research and Test Reactors experiment (RERTR).	Experiment data	41.1
6-22-81 through 6-26-81	Established core Nos. 312 through 316 for the Reduced Enrichment in Research and Test Reactors experiment (RERTR).	Experiment data	27.6
6-29-81 and 6-30-81	Established core Nos. 316 through 322 for the Reduced Enrichment in Research and Test Reactors experiment (RERTR).	Experiment data	9.4

Table 13. PCA Maintenance

Date	Component	Trouble or Change	Action
4-6-81	Log-N channel	Did not meet specifications.	The composite safety amplifier was replaced.
5-12-81	No. 1 shim-rod assembly	Faulty seat switch	The shim-rod assembly was pulled and a new seat switch installed. The armature was cleaned.
5-15-81	No. 1 shim-rod assembly	The lead screw was accidentally bent.	The lead screw was replaced with a spare. The magnet face and clutch switch push rod were cleaned.

Summary of Surveillance Tests at the PCA

Table 14 is a tabulation of the completion dates of the surveillance tests required by the Technical Specifications. This table contains all the surveillance tests scheduled for frequencies of one test per month or longer. Other surveillance requirements which are not reported are satisfied by routine completion of daily and weekly check sheets, start-up check lists, hourly data sheets, the operating log book, and miscellaneous quality assurance tests.

Table 14. Summary of Surveillance Tests at the PCA

Test	Most Recent Test	Previous Test
<u>Annual</u>		
Reactivity assigned to the servo-control system	1-28-81	12-12-80
Subcriticality with each shim-safety rod at its upper limit and all other shim-safety rods fully inserted	3-31-81	12-29-80
<u>Semiannual</u>		
Monitron calibration	6-29-81	2-17-81
Radiation monitoring equipment calibration	6-4-81	4-2-81
<u>Quarterly^a</u>		
Safety channel No. 1 calibration	3-30-81	12-29-80
Safety channel No. 2 calibration	3-30-81	12-29-80
Safety channel No. 3 calibration	3-30-81	12-29-80
Log-N channel calibration	3-30-81	12-29-80
Fission chamber channel calibration	3-27-81	12-19-80
Measurement of release time and time of flight for the shim-safety rods	5-8-81	3-31-81

^aQuarterly checks delayed due to an extended shutdown period.

THIS PAGE
WAS INTENTIONALLY
LEFT BLANK

INTERNAL DISTRIBUTION

1. S. J. Ball	18. R. V. McCord
2. G. H. Burger	19. J. A. Ray
3. C. D. Cagle	20. T. M. Sims
4. J. W. Cleland	21. K. W. Sommerfeld
5. G. H. Coleman	22. J. H. Swanks
6. R. R. Coltman, Jr.	23. R. D. Taylor
7. J. A. Conlin	24-25. J. R. Thomas
8. B. L. Corbett	26. K. W. West
9. W. A. Duggins	27. M. K. Wilkinson
10. T. P. Hamrick	28-29. Laboratory Records Department
11. R. W. Hobbs	30. Laboratory Records, ORNL R.C.
12. S. A. Hodge	31-32. Central Research Library
13. S. S. Hurt	33. Document Reference Section
14. D. T. Ingersoll	34. ORNL Patent Section
15-17. E. D. Lance	

EXTERNAL DISTRIBUTION

- 35. Safety and Environmental Control Division, DOE-ORO
- 36. J. A. Lenhard, Office of Assistant Manager for Energy Research and Development, Department of Energy, Oak Ridge Operations Office, Oak Ridge, Tennessee 37830
- 37-63. Technical Information Center, DOE