OAK RIDGE RESEARCH REACTOR
QUARTERLY REPORT
OCTOBER, NOVEMBER, AND
DECEMBER OF 1972

W. H. Tabor
S. S. Hurt, III

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OPERATIONS DIVISION

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MARCH 1973

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SUMMARY

The ORR operated at an average power level of 29.9 Mw for 92.2% of the time during October, November, and December of 1972. Thirty-seven fuel elements were declared spent (^{235}U content ~ 120 g) during the quarter, while twenty-five new elements were placed in service. The apparent imbalance in numbers of elements reflects an attempt to decrease the inventory of partially depleted elements. Burnup of the shim-rod elements depleted during the year averaged 87.2%, up $\sim 23\%$ from previous years.

The reactor was shut down on 10 occasions, 8 of which were scheduled. The total downtime was only approximately 172 hrs, lower than usual because there was only one end-of-cycle shutdown. Unscheduled downtime, however, totaled 10.667 hrs for only two shutdowns since refueling was required on both occasions.

Minor difficulties were encountered with the operator assembly (magnet) for the No. 5 shim-rod drive, and the assembly was replaced. The operator assembly which was replaced had been in service for only four months.

Special tests or measurements completed during the quarter included: (1) gamma flux measurements in the core, (2) beam-hole flux measurements, (3) MoO_3 mock-up flux measurement, and (4) beam-flux enhancement runs.

OPERATIONS

The basic operating data presented in Table 1 indicates that the ORR operation for the quarter was normal as compared with recent experience.

Details relative to the cycles of operation during the quarter are given in Table 2.

Table 1. ORR Basic Operating Data
October, November, and December of 1972

	This Quarter	Last Quarter	Calendar Year 1972	Calendar Year 1971
Total energy, Mwd	2,539.58	2,344.8	9,822.7	9,714.9
Average power, Mw/operating hr	29.9	29.4	29.8	29.8
Time operating, %	92.2	86.6	90.1	89.1
Availability, %	93.3	89.6	92.4	91.5
Reactor water radio- activity, $\frac{\text{c/min}}{\text{ml}}$ (av)	31,100	29,800	30,150	32,687
Pool water radioactivity, $\frac{\text{c/min}}{\text{ml}}$ (av)	618	510	587	635
Reactor water resis- tivity, ohm-cm (av)	789,000	823,000	816,200	914,000
Pool water resistivity, ohm-cm (av)	896,000	884,000	704,000	557,000
Fuel elements depleted	37	1	73	74
Average burnup of fuel elements depleted, %	47.2	51.5	49.8	52.9
Shim rods depleted	1	2	6	11
Average burnup of shim rods depleted, %	89.2	88.8	87.2	70.5
Radioisotope samples	3	3	43	131
Research samples	13	23	45	48

Table 2. Cycles of Operation

Cycle No.	Date Begun	Date Ended	Accumulated Energy (Mwd)
108	September 15, 1972	November 5, 1972	1,494.91*
109	November 10, 1972	In Progress	1,488.28

* 1,051.30 Mwd accumulated in this quarter.

FUEL USAGE AND INVENTORY

Data relative to fuel usage and inventory may be found in Tables 1 and 3. As may be noted therein, the inventory of new elements has been reduced to about a six-month supply; however, a new supply is being fabricated. It may also be noted that the average burnup for fuel elements for calendar year 1972 was ~3% less than that for 1971, probably as a result of extending the life of each shim rod.

Table 3. ORR Fuel Status

	This Quarter	Last Quarter	Calendar Year 1972	Calendar Year 1971
Depleted fuel elements transferred for chemical separation	12	11	73	74
Average percent burnup of fuel elements transferred	53.0	52.9	52.4	52.4
New fuel elements placed in service	25	16	97	97
New fuel elements available for use	51*	76		
Depleted shim rods trans- ferred for chemical separation	2	0	8	10
Average percent burnup of shim rods transferred	86.3	----	76.5	67.6
New shim rods placed in service	1	2	6	11
New shim rods available for use	4	5		
New shim-rod fuel assemblies available for use	0	0		

*Includes four partial fuel elements.

SHUTDOWNS AND POWER REDUCTIONS

Table 4 presents a summary of the shutdowns which occurred during the quarter, while details are presented in Tables 5 and 6. It is interesting to note that the shutdown of November 11 was scheduled following a threat of damage to AEC facilities by the hijackers of a commercial plane.

The reactor power was reduced to below normal full power only once during the quarter (October 7, 1972) by an automatic setback signal resulting from temporary high pressure in the normal off-gas (NOG) system. The increase in NOG pressure occurred while the flow through the filter pit was being rerouted. The power level was reduced to 15 Mw, and recovery was normal.

Table 4. Summary of Shutdowns

Description of Shutdown . .	Number	Downtime (hr)
Scheduled		
Regular, end of cycle	1	123.167
Regular, refueling	1	3.450
Refular, refueling, and iodine removal	5	16.017
Special, hijacker's threat to AEC's Oak Ridge Facilities	<u>1</u>	<u>18.717</u>
Subtotal	8	161.351
Unscheduled		
Equipment failure, reactor	1	7.350
Instrument failure, reactor	<u>1</u>	<u>3.317</u>
Subtotal	<u>2</u>	<u>10.667</u>
Total	10	172.018

Table 5. ORR Unscheduled Shutdowns, Details

Date	Duration (hr)	Incident Report No.	Remarks
11-16-72	3.317	ORNL 72-70	The electrometer in the north N ¹⁶ channel failed momentarily, causing the recorder to drive upscale to the scram set point. Xenon accumulation prevented an immediate return to power and the reactor was refueled before startup.
12-23-72	7.350	ORNL 72-73	The contacts on relay 13X stuck in the withdraw mode, resulting in a slow withdrawal of No. 6 rod even though the servo system called for rod insertion. When the mode of control was changed from servo to manual, rapid withdrawal of the No. 6 rod occurred, causing a power excursion to the reverse point. The reactor was then shut down (manually scrammed) to permit repairs. Refueling was required.

Table 6. ORR Scheduled Shutdowns; Details

Date	Duration (hr)	End Cycle	Remarks
10-6-72	3.250	108B	The reactor was refueled and isotope (iodine, xenon) work was completed.
10-20-72	3.250	108C	The reactor was refueled and isotope (iodine, xenon) work was completed.
10-27-72	3.450	108D	The reactor was refueled.
11-5-72	123.167	108	This shutdown terminated operating cycle 108. Maintenance work included the following: removal of heads to the No. 4 heat exchanger for a routine inspection of the secondary flow tubes; replacement of exhaust stack on the diesel generator and the removal of the diesel emergency circuit for the MSR and GCR 1 and 2 experiments; the support bracket for the underwater saw vise was repaired; completion of all routine maintenance work; and replacement of the operator for No. 5 shim-rod drive. Experiment work included pressure testing of the GB-10 experiment and preinstallation work was begun on the future HTGR experiment.
11-11-72	18.717	109A	This shutdown was scheduled as a precautionary measure due to a hijacked plane threat to the AEC Oak Ridge Facilities. The reactor was refueled before startup.
11-30-72	3.650	109C	The reactor was refueled and isotope (iodine, xenon) work was completed.
12-12-72	2.850	109D	The reactor was refueled and isotope (iodine, xenon) work was completed.
12-22-72	3.017	109E	The reactor was refueled and isotope (iodine, xenon) work was completed.

INSTRUMENTATION AND REACTOR CONTROLS

A summary of the maintenance and changes to the instrumentation is presented in Table 7. One unscheduled shutdown resulted from instrument failure--specifically, from an upscale spike of the North ¹⁶N recorder which apparently was caused by faulty vacuum tubes in the electrometer for this instrument channel.

Control relay R-13X also failed (sticking contacts) resulting in continuous slow-speed withdrawal of No. 6 shim-control rod which was terminated by a manual scram to prevent an undesired flux tilt. An analysis of this incident and the conditions leading to it indicate that a search for a better relay, perhaps a solid-state device, is warranted.

Information relative to the ionization chambers and fission chambers is given in Table 8.

PROCESS SYSTEMS AND MECHANICAL COMPONENTS

Details of maintenance or changes to the process systems are given in Table 9, while Table 10 summarizes the results of inspection and maintenance relative to the reactor mechanical components. Activities related to the process systems were rather routine in nature with only minor maintenance required.

The operator assembly for the No. 5 shim-rod drive, however, was replaced after the magnet failed to meet the specification relative to variation of drop current. Inspection of the unit which was replaced revealed damage to the scram shock pad, which is constructed of rubber

and thin fiberboard. The damage was sufficient to produce small particles which lodged between the magnet and its armature, thus changing the air gap and consequently the drop current.

Information relative to the filters in the various gaseous waste systems is detailed in Table 11.

EXPERIMENT FACILITIES AND CORE CHANGES

Experiment facility assignments are listed in Table 12, while facility usage is given in Table 13. The core configurations used during the quarter are shown in Figures 1 and 2.

ORR LATTICE LOADING

For Fuel Cycles 108B, 108C, and 109A through 109G

	1	2	3	4	5	6	7	8	9
A	Be	Be	Fuel	Fuel	Fuel	Fuel	Be	Be	E
B	Be	Be	Fuel	SR	Fuel	SR	Fuel	E	E
C	E	Be	Fuel	Fuel	Fuel	Fuel	Fuel	Be	Be
D	Be	Be	Fuel	SR	Fuel	SR	Fuel	HT	Be
E	Be	^{131}I	Fuel	Fuel	Fuel	Fuel	Fuel	Be	Be
F	Be	Be	Fuel	SR	Fuel	SR	Fuel	Be	E
G	Be	Be	Be	Be	Be	Be	Be	Be	Be

<u>LATTICE COMPONENT</u>	<u>NUMBER</u>
Fuel	<u>23</u>
Shim Rod (SR)	<u>6</u>
Beryllium (Be)	<u>27</u>
Experiment (E)	<u>5</u>
Iodine Sleeve (^{131}I)	<u>1</u>
Isotope Stringer (Iso)	<u>0</u>
Hydraulic Tube (HT)	<u>1</u>

Fig. 1. ORR Lattice Configuration October 1, 1972, through October 19, 1972, and November 11, 1972, through December 31, 1972

ORR LATTICE LOADING

For Fuel Cycles 108D and 108E

	1	2	3	4	5	6	7	8	9
A	Be	Be	Fuel	Fuel	Fuel	Fuel	Be	Be	E
B	Be	Be	Fuel	SR	Fuel	SR	Fuel	E	E
C	E	Be	Fuel	Fuel	Fuel	Fuel	Fuel	Be	Be
D	Be	Be	Fuel	Sr	Fuel	Sr	Fuel	HT	Be
E	Be	¹³¹ I	Fuel	Fuel	Fuel	Fuel	Fuel	Be	Be
F	Be	Be	Fuel	Sr	Fuel	Sr	Fuel	Be	E
G	Be	Be	Fuel	Be	Be	Fuel	Be	Be	Be

<u>LATTICE COMPONENT</u>	<u>NUMBER</u>
Fuel	<u>25</u>
Shim Rod (SR)	<u>6</u>
Beryllium (Be)	<u>25</u>
Experiment (E)	<u>5</u>
Iodine Sleeve (¹³¹ I)	<u>1</u>
Isotope Stringer (Iso)	<u>0</u>
Hydraulic Tube (HT)	<u>1</u>

Fig. 2. ORR Lattice Configuration October 20, 1972, through November 5, 1972

Fig. 2. ORR Lattice Configuration October 20, 1972, through November 5, 1972

PROCEDURE ADDITIONS OR REVISIONS

A revision to the ORR operating manual was made on October 30, 1972. Section 7.1C, which provides a description of the emergency electrical system, was revised to include changes to the annunciation panel for the diesel generator. The annunciator panel had recently been revised to include monitoring of the condition of the starter battery and its charger. The changes were authorized by Addendum 1 to Mechanical Change Memorandum No. ORR-12.

SPECIAL TESTS AND INCIDENT REPORTS

Special Tests

Flux Measurement, Beam Flux Enhancement Configuration, September 14 and 15, 1972

This test, described in the previous quarterly report¹, was designed to determine the flux change at the beam holes due to adding fuel in core positions G-3 and G-6. Thermal flux measurements, shown in Figures 3 and 4, were made in two beryllium pieces (Core positions G-4 and G-5) with loading BFEC-1 having no fuel in positions G-3 and G-6 and with loading BFEC-3 containing fuel in positions G-3 and G-6. Contrary to expectations based on calculations, the flux for the latter loading was slightly lower than that for the former. This information was substantiated by measurements by the beam-hole experimenters which also indicated very little change in flux with the fuel in core positions G-3 and G-6.

¹W. H. Tabor and S. S. Hurt, III, Oak Ridge Research Reactor Quarterly Report, July, August, and September of 1972, ORNL-TM-4063 (1973).

Incident Reports

Incident reports Nos. ORNL-72-70 (final report) and ORNL-72-73 (initial report) were issued on December 28, 1972. These reports describe the unscheduled shutdowns listed in Table 5, which were caused, respectively, by instrument failure and relay malfunction.

Fig. 3. Thermal Flux Vertical Profile for Core Position G-4, Loadings BFEC-1 and BFEC-3

Fig. 4. Thermal Flux Vertical Profile for Core Position G-5,
Loadings BFEC-1 and BFEC-3

Table 7. Maintenance and Changes, Instrumentation and Controls

Date	Component	Trouble or Change	Reason or Maintenance
No. 1 Counting-Rate Channel			
No maintenance or changes were required.			
No. 2 Counting-Rate Channel			
10-9-72 through 10-12-72	No. 2 counting- rate meter	Erratic readout	The counting-rate meter, the A-1 amplifier, and the power supply were replaced; however, the erratic readout continued which indicated chamber trouble. "Snake" assembly TSM-3-F29 was installed but was found to be inoperable due to a grounded circuit and was returned to the shop for repairs.
10-24-72	No. 2 counting- rate chamber	Inoperative	The fission chamber was replaced with chamber TSM-3-F29 which corrected the problem.
11-20-72	Counting-rate meter	Replacement	The counting-rate meter was replaced because the one in use did not meet specifications.
No. 1 Log-N Channel			
No maintenance or changes were required.			

Table 7 (Continued)

Date	Component	Trouble or Change	Reason or Maintenance
No. 2 Log-N Channel			
10-19-72	Log-N amplifier	Erratic readout	The log-N amplifier was replaced to correct an erratic readout on the log-N period recorder.
No. 1 Safety Channel			
			No maintenance or changes were required.
No. 2 Safety Channel			
			No maintenance or changes were required.
No. 3 Safety Channel			
			No maintenance or changes were required.
Magnet Amplifiers			
			No maintenance or changes were required.
Nos. 1 and 2 Gamma Channels			
			No maintenance or changes were required.

Table 7 (Continued)

Date	Component	Trouble or Change	Reason or Maintenance
North ¹⁶ Channel			
11-30-72	N ¹⁶ Recorder	Replacement	The recorder amplifier was replaced to correct an erratic readout on the recorder.
12-11-72	N ¹⁶ Recorder	Replacement	The recorder amplifier was replaced to correct an erratic readout on the recorder.
South ¹⁶ Channel			
No maintenance or changes were required.			
Micromicroammeter Channel			
No maintenance or changes were required.			
Servo Channel			
No maintenance or changes were required.			
Reactor Noise Monitor			
No maintenance or changes were required.			

Table 7 (Continued)

Date	Component	Trouble or Change	Reason or Maintenance
Radiation Detection Instrumentation			
No maintenance or changes were required.			
Process Instrumentation			
10-31-72	Pool pH controller	Erratic readout	The tubes in the controller were replaced to correct an erratic readout on the pH recorder.
Facility Radiation and Contamination Alarm System (FRCAS)			
12-5-72	Entire System	Routine test	A functional check of the system was made by Instrumentation and Controls Division personnel. The results were satisfactory.
Shim-Rod Control Circuitry			
11-6-72	Servo relays	Replacement	Routine maintenance inspection revealed relays 13X and 14X to be in need of replacement.
12-23-72	Servo relay	Replacement	The 13X relay failed in the closed position (contacts stuck). The relay was replaced.

Table 8. Present Status of Ionization Chambers and Fission Chambers

Chamber Serial No.	Location	Present Service	Date Present Service Started	Previous Service	Remarks
Installed Chambers					
PCP-III-106-66-9	Position 7	No. 1 safety	September, 1966 (safety)	None	No trouble; fabricated at ORNL. Compensated section used from February, 1969, until March, 1970, as No. 1 Log N.
PCP-III-106-66-5	Position 2	No. 2 safety and No. 2 log N	November, 1971	ORR	Used as No. 2 safety and No. 2 log N from September 27, 1968, to July 22, 1970, and from May 7, 1971, to May 20, 1971.
PCP-II-106-66-3	Position 4	No. 3 safety and No. 1 log N	May, 1964 (safety) March, 1970 (log N)	None	No trouble; fabricated by ORNL.
PCP-II-106-63-4	Position 5	Servo and micromicro- ammeter	June, 1964	None	No trouble; fabricated by ORNL.
TSM-2-F45	Poolside	No. 1 counting rate, north	April 26, 1971	None	Replaced fission chamber "snake" assembly S27-34R-F29.
CTC-5 (C-770)	Position 8	Noise monitor	October, 1971	LITR	Used as No. 1 safety at the LITR; modified for ORR-BSR underwater service.
PCP-II-105-63-2	Poolside, south	No. 1 gamma, south	April 26, 1972	ORR	Used as No. 2 gamma, north, from April, 1964, until December, 1970.

Table 8 (Continued)

Chamber Serial No.	Location	Present Service	Date Present Service Started	Previous Service	Remarks
PCP-II-105-63-3	Poolside, north	No. 2 gamma, north	August 17, 1971	ORR	Used as No. 1 gamma, south, from April, 1964, until March, 1970.
TSM-3-F29	Poolside	No. 2 counting rate	October 24, 1972	None	Replaced fission chamber "snake" assembly TSM-1-F52.
Spare Chambers					
PCP-II-105-63-1	ORR plug storage	Awaiting repair	April 26, 1972	ORR	Used as No. 1 gamma, south, from March 31, 1970, until April 26, 1972.
TSM-1-F52	ORR I&C shop	Awaiting repair	April 26, 1972	ORR	Used as No. 2 counting rate (south) from April 26, 1972, until October 24, 1972.
S27-34R-F29	ORR plug storage	Awaiting repair	April 26, 1971	ORR	Used as No. 1 counting rate from July 28, 1970, to April 26, 1971.
S3-8R-F22	ORR plug storage	Awaiting repair	April 26, 1971	ORR	Used as No. 2 counting rate from January 14, 1970, to April 26, 1971.
CTC-1	ORR plug storage	Awaiting repair	October, 1971	ORR	Used as noise monitor from March, 1962, until October 1, 1971.
CTC-4 (C-769)	ORR plug storage			LITR	Used as No. 2 safety in the LITR; modified for ORR-BSR underwater service.

Table 9. Process Systems, Maintenance and Changes

Date	Component	Remarks
Reactor Primary Cooling System		
11-6-72	Emergency gasoline cooling pump	The engine oil was changed.
11-7-72	Reactor tank access cover	The plastic view-port covers were replaced.
11-8-72	Bypass filters	The cartridges were replaced.
Reactor Secondary Cooling System		
10-24-72 through 11-1-72	Cooling tower basin drain	A new drain line (as specified in Mechanical Change Memo No. ORR 19) was installed from the tower basin to White Oak Creek. The new drain line allows the water to be drained with the basin drain valve fully opened at a much faster rate.
11-6-72 through 11-8-72	Pump and fan starters	The relays, wires, and coils were inspected and cleaned.
11-6-72 through 11-9-72	Cooling tower and fans	The basin and screens were cleaned; oil was changed in the fan gear boxes; and vibration checks were completed. The results were satisfactory.

Table 9 (Continued)

Date	Component	Remarks
11-6-72 through 11-7-72	No. 4 heat exchanger	The secondary side was drained so the heads could be removed for an inspection of the secondary flow tubes. The inspection showed the tubes to be in satisfactory condition. The heads were cleaned and new gaskets were installed when the unit was reassembled.
11-13-72	Ledex stepping motor	The automatic fan-control system was inoperative due to a faulty Ledex stepping motor. The motor was replaced and the system operated satisfactorily.
11-30-72	Ledex stepping motor	The stepping motor for the automatic control on the cooling fans burned out. The motor was replaced.
12-13-72	Cooling tower, south fan	The fan switch F15-48A was replaced and the cams were adjusted.

Pool Secondary Cooling System

10-9-72 through 10-30-72	Acid-addition system	The system has not performed satisfactorily since its installation on August 17, 1972. Many checks for malfunction have been made with no satisfactory results. The pump was removed and returned to the factory October 30, 1972. The former acid-addition system (automatic electric solenoid) was placed in service and will remain in service until new system is reinstalled.
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Table 9 (Continued)

Date	Component	Remarks
11-6-72 and 11-7-72	Cooling tower and fan	The basin and screen were cleaned, and the oil was changed in the fan gear box. Vibration checks were completed with satisfactory results.
11-17-72	Acid control solenoid	The faulty solenoid was replaced to correct an erratic pH control.
Emergency Cooling System		
11-6-72	Reactor vessel spray heads	The spray heads were checked with satisfactory results.
11-8-72	Nos. 1, 2, and 3 dc units	Functional tests of equipment and alarms confirmed that the systems were in satisfactory condition.
Cell Ventilation System		
10-9-72 through 10-11-72	Steam turbine	The system was checked to locate the cause of the turbine starting to run for no apparent reason. The air regulator was found to be leaking. Satisfactory repairs were made.
11-6-72	Steam turbine	A steam leak was repaired.
11-8-72	Building and heating ventilation unit No. 3	A faulty belt was replaced.

Table 9 (Continued)

Date	Component	Remarks
12-19-72	Building and heating ventilation unit No. 3 steam condensate pump	The condensate pump was replaced with a spare unit. A leak in the condensate line was also repaired.

Electrical System

11-6-72 through 11-8-72	Miscellaneous breaker panels for electric motors, dc batteries, battery racks, and control room instrument cabinets	Routine inspection and cleaning were performed. Relays 13X and 14X were replaced.
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Emergency Electrical System

11-6-72	Diesel generator	The exhaust stack was replaced, and the diesel emergency circuit for the MSR and GCR 1 and 2 experiments was removed in accordance with Mechanical Design Change Memo 18.
11-7-72	Diesel generator	The routine end-of-cycle load test was performed with satisfactory results.
12-19-72	Diesel generator	A section of the radiator was replaced with a spare unit. The section removed was leaking.

Miscellaneous

10-30-72	No. 6 sump pump motor	A loose wire to the starter coil was replaced.
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Table 9 (Continued)

Date	Component	Remarks
11-7-72	Underwater saw vise and cutter box	The support bracket for the vise was repaired and checks were made for a new cover plate for the box to be installed at a later date.
12-1-72	North Hytor vacuum pump	An extension was added to the exhaust.

Table 10. Reactor Mechanical Components, Maintenance and Changes

Date	Component	Remarks
11-7-72	Poolside irradiation facility	The outer surface of this facility was examined through use of the omniscope with right angle viewing head and 4X magnification. A very slight increase in oxide accumulation was noted, but this occurred only in a few random areas of the corner welds. There was no evidence of cracking or bowing of the metal, and the mechanical damage was still limited to very superficial scratches, probably quite old.
11-7-72	Emergency core spray system	The routine functional test and visual inspection were completed. The system functioned as expected, and no evidence of damage or defect was noted.
11-7-72	Reactor tank flanged connections and experiment penetrations	The gaskets used in the various connections were examined and found to be in satisfactory condition.
11-8-72	No. 5 shim-rod drive	The operator assembly which includes the snubber sub-assembly, the magnet subassembly, and the clutch and response switches, was replaced after end-of-cycle checks revealed that the magnet assembly performance did not meet specifications, i.e., the drop current was not consistently within limits. The newly installed assembly functioned as designed, and preliminary examination of the components which were removed prior to disassembly showed no physical defects.

Table 11. Status of Filters - Gaseous Waste Systems

Type Filter	Bank Designation	Date Installed	Date Last Tested	Type Test	Retention Efficiency (%)
Cell-Ventilation System					
CWS	Overall [*]	North, June, 1964; South, 1-12-65	9-11-72	DOP	99.998
Charcoal	Both banks	North, 8-23-67; South, 10-17-67	8-22-72	Elemental iodine	99.938
Pressurizable Off-Gas					
CWS	North	4-3-68	9-11-72	DOP	99.992
Charcoal	North	7-22-68	11-7-72	Elemental iodine	99.68**
CWS	South	10-18-67	9-11-72	DOP	99.998
Charcoal	South	12-8-69	7-18-72	Elemental iodine	99.988
Basement Hood Exhaust					
CWS	South	2-16-72	9-19-72	DOP	99.997
CWS	North	2-16-72	9-19-72	DOP	99.998

* The CWS filters in the cell-ventilation system were checked in series.

** Changed to the south bank of filters, the north bank was tagged "out of service".

Table 11 (Continued)

Type Filter	Bank Designation	Date Installed	Date Last Tested	Type Test	Retention Efficiency (%)
Normal Off-Gas					
CWS	West	7-24-72	8-3-72	DOP	99.998
Charcoal	West	11-17-72	11-30-72	Elemental iodine	99.985*
CWS	East	7-24-72	8-3-72	DOP	99.998
Charcoal	East	10-6-71	4-24-72	Elemental iodine	99.920

*The charcoal filter was replaced on November 17, 1972, after efficiency tests of October 31 and November 7 yielded elemental iodine removal efficiencies of 99.89 and 99.85%, respectively.

Table 12. Facilities Assignments (End of Quarter)

Facility	Access Flange	Nature of Experiment	Division or Other Sponsor
Lattice Positions			
A-1	V-11		Available for assignment
A-2	V-11		Available for assignment
A-9	V-2	Equipped with a facility tube	Available for assignment
B-2	V-10	Equipped with a facility tube	Available for assignment
B-8	V-1		Available for assignment
B-9	V-2	Equipped with a facility tube	Available for assignment
C-1	V-9	Equipped with a facility tube	Reactor
E-2	None	Radionuclide (iodine and xenon) production	Isotopes
D-8	V-3	Hydraulic tube No. 2	Isotopes and Chemistry
F-1	V-8		Available for assignment
F-2	V-6	Equipped with a facility tube	Available for assignment
F-8	V-4		Available for assignment
F-9	V-5	Equipped with a facility tube	Available for assignment

Table 12 (Continued)

Facility	Access Flange	Nature of Experiment	Division or Other Sponsor
Poolside Positions			
P-2, P-3, P-4, and P-8	None		Available for assignment
P-7	None	GCR capsule irradiations	Reactor
P-1 and P-9	None		Available for assignment
P-5	None		Available for assignment
P-6	None		Available for assignment
P-9*	None	Neutron radiography	Operations and Metals and Ceramics
P-9+*	None	Pneumatic tube for activation analysis	Chemistry
Large Facilities			
HN-1	None	Beam-hole or loop experiments	Available for assignment
HN-2	None		Available for assignment

* The installation of these facilities does not prevent the use of P-9 position for capsule irradiation.

Table 12 (Continued)

Facility	Access Flange	Nature of Experiment	Division or Other Sponsor
HN-3	None	Pneumatic tube for activation analysis	Analytical Chemistry
HN-4	None	Equipped with a collimator	Available for assignment
HS	None	Equipped with gas-cooled loop 2 components (on standby)	Available for assignment
Beam Holes			
HB-1	None	Available for beam-type experiment	Unassigned
HB-2	None	Neutron diffractometer	Solid State
HB-3	None	Neutron diffractometer	Solid State
HB-4	None	Neutron diffractometer	Chemistry
HB-5	None	Available for beam-type experiment	Unassigned
HB-6	None	Available for beam-type experiment	Unassigned

Table 13. Experiment Facility Usage

Facility	Date Installed	Date Removed	Description of Experiment	Division or Other Sponsor
D-8	3-10-67		Hydraulic tube No. 2 used for isotope production and short-term irradiations	Operations
F-2	7-26-71		Five aluminum rods, one Fe flux monitor in aluminum can, 1-mg rod and aluminum can	Metals and Ceramics
GCR P7-A	8-8-72		GB-10 capsule experiment	Reactor
P-9	12-10-69		Neutron radiography	Operations and Metals and Ceramics
P-9+	10-18-67		Pneumatic tube for irradiation of short-lived isotopes	Chemistry
HB-2	7-58		Neutron diffraction experiments	Solid State Physics
HB-3	11-1-59		Neutron diffraction experiments	Solid State Physics
HB-4	7-58		Neutron diffraction experiments	Chemistry
HN-3	11-59		Activation analysis	Analytical Chemistry
HN-4	12-15-63		Void determinations in irradiated materials	Solid State Physics
HN-4	12-15-63		"Fly's Eye" two-dimensional neutron detector for neutron diffraction and radiography	Instrumentation and Controls

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