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BNL-62472

REACTOR OPERATIONS

BROOKHAVEN MEDICAL RESEARCH REACTOR

BROOKHAVEN HIGH FLUX BEAM REACTOR

RECEIVED

JAN 03 1995

OSTI

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JULY 1995

INFORMAL REPORT

BROOKHAVEN NATIONAL LABORATORY

ASSOCIATED UNIVERSITIES, INC.

UPTON, NEW YORK 11973-5000

under contract No. DE-AC02-76CH00016 with the
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MASTER

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Part I

Brookhaven Medical Research Reactor

1. Reactor

The reactor ran for 14 days with 21 startups during the month of July. A total of 88.14 Mwhrs of thermal energy were produced bringing the total to date to 22,137.47 Mwhrs.

2. Instrumentation

There were no instrument occurrences during the month of July, 1995.

3. Mechanical Maintenance

All scheduled tickler card maintenance was completed.

4. Occurrence Reports

There were no reportable occurrences for the month of July 1995.

5. Safety

There were no first aid or lost time due to accidents for the month of July 1995.

BMRR TECHNICAL SAFETY SURVEILLANCE REQUIREMENTS RECORD

MONTH July YEAR 1995

<u>Requirement</u>	<u>Period</u>	<u>Previous Completion Date</u>	<u>Scheduled Date</u>	<u>Completion Date</u>	<u>Deadline if Not Completed</u>
Operations					
Confinement System					
a. Nuclear Incident System (M-4.2.4)	M	06/19/95	07/95	07/25/95	
b. Bldg. Relief Valves (M-4.2.2)	M	06/15/95	07/95	07/06/95	
c. Safety Circuit Test (Q-4.3.4)	Q	04/12/95	07/95	07/10/95	
d. Control Rod Seating (M-4.8.6)	M	6/01/95	07/95	07/10/95	
Instrumentation					
a. Fission Products Monitor Calibration (A-4.7.3)	A	07/18/94	07/95	07/28/95	

[TSSRR/jultechs]

M = Monthly
 Q = Quarterly
 () = Date of the month in which card is issued

A/2 = Semi-Annually
 A = Annually

SUMMARY OF BMRR IRRADIATIONS

07/01/95 TO 07/31/95

DATE	PROJECT	HOURS	FACILITY	DESCRIPTION OF SAMPLE
07/06/95	MEDICAL	1.000	RADIAL	CELLS w/B-10
07/06/95	MEDICAL	1.000	TREATMENT ROOM #2	BNCT TREATMENT EQUIP.
07/06/95	MEDICAL	3.650	Pn-TUBE	Cr in H2SO4
07/11/95	MEDICAL	2.600	TREATMENT ROOM #2	CELLS
07/11/95	MEDICAL	0.083	Pn-TUBE	In-115 STANDARDS
07/11/95	CHEMISTRY	0.006	Pn-TUBE	Au, Fe, Al FOILS
07/11/95	MEDICAL	0.167	Pn-TUBE	GdCl3
07/12/95	REACTOR	0.333	TREATMENT ROOM #2	ELECTRONIC COMPONENTS
07/12/95	MEDICAL	6.650	TREATMENT ROOM #1	RATS
07/13/95	MEDICAL	0.917	TREATMENT ROOM #2	BNCT PATIENT
07/13/95	MEDICAL	4.500	RADIAL	CELLS w/B-10
07/13/95	MEDICAL	0.333	TREATMENT ROOM #2	BEAM CHECK
07/14/95	MEDICAL	5.750	TREATMENT ROOM #1	RATS
07/17/95	MEDICAL	6.000	TREATMENT ROOM #1	RATS
07/18/95	MEDICAL	5.000	TREATMENT ROOM #2	U-238 CHAMBER
07/19/95	MEDICAL	0.250	Pn-TUBE	GdCl3
07/19/95	MEDICAL	5.117	TREATMENT ROOM #1	RATS
07/19/95	MEDICAL	0.167	Pn-TUBE	GdCl3
07/20/95	MEDICAL	0.333	TREATMENT ROOM #2	BEAM CHECK
07/20/95	MEDICAL	5.167	RADIAL	CELLS w/B-10
07/20/95	MEDICAL	0.700	TREATMENT ROOM #2	BNCT PATIENT
07/21/95	CHEMISTRY	6.500	Pn-TUBE	Cr SAMPLES
07/25/95	MEDICAL	4.333	TREATMENT ROOM #2	CELLS
07/25/95	MEDICAL	1.500	TREATMENT ROOM #1	RATS
07/26/95	MEDICAL	4.167	TREATMENT ROOM #2	TLD's / Au and Cd-Au
07/26/95	MEDICAL	0.167	Pn-TUBE	Gd-158
07/26/95	S&EP	0.083	WIDE BEAM	NEUTRON DOSIMETRY

DATE	PROJECT	HOURS	FACILITY	DESCRIPTION OF SAMPLE
07/27/95	MEDICAL	5.133	RADIAL	CELLS w/B-10

TOTAL NO. OF HOURS: 71.60556

TOTAL NO. OF SAMPLE CAPSULES LOADED: 8

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PART II

Brookhaven High Flux Beam Reactor

July

31 Days

10837 - 10867

Reactor Operation to Date	278,887.00	MWD
Reactor Operation for Month	597.84	MWD
Hours of Operation	483.80	HRS
Average Power Level ((MWDx24) / Hours of Operation)	29.65	MW
Maximum Power Level	30.00	MW
Downtime	34.97	%
Electrical Energy Consumed within HFBR Bldg.	927,000.	KWH
Electrical Energy Consumed by Sec. Water Pumps	201,300.	KWH
Electrical Energy Consumed in Pumphouse 440V System	20,300.	KWH
Total Electrical Energy Consumed within HFBR Complex	1,148,600.	KWH
Electrical Energy Consumed by CNF Compressor	207,200.	KWH
Elements Charged this Month	8	
Elements Discharged this Month	8	
Reactor D ₂ O Inventory (within 200 pounds)	100,818.00 (45,731.04	LBS KG)
Reactor D ₂ O Isotopic Purity (Average All Systems)	99.50	%
Helium Consumed (NTP)	15,395.52 (435.	CF CM)
CO2 Consumed	9,600. (4,354.	LBS KG)

JULY 1995

HFBR

MAXIMUM POWER LEVEL 30.00 MW
AVERAGE POWER LEVEL 29.65 MW

POWER LEVEL, MEGAWATTS

30
25
20
15
10
5
0

DATE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

2. Explanation of Histogram

Operating Cycle No. 281 was in progress at the beginning of this report period. The reactor was shutdown at 1000 hours on July 9, 1995 for scheduled maintenance and refueling.

On July 20, 1995 at 0552 hours, the reactor was started up and the Estimated Critical Position verified. At 0815 hours reactor power was raised to 4MW for a Health Physics Shield Check. Tri-monthly Safety Circuit Testing was performed from 0946 to 1111 hours during which power was periodically raised to 15 MW. At 1127 hours reactor power was raised to 30 MW for Operating Cycle No. 282.

At 0855 hours on July 25, 1995 the reactor scrammed due to a momentary loss of incoming power to the building do to a severe thunderstorm in the area. The reactor was restarted at 0928 hours and 30 MW operation attained a 1025 hours. Reference Occurrence Report CH-BH-BNL-HFBR-1995-0008.

3. Operating Difficulties:

On July 6, 1995 the operating crew noticed an increasing trend on Primary Water Fission Products Monitor RRa100. Primary water iodine grab sample analysis confirmed an increasing trend. Administrative limits for iodine activity were established, conservatively below Technical Safety Requirement levels, and the trend monitored through the end of the cycle. All fuel elements were sampled and the leaking element (#1518) identified. Further investigation indicated that the comb had failed and the resulting hydraulic action caused fretting wear of the fuel plates. Reference Occurrence Report CH-BH-BNL-HFBR-1995-0007 for details.

On July 15, 1995 approximately 150 gallons of heavy water leaked from the primary system through the GA101A primary pump shaft seal. The shaft seal seating surfaces separated following ejection of the shaft coupling tapered pin. GA101A was being run for post maintenance testing following bearing and seal replacements when the pin was ejected. Reference Occurrence Report CH-BH-BNL-HFBR-1995-0006 for details.

4. Reactivity Comments:

The excess reactivity at the end of Operating Cycle No. 281 was 1.1\$. The excess reactivity at the beginning of Operating Cycle No. 282 was 22.27 \$.

5. Building Confinement - Test and Changes

None.

6. Changes to Reactor or Process Systems

None.

7. Instrumentation

There were no instrument occurrences during the month of July 1995.

8. Mechanical Maintenance

All scheduled tickler card maintenance was completed.

9. Occurrence Reports

There were three reportable occurrences for the month of July 1995.

CH-BH-BNL-HFBR-1995-0006, Leak of heavy Water from Pump Seal of Primary Coolant System Pump "A", 7/15/95.

CH-BH-BNL-HFBR-1995-0007, HFBR KM Type Fuel Element - Comb and Cladding Failure, 7/6/95.

CH-BH-BNL-HFBR-1995-0008, Reactor Shutdown due to Momentary Interruption of Off-Site Electric Power Caused by Harsh Weather Condition, 7/25/95.

10. Experimental Facilities

The reactor was shutdown for maintenance July 9 - 20, 1995.

Experimental work was in progress on the following beam lines from July 1 - 9, 1995 and also July 20 - 31, 1995.

H-1B Physics Department - Nuclear Structure Group - work in progress.

H-1A Powder diffractometer in service.

H-2 Physics Department - TRISTAN Experiment Dismantled

H-3 Biology Department - On 5/15 experiment shutdown for modification work.

H-3A Experimental work in progress.

H-3B Experimental work in progress.

H-4 Physics Department - Neutron Scattering Group.
H-4M Experimental work in progress.
H-4S Experimental work in progress.
H-5 Chemistry Department - Chemistry Department Neutron Scattering Group.
H-6 Chemistry Department - Chemical Crystallography Group.
H-6M & H-6S - Experimental work in progress.
H-7 Physics Department - Neutron Scattering Group.
H-8 Physics Department - Neutron Scattering Group.
H-9 Reactor Division - Cold Neutron Facility.
H-9A Physics - Experimental work in progress.
H-9B Biology - Experimental work in progress.
H-9R Physics - Neutron Reflectometer in-service.

11. Cold Neutron Facility

Operating History

The CNF was operating at the beginning of the reporting period. The CNF automatically vented and purged on July 7th at 1515 hours due to inpile vacuum system turbo pump tripping. The CNF restarted on the same day at 2143 hours and remained operating until the end of operating cycle number 281. The CNF started up with the reactor on July 20th at 1222 hours.

The CNF automatically vented and purged on July 25th at 0845 hours due to severe weather conditions (the reactor also shutdown). The CNF restarted on the same day at 1312 hours and operated for the remainder of the reporting period.

The CNF operated for 467 hours during July. Lost time was due to a trip of the inpile vacuum system turbo pump and severe weather conditions (thunder storms). The CNF produced cold neutrons 98% of the time that the reactor was at full power.

Operating Difficulties

On July 7th an inpile vacuum system turbo pump trip is believed to have been by operating the turbo pump in the low torque mode. In this mode, the pump operates closer to the current trip setting. It is suspected that the pump had a momentary higher current draw that caused a pump trip on high current. The pump has been set to the high torque mode to prevent further occurrences.

The reactor and CNF shutdown on July 25th due to severe thunder storms.

The CNF lost 11 hours due to the turbo pump trip and severe weather conditions.

Maintenance Activities

All required maintenance and surveillance testing was completed. Oil was removed from piping leading to turbines. Particulate filter at discharge of compressor charcoal filter was replaced because it had become saturated with oil.

12. Safety

There were three first aid and 1 lost time due to accidents for the month of July, 1995.

13. Fuel Element Inventory

Elements in Use as of July 31, 1995

In Reactor(s)	HFBR 28	BMRR 36	64
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Element Movement during the Month

Charged to reactor	8
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Discharged from reactor	8
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HFBR TECHNICAL SAFETY REQUIREMENT SURVEILLANCES

JULY 1995

PROCEDURE		COMPLETION DATE(S)	COMMENTS
No.	Title		
184	Water Chem. - Tech. Spec. Surveillance Requirements	10,17	
236	CO2 Cavity Tritium Sample	3,10,17,24,31	
IR 2.exp	Isotopic Purity of Experimental System	5,24,31	
IR 2.pri	Isotopic Purity of Primary System	5,24,31	
MIS 1.8	Determination of pD with Orion pH meter (Primary System)	5,24,31	
IC 2.1.exp	Chloride Content in Experimental System	5,24,31	
IC 2.1.pri	Chloride Content in Primary System	5,24,31	
302	Criticality Alarm System Operability Test	1	
310	SPAM Station Checks	15	
116A	Control Rod Interlock	9	
116B	SCRAM Logic Action Tests	9	
116C	SETBACK Logic Action	9	
116D	SCRAM & SETBACK Trip Point & Channel Independency	9	
116E	Nuclear Instrumentation Performance	20	
116F	LOLOLOW AND LOLOW Logic Action & Channel Independency	12	
291	Low-Low-Low Level Pony Motor Trip Relay Test	17	
296	LI-107/LI-109 Operability Check	18	LI107 is Out of Service.
324	Review of HFBR Management Tec. and RAD Safety Support	13	
301	Fuel Handling Blower (GB 302) Air Flow Measurement	10	Performed as post work testing after bearing replacement.
HE 3&11 (A)	24 VDC Battery Float Voltage	DUE	
HG 8(A)	LI-109 24 VDC Float Voltage and Battery Operability Check	13	
HB 126&127	GA-101A & B Pump Circuits Cal. Trip Pt & Time Delay Check	12	
HB 216-219	Pony Motor Current Instrument Calibration	14	
HB 110(B)	Conductivity Cells CR1-5 Calibration	12	
HP 36	LI107 Calibration		LI107 is Out of Service.
HT 49	Pdla-102 Calibration	13	
HT 50	Pdla-103 Calibration	13	
HT 51	PdRa-101 Calibration	13	
TC 627E	250V Monthly Battery Inspection	1	
TC 632E	Monthly Pony Motor Battery Inspection	1	

SUMMARY OF HFBR IRRADIATIONS
07/01/95 TO 07/31/95

DATE	PROJECT	HOURS	FACILITY	DESCRIPTION OF SAMPLE
07/05/95	PHYSICS	115.667	V-14	Cu-63
07/06/95	DAT	1.500	V-11	SiO2 SLIDES
07/07/95	REACTOR	0.067	V-15	3/4" X 8" 6061 Al CYL
07/07/95	REACTOR	0.033	V-14	3/4" X 8" 6061 Al CYL
07/21/95	NASA	24.000	V-15	SILICATES
07/21/95	DAT	4.350	V-11	SiO2 SLIDES
07/24/95	UNIV OF MARYLAND	1.000	V-11	Ir STANDARDS
07/25/95	CHEMISTRY	19.917	V-10	LIMESTONE
07/25/95	PHYSICS	92.617	V-14	Cu-63
07/27/95	DAT	2.067	V-11	SiO2 SLIDES
07/28/95	PHYSICS	65.000	V-14	Cu-63
07/31/95	MEDICAL	4.417	V-12	Au-197
07/31/95	UNIV OF MARYLAND	4.000	V-11	AEROSOL ON FILTERS

TOTAL NO. OF HOURS: 334.6333

TOTAL NO. OF SAMPLE CAPSULES LOADED: 13

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End of Report