

**OAK RIDGE  
NATIONAL  
LABORATORY**



**Oak Ridge Research Reactor Shutdown  
Maintenance and Surveillance  
Semiannual Report  
October 1989–March 1990**

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"B" Reactors Section

**OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE AND  
SURVEILLANCE SEMIANNUAL REPORT  
OCTOBER 1989 - MARCH 1990**

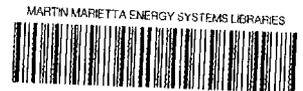
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## ACRONYMS

CAM	constant air monitor
DOE	Department of Energy
DOP	dioctylphthalate
FR&CAS	Facility Radiation and Contamination Alarm System
HB	horizontal beam
HFIR	High Flux Isotope Reactor
I&C	Instrumentation and Controls Division
LEU	low-enriched uranium
NOG	normal off-gas
ORR	Oak Ridge Research Reactor
P&E	Plant and Equipment Division
QA&I	Quality Assurance and Inspection
RORC	Reactor Operations Review Committee
HP	Health Physics
PORC	Plant Operations Review Committee
LITR	Low Intensity Test Reactor
NSR	Nuclear Safety Review
HEPA	High Efficiency particulate, air
PM	programmed maintenance

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OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE  
AND SURVEILLANCE SEMIANNUAL REPORT  
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SUMMARY

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

Maintenance activities, both mechanical and instrument, were essentially routine in nature.

Shutdown activities are shown in Table 1.

INSTRUMENTATION AND REACTOR CONTROLS

The performance of the instrumentation for the facility was satisfactory, and maintenance required is indicated in Table 2.

PROCESS SYSTEM

The performance of the process system was satisfactory, and maintenance required is indicated in Table 3.

GASEOUS-WASTE FILTERS

Table 4 summarizes the results of efficiency tests of the various gaseous-waste filters.

TRANSFER OF FACILITY

Preparation for transfer of the facility to the remedial action program is shown in Table 5.

Table 1. Shutdown activities

Date	Remarks
10/12/89	Gary Coleman and Tom Hamrick performed QA surveillance checks at HFIR and TSR-II.
10/30/89	Covered the three carriers stored at the south side of Building 3005 with yellow plastic and HP attached radiation tags.
10/30/89	Assisted riggers and Glen Bowden with transfer of HFIR inner control cylinders from plywood boxes to control cylinder containers in cage at first level south.
11/7/89	RORC reviewed ORR and CEF.
11/8/89	P&E removed miscellaneous items including a step ladder from overhead crane platform per RORC recommendation. HP cleared all items for disposal and P&E disposed of in appropriate dumpsters.
11/13/89	P&E transferred a truckload of miscellaneous green-tagged items from first-level south to salvage.
11/15/89	Radio 653 transferred to shop for annual check.
11/15/89	HP calibrated building monitrons and CAMs.
11/15/89	SWP 20909 issued for replacement of sump pump in 24-in. strainer pit.
12/4/89	Radios 652 and 654 transferred to shop for annual check.
12/6/89	Two supervisors completed test on ORR/BSR Normal, Abnormal, Emergency, and Radiological controls.
12/8/89	Returned radios 652 and 654 from shop to control room.
12/12/89	Two supervisors attended quarterly safety meeting.
12/13/89	Two supervisors attended annual MBA training seminar at 3047.
12/14/89	Two supervisors responded to emergency drill at HFIR.
12/15/89	One supervisor attended PORC meeting on NSR 724 for the LITR fuel carrier.

Table 1 (continued)

Date	Remarks
1/9/90	Three supervisors participated in shelter-in-place drill for Building 3042.
1/10/90	One supervisor completed Radiation Worker Training.
1/12/90	Sent two truckloads of green-tagged miscellaneous equipment from first level north to salvage.
1/26/90	Restocked safety equipment cabinet in Building 3004.
2/1/90	Transferred miscellaneous contaminated noncompactible equipment from first level to steel box at 3001 building.
2/6/90	Issued SWP-20911 for Engineering Department to take samples of spring water in pipe chase.
2/12/90	Backwashed pool demineralizer cation and anion columns to increase flow through demineralizer. Flow increased from 15 gpm to 45 gpm.
2/12/90	Fire department inspected fire extinguishers in Building 3042.
2/14/90	HP calibrated Building 3041 CAMs.
2/15/90	HP calibrated Building 3042 monitrons.
2/16/90	Environmental sampling personnel sampled reactor primary water and sent to Analytical Chemistry for analysis.
2/20/90	Backwashed pool demineralizer columns, flow increased from 15 gpm to 47 gpm.
3/5/90	P&E transferred miscellaneous green-tagged items from first level east to salvage.
3/20/90	Two supervisors attended Radiological Controls class at HFIR.
3/21/90	One supervisor attended Radiation Worker Training.
3/21/90	Performed cell vent functional checks.

Table 1 (continued)

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Date	Remarks
3/22/90	Two supervisors attended Reactor Theory class at HFIR.
3/23/90	Two supervisors attended class on Reactor Theory, Heat Transfer, and Fluid Flow at HFIR.
3/26/90	Two supervisors attended quarterly safety meeting.
3/27/90	Replaced the two nitrogen cylinders for the basement evacuation horn.
3/29/90	Two supervisors attended Professional Development Personnel Motivation session at HFIR.
3/31/90	Continued wetting of secondary towers as a means of fire prevention.
3/31/90	Water quality during report period: pool water resistivity ohm-cm was 1,090,000; reactor water resistivity ohm-cm was 1,070,000; and pool and reactor water radioactivity cpm/ml was BG.

---

**Table 2. Maintenance and changes, instrumentation and controls**

Date	Component	Reason or Maintenance
10/11/89	Evacuation horn	I&C checked sound levels in Building 3042.
10/19/89	FR&CAS	I&C performed quarterly check.
10/23/89	Monitron	I&C changed tubes in first level east monitron.
10/23/89	CAMs	I&C relamped indicator lights.
10/30/89	CAMs	I&C changed charts.
11/7/89	LMB-106	I&C repaired and returned to service.
12/7/89	Instrument checks	I&E performed quarterly surveillance instrument checks.
12/18/89	FR&CAS	I&E performed bimonthly check.
1/16/90	NOG radiation recorder	I&C replaced balance motor, chart drive motor, and calibrated recorder.
1/23/90	NOG	I&C replaced battery in NOG temp recorder in control room.
1/26/90	pH meter probe	I&C added fluid to probe in basement.
2/12/90	FR&CAS	I&C performed quarterly check.
2/16/90	Recorders	I&C overhauled and calibrated the NOG temp and the reactor-pool temp recorders in the control room.
2/23/90	Instrument checks	I&C performed quarterly surveillance instrument checks.
3/2/90	Pool demineralizer	I&C calibrated flow transmitter in basement and receiver gauge in control room.

Table 3. Process systems, maintenance and changes

Date	Component	Remarks
10/6/89	Fill and drain pump	P&E performed programmed maintenance (PM).
10/11/89	Emergency diesel generator	P&E performed PM.
10/16/89	Centravac	P&E performed PM on purse unit.
10/17/89	Elevator	P&E repaired outer door at first level.
10/18/89	Elevator	P&E performed PM on elevator.
10/23/89	Steam tracing	P&E checked steam tracing and heaters in ORR complex.
10/31/89	Building 3085 valves	P&E performed PM on primary pumps motorized valves and 24-in. strainer valve.
11/1/89	Centravac	Air Conditioning (AC) personnel shut-down for the winter.
11/3/89	Control room AC	AC personnel greased fan bearings.
11/7/89	Diesel fuel tank	P&E removed dirt from above tank so length of tank could be determined. Length is 18 ft, 3 inches.
11/10/89	Heating units	P&E performed PM on units in third-level changehouse and southeast corner of basement.
11/15/89	Sump pump	P&E replaced pump in 24-in. strainer pit.
11/20/89	Condensate pump	P&E cleaned level probes and changed out relay for pump southeast corner of basement.
11/22/89	Vacuum pumps	P&E performed PM on three Nash Hyton vacuum pumps in basement.
11/28/89	CAM	P&E replaced belts on first level south CAM.

Table 3 (continued)

Date	Component	Remarks
11/28/89	Building 3004	P&E performed PM on steam station.
12/5/89	Hoists and chainfalls	QA&I inspected all in Building 3042.
12/7/89	Steam regulator	P&E performed programmed maintenance on fresh-air intake unit in southeast corner of basement.
12/11/89	Hood vent fan	P&E replaced bearings in basement lab north hood vent fan.
12/13/89	Electrical cords	P&E inspected and tagged cords in Building 3042.
12/15/89	AC units	P&E changed filters on AC units in Building 3042.
12/15/89	Emergency diesel	P&E PM.
12/15/89	Emergency diesel battery	P&E replaced defective starting battery with a new battery.
12/19/89	Programmed maintenance	P&E performed on basement exhaust filters and battery emergency lights in building.
12/21/89	AC unit	P&E repaired leak in control room AC evaporator.
12/27/89	Air line	P&E repaired broke 1/4-in. tubing line on first level that goes to control room makeup tank level indicator.
1/9/90	Batteries	Riggers transferred new nickel-cadmium batteries from HFIR cage first level to HFIR.
1/15/90	Centravac	P&E rebuilding No. 1 and No. 2 chill water pumps.
1/17/90	CAMs	P&E PM maintenance.
1/17/90	Emergency diesel generator	P&E PM maintenance.

Table 3 (continued)

Date	Component	Remarks
1/17/90	Shipping container	Riggers transferred new fuel shipping container from ORR to Building 7012.
1/18/90	Eyebath	P&E repaired eyebath in Building 3004.
1/18/90	Emergency diesel generator	P&E replaced two starter batteries.
1/19/90	Circuit breaker	Electrician replaced defective circuit breaker 25-in. lighting panel "C" at column C-5.
1/22/90	Building 3042	P&E relamped in the building.
1/22/90	Programmed maintenance	P&E performed programmed maintenance on pool heat exchanger valves, north and south Christmas tree valves, Goulds sump pump, Yale 2-ton hoist for basement hatch door, motorized bridge trolley, underwater saw, and winch for isotope tray.
1/23/90	No. 3 sump	P&E installed new pump.
1/23/90	Building 3103	P&E repaired or replaced frozen busted water lines at Building 3103 secondary towers.
1/25/90	Overhead crane	P&E made visual inspection of crane cables.
1/25/90	Eyebath	P&E installed new eyebath at entrance to pipe tunnel.
1/25/90	High bay roof	P&E made temporary repair of leak.
1/29/90	Elevator	QA&I performed 5-year and annual brake and load test on building elevator. Elevator failed 2500-lb load test for lifting. Removed from service until repairs are made.
1/30/90	Building 3042	P&E relamped in building.
1/31/90	Emergency diesel generator	P&E repaired steam leak on heater in the room.

Table 3 (continued)

Date	Component	Remarks
1/31/90	Hot cell sink	P&E replaced broken valve handle.
2/1/90	Stokes metal baskets	QA&I inspected Stokes metal emergency baskets.
2/6/90	Sulfuric acid tank	Riggers transferred empty, rinsed out BSR regenerating acid tank from Building 3004 to Building 7012.
2/8/90	Overhead crane	P&E performed PM.
2/8/90	Building 3095	Roofers repaired roof leak.
2/15/90	Air Conditioners	P&E performed PM on two window type air conditioners in basement.
2/27/90	CAM	P&E installed new conduit for moving first level south CAM out of HFIR fenced in area.
2/28/90	Safety showers/Eyebaths	P&E inspected and tested safety showers and eyebaths in Building 3085.
2/28/90	Exp. valves	P&E removed Pressure Products vales on south balcony for Clemmer to transfer to HFIR.
2/28/90	HFIR carrier	Riggers transferred empty HFIR spent fuel carrier from Building 7503 to second level west of Building 3042 for temporary storage.
2/28/90	Steam heater	P&E repaired steam leak on heater in No. 2 pump cell in Building 3085.
3/15/90	AC units	P&E changed filters on second- and third-level air conditioners.
3/20/90	Elevator	QA&I retested elevator after repairs and adjustments were made by P&E. Elevator passed load and brake test and was returned to service.

Table 3 (continued)

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Date	Component	Remarks
3/21/90	Ladders	P&E inspected wood ladders in Buildings 3086 and 3103. Tagged the ladder in 3086 and disposed of the one in 3103.
3/22/90	Filters	QA&I ran DOP test on north and south basement lab hood exhaust, cell vent, and NOG east and west bank filters. All passed.
3/22/90	Facility pump	P&E replaced defective south pump motor with motor from north pump and returned pump to service.
3/30/90	Computer	P&E transferred computer from Room 307 to Paula Wright at HFIR.

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Table 4. Status of filters, gaseous waste systems

Type filter	Bank designation	Date last changed	Date last tested	Type test	Retention efficiency (%)
<i>Cell-ventilation system</i>					
HEPA	Overall <sup>a</sup>	North, 4/16/80 South, 8/14/85	3/22/90	DOP	99.993
Charcoal	Both banks	North, 6/30/87 South, 1/29/88	6/22/88	Elemental iodine	99.882 <sup>b,c</sup>
<i>Basement hood exhaust</i>					
HEPA	South	3/9/89	3/22/90	DOP	99.996
HEPA	North	3/9/89	3/22/90	DOP	99.996
<i>Normal off-gas</i>					
HEPA	West	1/27/89	3/22/90	DOP	99.998
Charcoal	West	1/27/89	3/22/90	Elemental iodine	99.900
HEPA	East	1/27/89	9/13/89	DOP	99.996
Charcoal	East	1/27/89	2/1/89	Elemental iodine	99.883 <sup>b</sup>

<sup>a</sup>The HEPA filters in the cell-ventilation system were checked in series.

<sup>b</sup>Filter retention efficiency 99.882% unsatisfactory, filters to be changed.

<sup>c</sup>Fissionable material removed from facility.

DOE granted Technical Specification suspension.

**Table 5. Preparation for transfer of facility to Remedial Action Program**

Date	Remarks
	None

**SUMMARY OF SURVEILLANCE TESTS**

Table 6 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 will be revised to address only shutdown surveillance requirements. This document will be submitted to RORC and DOE for review and approval. Other surveillance requirements that are not reported are satisfied by routine completion of daily and weekly check sheets, the operating logbook, and miscellaneous quality assurance tests.

Table 6. Summary of surveillance tests

Test	Most recent	Previous
<i>Biennially</i>		
Normal off-gas vacuum monitor calibration	6/7/89	10/1/87
Building ventilation flow monitor calibration	6/7/89	5/5/87
<i>Semiannually</i>		
Pressure-drop measurements across NOG filters	3/26/90	9/25/89
NOG filter system efficiency		
Elemental iodine test - east bank	2/1/89 <sup>a</sup>	6/23/88
Elemental iodine test - west bank	1/31/89 <sup>a</sup>	12/29/88
Diocetylphthalate test - east bank	3/22/90	9/13/89
Diocetylphthalate test - west bank	3/22/90	9/13/89
Containment closure system function test	3/21/90	9/19/89
Cell-ventilation filter system efficiency <sup>a</sup>		
Elemental iodine measurements	6/22/88 <sup>a</sup>	2/10/88
Diocetylphthalate measurements	3/22/90	9/13/89
Radiation monitoring equipment calibration	2/13/90	11/15/89
Stack radiation monitor calibration	3/28/90	12/1/89

<sup>a</sup>Fissionable material removed from facility.  
DOE granted Technical Specification suspension.

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