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**Bulk Shielding Facility
Quarterly Report
April, May and June of 1979**

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

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

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BULK SHIELDING FACILITY QUARTERLY REPORT

APRIL, MAY AND JUNE OF 1979

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SPONSOR: J. A. Cox
Director, Operations Division

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BULK SHIELDING FACILITY QUARTERLY REPORTAPRIL, MAY AND JUNE OF 1979

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

SUMMARY

The BSR operated at an average power level of 1967 kW for 72.58% 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 27.750 hours as part of the training programs for nuclear engineering students from the University of Tennessee.

The PCA was also used in the above-mentioned training programs and was operated on one occasion when Mississippi State University students actively participated in training laboratories. The PCA was also operated on twenty-eight occasions for the Reactivity Determination using Spectra Density Measurements Experiment and on eighteen occasions for the Pressure Vessel Simulator Benchmark Experiment.

BULK SHIELDING REACTOR

Operations

During this quarter, the reactor operated primarily for the irradiation of research experiments. It was operated at low and variable power (1.75% of the operating time) to enable nuclear engineering students from 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 of 1979)

	This Quarter	THIS LAST Quarter	Year To Date
Total energy, kWd	129,929	128,258	258,187
Average operating power, kW	1967	1815	1891
Time operating, %	72.58	77.64	75.11
Reactor availability, %	80.55	82.62	81.58
Reactor water radioactivity, counts min ⁻¹ ml ⁻¹ (av)	2165	1964	2064
Reactor water resistivity, ohm-cm (av)	1,025,000	1,183,000	1,104,000
Research samples	71	38	109

Core loading 56 (Fig. 1) had previously been temporarily converted to core loading 57 (Fig. 2) for Low Temperature Irradiation Facility (LTIF) Experiment irradiations. Core loading 57 was accomplished by replacing the United Nuclear Series fuel element in CP-55 with an A1 core piece. Core loading 56 was re-established after completion of the LTIF runs.

Core loading 56 was converted to core loading 58 (Fig. 3) on April 16, 1979 to provide excess reactivity for versatile operation. The initial operating mass (5088 g ²³⁵U) of core loading 56 had been reduced to 4947 g due to burnup, thereby reducing the excess reactivity from 4.96% $\Delta k/k$ to 3.62% $\Delta k/k$ (1.07% $\Delta k/k$ above xenon equilibrium).

Core loading 58 was accomplished by replacing two partially depleted United Nuclear Series fuel elements with two new Ames Laboratory Series fuel elements. Core loading 58 had an initial operating mass of 5086 g which provided an excess reactivity of 4.47% $\Delta k/k$ (1.92% $\Delta k/k$ excess reactivity above xenon equilibrium).

Core loading 58 was converted to core loading 59 (Fig. 4) on May 9, 1979 to provide excess reactivity for versatile operation. The initial operating mass (5086 g ^{235}U) of core loading 58 had been reduced to 5060 g due to burnup thereby reducing the excess reactivity from 4.47% $\Delta k/k$ to 4.10% $\Delta k/k$ (1.55% $\Delta k/k$ above xenon equilibrium).

Core loading 59 was accomplished by replacing two depleted MTR-Series fuel elements with two partially depleted MTR-Series fuel elements. Core loading 59 had an initial operating mass of 5101 g which provided an excess reactivity of 5.15% $\Delta k/k$ (2.60% $\Delta k/k$ excess reactivity above xenon equilibrium).

Core 59 was temporarily converted to core loading 60 (Fig. 5) on June 14, 1979 for LTIF experiment irradiations. Core loading 60 was accomplished by replacing the BSF Series fuel element in CP-55 with an A1 core piece. Core loading 60 had an initial operating mass of 4880 g which, when against the LTIF experiment complex, provided an excess reactivity of 3.34% $\Delta k/k$ (0.79% $\Delta k/k$ excess reactivity above xenon equilibrium). Core loading 60 was converted back to core loading 59 on June 25, 1979 after completion of the LTIF irradiations.

				FC	YZP 0042 181	M-18-H 178	YZP 0046 183	A1
81	82	83	84	85	86	87	88	89
				M-12-H 159	E NRL	Solid A1	E NRL	YZP 0047 177
71	72	73	74	75	76	77	78	79
		EAST D.C.		YZP 0040 194	B-193-C 64	M-15-H 177	B-199-C 66	YZP 0041 190
61	62	63	64	65	66	67	68	69
		TANK		M-7-H 156	M-13-H 154	YZP 0044 180	M-14-H 149	YZP 003X 179
51	52	53	54	55	56	57	58	59
				YZP 0048 187	BSF-S-15 85	M-20-H 161	BSF-S-16 85	YZP 003Y 188
41	42	43	44	45	46	47	48	49
				BSF A-2 222	M-10-H 140	YZP 003W 176	M-11-H 137	BSF A-3 222
31	32	33	34	35	36	37	38	39
				M-16-H 145	BSF-S-13 67	M-19-H 168	BSF-S-19 66	M-6-H 155
21	22	23	24	25	26	27	28	29
				A1 Plug	M-9-H 157	M-17-H 167	M-8-H 159	A1
11	12	13	14	15	16	17	18	19

BSR CORE

56
 LOADING NO.
 January 22, 1979
 DATE
 2.96% $\Delta k/k$
 EXCESS REACTIVITY
 5088 g
 OPERATING MASS

ROD POSITIONS AT CRITICAL (With Operating Mass)

ROD NO.	IN. WITHDRAWN	
1	9.22	11.21
2	9.22	11.21
3	9.22	11.21
4	9.22	11.21
5	23.00	11.21
6	23.00	11.21

REMARKS:

Fig. 1. Core Loading 56 BSR

Fig. 2. Core Loading 57 BSR

BSR CORE

57

LOADING NO	March 2, 1979
DATE	4.21% $\Delta k/k$
EXCESS REACTIVITY	4932 g
OPERATING MASS	

ROD POSITIONS AT CRITICAL (With Operating Mass)

ROD NO.	IN. WITHDRAWN	
1	10.63	12.32
2	10.63	12.32
3	10.63	12.32
4	10.63	12.32
5	23.00	12.32
6	23.00	12.32

REMARKS:

Core 57 used for LITF experiment runs.

81	82	83	84	FC	YZP 0042 179	M-18-H 175	YZP 0046 181	A1
71	72	73	74	M-12-H 167	E NRL	Solid A1	E NRL	YZP 0047 174
61	62	63	64	YZP 0040 188	B-198-C 62	M-15-H 171	B-199-C 64	YZP 0041 186
51	52	53	54	BSF A-5 222	M-13-H 147	YZP 0044 172	M-14-H 143	BSF A-4 222
41	42	43	44	YZP 0048 181	BSF-S-15 83	M-20-H 154	BSF-S-16 83	YZP 003Y 182
31	32	33	34	BSF A-2 215	M-10-H 134	YZP 003W 169	M-11-H 131	BSF A-3 216
21	22	23	24	M-16-H 146	BSF-S-18 66	M-19-H 163	BSF-S-19 65	M-6-H 152
11	12	13	14	A1 Plug	YZP 003X 174	M-17-H 163	M-8-H 156	A1

BSR CORE

58

LOADING NO.
April 16, 1979
DATE
4.47% $\Delta k/k$
EXCESS REACTIVITY
5086 g
OPERATING MASS

ROD POSITIONS AT CRITICAL (With Operating Mass)

ROD NO.	IN. WITHDRAWN	
1	10.10	12.10
2	10.10	12.10
3	10.10	12.10
4	10.10	12.10
5	23.00	12.10
6	23.00	12.10

REMARKS:

Fig. 3. Core Loading 58 BSR

				FC	YZP 0042 179	M-18-H 174	YZP 0046 181	A1
81	82	83	84	85	86	87	88	89
				M-12-H 166	E NRL	Solid A1	E NRL	YZP 0047 173
71	72	73	74	75	76	77	78	79
		EAST D.O.		YZP 0040 187	B-198-C 62	M-15-H 170	B-199-C 63	YZP 0041 185
61	62	63	64	65	66	67	68	69
		TANK		BSF A-5 222	N-13 146	YZP 0044 171	M-14-H 142	BSF A-4 221
51	52	53	54	55	56	57	58	59
				YZP 0048 180	BSF-S-15 83	M-20-H 153	BSF-S-16 82	YZP 003Y 181
41	42	43	44	45	46	47	48	49
				BSF A-2 214	YZP 003X 173	YZP 003W 168	M-17-H 162	BSF A-3 215
31	32	33	34	35	36	37	38	39
				M-16-H 146	BSF-S-13 66	M-19-H 162	BSF-S-14 65	M-6-H 151
21	22	23	24	25	26	27	28	29
				A1 Plug	M-7-H 150	M-9-H 154	M-8-H 155	A1
11	12	13	14	15	16	17	18	19

BSR CORE

59

LOADING NO.

May 9, 1979

DATE

5.15% $\Delta k/k$

EXCESS REACTIVITY

5101 g

OPERATING MASS

ROD POSITIONS AT CRITICAL
(With Operating Mass)

ROD NO.	IN. WITHDRAWN	
1	8.95	10.95
2	8.95	10.95
3	8.95	10.95
4	8.95	10.95
5	23.00	10.95
6	23.00	10.95

REMARKS:

Fig. 4. Core Loading 59 BSR

Fig. 5. Core Loading 60 BSR

BSR CORE

60

LOADING NO.
June 14, 1979
DATE
3.34% $\Delta k/k$
EXCESS REACTIVITY
4880 g
OPERATING MASS

ROD POSITIONS AT CRITICAL (With Operating Mass)

RCC NO.	IN. WITHDRAWN	
1	10.05	12.05
2	10.05	12.05
3	10.05	12.05
4	10.05	12.05
5	10.05	12.05
6	23.00	12.05
7	23.00	12.05

REMARKS:

Core 60 used for LTIF experiment runs.

Shutdowns

There were two unscheduled shutdowns during the quarter: one from an experiment setback and one from a plant-wide electrical power surge. Table 2 gives an analysis of both scheduled and unscheduled shutdowns.

Table 2. Analysis of Shutdowns

Description of Shutdown	Number	Downtime (hrs)
Scheduled		
Experimenters:		
No request to operate	4	138.517
Experiment insertion, removal or data taking	18	28.683
Repositioning of the reactor	2	5.617
Reactor Operations:		
Xenon decay for refueling	2	61.500
Refueling critical runs	3	7.567
University personnel training	6	1.150
BSR quarterly shutdown and maintenance	3	341.317
<u>SUBTOTAL:</u>	38	584.351
Unscheduled		
Experimenters:	1	0.117
Electrical Power Surge:	1	14.366
<u>SUBTOTAL:</u>	2	14.483
<u>TOTAL:</u>	<u>40</u>	<u>598.834</u>

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
4-2-79	Facility radiation and contamination monitoring system	Pool east monitron high level alarm inoperative	The high level meter was replaced.
4-5-79	Facility radiation and contamination monitoring system	Routine	Bimonthly check
4-9-79	Log-N channel	Would not calibrate	The Lcg-N amplifier was replaced.
4-11-79	Counting rate channel	Erratic readout	The lcg count rate meter was replaced.
4-30-79 through 5-1-79	Safety system	A reactor scram in the event of low ac line voltage (121A instrument power) was provided per reactor Instrument and Controls Design Change Memo BSR-2 MW-50.	To prevent possible mis-operation of the safety sigma amplifiers.
4-30-79 through 5-9-79	Instrumentation	Routine	Quarterly checks.

Table 3. Maintenance and Changes (Cont'd)

Date	Component	Trouble or Change	Reason or Maintenance
5-8-79 and 5-9-79	Pool level alarm switch assembly	The switch failed to operate during routine checkout	The level switch assembly was replaced.
5-21-79	No. 1 seat switch	The switch failed	A new seat switch was installed.
6-8-79	ΔP channel	Recorder readout spiking	The power supply was replaced.
6-15-79 through 6-18-79	ΔT channel	The thermo-bulbs failed	The thermo-bulbs were replaced and calibrated.
6-19-79	Log-N channel	Noisy and erratic readout	The power supply was replaced.
6-20-79	Miscellaneous radiation recorder	Improper response of the printout mechanism	The recorder drive cable was replaced.
6-25-79	Log-N channel	Sluggish response	The Log-N recorder amplifier was replaced.

Table 4. Maintenance and Changes, Mechanical System

Date	Component	Trouble or Change	Reason or Maintenance
4-11-79	Reactor secondary tower, North fan	Noisy and uneven operation	Replaced the stainless steel shot in the Dodge Flexidyne coupling, and replaced the shaft bearings to correct the trouble.
5-2-79 and 5-3-79	Shim-rod assemblies No. 1, 2, 3, 4, 5, and 6	Routine inspection	The shim-rod assemblies were removed to the underwater work platform for inspection as follows: Visual inspection - No evidence of cracks; Straight edge inspection - results satisfactory; Gauged, using 0.010 in. and 0.020 in. oversized gauges and feeler gauges - results satisfactory. Rust was cleaned from the armatures and magnets. The clutch switches were cleaned and the guide tubes brushed.
5-7-79	Reactor secondary tower, South fan	Routine maintenance	Replaced the stainless steel shot in the fan coupling.
5-8-79	Reactor secondary tower fans	Routine maintenance	The oil was changed in the fan gear boxes.

Table 5. Maintenance and Changes, Process System

Date	Component	Trouble or Change	Reason or Maintenance
4-30-79	Seccdary cooling tower basin	Routine cleaning and inspection	The secondary tower basin was drained, cleaned and refilled.
5-3-79 through 5-7-79	Heat exchanger (secondary side)	Reduction of efficiency	The heads of the secondary side of the heat exchanger were removed and the following work completed before re-installing: brushed and flushed the tubes, cleaned the heads, and installed new head gaskets.
6-25-79	Secondary cooling tower	Faulty make-up water valve	A new water valve (HCV-81) was installed.

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	2	0	2
Control rod fuel elements depleted	0	0	0
New fuel elements placed in service	7	2	9
New control rod fuel elements placed in service	0	0	0
New fuel elements available for use	22	12	22
New control rod fuel elements available for use	2	2	2
Partially depleted fuel elements available for use	2	7	2
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	2	2	2

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 using west D ₂ O tank	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
Steel specimen experiments	Core positions 76 and 78	Naval Research Laboratory
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
Liquid nitrogen cryostat ^b	On instrument bridge	Solid State
Ambient temperature facility ^b	North face of core	Solid State

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

^bOn standby.

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
39	1-9-74	3-13-74	1,320,000	1,931	101	6.2	6.0	666,000	908,000
40 ^a	3-15-74	7-30-74	1,400,000	9	0	6.2	6.0	364,000	1,132,000
41	8-16-74	12-4-74	1,500,000	2,316	385	5.8	5.8	630,000	895,000
42 ^b	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 ^b	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	5.8	1,183,000	1,910,000
55	4-11-79	In Service	2,250,000	2,188	164	5.5	5.7	1,006,000	1,675,000

^aThe reactor was shut down during the entire run.

^bNew 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 (%)
6-14-79	North Bank	DOP	99.996
6-14-79	Center Bank	DOP	99.996
6-14-79	South Bank	DOP	99.997

Special Programs

The University Engineering Department Experiments

The BSR was used for a training lab for university nuclear engineering students as described below.

Xenon Buildup and Decay Experiments

On April 27, 1979 following operation at 2 MW to achieve xenon equilibrium, the power level of the BSR was reduced to 4 kW to begin an experiment for students from the University of Tennessee to study the buildup and decay of xenon in the BSR core. The students performed all activities associated with the experiment under the direct supervision of an Operations Division supervisor. The experiment was an exercise in:

- 1) maintaining the reactor critical at 4 kW, 2) determining the reactivity worth of a shim rod under varying concentrations of xenon, and 3) determining the reactivity worth of xenon in the core as a function of time.

Table 10. Operational Activities

Date	Remarks
4-6-79	The skimmer filters were changed.
4-30-79	The emergency electrical power quarterly test was completed with satisfactory results.
5-7-79	All fuel elements including shim-rod fuel elements were visually inspected with satisfactory results.
5-9-79	The containment system quarterly functional checks were performed with satisfactory results.
6-4-79	The skimmer filters were changed.

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 month or longer. Other surveillance requirements which will not be reported are satisfied by routine completion of daily and weekly check sheets, startup 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
Biennial Tests		
Inspection of the shim-safety rods	5-3-79	4-26-78
Annual Tests		
Calibration of shim-safety rods	11-20-78	5-4-78
Core ΔT channel calibration	5-8-79	3-1-79
Primary coolant flow channel calibration	8-16-78	7-20-77
Pool water level channel calibration	5-8-79	11-16-78
Maximum rate of reactivity addition by the shim-safety rods	5-9-79	2-28-79
Reactivity assigned to the servo-control system	2-27-79	8-17-78
Subcriticality with each shim-safety rod at its upper limit while all other shim-safety rods are fully inserted	5-9-79	2-28-79
Semiannual		
Cell ventilation filter efficiency		
A. Methyl Iodine	1-9-78	6-22-78
B. Elemental Iodine	12-7-78	11-14-78
C. Dioctyl Phthalate	6-14-79	12-13-78
Radiation monitoring equipment calibration	6-5-79	4-5-79
Stack radiation monitor calibration ^a	6-27-79	3-1-79
Quarterly		
Safety channel No. 1 calibration	5-7-79	2-27-79
Safety channel No. 2 calibration	5-7-79	2-27-79
Safety channel No. 3 calibration	5-7-79	2-27-79

Table 11. Summary of Surveillance (Cont'd)

Test	Most Recent Test	Previous Test
Quarterly (Cont'd)		
Log-N channel calibration	5-8-79	2-27-79
Fission chamber channel calibration	5-8-79	2-27-79
Flapper valve position channel functional test	5-8-79	3-1-79
Measurement of release time and flight time for the safety-shim rods	5-9-79	2-28-79
Containment closure system functional test	5-9-79	3-1-79
In-leakage during containment mode	5-9-79	3-1-79

^aThis test is performed by-weekly.

POOL CRITICAL ASSEMBLY

Operations

The PCA was used 13.5 hours as an experiment facility for the benefit of nuclear engineering students from the University of Kentucky, 208.4 hours for the Reactivity Determination using Spectra Density Measurements Experiment, and 135.0 hours for the Pressure Vessel Simulator Benchmark Experiment. Operational activities in preparing the facility for use included a checkout 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
4-3-79	Established core No. 251 to obtain a critical mass following the standard approach-to-critical procedure	Training lab for the University of Kentucky Nuclear Engineering students	10.9
4-3-79	Established core No. 77 to permit calibration of the regulating rod	Training lab for the University of Kentucky Nuclear Engineering students	2.6
4-16-79 through 5-23-79	Established cores No. 252, 253, 254, 255, and 256 for the Reactivity Determination using Spectral Density Measurements Experiment	Training lab for the University of Tennessee Nuclear Engineering student	208.4
5-24-79 through 6-29-79	Established cores No. 238, 257, and 258 for the Pressure Vessel Simulator Benchmark Experiment	Experiment data	135.0

Table 13. PCA Maintenance

Date	Component	Trouble or Change	Action
4-9-79 through 4-11-79	Instrumentation	Routine	Quarterly checks
4-10-79	Counting rate channel	Did not meet speci- fications	The log count rate meter was re- placed
4-10-79	No. 3 safety channel	Did not meet speci- fications	The composite ampli- fier was replaced

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 month or longer. Other surveillance requirements which are not reported are satisfied by routine completion of daily and weekly check sheets, startup 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
Annual		
Reactivity assigned to the servo-control system	3-28-79	6-26-78
Subcriticality with each shim-safety rod at its upper limit and all other shim-safety rods fully inserted	4-11-79	1-4-79
Semiannual		
Monitron calibration ^a	6-26-79	6-18-79
Radiation monitoring equipment calibration	6-5-79	4-5-79
Quarterly		
Safety channel No. 1 calibration	4-10-79	1-4-79
Safety channel No. 2 calibration	4-10-79	1-4-79
Safety channel No. 3 calibration	4-10-79	1-3-79
Log-N channel calibration	4-10-79	1-3-79
Fission chamber channel calibration	4-10-79	1-3-79
Measurement of release time and flight time for the shim-safety rods	4-11-79	1-4-79

^aThis test is performed the first operating day of each week.

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