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Oak Ridge Research Reactor Shutdown Maintenance and Surveillance Quarterly Report October, November, and December 1987

G. H. Coleman
D. L. Laughlin

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FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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

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Research Reactors Division
Reactor Operations Section

OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE AND SURVEILLANCE QUARTERLY REPORT OCTOBER, NOVEMBER, AND DECEMBER 1987

G. H. Coleman
D. L. Laughlin

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Research Reactors Division

Date Published - March 1988

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Prepared by the
Oak Ridge National Laboratory
Oak Ridge, Tennessee 37831
operated by
MARTIN MARIETTA ENERGY SYSTEMS, INC.
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OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE AND SURVEILLANCE QUARTERLY REPORT OCTOBER, NOVEMBER, AND DECEMBER 1986

SUMMARY

The ORR was not operated during October, November, and December of 1987.

Maintenance activities, both mechanical and instrument, were essentially routine in nature. Details of fuel usage and inventory may be found in Table 1.

SHUTDOWNS

Reactor downtime (power level $<N_L$) totaled 2209 hours. A summary of the shutdown is given in Table 2, and details of the scheduled shutdown are contained in Table 3. Shutdown activities are shown in Table 4.

INSTRUMENTATION AND REACTOR CONTROLS

The performance of the instrumentation for the facility was satisfactory, and maintenance required is indicated in Table 5.

PROCESS SYSTEM

The performance of the process system was satisfactory, and maintenance required is indicated in Table 6.

EXPERIMENT FACILITIES, AND GASEOUS-WASTE FILTERS

Experiment facility usage is given in Table 7. Table 8 summarizes the results of efficiency tests of the various gaseous-waste filters.

Table 1. Fuel status

	This quarter	Last quarter
HEU		
Depleted fuel elements transferred for chemical recovery	0	0
Average percent burnup of fuel elements transferred	--	--
New elements, start of quarter	139	139
New elements received	0	0
New elements placed in service	0	0
New elements, end of quarter	139	139
Special or test elements	21	21
Depleted shim-safety rod elements transferred for chemical recovery	0	0
Average percent burnup of shim-safety rods transferred	--	--
New shim-safety rod elements, start of quarter	8	8
New shim-safety rod elements received	0	0
New shim-safety rod elements placed in service	0	0
New shim-safety rod elements, end of quarter	8	8

Table 1. (continued)

	This quarter	Last quarter
LEU		
Depleted fuel elements transferred for chemical recovery	0	0
Average percent burnup of fuel elements transferred	--	--
New elements start of quarter	30	30
New elements received	0	0
New elements placed in service	0	0
New elements end of quarter	30	30
Special or test elements	0	0
Depleted shim-safety rod elements transferred for chemical recovery	0	0
Average percent burnup of shim-safety rods transferred	--	--
New shim-safety rod elements start of quarter	4	4
New shim-safety rod elements received	0	0
New shim-safety rod elements placed in service	0	0
New shim-safety rod elements end of quarter	4	4

Table 2. Analysis of shutdowns

Description of shutdown	Number	Downtime (h)
Scheduled		
Special, DOE shutdown*	1	2209.0
Subtotal:	1	2209.0
Unscheduled		
Subtotal:	0	0000.0
TOTAL:	1	2209.0

*The Department of Energy ordered the Oak Ridge Research Reactor to be placed in permanent shutdown on July 14, 1987.

Table 3. Scheduled shutdowns, details

Date	Duration (h)	End cycle	Remarks
10-1-87 thru 12-31-87	2209.0	--	The ORR was shut down on March 26, 1987, by the Department of Energy orders for shutdown of class A and B reactors. On July 14, 1987, the Department of Energy issued orders for the ORR to be placed in permanent shutdown status.

Table 4. Shutdown activities

Date	Remarks
10-8-87	Loaded and shipped three gadolinium target rods to isotopes
10-12-87	Transferred all drums of tower treatment chemicals from Building 3103 to Building 3117
10-13-87	Cooling tower sludge dumpster removed from Buildings 3103 and 3086
10-13-87 thru 10-14-87	Cut eight aluminum core pieces in half
10-14-87	Cleaned pool demineralizer strainers to increase flow.
10-16-87	Loaded VITRO carrier with 14 halves of aluminum core pieces and shipped to burial ground
10-19-87	Cut 7 aluminum core pieces in half, loaded 14 halves in VITRO carrier and shipped to burial ground
10-20-87	Cut two aluminum core pieces and two solid aluminum pieces in half
10=21=87	Loaded VITRO carrier with 14 halves of aluminum pieces and shipped to burial ground
10-22-87	Loaded and shipped 26 previously irradiated iridium rods to HFIR facility for continued irradiation
10=-22-87	Cut two solid aluminum pieces in half
10-22-87	Removed 12 beryllium and 1 solid aluminum core piece from core. Reactor vessel core is now empty
10-22-87	Returned 37 rolls small red plastic bags to George Profitt at Building 7018 for credit
10-23-87	Loaded VITRO carrier with ten halves of solid aluminum core pieces and eight aluminum end boxes and shipped to burial ground
10-26-87	Cut 10 aluminum shim rod extrusions and 11 sample rod holders in half

Table 4. (continued)

Date	Remarks
10-26-87	Loaded VITRO carrier with 14 aluminum extrusions halves and 22 sample rod holder halves and shipped to burial ground
10-27-87	Experimenter removed dummy modules from HFED core piece
10-27-87	Cut seven aluminum shim rod extrusions and one HFED core piece in half
10-27-87	Loaded VITRO carrier with 13 aluminum shim rod extrusion halves and one HFED core piece and shipped to burial ground
10-29-87	Cut two aluminum core pieces in half
10-30-87	Loaded VITRO carrier with aluminum shim rod extrusions, aluminum core pieces, aluminum sample holders, aluminum spacers, and shipped to burial ground
11-2-87	Removed the north and south holddown arms from reactor vessel and stored on center pool grating
11-2-87	Cut three aluminum core pieces in half
11-3-87	Cut four aluminum core pieces in half
11-3-87	Double bagged two drums of spent resin and placed in oversized drums to protect against leakage
11-3-87	Loaded VITRO carrier with fourteen aluminum core piece halves, 2 aluminum sample holders and shipped to burial ground
11-4-87	Removed small empty gamma irradiator fuel rack from pool floor, bagged and placed in third level c-zone
11-12-87	Closed HB-1, 2, 3, 4, 5 and 6 shutters
11-13-87	Drained beam hole plugs HB-2, 3 and 5. All beam hole plugs empty and placed on air purge to normal off-gas system
11-13-87	Removed four antimony samples from Be RA-5 and placed in the isotope platform. A total of eight antimony samples are stored on the platform

Table 4. (continued)

Date	Remarks
11-16-87 thru 11-17-87	Measured temperature of pool and primary water with and without flow to determine gamma heat contribution for a period of forty eight hours. No significant change in temperature without flow was detected
11-16-87 thru 11-17-87	Double bagged and placed nine drums of spent demineralizer resin in oversized drums to protect against leakage
11-18-87	Placed HFED module 32 containing 8 Ni dummy plates in basket and transferred dummy modules 15, 16, 19 20, 21, and 26 to saw box
11-19-87	New fuel elements B-090, B-091, B-092, B-093, B-094, T-563, T-564, and T-565 transferred from 3042 vault to Y-12 storage vault
11-24-87	Stored transfiles and filing cabinets from Butler Building (7910) at first level north
12-8-87	Removed five fission chambers from five dry tubes in west pool
12-8-87	Transferred dry tube from west pool to reactor tank for radiation measurements in reactor tank
12-9-87	Took radiation readings in reactor tank. The highest reading obtained was 25,000 R/h
12-9-87	Performed a radiation measurement of a previously irradiated shim rod cadmium section. Read 200 mR/h through 9 in. water and 4 in. air
12-9-87	Regenerated Building 3001 canal demineralizer
12-11-87	Transferred dry tube used for radiation measurements from reactor tank to west pool
12-14-87	Regenerated the resin in pool demineralizer anion column
12-17-87	Transferred MFE-7J experiment to south hot cell
12-30-87	Removed degasifier demineralizer from service

Table 4. (continued)

Date	Remarks
12-30-87	Continued wetting wood of secondary towers once a week as a means of fire prevention
12-30-87	Continued scanning of LEU elements to determine fission product content
12-30-87	Water quality during quarter: pool water resistivity ohm-cm 1,176,000; reactor water resistivity ohm-cm 1,612,000; pool water radioactivity cpm/ml BG; and reactor water radioactivity cpm/ml BG
12-30-87	All ORR/BSR personnel successfully completed written and oral recertification exams during the quarter pertaining to BSR

Table 5. Maintenance and changes, instrumentation and controls

Date	Component	Trouble or change	Reason or maintenance
10-29-87	FRCAS	--	Quarterly checks
11-25-87	FT-1B transmitter	--	Set and calibrated
11-30-87	North and south standpipe recorder	--	Broken air supply tubing to recorder repaired
12-2-87	Control room CAM	Spurious alarms	Repaired and returned to service
12-7-87	FRCAS	--	I&C bimonthly check
12-8-87	Cell vent	--	I&C made quarterly functional tests of transmitters, PT-65, PT-66, and radiation alarms
12-8-87	NOG	--	I&C made quarterly functional tests of transmitters PT-63, PT-64, and radiation alarms
12-8-87	Seismic channels	--	I&C made quarterly tests of A and C channels
12-9-87	Reactor tank	--	I&C set up chamber and instruments to read radiation levels in tank
12-14-87	Building 3085 security system	--	Programmed maintenance

Table 6. Process systems, maintenance and changes

Date	Component	Remarks
10-12-87	Steam tracing	P&E repaired leaks
10-14-87	Pool demineralizer	Removed and replaced tops of strainers for cleaning
10-19-87	Fuel clamp tool	P&E repaired broke rod
10-20-87	Exhaust fans	P&E performed programmed maintenance on basement exhaust fan and exhaust fans EF-1 and EF-2 above laboratory in basement
10-21-87	Primary pumps exit valves	P&E lubricated limit torque drive
10-23-87	Steam supply line	P&E repaired broken steam line over Analytical Chemistry laboratory in basement
10-29-87	Overhead crane	P&E made visual inspection
11-12-87	No. 3 dc unit	Programmed maintenance
11-19-87	North facility	Riggers transferred miscellaneous experiment equipment to salvage
11-20-87	MFE-7J experiment	P&E prepared experiment for transfer to south hot cell
11-23-87	Centravac	P&E removed from service and drained air conditioning tower for the winter
11-23-87	"A" frames, hoists and chokers	QA&I checked and brought tags up to date
11-23-87	Nos. 1 and 2 dc units	Programmed maintenance
12-1-87	MFE transfer cask	Riggers transferred to 3025
12-9-87	Primary flow	Pipefitter installed new air regulator for 3085 transmitters

Table 6. (continued)

Date	Component	Remarks
12-9-87	3001 canal demineralizer	Pipefitter removed spool piece for regeneration
12-10-87	3001 canal demineralizer	Pipefitter reinstalled spool piece after regeneration completed
12-11-87	Overhead crane	Programmed maintenance
12-14-87	Pool demineralizer	Pipefitter removed spool pieces for regeneration of demineralizer
12-15-87	Pool demineralizer	Pipefitter reinstalled spool pieces after regeneration completed
12-15-87	Cell vent	QA&I made elemental iodine test on charcoal fitters
12-16-87	North and south facility pumps	Starters locked out, north pump motor removed for repair, and started replacing south pump seals
12-17-87 and 12-22-87	NOG	QA&I ran elemental iodine tests on west bank
12-21-87	North facility pump	Reinstalled repaired rebuilt motor

Table 7. Experiment facility usage

Facility	Access flange	Date installed	Date removed	Description of experiment	Division or sponsor
C-3	V-10	6-28-85	6-29-87	Material test, fusion program (MFE-7J)	Engineering Technology
C-7	V-2	6-28-85	6-29-87	Material test, fusion program (MFE-6J)	Engineering Technology
E-3	None	6-28-85	2-17-87	Aluminum-base, dispersion-type fuel plates (HFED)	Engineering Technology
HB-1	None	9-78		Neutron spectrometer	Solid State Physics
HB-2	None	11-1-58		Neutron diffraction experiments	Solid State Physics
HB-4	None	9-78		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		Neutron diffraction experiment	Instrumentation and Controls
South facility	None	12-16-63		Cold-finger plug[a]	Research Reactors

[a]The facility is on standby.

Table 8. Status of filters, gaseous waste systems

Type filter	Bank designation	Date last changed	Date last tested	Type test	Retention efficiency (%)
		Cell-ventilation system			
CWS	Overall[a]	North, 4-16-80 South, 8-14-85	9-3-87	DOP	99.990
Charcoal	Both banks	North, 6-30-87 South, 8-14-85	12-15-87	Elemental iodine	99.881[b]
		Basement hood exhaust			
CWS	South	3-11-80	9-3-87	DOP	99.996
CWS	North	3-11-80	9-3-87	DOP	99.995
		Normal off-gas			
CWS	West	8-25-87	9-3-87	DOP	99.998
Charcoal	West	8-25-87	12-21-87	Elemental iodine	99.646[c]
CWS	East	6-30-87	8-7-87	DOP	99.958
Charcoal	East	6-30-87	8-11-87	Elemental iodine	99.984

[a]The CWS filters in the cell-ventilation system were checked in series.
[b]Failed - Maintenance request to change out filters issued.
[c]Failed - Maintenance request to change out filters issued.

SUMMARY OF SURVEILLANCE TESTS

Table 9 is a tabulation of the completion dates of the shutdown surveillance tests required by the Technical Specifications. This table reflects only the shutdown surveillance requirements for the ORR facility. The technical specifications document is currently under revision to address only shutdown surveillance requirements. This document will be submitted to RORC and DOE for review and approval. 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 logbook, and miscellaneous quality assurance tests.

Table 9. Summary of surveillance tests

Test	Most recent	Previous
Biennially		
Normal off-gas vacuum monitor calibration	10-1-87	9-5-86
Building ventilation flow monitor calibration	5-5-87	11-19-86
Semiannually		
Pressure-drop measurements across NOG filters	12-27-87	6-28-87
NOG filter system efficiency		
Elemental iodine test - east bank	8-11-87	10-3-86
Elemental iodine test - west bank	12-21-87	8-27-87
Dioctyl phthalate test - east bank	9-3-87	8-7-87
Dioctyl phthalate test - west bank	9-3-87	3-25-87
Containment closure system function test	9-22-87	2-18-87
Cell-ventilation filter system efficiency		
Elemental iodine measurements	12-15-87	7-8-87
Dioctyl phthalate measurements	9-3-87	3-25-87
Radiation monitoring equipment calibration	10-7-87	4-8-87
Stack radiation monitor calibration	11-24-87	3-16-87

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