

UNCLASSIFIED

BNWC-8 5 G

(CLASSIFICATION)

ISSUING FILE

COPY NO.

DATE

6-15-65

PROJECT

REFERENCE COPY

RECEIVED 300 AREA

CIRCULATING COPY

RECEIVED 300 AREA

RE JUL 15 1965

TECHNICAL INFORMATION FILES

RETURN TO

**BATTELLE-NORTHWEST**

RICHLAND, WASHINGTON

TITLE

TECHNICAL INFORMATION FILES

TEST REACTOR AND ENGINEERING SERVICES MONTHLY REPORT  
MAY 1965

AUTHOR

W. D. Richmond

## DISTRIBUTION

NAME	BUILDING	AREA	NAME	BUILDING	AREA
J. G. Bradley	3201	300	J. R. Fishbaugher	309	300
R. G. Clark	3702	300	W. R. Lewis	309	300
S. Goldsmith	308	300	L. J. Lucas	328	300
H. Hartly	328	300	D. E. Newby	309	300
R. S. Paul	326	300	L. T. Pedersen	309	300
L. L. Rodig	3201	3000	M. G. Petersen	3746	300
D. P. Schively	314	300	J. G. Zwiener	309	300
N. G. Wittenbrock	762	700	→ 300 Area Files (2)	3760	300

BEST AVAILABLE  
REPRODUCED COPYReviewed and Approved for  
Public Release by the NSAT  
*Donald Brown* PNNL ADD  
4-3-2003 Date

ROUTE TO

PAYROLL NO.

LOCATION

FILES ROUTE DATE

*Eptia*

UNCLASSIFIED

(CLASSIFICATION)

(TO BE USED ON UNCLASSIFIED AND OFFICIAL USE ONLY DOCUMENTS)

REACTOR DEVELOPMENT - O4 PROGRAMPLUTONIUM RECYCLE PROGRAMPlutonium Recycle Test ReactorOperation

Reactor output for May was 996 MWD for an experimental time efficiency of 59% and a critical efficiency of 53%. There were thirteen operating periods during the month, of which four were terminated manually and nine were terminated by scrams. A summary of the fuel irradiation program as of May 31, 1965, follows:

	<u>Al-Pu</u>		<u>UO<sub>2</sub></u>		<u>UO<sub>2</sub>-PuO<sub>2</sub></u>		<u>Other</u>		<u>Program Totals</u>	
	<u>No.</u>	<u>MWD</u>	<u>No.</u>	<u>MWD</u>	<u>No.</u>	<u>MWD</u>	<u>No.</u>	<u>MWD</u>	<u>No.</u>	<u>MWD</u>
In-Core			3	1240.1	76	18364.2			79	19604.3
Maximum				437.2		494.8				
Average				413.1		241.6				
In Basin	7	572.5	30	3806.2	65	10247.5			102	14626.2
Buried							1	7.3	1	7.3
Chem. Process.	68	5465.8	35	1965.8					103	7431.6
Program Totals	75	6038.3	68	7012.1	141	28611.7	1	7.3	285	41669.4

(Note: MWD/Element x 20 = MWD/TU for UO<sub>2</sub> - 1 w/o PuO<sub>2</sub>.)

Heavy water loss and indicated helium loss for the month were 1181 pounds and 133,788 scf., respectively.

Equipment Experience

A total of 1363 craft manhours were utilized during the May reactor outage as follows:

Repair	729 manhours
Modification and Improvement	206 manhours
Operations Assistance	320 manhours
Preventive Maintenance	108 manhours

Total preventive maintenance effort for the month was 321 manhours, or 12.9% of available assigned manhours.

NOTICE

This document copy, since it is transmitted in advance of patent clearance, is made available to contractors solely for use in performance of work under contracts with the U. S. Atomic Energy Commission. This document is not to be published nor its contents otherwise disseminated or used for purposes other than specified above without patent approval for such release of use has been secured, upon request, from the Chief, Chicago Patent Group, U. S. Atomic Energy Commission, 9840 So. Cass Ave., Argonne, Illinois.

UNCLASSIFIED

Improvement Work Status (Significant Items)Work Completed

Flux Recorder Potentiometers Addition  
TKA-1 Modification  
Shipping Basket Stand Modification  
Deaerator Platform - M&M Cell  
Gas Chromatograph Modification  
Modification to PRTR Warehouse 3718-C

Work Partially Completed

Corrosion Loop Installation  
Additional Fuel Storage and Examination Facility  
Flux Wire Scanning System  
D<sub>2</sub>O Cleanup Facility  
Pneumatic Irradiation Facility  
Boric Acid Prototype Facility

Design Work Completed

PSCD Sample Station  
Shim Well Shielding

Design Work Partially Completed

Instrument Power Supply  
PRTR Experimental and Building Facility Addition  
PRTR Increased Power Level  
PRTR Vacuum Deaerator

Process Engineering and Reactor Physics

The traveling wire flux monitor system was put into service during May. Several scans have been made in Monitor Location 1450. Insertion or removal of the wire caused a moderator level change of about 0.2 inches. A high level trip, at 110% P, was received on one linear flux channel when the wire was removed from the core. Integration of the axial profile yielded axial peak-to-average thermal flux ratios of 1.144 for the HPD element and 1.282 for standard elements.

Eight of the 58-inch UO<sub>2</sub> - 2 w/o PuO<sub>2</sub> elements are under irradiation, including #6500 (Salt Cycle) and #6004 (Defected). The maximum exposure of an HPD element as of May 31, 1965, was approximately 134 MWD (= 4000 MWD/TU). The exposure of the Salt Cycle element was = 30 MWD (= 1000 MWD/TU). The power generation of the standard HPD elements continued in the 1000 - 1350 KW range.

UNCLASSIFIED

Analytical work supporting the design basis document for the chemical shim system was concluded. The following parameters have been established: 1) Ion exchange process using existing columns; and 2) Enriched boric acid for the batch core experiment.

Recalculation of allowable tube powers for 58-inch 2 w/o  $\text{PuO}_2$ - $\text{UO}_2$  fuel elements based upon the new capacity of the low pressure LWI system was completed. Limiting tube powers from a LWI standpoint only are: 1) Element having 2 w/o  $\text{PuO}_2$  at the ends of the fuel rods - 1400 KW; 2) Element having  $\text{UO}_2$  at bottom or both ends - 1800 KW; and 3) Element having  $\text{UO}_2$  and 1 w/o  $\text{PuO}_2$  buffer zone at both ends - 1800 KW.

A calculation of the reactivity decrease from voiding the coolant of the  $\text{UO}_2$  - 2 w/o  $\text{PuO}_2$  HPD core was performed and the results sent to Nuclear Safeguards and Engineering.

#### Experimental Reactor Services

The status of the various test elements at the end of May 1965, is shown below. Those elements discharged prior to May 1, 1965, have been deleted from this table.

Test Channel No.	Location	Element Number	Description	Date Initial Charge	Date Discharged	Approximate Accumulated MWD
14	1956	5097	Swaged-0.48%	4/2/62	--	305.2
48	1156	5150	0.48% ( $\frac{1}{2}$ " x $\frac{1}{2}$ " pads)	8/1/62		312.5
54	1647	5116	0.48% (clip-on pads)	5/8/62		314.6
54	1554	5118	0.48% (clip-on pads)	5/8/62		494.8
61	Basin	5192	0.48% - Physics	6/13/63	5/24/65	341.2
67	1047	5117	0.48% (Repaired wire)	10/20/63		288.4
72	1253	5253	1% (Zr coupons)	9/1/64		205.6
85	1855	5230	Vipac - 1%	1/30/64		261.0
108	1954	6501	EBWR Cluster	1/30/65		33.4
118	1946	6500	Salt Cycle, 2%	3/16/65		30.4

Twelve fuel elements were examined in the storage basin. Element #5192, a .48% instrumented physics element, had a defected area on a rod containing pelleted  $\text{PuO}_2$ - $\text{UO}_2$  fuel material. This rod, plus rods from fuel elements 1097 and 5237 were shipped to Radiometallurgy.

Ten examinations were made of nine process tubes, eight of which had increased flow rates. No significant increase in fretting corrosion occurred.

#### Fuel Element Rupture Testing Facility

FERTF Test #13, Irradiation of a 1600 KW thermocoupled HPD fuel element, was performed during May. Element #6502 was charged in the FERTF in location 1550. It was necessary to severely peak the flux in the center

UNCLASSIFIED

E

of the core to approach the desired test conditions. The element operated for about one week at a tube power of about 1525 KW, with the reactor effectively limited by tube outlet temperature limits.

Element #6004, an HPD element without graded enrichment in the ends, with an exposure of about 110 MWD ( $\sim 3300$  MWD/TU), was defected by drilling and punching a small hole through the cladding of one of the outer-ring rods. The element has been charged into the FERTF in location 1550 to begin FERTF Test #14.

#### Chemical Processing of Spent FRTF Fuels

The chemical processing campaign has been activated again and eight more fuel elements were included. The campaign, to be made in June, will produce  $\sim 10$  Kg of plutonium containing 21% Pu<sup>240</sup>.

#### TECHNICAL SHOPS SECTION

A total of 18,577 hours of shop work was produced with a backlog at the end of the period totaling \$240,361 or 30,045 hours. To meet emergency requests for service, it was necessary to work 1,436 overtime hours or 6.4 of the total hours produced in Technical Shops.

#### LABORATORY MAINTENANCE SECTION

Total productive time was 23,116 hours of 24,548 potentially available. Craft overtime worked was 3.2% of available manhours. Manpower utilization (in hours) was as follows:

A. Shop Work	1 658
B. Maintenance	7 303
1. Preventive Maintenance	2 378
2. Emergency or Unscheduled Maintenance	1 332
3. Normal Scheduled Maintenance	3 593
C. R&D Assistance	14 155

*WD Richmond*  
Manager, Test Reactor  
and Engineering Services

WD Richmond/bk