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OAK RIDGE NATIONAL LABORATORY

MARTIN MARIETTA

Oak Ridge Research Reactor Shutdown Maintenance and Surveillance Quarterly Report July, August, and September 1988

G. H. Coleman
D. L. Laughlin

OPERATED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
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Research Reactors Division
Reactor Operations Section

OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE AND SURVEILLANCE QUARTERLY REPORT JULY, AUGUST, AND SEPTEMBER 1988

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OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE AND SURVEILLANCE QUARTERLY REPORT JULY, AUGUST, AND SEPTEMBER 1988

SUMMARY

The ORR was not operated during July, August, and September of 1988.

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 2208 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
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

Table 1. Continued

	This quarter	Last quarter
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	2208.0
Subtotal:	1	2208.0
Unscheduled		
Subtotal:	0	0000.0
TOTAL:	1	2208.0

*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
7-1-88 thru 9-30-88	2208.0	--	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
7-5-88	Loaded OD-2 scrap carrier with 16 partial pieces of beryllium, 1 Al isotope stringer, and shipped to burial ground
7-5-88	Loaded OD-2 scrap carrier with 12 partial pieces of beryllium, 1 zirconium sleeve, and 1 Al post
7-5-88	Changed out the two nitrogen cylinders for the basement evacuation horn
7-5-88	Placed nuclear walk off mat inside and outside entrance to third level c-zone
7-6-88	Broke 14 pieces of beryllium for shipping to burial ground
7-6-88	Removed beryllium breaker from pool, cleaned, bagged, and placed in third level c-zone
7-7-88	Loaded OD-2 scrap carrier with 15 partial pieces of beryllium and 3 beryllium posts
7-8-88	Loaded and shipped to isotopes xenon rings T-6-136 and O22
7-11-88	Completed filling steel box with miscellaneous items from top of hot cell storage area
7-13-88	Transferred one dry tube to 3010
7-13-88	Made preparations at Building 3026-D for working on OD-2 scrap carrier
7-21-88	Loaded OD-2 scrap carrier with 15 partial pieces of beryllium and 2 beryllium posts
7-25-88	Loaded OD-2 scrap carrier with 17 partial pieces of beryllium
7-26-88	Loaded OD-2 scrap carrier with one Al isotope stringer, one xenon post with spacers, ionization chamber Z-183, two Al arms from sample rig, two partial pieces of beryllium, two Al plugs, one PVS dummy rod, two stainless steel beakers containing small pieces of beryllium, bolts, washers, and blocks from nose cone holder and TRIGA LEU grid parts
7-28-88	Returned beryllium breaker to HFIR
8-3-88	Cleaned six ion chamber protective covers and discarded in metal dumpster

Table 4. Continued

Date	Remarks
8-11-88	Transferred small carrier containing HFIR pressure vessel samples and stainless steel samples from Hanford to Building 3025 for Steve Spooner of Solid State Division
8-11-88	Installed new blade in underwater saw
8-11-88	Removed beryllium busting rack, beryllium racks 7 and 8 from center pool, washed off, wrapped in plastic, and stored in third level c-zone
8-12-88	Removed fuel section from three LEU shim rods
8-16-88	Bagged, taped, and had health physicist tag beryllium racks 7 and 8, piggy back racks A and B, and one utility rack for shipping to burial ground
8-17-88	Removed fuel section from three LEU shim rods
8-17-88	Installed new blade in underwater saw
8-19-88	Removed fuel section from two LEU shim rods
8-24-88	Transferred six LEU elements from Building 3042 to Building 3010
8-25-88	Transferred eight LEU elements from Building 3042 to Building 3010
8-26-88	Transferred ten LEU elements from Building 3042 to Building 3010
8-29-88	Transferred eight LEU elements from Building 3042 to Building 3010
9-1-88	Completed filling steel box with miscellaneous contaminated items to be sent to burial ground
9-7-88	Removed end boxes from five LEU elements
9-8-88	Installed new blade in underwater saw
9-8-88	Removed end boxes from two LEU, and one HEU fuel elements
9-8-88	Removed end boxes from four aluminum dummy fuel elements
9-19-88	Loaded OD-2 scrap carrier with four aluminum dummy elements, two pieces aluminum shim rod extrusions, two plugs, seven end boxes, and two shim rod bales

Table 4. Continued

Date	Remarks
9-19-88	Loaded OD-2 scrap carrier with 22 end boxes, 1 piece of steel, and 2 Al plugs
9-21-88	Transferred 24 fuel elements from racks I and VI to other racks to permit racks I and VI to be removed from pool
9-22-88	Removed racks I and VI from center pool, rinsed, wiped off, wrapped in plastic and placed in third level c-zone
9-26-88	Removed end boxes from ten LEU elements
9-29-88	Performed cell vent functional checks
9-30-88	Covered GE-700 carrier at burial ground No. 4 with tarps
9-30-88	Removed end boxes from six HEU elements
9-30-88	Continued scanning of LEU elements to determine fission product content
9-30-88	Continued wetting wood of secondary towers as a means of fire prevention
9-30-88	Water quality during quarter: pool water resistivity ohm-cm was 940,000, reactor water resistivity ohm-cm was 913,000, and pool and reactor water radioactivity cpm/ml BG

Table 5. Maintenance and changes, instrumentation and controls

Date	Component	Reason or maintenance
7-20-88	ORR instruments	I&C personnel turned off and removed fuses from: L2 - fission chamber drives and position indicators; L3 - shim rod position indicators; L4 - shim rod motor; L6 - shim rod motor; L7 - spare; L8 - shim rod motor; L10 - shim rod motor; L14 - shim rod motor; L16 - shim rod motor; L31 - magnet power; L34 - computer data acquisition system; L35 - servo and picoammeter noise channel; L36 - spare; L37 - safety recorders, ^{16}N, and gamma recorders; L39 - differential temperature recorder; L40 - startup channel and log N channel; L41 - reactor outlet temperature and differential temperature recorder; L42 - startup channel and log N channel; L43 - spare; L44 - spare; L45 - spare; L46 - spare; LX3 - digital temperature and flow instruments; and LX4 - rod seat switch indicators. The following instruments on circuit L33 turned off: POG pressure recorder, reactor tower pH recorder, and secondary cooling pH recorder. The reactor secondary water activity recorder on circuit L38 was turned off. Unplugged micromicroammeter
7-21-88	ORR instruments	I&C personnel unplugged power from safety channels A, B, and C, and undervoltage monitor. Disconnected servo heat power indicators, log N and count rate channel indicator lights, and removed battery from seat lights backup system
7-21-88	Annunciator cans	I&C personnel removed the following: DCs 1, 2 and 3, reactor and pool tower pH, reactor tower basin temperature, reactor exchanger secondary temperature, reactor secondary pump pressure low, reactor tower basin level, main pump bearing high temperature, low D/P, reactor tower fans, reactor pressure, D/T, reactor outlet temperature, main flow, water test, instrument start trip out, insert 5 rods, inactive fission chamber inserted, 1.8 N_L in start, servo rod range, N-16 test, servo trouble, setback request bypassed, period trip, level trip, 5 s period, slow scram, north and south gamma, north and south N-16, secondary activity, reverse trip, setback trip, reverse, setback, continuity and U.V. trip, A.C. line U.V., experiment setback, experiment reverse, strainer dP, test blocks, pool tower basin H_2O level, pool tower basin low temperature, emergency pump blocked, degasifier activity, and GCR common

Table 5. Continued

Date	Component	Reason or maintenance
7-22-88	Ionization chambers	The ion chambers removed from the ORR are as follows: No. 1 safety, type RSN 76A, S/N CTC-2; No. 2 safety, type RS C1-0808-202, S/N Z-182; No. 3 safety, type RS C1-0808-202, S/N B-4636; No. 1 Log N, type RS C2-1210-201, S/N A-4828; No. 2 Log N, type RS C2-1210-201, S/N A-4827; noise channel, type RS C2-1210-201, S/N A-4829; south gamma, type RS C4-0806-112, S/N W-1150; north gamma, type RS C4-0806-112, S/N Z-8494; and spare (c-zone), type RS C2-1210-201, S/N X-5921. One defective safety chamber was removed from the pool and transferred to the burial ground, type RS C1-0808-202, S/N Z-183
7-22-88	Ionization chambers	Insert attached
8-18-88	FRCAS	I&C personnel performed bimonthly checks
9-8-88	Hot cell	I&C personnel calibrated cell vent and NOG gauges
9-26-88	Cell vent	I&C personnel performed quarterly surveillance functional tests on PT-65, PT-66, and radiation alarms
9-26-88	NOG	I&C personnel performed quarterly surveillance functional tests on PT-63, PT-64, and radiation alarms
9-26-88	Seismic channels	I&C personnel tested "B" and "C" channels
9-30-88	Building 3004	I&C personnel replaced portable pH meter probe

Table 6. Process systems, maintenance and changes

Date	Component	Remarks
7-5-88	Process sump	P&E personnel replaced deep well pump in spring water collection container
7-5-88	Beryllium breaker	P&E personnel adjusted breaker cutters
7-5-88	OD-2 carrier	Riggers transferred to burial ground, unloaded, and returned to Building 3042
7-6-88	OD-2 carrier	Riggers transferred to burial ground, unloaded, and returned to Building 3042
7-6-88	East truck door	P&E personnel replaced leaking air line
7-7-88	Room 205	P&E personnel repaired steam leak
7-7-88	OD-2 carrier	Riggers transferred to burial ground, unloaded, and returned to Building 3042
7-12-88	Steel box	Riggers transferred to burial ground storage
7-15-88	OD-2 carrier	Riggers transferred to Building 3026-D for repair of bottom drawer
7-18-88	Room 205	P&E personnel installed steam trap on line for hot water heater
7-19-88	OD-2 carrier	Millwrights repaired sticking bottom drawer. QA&I personnel were present when work was performed
7-19-88	Control room air conditioning	P&E personnel unstopped condensate drain line
7-20-88	OD-2 carrier	Riggers transferred from Building 3026-D to Building 3042
7-20-88	OD-2 carrier	P&E personnel tack welded bolts in end plate on bottom drawer
7-22-88	OD-2 carrier	Riggers transferred to burial ground, unloaded, and returned to Building 3042

Table 6. Continued

Date	Component	Remarks
7-25-88	OD-2 carrier	Riggers transferred to burial ground, unloaded, and returned to Building 3042
7-26-88	Salvage	Riggers transferred three battery chargers, a large steel platform, two safe file cabinets, and a slate work bench top to Salvage
7-27-88	H&V unit	Air conditioning personnel replaced belts on H&V unit at first level south
7-27-88	One place LITR carrier	P&E personnel fabricated a new lifting rig for one place LITR carrier
7-29-88	Overhead crane	P&E personnel performed programmed maintenance
7-29-88	OD-2 carrier	Riggers transferred to burial ground, unloaded and returned to ORR
8-15-88	Underwater light	Electrician relamped
8-18-88	Experiment helium header	P&E personnel removed helium header and one cylinder rack at the south pad
8-19-88	LITR one place carrier	P&E personnel stamped "For Internal Use Only at ORNL" on carrier
8-22-88	Racks	Riggers transferred two beryllium racks, two piggy back fuel racks, and one utility rack to burial ground
8-24-88	LITR carrier	Riggers transferred to Building 3010 and back to Building 3042 six times
8-25-88	LITR carrier	Riggers transferred to Building 3010 and back to Building 3042 eight times
8-26-88	LITR carrier	Riggers transferred to Building 3010 and back to Building 3042 ten times
8-29-88	LITR carrier	Riggers transferred to Building 3010 and back to Building 3042 eight times

Table 6. Continued

Date	Component	Remarks
9-2-88	Steel box	Riggers transferred to burial ground
9-13-88	Experiment gas lines	P&E personnel removed temporary HSST, OC-5 gas lines on the north and south side of pool
9-16-88	Building 3042 CAMs	P&E personnel performed programmed maintenance
9-19-88	OD-2 carrier	Riggers transferred to burial ground, unloaded, and returned to Building 3042
9-20-88	OD-2 carrier	Riggers transferred to burial ground, unloaded, and returned to Building 3042
9-20-88	NOG east filter bank	QA&I personnel ran DOP test. Results were 99.996 % efficient
9-20-88	NOG west filter bank	QA&I personnel ran DOP test. Results were 99.996 % efficient
9-20-88	Cell vent filter bank	QA&I personnel ran DOP test. Results were 99.986 % efficient
9-20-88	North hot hood basement laboratory	QA&I personnel ran DOP test. Results were 99.994 % efficient
9-20-88	South hot hood basement laboratory	QA&I personnel ran DOP test. Results were 99.996 % efficient
9-21-88	OD-2 carrier	Riggers transferred to Building 3001
9-26-88	Shields	Riggers transferred three portable shields and two beam catchers to Salvage
9-29-88	L-9 annunciator circuit	Electrician replaced blown fuse for L-9 circuit

Table 7. Experiment facility usage

Facility	Access flange	Date installed	Date removed	Description of experiment	Division or sponsor
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	9-20-88	DOP	99.986
Charcoal	Both banks	North, 6-30-87 South, 1-29-88	6-22-88	Elemental iodine	99.882[b]
			Basement hood exhaust		
CWS	South	3-11-80	9-20-88	DOP	99.996
CWS	North	3-11-80	9-20-88	DOP	99.994
			Normal off-gas		
CWS	West	3-29-88	9-20-88	DOP	99.996
Charcoal	West	3-29-88	6-21-88	Elemental iodine	99.971
CWS	East	3-29-88	9-20-88	DOP	99.996
Charcoal	East	3-29-88	6-23-88	Elemental iodine	99.940

[a]The CWS filters in the cell-ventilation system were checked in series.

[b]Filter retention efficiency 99.882% unsatisfactory, filters to be changed.

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	9-25-88	6-26-88
NOG filter system efficiency		
Elemental iodine test - east bank	6-23-88	4-12-88
Elemental iodine test - west bank	6-21-88	4-14-88
Dioctyl phthalate test - east bank	9-20-88	3-29-88
Dioctyl phthalate test - west bank	9-20-88	3-29-88
Containment closure system function test	9-29-88	6-15-88
Cell-ventilation filter system efficiency		
Elemental iodine measurements	6-22-88	2-10-88
Dioctyl phthalate measurements	9-20-88	3-29-88
Radiation monitoring equipment calibration	7-6-88	4-7-88
Stack radiation monitor calibration	7-5-88	2-26-88

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