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Bulk Shielding Facility Quarterly Report October, November, and December 1987

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Research Reactors Division
Reactor Operations Section

BULK SHIELDING FACILITY QUARTERLY REPORT OCTOBER, NOVEMBER, AND DECEMBER 1987

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Research Reactors Division

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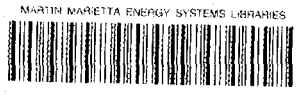

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BULK SHIELDING FACILITY QUARTERLY REPORT
OCTOBER, NOVEMBER, AND DECEMBER 1987

SUMMARY

The Bulk Shielding Reactor (BSR) remained shutdown during October, November, and December. Water-quality control in both the reactor primary and secondary cooling systems was satisfactory.

The Pool Critical Assembly (PCA) is shutdown for shim-safety rod magnets and associated electronic components upgrading.

BULK SHIELDING FACILITY

OPERATIONS

Core loading 103 is shown in Fig. 1. However, the shim-safety rod calibrations are not complete due to a reactor shutdown ordered by the Department of Energy on March 26, 1987.

The BSR remained down during the quarter as ordered by the Department of Energy. The basic operating data are shown in Table 1.

The Low-Temperature Neutron Irradiation Facility (LTNIF) functional testing and facility upgrading continues.

Shutdowns

The reactor remained shutdown during the quarter. Table 2 gives an analysis of the scheduled and unscheduled shutdowns.

Maintenance and Changes

Maintenance and changes to the instrumentation components in the complex are listed in Table 3.

Maintenance and changes of the process systems are listed in Table 4.

Maintenance and changes of the mechanical systems are listed in Table 5.

Operational Activities

The operational activities for the quarter are listed in Table 6.

Experiments

Work relating to LTNIF is listed in Table 7.

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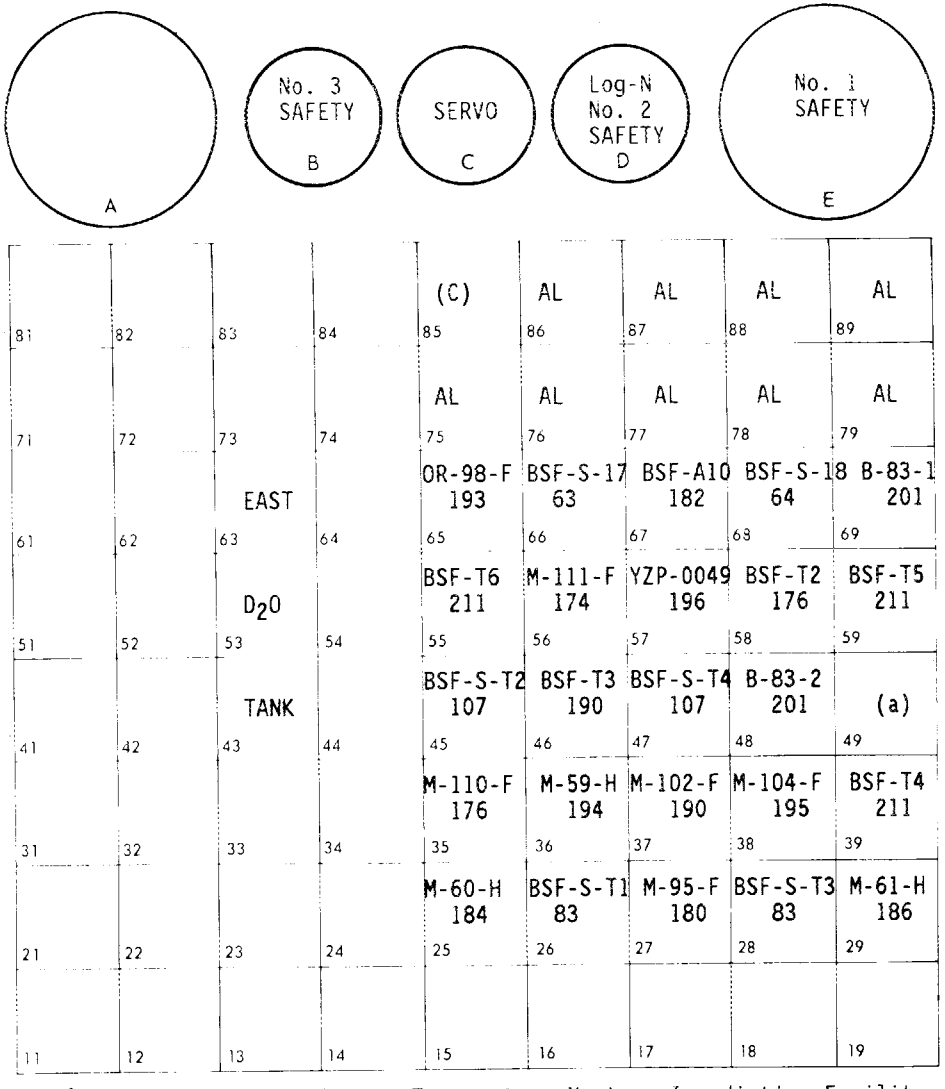

BSR CORE

LOADING NO.	103
DATE	March 24, 1987
EXCESS REACTIVITY	(b)
OPERATING MASS	3958 g

ROD POSITIONS AT CRITICAL
(With Operating Mass)

ROD NO.	IN. WITHDRAWN	
1	10.05	11.75
2	10.05	11.75
3	10.05	11.75
4	10.05	11.75
5	23.00	11.75
6	23.00	11.75

REMARKS:

DOE mandated reactor to be shut down 4 p.m., March 26, 1987

[a]Core position for the Low-Temperature Neutron Irradiation Facility.
[b]Rod calibrations are not complete due to a DOE mandated reactor shutdown on March 26, 1987.
[c]Fission chamber.

Fig. 1. Core loading 103, BSR.

Table 1. Basic operating data
(October-December 1987)

	This quarter	Last quarter	Year to date
Total energy, kWd	0	0	20,709
Average operating power, kW	0	0	439
Time operating, %	0	0	5.3
Reactor availability, %	99.9	99.9	99.9
Reactor water radioactivity, cpm/ml (av)	BG	BG	374
Reactor water resistivity, ohm-cm (av)	1,970,000	1,475,000	--
Research samples	0	0	7

Table 2. Analysis of shutdowns*

Description of shutdown	Number
Scheduled:	0
Unscheduled:	0
TOTAL:	0

*The Department of Energy ordered the reactor to be shut down on March 26, 1987. The reactor did not operate during the report period.

Table 3. Maintenance and changes, instrumentation and controls

Date	Components	Trouble/change	Maintenance performed
10-5-87	Servo computer	Faulty module	Replaced heat power module in servo programmable computer
10-29-87	FRCAS	Routine	Quarterly checks
11-3-87	BSR remote	Routine	Contractor installed conduit and terminal box for fiber optics
12-7-87	FRCAS	Routine	Bimonthly checks
12-11-87	Linear amplifier	Faulty connection	Repaired cable connection
12-16-87	Annunciator panels	New	Installed new annunciator panel in panel H
12-31-87	Seismic alarm	New	Installed seismic alarm channels

Table 4. Maintenance and changes, process systems

Date	Components	Trouble/change	Maintenance performed
10-8-87	Cell vent charcoal filters	Failed elemental iodine test	Replaced all three banks of filters
10-20-87	Control room thermostat	Changed location	Relocated thermostat
12-14-87	Pressure relief valve on acid mix tank	Failed test	Installed new pressure relief valve
12-15-87	BSR vault steam	Steam leak	Repaired steam leak

Table 5. Maintenance and changes, mechanical systems

Date	Components	Trouble/change	Maintenance performed
10-9-87	Secondary tower fans	Routine	Checked load amps on fans
10-28-87	Overhead crane	Faulty brakes	Replaced brakes
10-29-87	Overhead crane	Replaced brakes	Inspected and load tested overhead crane
11-3-87	Primary water system	Damaged insulation	Repaired insulation
12-17-87	Decay tank sparger	New equipment	Installed sparger in decay tank

Table 6. Operational activities

Date	Remarks
10-13-87	Tagged NOG system in stack area to ensure proper valving on relief valves
12-31-87	Completed cell vent system quarterly checks
12-31-87	Completed emergency electrical power quarterly test

Table 7. Experiment facilities activity, LTNIF

Date	Remarks
10-13-87	Transferred LTNIF electromagnet assembly to pool storage dewar
10-29-87	Pulled cryostat insert and plug, placed in storage area
11-3-87	Installed catch tray on cryostat top
11-11-87	Pulled gas circulating fan assembly from cryostat to be modified
11-13-87	Replaced gas fan assembly into cryostat
11-25-87	Transferred dewar from west laboratory to north end of bay area

Fuel

Changes in the fuel inventory are reported in Table 8.

Table 8. Fuel and shim-safety rod status

	This quarter	Last quarter	Year to date
Fuel elements depleted	0	0	0
Shim-safety rod fuel elements depleted	0	0	0
New fuel elements placed in service	0	0	0
New shim-safety rod fuel elements placed in service	0	0	0
Partially depleted shim-safety rod fuel elements	6	6	6
New fuel elements available for use	15	15	15
New shim-safety rod fuel elements available	7	7	7
Partially depleted fuel elements available for use (includes core)	30	30	30
New boron stainless steel shim-safety rods placed in service	0	0	0
Boron stainless steel shim-safety rods in service	6	6	6
Boron stainless steel shim-safety rods available for use	1	1	1

Experiment Facilities Assignments

Experiment facilities assignments are listed in Table 9. The tubes of the east D_2O tank are not permanently assigned; they have been used by various Laboratory personnel for short-term sample irradiations.

Table 9. Experiment facilities assignments

Facility	Location	Division or sponsor
Dry thermal-neutron tubes (D-3-1 and -2)	East D_2O tank	Research Reactors
Wet thermal-neutron tubes (D-4-1 and -2, D-6-1, -2, -3, -4, and -5)	East D_2O tank	Research Reactors
Low-Temperature Neutron Irradiation Facility (LTNIF)	Southwest corner of pool	Solid State

Demineralizer Performance

Table 10 gives detailed information on the condition of the primary water system for the preceding quarters and pertinent data on the performance of the bypass demineralizer.

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 are not reported are satisfied by routine completion of daily and weekly check sheets, start-up checklists, hourly data sheets, the operating log book, and miscellaneous quality assurance tests.

Table 10. Demineralizer performance data

Run No.	Initiation date	Termination date	Throughput (gal)	Gross gamma (cpm/ml)		pH		Specific resistance (ohm-cm)	
				In	Out	In	Out	In	Out
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	8-11-81	1,250,000	1,941	141	5.4	5.7	896,000	2,258,000
65	8-12-81	9-8-81	425,000	2,163	142	5.2	5.4	445,000	1,126,000
66[a]	9-19-81	1-3-82	850,000	1,666	119	5.4	5.6	1,138,000	1,980,000
67	1-4-82	4-5-82	2,400,000	1,874	150	5.4	5.6	970,000	1,691,000
68	4-7-82	7-8-82	2,000,000	1,841	138	5.3	5.5	915,000	1,841,000
69	7-9-82	7-27-82	750,000	1,962	129	5.2	5.4	720,000	1,136,000
70[a]	9-22-84	8-30-83	1,900,000	527	59	5.2	5.4	1,180,000	2,034,000
71[b]	8-31-83	5-15-84	2,693,560	2,961	166	5.6	5.8	1,030,000	1,830,000
72	6-5-84	9-11-84	2,851,200	--	--	5.5	5.7	1,025,000	2,000,000
73	9-13-84	2-8-85	2,650,000	2,467	230	5.6	5.9	758,000	1,289,000
74	2-16-85	4-1-85	1,114,560	2,565	--	5.6	6.1	468,000	1,501,000
75[a]	4-2-85	7-16-85	3,389,760	3,337	282	5.7	6.1	736,000	1,590,000
76	7-19-85	12-6-85	4,354,460	3,727	196	5.7	5.9	840,000	1,818,000
77	12-10-85	4-9-86	3,543,400	1,268	104	5.7	5.8	1,023,000	2,033,000
78	4-11-86	9-15-86	4,521,600	3,238	365	5.9	6.2	686,000	1,613,000
79	9-17-86	11-1-86	1,094,400	1,122	141	5.8	5.9	939,000	2,165,000
80	11-14-86	1-26-87	530,000	1,910	162	6.0	6.4	641,000	1,583,000
81[a]	1-30-87	9-3-87	4,665,600	374	47	5.6	5.7	922,000	1,708,000
82	9-8-87	--	--	--	--	--	--	--	--

[a]New resin in the demineralizer columns.

[b]The demineralizer operated on low flow (approximately 7 gpm) from September 26, 1983, to January 17, 1984, due to a failure of the booster pump.

Table 11. Summary of surveillance tests at the BSR

Test	Most recent test	Previous test
Biennial tests		
Inspection of the shim-safety rods	1-22-87	9-23-85
Annual tests		
Core dT channel calibration	9-25-87	9-29-86
Core dP channel calibration	9-30-87	9-30-86
Primary coolant flow channel calibration	9-30-87	9-30-86
Pool water-level channel calibration	9-30-87	6-10-87
Maximum rate of reactivity addition by the shim-safety rods	3-26-87*	12-16-86
Reactivity assigned to the servo-control system	3-26-87*	5-2-86
Subcriticality with each shim-safety rod at its upper limit while all other shim-safety rods are fully inserted	9-25-87	6-9-87
Semiannual		
Cell-ventilation filter efficiency		
A. Elemental iodine	10-9-87	9-25-87
B. Dioctyl phthalate	6-22-87	12-12-86
Continuous air monitor	8-5-87	5-5-87
Radiation monitron	9-3-87	6-3-87
Stack radiation monitor calibration	11-24-87	3-16-87

Table 11. (Continued)

Test	Most recent test	Previous test
Semiannual (continued)		
NOG filter system efficiency		
Elemental iodine test - east bank	8-11-87	7-2-87
Elemental iodine test - west bank	12-21-87	8-27-87
Dioctyl phthalate test - east bank	9-3-87	8-11-87
Dioctyl phthalate test - west bank	9-3-87	3-2-87
Quarterly		
Safety channel No. 1 calibration	12-4-87	9-24-87
Safety channel No. 2 calibration	12-9-87	9-24-87
Safety channel No. 3 calibration	12-9-87	9-24-87
Log-N channel calibration	12-9-87	9-23-87
Fission chamber channel calibration	3-11-87**	12-4-86
Flapper valve position channel functional test	12-16-87	9-30-87
Measurement of release time and time of flight for the shim-safety rods	12-14-87	9-25-87
Containment closure system functional test	12-31-87	9-10-87
In-leakage during containment mode	12-31-87	9-10-87
Ten year		
Syphon break system functional test	7-17-86	3-11-82
Reactor containment inspection	9-22-83	1-3-75

Table 11. (Continued)

Test	Most recent test	Previous test
Ten year (continued)		
Support structure inspection	9-22-83	1-3-75
Reactor bridge inspection	8-30-85	10-12-72
Primary piping (in-pool) inspection	6-16-87	1-3-75
Primary piping (pump house) inspection	9-4-85	10-12-72
Primary piping (valve pit) inspection	8-26-85	10-12-72
Primary pump (when accessible	3-19-81	5-5-80
Others		
Calibration of shim-safety rods	3-26-87*	5-2-86
Emergency electrical power test	12-31-87	9-10-87
LTNIF, pool water level, functional test	6-5-87	1-20-87

*Rod calibrations are not complete due to the DOE-ordered shutdown on March 26, 1987.

**Counts not sufficient to make calibration check. This will be done prior to reactor startup.

POOL CRITICAL ASSEMBLY

OPERATIONS

The PCA is shutdown for shim-safety rod magnets and associated electronic components to be upgraded. The fuel elements have been shipped to Savannah River for reprocessing.

SURVEILLANCE TESTS AT THE PCA

Shim-safety-rod magnets and associated electronic components are being upgraded at the PCA. Until this work is completed, it will not be possible to make all the surveillance tests required at this facility by the Technical Specifications. Thus, a waiver of the PCA Technical Specifications surveillance test requirements during the proposed modification and component replacement period was granted.[1]

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[1]Letter to B. L. Corbett from K. H. Poteet, subject "Waiver of Surveillance Tests at the PCA," March 26, 1985.

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