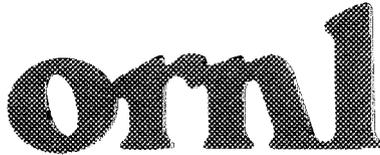


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Oak Ridge Research Reactor
Shutdown Maintenance and
Surveillance Semiannual Report
April–September 1990

G. H. Coleman
D. L. Laughlin

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ORNL/TM-11794

Research Reactors Division
"B" Reactors Section

**OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE AND
SURVEILLANCE SEMIANNUAL REPORT
APRIL - SEPTEMBER 1990**

G. H. Coleman
D. L. Laughlin

DATE PUBLISHED: MAY 1991

Notice: This document contains information of a preliminary nature. It is subject to revision or correction and, therefore, does not represent a final report.

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ACRONYMS

BSF	Bulk Shielding Facility
CAM	constant air monitor
CEF	Critical Experiments Facility
D&D	decontamination and decommissioning
DOE	Department of Energy
DOP	dioctylphthalate
FR&CAS	Facility Radiation and Contamination Alarm System
HB	horizontal beam
HFED	high-uranium loaded fuel element development program
HEPA	high efficiency particulate, air
HFIR	High Flux Isotope Reactor
HP	Health Physics
I&C	Instrumentation and Controls Division
LEU	low-enriched uranium
LITR	Low Intensity Test Reactor
LMB	Lab monitor beta
NOG	normal off-gas
NSR	Nuclear Safety Review
NSS	Nuclear Support Services
ORR	Oak Ridge Research Reactor
P&E	Plant and Equipment Division
PM	programmed maintenance
PORC	Plant Operations Review Committee
QA&I	Quality Assurance and Inspection
RRD	Research Reactors Division
RORC	Reactor Operations Review Committee
TSF	Tower Shielding Facility

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OAK RIDGE RESEARCH REACTOR SHUTDOWN MAINTENANCE
AND SURVEILLANCE SEMIANNUAL REPORT
APRIL - SEPTEMBER 1990

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
4/10/90	NSS personnel began frisking and smearing in Building 3042.
4/11/90	Removed and disposed of contaminated wooden steps from third level changehouse.
4/12/90	Two supervisors attended Leadership Styles training at HFIR.
4/25/90	Three ion chambers for CEF were stored in Loop II cell.
4/27/90	Group from DOE Headquarters D&D toured ORR.
4/30/90	Sent 4500 gallons demineralized water to TSF.
4/30/90	Transferred paraffin and polyethylene blocks and sheets from top of beam hole shields to floor.
5/1/90	Turned off steam and heaters in the outside area of ORR/BSR complex.
5/1/90	Sent 4500 gallons demineralized water to TSF.
5/2/90	Sent 3000 gallons demineralized water to TSF.
5/7/90	Two supervisors attended movie "Fighting Fire Before it Starts."
5/9/90	Placed signs (NOTICE-ACCESS LIMITED TO AUTHORIZED PERSONNEL) at following locations: <ol style="list-style-type: none"> 1. Motorized bridge N & S entrances. 2. Portable bridge N & S entrances. 3. SE & SW corners of third level pool walkway.
5/10/90	HP calibrated building monitrons and CAMs.
5/14/90	One supervisor attended lessons learned "Baseline Contamination," at Building 7910 conference room.
5/15/90	Hot cell personnel transferred boxes of microfilm from Building 3525 to ORR storage. All films pertain to previous ORR operation.
5/17/90	G. H. Coleman and HP surveyed materials in Building 3095, maximum radiation reading /mrem/h. Updated radiation tags.

Table 1. Continued

Date	Remarks
5/18/90	110 gallons demineralized water delivered to Project Engineering.
5/21/90	One supervisor attended safety meeting at HFIR.
5/21/90	HFIR fuel carrier cleaned and transferred to HFIR for crane certification training.
5/25/90	Transferred three inspected and tagged safety belts to TSF.
6/1/90	Transferred east aluminum portable bridge from east end reactor pool to third level c-zone.
6/11/90	Replaced two nitrogen cylinders for the basement evacuation horn.
6/11/90	Two supervisors attended "Team Building" session of supervisory skills workshop training at HFIR.
6/11/90	Nuclear Support Services (NSS) personnel began comprehensive radiation - contamination survey of Building 3042.
6/12/90	One supervisor viewed "Lessons Learned from HFIR Baseline Radiation/Contamination Survey" tape.
6/13/90	Escorted C. C. Ragen on tour of Building 3042 checking prints for accuracy for future asbestos survey.
6/13/90	Transferred six fission chambers from MBA-020 to MBA-135 (I&C). Transfers # 12243 and 12244.
6/15/90	Placed EMERGENCY EXIT ONLY signs on all doors except second level southwest. Deactivated badge reader on east side of building. At this time, personnel must enter building through second level NW badge reader door and leave via second level SW door after frisking and logging out.
6/15/90	DOE committee chaired by Dr. Martin McBride made walk-through of Building 3042.
6/18/90	Two supervisors attended RRD quarterly safety meeting.
6/21/90	Compactible dumpster emptied.

Table 1. Continued

Date	Remarks
6/22/90	Transferred contaminated paraffin and polyethylene blocks and sheets from first level east to steel box at Building 3001.
6/29/90	Performed quarterly criticality alarm checks at Building 9213 (CEF at Y-12 Plant).
7/12/90	Fire Department inspected fire extinguisher in Building 3085 annex.
7/13/90	Disposed of old tarp and installed new one over NOG filter pit.
7/16/90	110 gallons demineralized water delivered to Project Engineering.
7/17/90	165 gallons demineralized water delivered to Project Engineering.
7/17/90	Robert Weston Associate, started asbestos survey in Building 3042.
7/18/90	Fire Department tested heat detectors and auxiliary boxes in Building 3042.
7/18/90	Removed unused masks and filters from supply cabinet, HP green tagged, and masks returned to Industrial Hygiene Building 3550.
7/19/90	165 gallons demineralized water delivered to Project Engineering.
7/25/90	Placed sign on outside of NW badge reader door stating that all personnel are required to use portal monitor when entering and exiting Building 3042.
7/26/90	330 gallons demineralized water delivered to Project Engineering.
7/26/90	Reposted tank air permits, two at Building 3004 and one at Building 3103.
7/31/90	Two supervisors attended Waste Generator Certification training.
7/31/90	Changed out nitrogen cylinders for third level evacuation horn.
8/1/90	One supervisor to mask fitting.
8/2/90	One supervisor to mask fitting.
8/3/90	Truck 9379 surveyed at Building 5505 and cleared for entering Y-12 Plant.

Table 1. continued

Date	Remarks
8/6/90	HP performed functional check of monitrons in Buildings 3042 and 3085.
8/7/90	HP performed functional check of CAMs in Building 3042.
8/7/90	One supervisor attended CPR training.
8/7/90	Two supervisors attended ORR/BSR training and passed exam at Building 7917.
8/8/90	Removed the three life-preserver rings from pool side.
8/15/90	Cleaned 15 spots of fixed contamination on third level.
8/16/90	Electrical Safety Committee reviewed Building 3042.
8/16/90	Water fountain in basement disconnected, green tagged by HP, and transferred to Building 3095. Area had been designated a regulated area.
8/17/90	165 gallons demineralized water delivered to Project Engineering.
8/17/90	A shepard's hook was hung from motorized bridge for use if someone fell into the pool.
8/20/90 thru 8/31/90	A radiological cleanup of fixed and loose contamination found by NSS was begun. As of August 31, 1990, 261 spots had been cleaned, 220 of these cleared by HP.
8/31/90	Two supervisors attended Occurrence Reporting training.
9/4/90	HP performed performance and functional test of building monitrons and CAMs.
9/19/90	Fire Department inspected and recharged the three hot cell fire extinguishers.
9/24/90	Placed contaminated sheets and pieces of cadmium in 55 gallon drum. HP checked and tagged and paperwork completed for pick-up by hazardous waste personnel.
9/25/90	220 gallons demineralized water delivered to Project Engineering.
9/25/90	Performed cell vent system semiannual functional checks.

Table 1. continued

Date	Remarks
9/26/90	Transferred seven used charcoal filters from north side of Building 3042 to steel box.
9/27/90	700 gallons demineralized water delivered to Building 3019.
9/27/90	Two supervisors attended GEAT training.
9/28/90	Transferred two new Nash-Hytor vacuum pumps from basement to Building 3095.
9/30/90	Radiological and general cleanup of Building 3042 continued throughout September. 482 spots of fixed or transferable contamination were cleaned. Contaminated materials that could not be cleaned were disposed of in steel boxes; 212 spots found by NSS remain as of September 30, 1990. Seven 4' x 4' x 6' steel boxes have been filled with contaminated materials and sent to burial ground. Utility workers are working on spots that require chipping of concrete to remove fixed radiation.
9/30/90	Continued wetting of secondary towers as a fire prevention measure.
9/30/90	Water quality during report period: pool water resistivity ohm-cm was 1,099,000; reactor water resistivity ohm-cm was 1,015,000; and pool and reactor water cpm/mL was BG.

Table 2. Maintenance and changes, instrumentation and controls

Date	Component	Reason or Maintenance
4/3/90	CAMs and monitrons	I&C repaired first level south monitron and CAMs second level west, basement NW, and basement south.
4/16/90	Reactor water	I&C replaced gamma monitor module for reactor water activity.
4/25/90	Cell vent	I&C removed and transferred PX-108 pressure switch to shop for repair.
5/2/90	FR&CAS	I&C performed bimonthly check.
5/30/90	Instrument checks	I&C performed quarterly surveillance instrument checks.
5/31/90	CAM	I&C replaced bad tube in NW basement CAM.
6/13/90	pH probes	I&C added fluid to probes in the basement and at Building 3004.
6/21/90	Monitrons and CAMs	I&C relamped power lights on monitrons and CAMs in Building 3042.
6/21/90	FR&CAS	I&C performed quarterly check.
6/26/90	CAMs	I&C changed chart paper on building CAMs.
7/13/90	NOG recorder	I&C replaced defective chart drive motor on NOG temperature recorder.
7/26/90	Instrument shop	I&C moved their shop from Rooms 209 and 211 to Room 103 at Building 3010.
8/15/90	CAMs	I&C calibrated building CAMs airflow.
8/17/90	Power supply	I&C removed and transferred two compensated ion chamber power supplies to TSF.

Table 2. continued

Date	Component	Reason or Maintenance
9/4/90	Instrument checks	I&C performed quarterly surveillance instrument functional tests.
9/6/90	FR&CAS	I&C performed bimonthly check.
9/8/90	Monitrons and CAMs	I&C repaired and returned to service monitron basement SE, CAMs basement NW, and poolside. Transferred CAMs from P-tube and first level north to shop for repair.
9/20/90	Hot cell instrumentation	I&C cleaned and calibrated N&S hot cell off-gas vacuum recorders controllers and installed three new magnehelic gages PD1-101, 104, and 107.
9/24/90	Badge reader	Security I&C repaired NW door badge reader.

Table 3. Process systems, maintenance and changes

Date	Component	Remarks
4/2/90	Programmed maintenance	P&E performed PM on building exhaust louvers and east and west truck doors.
4/4/90	20-ton crane and "A" frame	QA&I load tested. Both passed the test.
4/4/90	West truck doors	P&E cleaned agastat contacts so doors would close when building is placed in containment.
4/4/90	Building air intake	Roofers caulked around where stack braces connect to building to stop rainwater from leaking into building.
4/6/90	AC and ventilation unit #3	P&E installed new motor and fan bearings and modified the shaft.
4/11/90	Building elevator	P&E changed out key-operated control switch.
4/11/90	PM	P&E performed programmed maintenance on N&W basement lab vent blowers.
4/12/90	PM	P&E performed programmed maintenance on vent fans in second level ladies' restroom and above basement sample sink.
4/17/90	CAM	P&E moved out of locked HFIR cage first level south for easier access for maintenance and testing by I&C and Health Physics.
4/18/90	NOG	QA&I tested backflow preventor
4/18/90	Lab vent fan	P&E replaced bearings and belts on basement lab north hood vent exhaust fan.
4/19/90	Security alarm system	Programmed maintenance performed on security alarm system for ORR/BSR.
4/19/90	OD-2 carrier	QA&I inspected welds and drawer stops.
4/19/90	Badge reader doors	P&E repaired east and west doors.

Table 3. Continued

Date	Component	Remarks
4/23/90	Ladders and hoists	QA&I inspected and tagged fixed ladder at hot cell, metal ladder at HB-1, and two chain hoists at HB-6.
4/27/90	South hot cell	P&E relamped inside south hot cell.
5/2/90	HFIR batteries	Riggers transferred 4 plywood boxes containing 94 batteries from HFIR cage first level east to shipping.
5/4/90	Steam vent line	P&E redirected steam pop-off vent line NW corner of Building 3042.
5/8/90	H&V unit	P&E installed new belts on first level south unit.
5/14/90	HB-6	P&E removed polyethylene sheets from HB-6 shield in preparation for disposal.
5/15/90	CAMs	P&E performed programmed maintenance on building CAMS.
5/21/90	HFIR carrier	Riggers transferred to HFIR.
5/23/90	Safety belts	QA&I inspected and tagged three new safety belts.
5/24/90	Polyethylene blocks	Riggers transferred two skids to TSF.
5/30/90	Programmed maintenance	P&E performed on building 3085 exhaust fans and Building 3042 N&S Nash-Hytor vacuum pumps.
6/1/90	Paraffin and polyethylene blocks	Riggers transferred from first level east to dumpster.
6/1/90	Vacuum pumps	P&E disconnected vacuum pumps on top of beam hole shields and moved to floor for disposal when oil is removed.
6/13/90	Elevator	P&E replaced defective diode in elevator door controls.

Table 3. Continued

Date	Component	Remarks
6/14/90	Electrical cords	P&E inspected all accessible electrical cords in Building 3042.
6/15 & 16/90	Process sump	P&E installed a bypass line around leaking process sump pump discharge line.
6/18/90	AC units	AC personnel changed filters on units in Building 3042.
6/22/90	Lunch room	P&E ran conduit and wire for electrical outlet outside lunch room for frisker. Frisker to be used before entering lunch room
6/25/90	Centravac	AC personnel restarted centravac.
6/27/90	NW exit door	P&E repaired crash bar.
7/3/90	Centravac	P&E performed programmed maintenance
7/9/90	Furniture	P&E transferred Training Section's furniture and records to new office building 7917.
7/9/90	Vacuum pumps	Riggers transferred brown-tagged vacuum pumps to landfill.
7/11/90	Water heater	P&E replaced relief valve.
7/16/90	Portal monitor	Riggers delivered new portal monitor to second level west.
7/17/90	Grass	P&E cut high grass and weeds north of Building 3085.
7/18/90	Control room AC	AC personnel installed new compressor on control room AC unit.
7/19/90	Furniture	P&E moved I&C furniture and files to Room 200, Building 3010.
7/23/90	3109	QA&I checked backflow preventor.

Table 3. Continued

Date	Component	Remarks
7/23/90	Exit lights	P&E relamped in Building 3042.
7/24/90	Portal monitor	P&E and I&C completed hookup, tested, and monitor is operational.
7/26/90	Control room AC	AC personnel installed new pulley and belts.
7/31/90	H&V units	AC personnel performed programmed maintenance.
8/2/90	Crane	P&E performed programmed maintenance on overhead crane.
8/3/90	Evacuation horn	P&E leak-tested nitrogen cylinders connections for third level evacuation horn, found and stopped a small leak.
8/8/90	Emergency diesel generator	P&E replaced two starter batteries.
8/16/90	NW exit door	P&E repaired defective crash bar.
8/17/90	Centravac	AC personnel removed from service and P&E repaired chilled water pump and butterfly valve.
8/22/90	PM	P&E performed programmed maintenance on Nash-Hytor vacuum pumps and underwater saw.
9/7/90	HFED platform and aluminum bridge	P&E cut into pieces for disposal via steel box to burial ground.
9/20/90	Pool tools	P&E cut into pieces for disposal via steel box to burial ground.
9/25/90	LMBs	P&E installed 110-v lines and receptacles in basement NW stairwell, outside elevator in basement, and at exit from regulated area third level north for LMBs to be used for frisking when exiting a regulated area.
9/26/90	CAM 306	P&E installed new blower, belts, and hoses on CAM first level north.

Table 3. continued

Date	Component	Remarks
9/27/90	HEPA filters	QA&I performed DOP test on NOG east and west banks, cell vent, south lab hood exhaust, north and south hot cell exhaust HEPA filters.
9/27/90	AC unit	AC personnel removed AC unit from Room 302.
9/27/90	H&V unit 3	P&E replaced starter heater, tightened seals on pump, and changed from level probes to float on steam condensate pump in NE corner of basement.
9/30/90	Eyewashes and safety showers	P&E tested per schedule during the report schedule.

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 ^a	North, 4/16/80 South, 8/14/85	9/27/90	DOP	99.997
Charcoal	Both banks	North, 6/30/87 South, 1/29/88	6/22/88	Elemental iodine	99.882 ^{b,c}
<i>Basement hood exhaust</i>					
HEPA	South	3/9/89	9/27/90	DOP	99.992
HEPA	North	3/9/89	3/22/90	DOP	99.996
<i>Normal off-gas</i>					
HEPA	West	1/27/89	9/27/90	DOP	99.998
Charcoal	West	1/27/89	1/31/89	Elemental iodine	99.900
HEPA	East	1/27/89	9/27/90	DOP	99.998
Charcoal	East	1/27/89	2/1/89	Elemental iodine	99.883 ^b

^aThe HEPA filters in the cell-ventilation system were checked in series.

^bFilter retention efficiency 99.882% unsatisfactory, filters to be changed.

^cFissionable 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 checksheets, 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	9/24/90	3/26/90
NOG filter system efficiency		
Elemental iodine test - east bank	2/1/89 ^a	6/23/88
Elemental iodine test - west bank	1/31/89 ^a	12/29/88
Dioctylphthalate test - east bank	9/27/90	3/22/90
Dioctylphthalate test - west bank	9/27/90	3/22/90
Containment closure system function test	9/25/90	3/21/90
Cell-ventilation filter system efficiency ^a		
Elemental iodine measurements	6/22/88 ^a	2/10/88
Dioctylphthalate measurements	9/27/90	3/22/90
Radiation monitoring equipment calibration	9/4/90	2/13/90
Stack radiation monitor calibration	9/4/90	3/28/90

^aFissionable material removed from facility.
DOE granted Technical Specification suspension.

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